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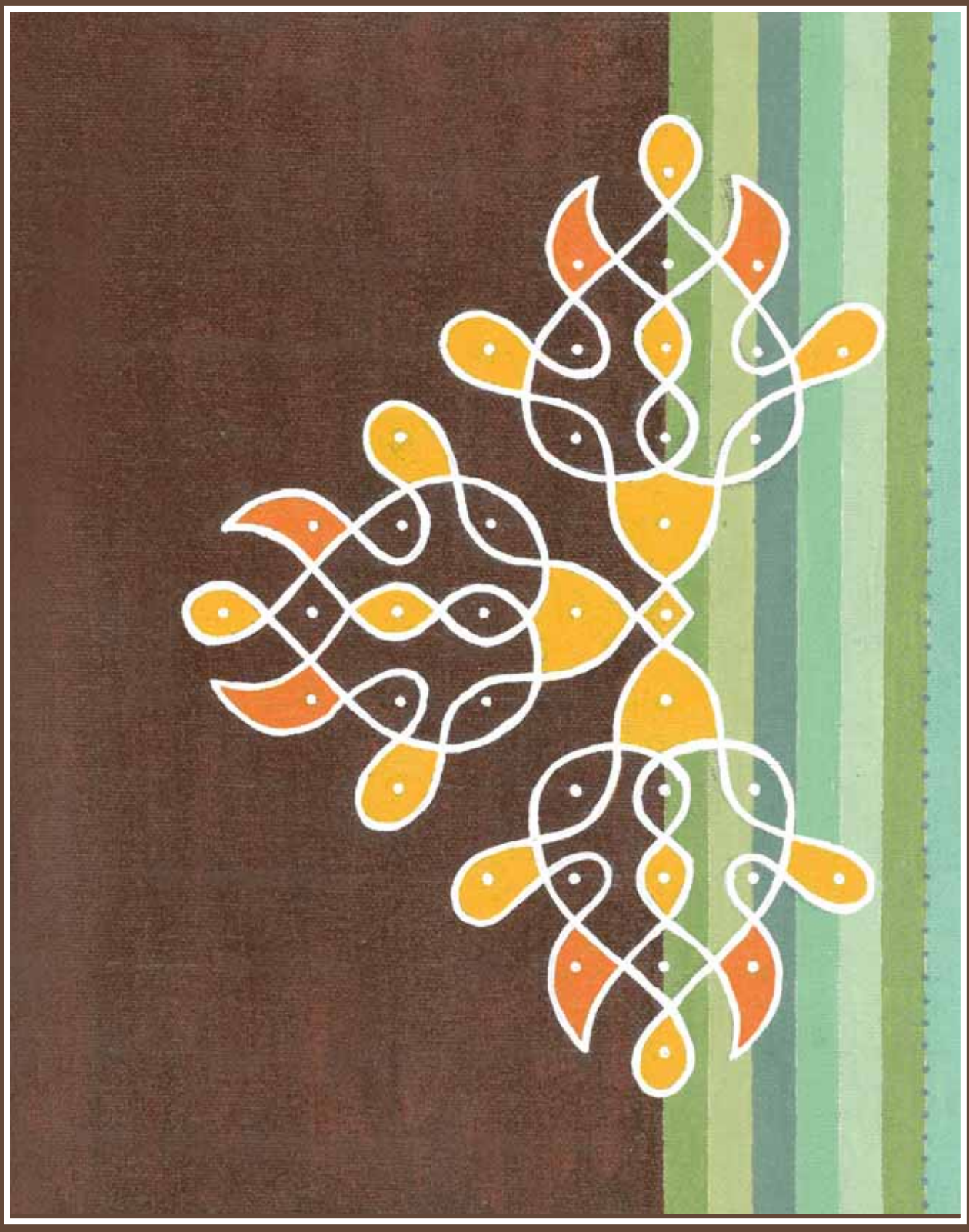

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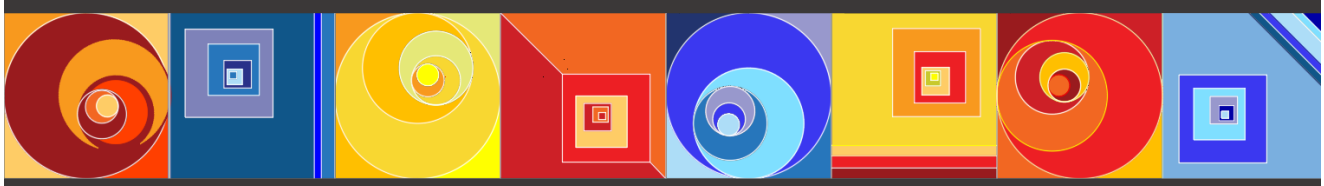

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+91 22 22046972 / 22818491 / 22884805
iiapublication@gmail.com
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Editor Ar. Lalichan Zacharias
R.N.I. No.9469/57
lalichanz@gmail.com

Advisors : **Ar. Mukul Goyal**

Printer's Email
arihantdigiprint.offset@gmail.com
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EDITOR'S NOTE

Dear Fellow Members of the Indian Institute of Architects,

March, the month which celebrates a plethora of events of national and international importance. 8 March is International Women's Day, a widely-witnessed day, honouring the accomplishments of women and bringing attention to gender equality. 22 March is World Water Day which provokes us to think of sustainable water management techniques and preservation of water supply for equitable water availability for the world's population. Nationally 4 March is observed as National Safety Day to increase public awareness of safety at the workplace and to avoid accidents. Seasonally too, it indicates the starting of spring all across the nation, with the celebration of Holi.

We started with Women's Day celebrations at various IIA Chapters, Centres and Sub-Centres. All of us at IIA can facilitate and be the catalysts of change, enabling and inspiring women professionals all across the nation to build their careers towards inclusive and supportive environments. This year, the IIA Women Empowerment Committee enthused celebrations at more than twenty places, conducting talks, workshops, panel discussions and site visits exhibiting the indomitable spirit of women and showing their strengths in the practice of architecture.

The much-awaited national event, *IIA National Awards for Excellence in Architecture 2022*, conducted on 22 and 23 March 2024, hosted by the Brihan Mumbai Centre at the JW Marriott at Sahar, Mumbai under the leadership of Centre Chairman, Ar. Nilesh Dholakia, was a grand success. More than 500 architects pan-India participated in these Awards in 27 categories, carefully curated by the Convener of these Awards, Ar. Kurian George and his dynamic team. This demonstrated the capacity and strength of the architectural fraternity to compete on the world platform. The Young Practices showed great promise in this direction seen in the Awards presentations. This event was graced by our President of the Council of Architecture, Ar. Abhay Purohit. Such events definitely give us the confidence that IIA's role in every aspect of architectural practice is crucial to build the fraternity cohesively.

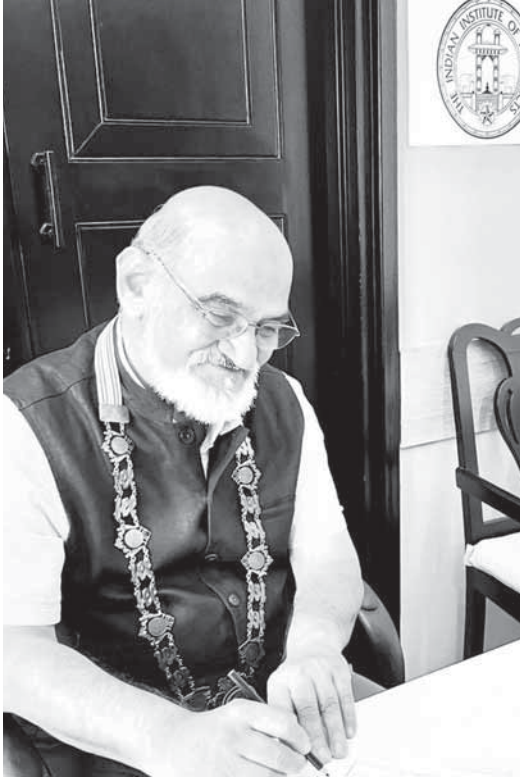
The next national IIA event will be the International Research Conference, ANVESHAN, scheduled to be held on 29-31 August 2024 at Thiruvananthapuram, Kerala. I am sure we all will participate in this first International Research Conference by IIA, along with the accompanying *Sorab Bharoocha Memorial Lecture* in large numbers.

The earlier-planned *Young Architects Festival* curated and hosted by IIA Goa Chapter is now rescheduled due to elections. It will now be held on 13-14 September 2024 at Panjim, Goa.

An appeal to all IIA members to contribute to JIIA with articles, projects, research papers and most importantly, in terms of sponsorship and funding. Thank you for your continued support and readership.

Prof. Vinit Mirkar
Editor

PRESIDENT'S MESSAGE



Dear Fellow Members,

Recently, on 22-23 March, we had the *IIA National Awards for Excellence in Architecture 2022* hosted by the IIA Brihan Mumbai Centre at JW Marriott, Mumbai. It was indeed an excellent event. More than 500 members participated, and the Jurors did a commendable job. Hats off to them !!

This time, almost 70 percent of the participants were young architects. It was really a great experience to see young practising architects showcasing their projects. All the participants have done great work and it proved to be quite a task for the Jurors to choose amongst them.

I would like to mention that our members are reluctant to pay the registration fees which was a nominal Rs. 5000 for two days, and later even further reduced. Still members could not join. We must encourage young practising architects with a hope for the next IIA National Awards, so that more and more members will participate.

I was also very encouraged to see almost all the Chapters and Centres celebrating International Women's Day on 8 March. Each Chapter and Centre has celebrated in different ways and they have also involved the general public in all the events.

At IIA, we have many events lined up from April 2024 till April 2025. It shows that all Chapters and Centres are working hard towards promoting and making outreach of IIA stronger. So we are also planning to have international events where ARCASIA and UIA will also participate. Happy to see all the Chapters and Centres proud to be IIA members.

Ar. Vilas Avachat
IIA President

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Beyond Dots and Lines

The Reflection and Resilience of Women through Kolam

Women empowerment is a global movement advocating for the rights, equality and recognition of women in all spheres of life. All forms of art play an important role in providing women with a platform for expression, creativity, cultural identity and social cohesion. As we celebrate Women's Day, it is essential to recognize the role of women in all spheres of life and in promoting cultural sustainability and social equity within architectural practice.

Kolam, a prominent and ancient South Indian art form, shares a common thread with *rangoli,* both being 'short-term' art. It can be seen as a microcosm of broader philosophical ideas: the impermanence of the universe and the practice of detachment. The ability to rejuvenate and practice the art of decorating the house front with a fresh *kolam* design daily is a powerful lesson in resilience and renewal, just like the resilience and achievements of women worldwide.

Kolam, literally means *'*form' and *'*beauty' in Tamil. The geometrical line drawing is made up of loops, curves and straight lines drawn around a dot grid. The dot is a symbol of the cosmos and its origin in Hindu philosophy, just as the women serve as the focal point of expression within their households and communities. *Kolam* is often drawn on damp and clean floors and this act of cleaning reflects a sense of respect for one's environment, encouraging cleanliness and hygiene that fosters a sense of belonging to the community's well-being.

Kolam is traditionally drawn on floors made of cow dung which has antibacterial properties. Women have always demonstrated their ingenuity in utilizing natural resources for the well-being of their families. The lines of coarse rice flour entice ants, birds and other small creatures to eat it, symbolizing the coexistence of all life forms within the home's environment. The women engage in this creation with the use of rice paste which is related to the concept of *punya* in Hindu philosophy, referring to positive, virtuous deeds that accrue in spiritual blessings through their artistic endeavours.

The artwork is considered an auspicious symbol. The design patterns are distinctive to each region and community. The daily practice of drawing *kolam* aids in enhancing creativity, attention and problem-solving capacity. For important festivals, religious celebrations and family occasions, the community's women will come together to draw larger patterns.

The pattern of the *Vajra Kolam* in this cover's narrative is woven with threads of symbolic value. The term *vajra* is associated with the eagle, which is a symbol of determination, immense strength and clarity of mind. The vibrant green shade depicts many landforms as the creature takes flight, resulting in a dynamic and harmonious visual narrative that symbolizes the flourishing of life and the interconnectedness of all living beings. It also incorporates fish and a turtle which represent prosperity and endurance respectively- a symbolic journey that contemplates the deeper meanings within the artwork through women's life journeys.

Ar. Pornima Buddhivant (A27373) has graduated from Rachna Sansad's Academy of Architecture, Mumbai, and completed M. Arch. (Environmental) from BNCA, Pune. She is currently teaching at Thakur School of Architecture & Planning, Mumbai. She is the TEDx Speaker and SDG advocate. She is associated with Solar Decathlon India as a Technical Resource Group and as an Executive Committee Member at INTACH Mumbai.
Email: pornima.buddhivant7@gmail.com

JIIA Call
for Papers, Articles, Projects

The Journal of the Indian Institute of Architects invites original and unpublished contributions from members **ONLY** (academicians, practitioners and students) under the following FOUR categories. Submission in each category is strictly only through the respective google forms.

In order to be accepted for publication, all material sent in these categories should have the following components:

1. MS Word document file with text only. Please do not format it in anyway. The numbered captions for all the images will also be in this document.
2. Folder with all images (minimum 300 dpi), numbered according to the captions given in your text file
3. Photograph of the author/s (minimum 300 dpi).
4. Author biodata – Maximum 50 words.
5. PDF (optional)– showing the intended layout. This pdf should include text and all images, with numbered captions.

Category 1 : Articles

google form link: https://forms.gle/7pDFva1HDH4hfUyj8

Essays, interviews, articles (1500- 2500 words), book reviews (600 and 750 words), travelogues, sketches and photo-essays in the areas of architecture, planning, urbanism, pedagogy, heritage, technology, ecology, theory and criticism, visual design, practice or any other relevant subject pertaining to the built environment. (Details of the format will be available on the JIIA website).

- For a design project, please include the 'Fact File' with the following details : Project Name, Location, Plot area, Total built up, Structural consultants, Project completion. Also please give the photo captions and credits. Please ensure that the image is referred to within the text. For eg, "As seen in Figure 1...". This is essential for the layout.
- For design projects, plans and sections of the project are desirable along with the photographs.
- Book reviews should be only of books by Indian authors. please include the "Fact File" with the following details: book title, author name, publisher, year of publication, ISBN, language the book is written in, genre (technical/ fiction/ etc.), no of pages, dimensions (in cm), type (Kindle/ paperback/ hardback), available at (amazon.in/ flipkart.com/ others).
- Please send a write-up of about 200-300 words along with sketches and photo-essays.

Category 2 : Student Work

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Summaries of dissertations (2000-3000 words) at the level of B.Arch. & M.Arch., and theses at the Ph.D. level. The Guide for that work will be mentioned as the Co-author. (Format will be available on the JIIA website).

Category 3 : Contributions from Chapter Correspondents

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(a) *Chapter News:* This includes various interesting activities from the Centres of your Chapters (maxm. 500 words for the news from the *entire* Chapter).

(b) News of conferences by the academic institutes in your respective Chapters.

(c) *Obituaries :* Obituaries of IIA members should consist of the photograph of the departed soul, the dates of birth and death and a short 50-word note.

Category 4 : Research Papers

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Research papers (2000-5000 words) in the prescribed format. The research may be based on their ongoing or completed research. (Format is available on the JIIA website). All contributions in this category will be double blind peer-reviewed before being accepted for publication by academic experts of repute.

Category 5 : Cover Design

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Students from affiliated colleges are invited to design the cover page theme. This should be a graphic based on some aspect of Indian Knowledge Systems. The submission will include the graphic file (jpeg or corel draw); a theme note (with a title) of about 500 words explaining the concept of the graphic.

Please note that the image you send will be adjusted as per the layout requirements of the JIIA Cover.

Please note:

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2. Submissions will **NOT** be accepted through email.
3. Any queries to be addressed to : jiiaeditorial@gmail.com.
4. When you correspond with us, please give your email id (that you regularly use) and your cell no. (preferably with WhatsApp).
5. It is compulsory to mention your IIA regn. No. Submissions will **NOT** be accepted from non-members.
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7. JIIA does not charge any fees for publication of any professional or academic work.
8. It is understood that submission from an author is an original work, unpublished anywhere else, and that IIA and JIIA are in no way responsible for any matter or dispute arising out of the publication of the same.
9. All authors are requested to refer to further detailed information available on the JIIA website.

Ghotul as a Space for Social Interaction, Learning and Cultural Activities within Education Settings

Case of Tribal Schools in Gadchiroli, Maharashtra, India

Ayush Prakash Hazare
Final Year B. Arch. Student
Marathwada Mitra Mandal's
College Of Architecture (MMCOA), Pune
Email: ayushhazare46@gmail.com

Dr. Jyoti Jain Tholiya
Associate Professor
Marathwada Mitra Mandal's College Of Architecture (MMCOA), Pune
Email: jyoti.tholiya@gmail.com

Abstract
Children spend a significant portion of their formative as well as adolescent years within educational environments, wherein both semi-covered and outdoor spaces serve as crucial parts for their holistic development, especially for tribal children. This space, called *Ghotul, is* a common feature among the Gond tribes in India as youth dormitory. This developmental journey encompasses facets such as social interaction, academic learning, and participation in cultural activities. The paper analyses the impact of *ghotul* as a space for social interaction, learning and cultural activities within the context of the current education system in tribal, rural, and urban areas. Studies were carried out in six tribal villages and seven tribal schools (out of which two were *ashram shalas*). The data collected from tribal children, parents and teachers showed that 58% of folks used *ghotul* for indoor play/ recreational activities and 23%, 10%, and 9% for social interaction, cultural activities and learning respectively. The studies also showed that the original intended use of *ghotul* has been lost due to various advancements in education systems, hence there is a need for incorporation of *ghotul* which satisfies all three aspects of education- social interaction, learning and cultural activities- which are important for the overall development of children. By integrating the *ghotul* into educational frameworks, this research advocates the enhancement of sustainable semi-covered open spaces within educational settings. Such incorporation not only honours indigenous traditions but also enriches the educational landscape by fostering an environment conducive to holistic development of children.

Key words: *Ghotul, Social Interaction, Learning, Cultural-Activities, Education.*

1. Introduction

The origins of traditional Indian schools can be traced back to the ancient *gurukul ashrams*, where students resided with their *gurus* and studied ancient texts. Contemporary educational institutions, including schools and colleges, have evolved significantly from these *ashrams* and *madrasas* (Das, 2018). In ancient *gurukuls*, the relationship between the *guru* and his disciples was characterised by intimacy and personal connection, contrasting with the more formal relationships seen in contemporary settings (Soni & Trivedi, 2018). In contemporary times, while the physical appearance of educational institutions has evolved, the fundamental ethos of learning persists, albeit in a modified manner. The physical environment, encompassing spaces such as classrooms, playgrounds, and courtyards, alongside well-designed built and natural areas, including outdoor play spaces, play a crucial role. In ancient times, several classes used to be held in open air under the shade of trees where a child could enjoy the contact of nature. The physical environment along with the designing of built and unbuilt spaces

has an immediate effect on the students' mind (Das, 2018).

The physical surroundings are integral to the comprehensive development of children, facilitating activities such as social interaction, knowledge acquisition and cultural engagement. This approach, embraced and implemented by the Gond tribe in central India, has proven to be an effective method for fostering the overall well-being of children. Representing 8.6 percent of India's population, tribal communities, as per the 2011 Census, encompass 109 million people, many of whom are economically and socially disadvantaged, listed in Article 342 of the Indian Constitution. The Gonds, the largest tribe, situated in Gondwana in central India, are sub-divided into various groups, including Raj-Gonds, Khatola-Gonds, and Madia-Gonds. Recognised as a 'Scheduled Tribe' in multiple states, the Gond population totals 1,13,44,629, emphasising the importance of understanding and integrating their unique heritage into mainstream society (Koreti, 2016).

Ghotul (pronounced phonetically) is a common feature among the Gond tribes in India as youth dormitory (Deogaonkar, 2007). The tradition of *ghotul* is particular to the Gond and Muria communities (Moulia, 2019). The traditional *ghotul* institutions of the Gonds fostered a sense of discipline and cooperative effort among their members. Contrary to some scholars' perceptions of it merely as a gathering place for young men and women at night, the *ghotul* served as a hub for learning and held religious significance. In times when formal educational institutions were unavailable to the Gond community, the *ghotul* operated as a training centre, instilling values of integrity and individuality among its members (Koreti, 2016). The *ghotul* institution plays a significant role in fostering and safeguarding various forms of arts, legends, songs, dances and folk tales, serving as exemplary representations of regional culture. Thanks to the *ghotul*, these cultural elements have endured in their authentic forms. However, modern influences are beginning to bring about noticeable changes (Shankar, 2016). Industrialisation and modernisation have introduced negative influences into the lives of the Madia and Gond tribes, with external influences shaping their culture, notably the *ghotul* institution. However, there's a decline in cultural activities due to establishment of *ashram* schools and modern *ghotul* organisation, alongside challenges such as community cohesion issues and gaps in traditional practices (Ghutke, 2020). Education can be enhanced by utilizing space like the *ghotul*, which provide a holistic system of co-education encompassing social and economic functions, artistic training, efficient labour division, and the cultivation of discipline and freedom. The Muria *ghotul* exemplifies Seligman's concept of the psychoanalytic ideal of education (Chakravarty, 1996). Today *ghotul*s have lost their originality and existence. The absence of such spaces in today's modern educational system as well as tribal schools impedes the holistic development of children and contributes to the erosion of our rich culture.

2. Literature review

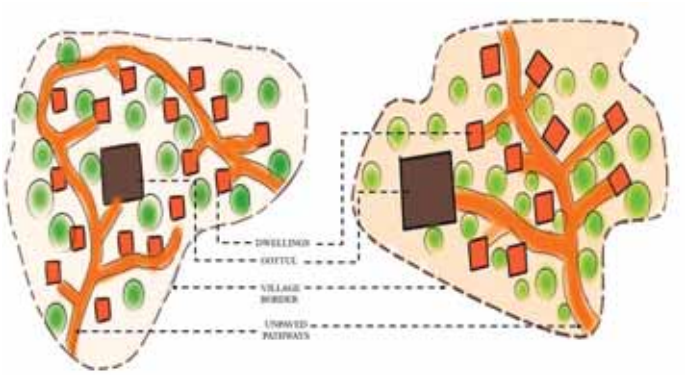
2.1. *Origin and History of Ghotul*

Dewar is a character in a core tale of the Muria tribe. He is highly esteemed for his ethical conduct and refraining from exploiting his position, much like Lingo, their revered figure. The core tale of the Muria revolves around Lingo. He achieved prominence by resisting the advances of his six alluring *bhaujis*. Despite being the youngest among seven brothers, he remained indifferent to their attempts to win him over. In retaliation, they falsely accused him before their husbands, who then burned him alive. Miraculously, he was revived. Even when buried alive, he was miraculously rescued. Eventually, he distanced himself from the six brothers and founded the Muria *ghotul* dormitory (Shankar, 2016).

In Vidarbha's Gond communities, youth dormitories aren't found in areas like Amravati, Nagpur, Gondia and Yavatmal, but they are reported in Chandrapur-Gadchiroli districts, especially among the Madia-Gonds. Similar institutions exist among the Marias in the Bastar district of Chhattisgarh, like the Abhuj Maria and Bisonhorn Maria. However, there are significant differences in the nature and activities of these dormitories between Maharashtra and Bastar. In Bastar, *ghotuls* are known for allowing free interaction between Gond boys and girls, leading to marriages. However, among the Madia Gonds of Bhamragad and Etapalli, girls and boys haven't *ghotuls* in Ghotuls for the past 100 to 150 years. Nonetheless, they still gather in the evenings for singing and dancing and fostering friendships.

2.2. *Organisation of the Ghotul*

The *ghotul* is a *jhuggi*-type house which may be situated either at the border or in the middle of the village as shown in figures 1a and 1b (Ghutke, 2020) and located in the main dwelling area of the community (Moulia, 2019). In only two Madia villages are there separate *ghotuls* for boys and girls, namely at Pungasur and Kuvvkodi in Bhamragad Tahsil in the Gadchiroli District of Maharashtra (Deogaonkar, 2007).



Figures 1a and 1b: Typical Organisation of *ghotuls* in Gond tribal villages
Source: Analysis and graphical representation by Authors

2.3. *Structure of Ghotul*

The *ghotul* is a large structure upon a raised earthen platform, walled with wooden planks coated with mud or cow dung, and roofed with either grass or tiles as shown in figure 2. Typically, the *ghotul* is divided into two sections by a partition and surrounded by a spacious courtyard enclosed by wooden stumps and a swing door. Within the compound, there is a sizable stone slab serving as a washing and bathing platform for hygiene practices. Occasionally, handicraft items are displayed on the large wooden rafters beneath the roof, alongside musical instruments such as the dhol, pagai, and chitkora (Ibid., 2007).

2.4. *Members of Ghotul*

In early times the Muria *ghotul* served as a mandatory institution for unmarried boys and girls within the tribe, with a structured membership process. Following a thorough assessment period, initiates receive a distinct title, along with a graded rank and corresponding social responsibilities. Leaders, namely the *sirdar* for boys and the *belosa* for girls, are designated to oversee and maintain order within the community. Male members are referred to as *chelik*, while female members are called *motiari*. The dynamics between the *chelik* and *motiari* are influenced by the specific *ghotul* they belong to (Elwin, 1947) (See Table 1).

2.5. *Activities done in Ghotul*

The *ghotul-pata* consists of songs that relay the community's history, ancestors, deities and culture

Table 1: Members of the Ghotul and their designated names
Source: Authors

Girl members of the Ghotul	*Motiaris*
Boy members of the Ghotul	*Cheliks*
Leader of Girl members	*Belosa*
Leader of Boy members	*Siredar*

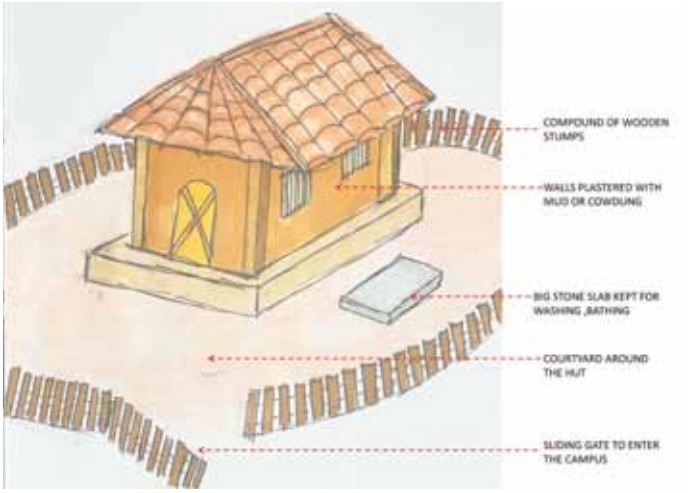


Figure 2: Elements of a typical *ghotul*
Source: Analysis and graphical representation by Authors

taught to the younger generation during singing and dancing sessions, serving as a cultural institution for heritage transmission through oral tradition (see figure 3). Nowadays, elders gather near the *ghotul* to enjoy music and observe the dances. Recently, the *ghotul* has been repurposed as a temporary lodging for visitors and officials. Initially, guests are provided with rations collected from the village community for the first few days. Additionally, community programmes and meetings are occasionally conducted within or around the *ghotul* (Deogaonkar, 2007). Individuals are trained in hygiene, discipline, and pride in appearance, while also learning to respect themselves, elders, and serve the community (Deora, 2015).

Figure 3: Transmission of knowledge through oral tradition in *ghotul* from one generation to the next
Source: The author analysed and graphically represented the source data.

3. Methodology

This research was undertaken within the tribal enclaves nestled within the Gadchiroli district of Maharashtra. Employing a methodological paradigm, which entailed the deployment of structured interviews, questionnaires, case studies and observations, the research aimed to elucidate the multifaceted repercussions of the *ghotul* as a space on the educational milieu and its seminal role in nurturing the holistic development of children. A cohort of 118 participants was drawn from the age range of 6 to 18, comprising students. Additionally, a subset of 23 educators was enlisted, with 5 hailing from non-governmental organisations (NGOs), thereby ensuring a diverse range of perspectives

regarding the interplay between *ghotul* and its educational significance. Furthermore, 20 samples were collected from tribal parents, strategically chosen to glean insights into the perceptions and utilitarian aspects of *ghotuls*, thereby enriching the breadth and depth of the study.

3.1 *Study Area*

The research was carried out in six tribal villages of Gadchiroli, Maharashtra namely: Karwafa, Rangi, Moholi, Dhanora, Mendha and Lekha as shown in figure 4.

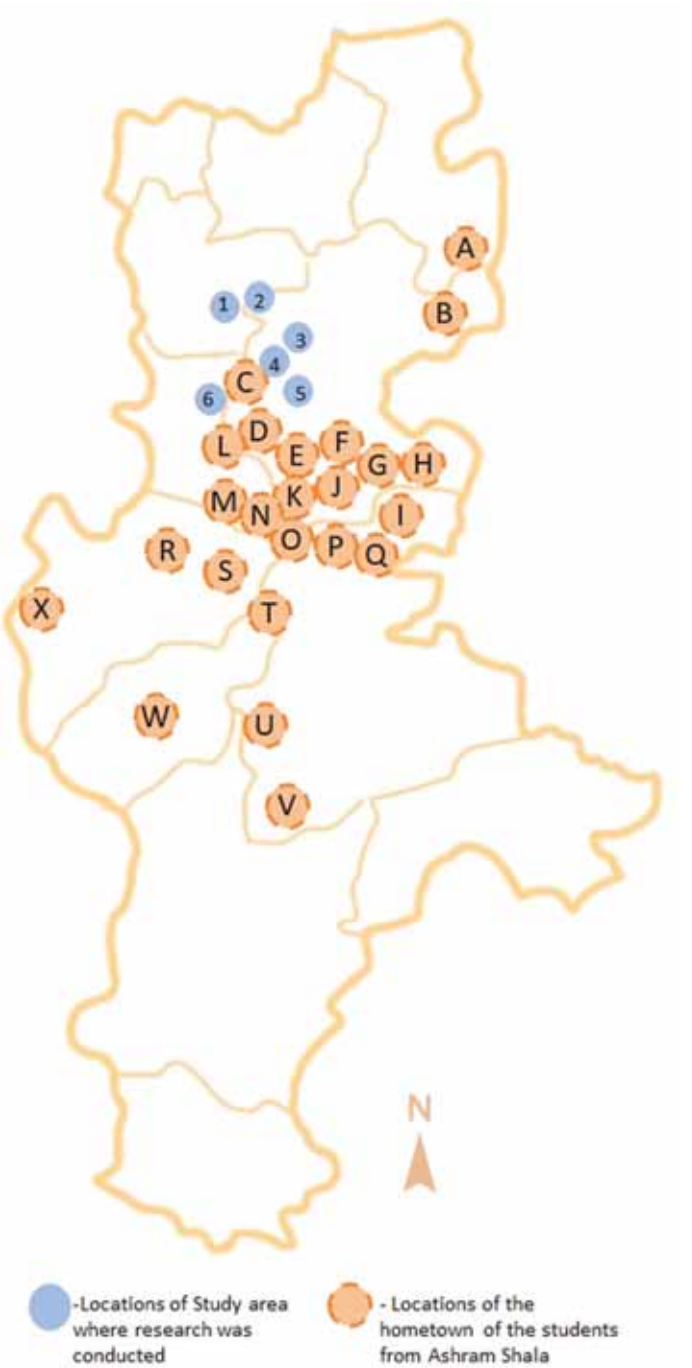


Figure 4: Locations of study areas where research was conducted and locations of the hometown of the students from the *ashram shala*
Source: Authors, from Google maps

The samples of the students from the *ashram shala*, which gave an opportunity to inner tribal areas of Gadchiroli are listed below and shown in figure 4 :

(A) Mohgaon (B) Ambezari (C) Ranbhumi (D) Karwafa (E) Kondawahi (F) Ghodezari (G) Godalwahi (H) Gatta (I) Bhimpur (J) Fulbodi (K) Phustola (L) Salai Tola (M) Raipur (N) Kondawahi (O) Rakhatola (P) Recha (Q) Kasurwahi (R) Bhendikanhar (S) Talodhi (T) Keligatta (U) Makkepalli (V) Vedampalli (W) Mukali and (X) Durgapur

3.2 *Case Study*

A *ghotul* from Mendha village was selected for examination due to the enduring preservation of the village's rich tribal heritage (figure 5). Positioned at the village's epicenter, the *ghotul* is enclosed by a bamboo compound featuring a swing door, also crafted from bamboo. Its architectural layout follows a rectangular design, enhanced by a 150 mm plinth that serves as a barrier against insect infiltration. The flooring is meticulously finished with mud and cow dung (figure 6). The *ghotul* serves as a hub for various activities, predominantly catering to children engaging in indoor games, as depicted in figure 7. Architecturally, it's a semi covered space incorporated with bamboo walls on two sides, complementing the sloping roof crafted from Mangalore tiles. Supported by 10 *sagvan* wood posts adorned with *rangoli* designs at their bases (figure 8), the roof not only provides structural stability but also aids in regulating the interior temperature. The use of Mangalore tiles for roofing material ensures optimal thermal comfort, maintaining a cool environment in summer and warmth during winter. Additionally, the beams serve a dual function, providing structural support

Figure 5: Organisation of *ghotuls* in Mendha village, Gadchiroli and location of *ghotuls*
Source: Derived from Google maps by Authors

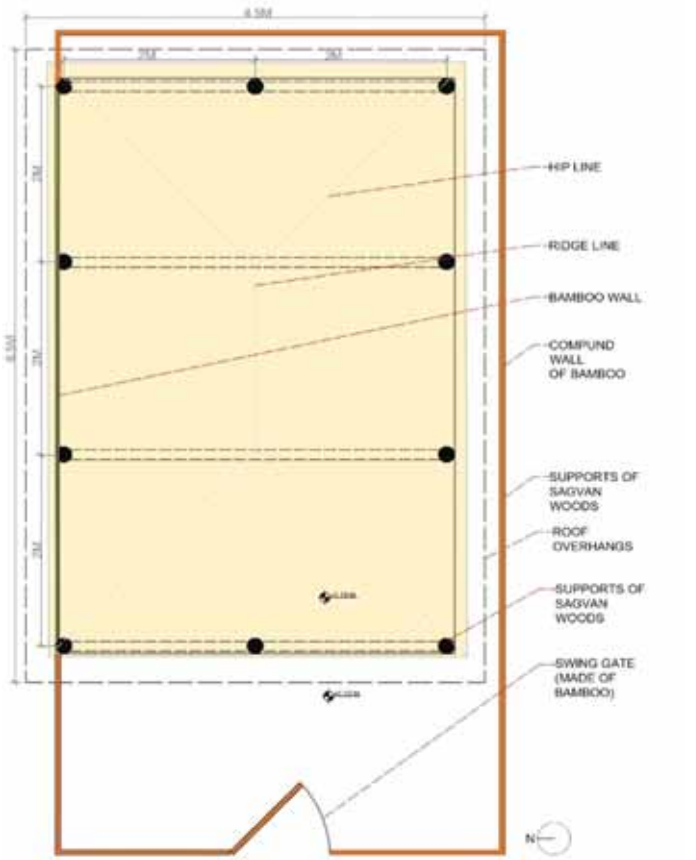


Figure 6: Layout of a *ghotul* in Mendha village
Source: Authors

Figure 7: *Ghotul* at Mendha village with instruments hung and kept on a wooden plank; Also seen is the use of space by tribal children
Source: Authors

Figure 8: *Ghotul* at Mendha village with bamboo walls, compound walls as well as base of the *support decorated with rangoli*
Source: Authors

while also serving as fixtures for hanging instruments like the dhol (figure 7). Functionally, the *ghotul* serves as a versatile space accommodating meetings, traditional Rela dances, songs, music, weddings and crucial discussions concerning tribal affairs, village governance and other community matters. Its significance as a cultural epicenter underscores its pivotal role in preserving the communal identity and traditions of Mendha village.

3.3 *Data Analysis*

The study collected samples from six tribal schools, two of which were *ashram shalas*, totaling 118 students. Additionally, structured interviews were conducted with 23 teachers and 20 parents. Questionnaires were distributed among teachers, parents and students aged 6 to 18. Data was collected through structured questionnaires from parents and senior members of the tribal community, as portrayed in Tables 2,3 and 4. The aim was to assess the influence of *ghotul* utilisation on the educational journey and holistic development of present-day students, while also delving into the broader implications and various functions of *ghotul* usage. Table 2,3 and 4 elucidate the multifaceted aspects of *ghotul* and its applications. Through the gathered data, four key parameters emerged as particularly noteworthy in understanding the prevalence and significance of *ghotul* usage, namely social interaction, learning, cultural activities and indoor play /recreational activities.

4. Results

Through the examination of the data obtained from students, as depicted in figure 9, it was observed that *ghotul* served various functions. Specifically, 52% of its usage was attributed to facilitating indoor games among children, such as *chaupar*. Additionally, 43% of its utilisation involved fostering social interactions, including discussions on significant matters pertaining to tribal village affairs. Notably, the research revealed a comparatively minimal engagement with *ghotul* for educational and cultural purposes. The analysis of data gathered from teachers reveals that 40% of *ghotul* utilisation in the villages is attributed to indoor games, while 12% and 8% were utilise for educational learning purposes and cultural activities, respectively (Figure 10). According to the findings presented in figure 11, the data obtained from parents indicates that 37% of *ghotul* usage is dedicated to social interaction, while 33% is allocated for indoor games. A smaller proportion, 25% and 5% respectively, is designated for cultural activities and learning purpose.

Table 2: Locations of study area, number of samples from each location, current uses of ghotuls according to students
Source: Survey and data collected by Authors

No	Locations	Number of Samples	Uses of Ghotul			
			Social interaction	Learning	Cultural activities	Indoor play/ Recreational activities
1	Rangi	20	11	2	1	20
2	Moholi	26	22	1	3	19
3	Dhanora	6	6	-	-	6
4	Mendha	18	15	-	-	18
5	Lekha	32	27	1	-	32
6	Karwafa	16	12	1	2	16
Total		**118**	**93**	**5**	**6**	**111**

Table 3: Locations of study area, number of samples from each location, current uses of ghotul according to teachers
Source-Survey and data collected by Author

No (Refer Fig. 5)	Locations	Number of Samples	Uses of Ghotul			
			Social interaction	Learning	Cultural activities	Indoor play/ Recreational activities
1	Rangi	7	7	3	1	7
2	Moholi	2	2	1	1	2
3a	Dhanora	2	2	-	-	2
3b	*Dhanora* (NGO: Quest)	5	5	2	1	5
4	Mendha	3	3	1	-	3
5	Lekha	2	2	-	1	2
6	Karwafa	2	2	-	1	2
Total		**23**	**23**	**7**	**5**	**23**

Table 4: Locations of study area, number of samples from each location, current uses of ghotul according to parents.
Source-Survey and data collected by Author

No. of Samples	Uses of *ghotuls*			
	Social interaction	Learning	Cultural activities	Indoor play/ Recreational activities
20	20	3	15	20

5. Discussion

In the heart of central India, tribal children grow up surrounded by forests and vast open spaces, where nature holds deep significance. However, to pursue further education, they often must leave their homes, particularly to attend residential *ashram* schools, as accessing education in their remote villages poses significant challenges. In these forested villages, a *ghotul* stands as a semi-covered space, a departure from its earlier form as a thatched hut with bamboo or mud walls. Situated at the centre of the village, the *ghotul* serves as a focal point for resolving crucial village matters and hosting various gatherings, including weddings and traditional Gond tribe dances. Initially, it served as an institution for nurturing the overall development of children. Yet, with modernization and the establishment of tribal schools and *ashram shalas*, *ghotuls* are undergoing a transformation away from traditional roots. Their original purpose is diminishing as they now serve a variety of other functions. Research reveals that a *ghotul* is primarily utilised for social interactions, such as making decisions about weddings, discussing forest-related issues, addressing common clan problems and resolving internal conflicts.

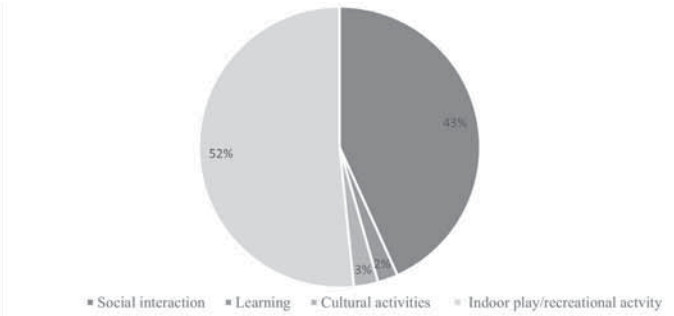


Figure 9: Uses of *ghotul* according to data collected from students
Source: Authors

Figure 10: Uses of *ghotul* according to data collected from teachers
Source: Authors

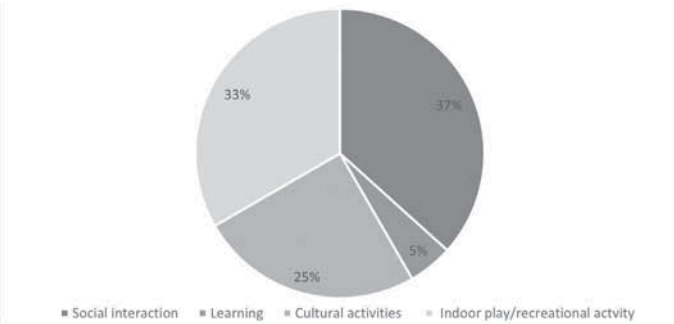


Figure 11: Uses of *ghotul* as per data collected from teachers
Source: Authors

Beyond serving as a space for social interaction, the *ghotul* also functions as a venue for various recreational activities among the children within the village. Common musical instruments are housed there, facilitating musical play among the children. Girls engage in imaginative play with kitchen sets, gathering local natural materials such as leaves, wood, fruits and vegetables to create intriguing crafts. Boys, on the other hand, utilise the resources available in *ghotul* to craft toys like bullock carts, and they fashion slingshots from locally sourced wood. Clay is moulded into balls, left to dry atop the *ghotul's* roof, and subsequently used for bird-hunting and consumption. Given its ventilation and thermal comfort, the *ghotul* encourages indoor play, fostering a vibrant atmosphere for recreational pursuits among the children. The utilisation of the *ghotul* for cultural tribal activities exhibits a significant decline compared to its prevalence in fostering social interaction and indoor recreational pursuits. At present, the *ghotul* primarily serves as a venue for conducting marriage ceremonies and traditional dances associated with such events. However, the authentic roots of the Rela dance, as practiced by members of the traditional *ghotul* institution, have gradually faded into obscurity. Consequently, the cultural significance once attributed to *ghotuls* has dwindled in contemporary times. This trend underscores the diminishing role of *ghotuls* in preserving and transmitting tribal cultural heritage to future generations, despite its historical importance as a paramount space for fostering cultural activities within tribal communities.

The utilisation of *ghotuls* as a learning space for children shows a marked decrease when compared to its role in facilitating social interaction, indoor recreation and cultural activities. This decline in its educational function can be attributed to the influence of modernisation, which has prompted a significant migration of students from their villages to attend tribal schools or *ashram shalas*. Consequently, the *ghotul* is predominantly utilised for the dissemination of knowledge rather than formal educational instruction, leading to its diminished importance in educational endeavours within tribal communities. The *ghotul*, a traditional institution in tribal communities, has historically played a crucial role in transmitting cultural knowledge from one generation to the next. However, due to modernisation and socio-economic changes, this transfer of cultural heritage within the *ghotul* is declining. As a result, the cultural aspect of tribal children is at risk of being lost. Efforts to revitalize the *ghotul* as a centre for cultural education and transmission are essential to preserve tribal cultural identity for future generations.

6. Conclusion and Recommendations

The *ghotul*, as an institution, has historically served as a unique space for the exchange of traditional tribal knowledge and techniques, fostering social interaction and cultural activities. However, in contemporary educational systems, particularly in tribal areas, such spaces are conspicuously absent. There is a pressing need for welcoming environments that cater to the needs of tribal children, who often have limited exposure to the outside world. The *ghotul* not only offers cultural richness, but also provides thermal comfort through the use of traditional construction methods and sustainable materials such as bamboo, Mangalore tiles, hay, cow dung, wood and mud. Integrating *ghotuls* within school settings holds promise not only for preserving tribal culture but also for facilitating the transmission of traditional knowledge across generations. While *ghotuls* in villages serve various purposes, they often

diverge from their original intent envisioned by tribal ancestors. Therefore, incorporating *ghotuls* into educational institutes can foster social interaction, learning and cultural activities among tribal students, as well as in schools located in rural, urban and rurban areas, with appropriate modifications.

Recommendations

The following are the recommendations of this study:

1. Policies shall be revived which are designed, by taking into consideration the mindset of tribal children. Also, spaces shall be designed and provided on that basis.
2. Design a curriculum that integrates traditional tribal knowledge and practices that are taught within the *ghotul* into formal education systems, encompassing subjects like tribal culture, language, traditional crafts and ecological knowledge.
3. Ensure that *ghotul*-inspired educational facilities harmonise with their natural surroundings, incorporating elements of biophilic design to promote connections with nature. Utilise landscaping, greenery, and natural light to create inviting and sustainable learning environments that enhance student well-being and environmental awareness.
4. Create dedicated *ghotul* learning centres within schools or as standalone educational facilities in tribal areas. These centres can serve as hubs for cultural activities, traditional storytelling, crafts and other forms of knowledge transmission.
5. Involve tribal community members, elders and cultural experts in the design and implementation of *ghotul*-based education initiatives. Their input is essential for ensuring cultural authenticity and relevance.
6. Provide training programs and workshops for teachers working in tribal areas to equip them with the necessary knowledge and skills to effectively integrate *ghotul*-based education into their teaching practices.
7. Design flexible learning spaces within schools or educational institutions that draw inspiration from the communal and interactive nature of the *ghotul*. These spaces should be adaptable to accommodate various learning activities, cultural events and community gatherings.
8. Encourage research partnerships and collaborations between urban educational institutions, tribal communities and cultural organisations to explore innovative approaches to *ghotul* -based education in urban settings. This can involve interdisciplinary studies, community-based research projects and joint initiatives to document and preserve tribal cultural heritage.

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I am deeply indebted to the epicentre of my life, my parents Archana and Prakash Hazare for their unwavering support and love throughout this journey. I really want to thank my little nephew Ruchir who I love the most, who gives me strength and means the world to me. I wish to extend my heartfelt appreciation to the anonymous reviewer for their invaluable insights, which greatly enriched the quality of this work. Special recognition is owed to all the members of QUEST NGO as well as Sayali Patwardhan for their invaluable assistance in facilitating access to tribal areas and schools, thereby enabling the outreach to tribal children and providing safety in Naxalite-prone areas. My sincere gratitude also goes to Ar. Vinita Lavate, Associate Professor at MMCOA, for her invaluable contributions in reviewing the questionnaire. I am also grateful to my niece Avani Hazare for her continuous assistance throughout the course of this research. My heart goes to all the tribal children who are deprived of their basic human rights. Lastly, I extend profound thanks to all the tribal children, their families, and teachers for their cooperation and allowing me to enter the tribal naxalite-prone areas, schools and ashram shala for data collection (Figures 12, 13 and 14), as well as for their enthusiastic participation, without which this research would not have been possible.

Figure 12: Author with a 77-year-old freedom fighter for interview purpose.
Source: Authors

Figure 13: Author with Gond tribal kids at Mendha Tribal Village.
Source: Authors

Figure 14: Data collection from tribal kids in the middle of the dense Naxalite-prone forest of Gadchiroli.
Source: Authors

References

- Chakravarty, K.K. (1996). *Tribal Identity in India: Extinction or Adaptation!* Bhopal: Indira Gandhi Rashtriya Manav Sangrahalaya.
- Das, A. (2018). A Study of Traditional Indian School in the Present Day Context from an Architectural View Point. *Journal of Interior Designing and Regional Planning,* Volume 3, Issue 3, 1-5.
- Deogaonkar, S.D. (2007). *The Gonds of Vidarbha.* New Delhi: Concept Publishing Company.
- Deora, S. (2015). *Migration among the Madia of Bastar: Assessing its Worth.* Mumbai: NewsReach.
- Elwin, V. (1947). *The Muria and their Ghotul.* Bombay: Geoffrey Cumberlege, Oxford University Press.
- Ghutke, C.M. (2020). Changing Pattern of 'Gotul' Institution in Madia Tribe: A Sociological Study. *International Research Journal of Management Sociology & Humanity* (IRJMSH), 253-257.
- Koreti, S. (2016). Socio-Cultural History of the Gond Tribes of Middle India. *International Journal of Social Science and Humanity, Vol. 6, No. 4*, 288-292.
- Moulia, T.C. (2019). Towards Understanding Identity, Culture and Language. *The 2019 Conference on Asian Linguistic Anthropology Revitalisation and Representation*, (pp. 130-135). Siem Reap, Cambodia.
- Shankar, S. (2016). Ghotul: An Institution of Tribal Art and Culture of Bastar. *Dialogue: A Journal Devoted to Literary Appreciation,* Vol XII, No. 2, 36-44.
- Soni, B.K.; Trivedi, J.C. (2018). A Case Study on Gurukul System of Education: A Contemporary Approach by Gotirth Vidyapeeth. *Rajagiri Management Journal,* Volume 12, Issue 2, 35-58.

Ayush Prakash Hazare is a Final Year B.Arch. student at MMCOA Pune (IIA-affiliated). He has been working on research papers from his third year and published and presented his work at various conferences. As a certified cybercrime officer, Ayush demonstrates a commitment to digital ethics and security. His research has helped to draw the attention of local bodies towards citizens' problems.
Email: ayushhazare46@gmail.com

Dr. Jyoti Jain Tholiya is an Associate Professor at Marathwada Mitra Mandal's College of Architecture (IIA-affiliated), Pune. She has a B.Arch. (2002) from Maulana Azad National Institute of Technology, Bhopal, a Master's degree in Geography (2007) from Arizona State University, Master's in Urban Development Planning (2004) and PhD in Geospatial Sciences from Symbiosis International University, Pune (2022). She has over 17 years of professional and teaching experience in the USA and India in the fields of GIS, urban planning and architecture. She has authored numerous research papers in peer-reviewed journals and presented at various national and international conferences.
Email: jyoti.tholiya@gmail.com

ARTICLE

Architecture and Heritage in Cinema

The Built and Unbuilt

By Ar. Savar Suri

Built heritage has shaped the visual language of Indian cinema in the form of backdrops and visual motifs. There is a unique relationship between these two visual art forms. India has a rich history and diverse architectural styles that have developed as a result of the influence of various dynasties, such as the Mughals, Rajputs and Cholas to name a few. The art of cinema in India has evolved and grown, starting with Mughal-E-Azam, to an icon like Gadar. There is a profound impact of Indian cinema on society, its ability to connect with audiences emotionally and its power to shape popular culture, similar to how architecture as art also affects society.

The Representation of Architecture in Indian Cinema

Architecture and built heritage are depicted and utilised in various genres of Indian films, including historical epics, regional cinema, and contemporary films. This is achieved primarily by the use of architectural heritage and iconic landmarks as visual backdrops in Indian cinema, wherein these architectural sites become integral to the storytelling process, creating a sense of time, place, and atmosphere. Also, monuments are sometimes used as backdrops for storytelling, highlighting their significance in conveying historical narratives and cultural contexts. These architectural gems also sometimes assume the role of characters, influencing the emotions and actions of the film's protagonists.

Often there is an effort by the director, writer and set designer to create striking and iconic shots capturing the grandeur and beauty of architectural sites and bringing them to life on the big screen, sometimes with music. To illustrate this, specific examples from Indian cinema can be cited. For instance, the iconic song "Bol Na Halke Halke" from the film "Jhoom Barabar Jhoom" (2007), showcases the Taj Mahal and explores its emotional impact on the audience. The Taj is also shown as a backdrop in the song "Suno Na Sangemarmar" from the film "Youngistaan" (2014), coming onto the screen in conjunction with the lyrics corresponding to it. There is also a rich depiction of Mughal forts and palaces in Bollywood films, with a particular focus on the Red Fort and Chandni Chowk, for instance in films like "Fanaa" (2006) and "Bajrangi Bhaijaan" (2015). There is widespread use

Fig. 1: Still from the famous dance sequence in "Mughal-E-Azam" (1960). *Source: Deepesh Salgia and Shapoorji Pallonji & Co. Ltd.*

of temples, masjids, and churches in Indian cinema, examining their symbolism and cultural significance through the lens of films like "Rab Ne Bana Di Jodi" (2008) where all these are used in a single song "Tujh Mein Rab DIkhta Hai" and also in the same film, the female solo version of the song has the beautiful Golden Temple in Amritsar as a backdrop signifying purity in intention of Shahrukh Khan's character of "Suri" through the eyes of Anushka Sharma's character "Taani Ji". Also, another example is the ace director Mani Ratnam's envisioning of South Indian architectural landmarks in his films such as "Raavan" (2010) wherein the character "Beera" played by Abhishek Bachchan is introduced, at his hideout in the film, dancing at the Malayatoor Reserve Forest in Idukki, Kerala next to a water body which has a statue of the buddha lying on the water, a grand setting as it were, framed beautifully.

Architecture as Historicity

Films often try and recreate ancient structures and settings based on the period the film or series is set in, this transports audiences to different time periods, immersing them in the grandeur and architectural splendour of eras gone by. There have also been recreations of ancient structures for period films, such as the television series Ramanand Sagar's "Ramayana" (1987) and other historical epics. The

Fig. 2: Still from the song "Bol Na Halke Halke" from the film "Jhoom Barabar Jhoom" (2007).
Source: Yash Raj Films

Fig. 3: Old Delhi in Bajrangi Bhaijaan" (2015).
Source: Yash Raj Films

representation of the architectural styles of different regions also finds their influence in films. For instance, filmmakers incorporate local architectural elements and traditions to create a distinct sense of place and identity. In films like "Kantara" (2022), there is a showcase of localised southern Indian architectural styles and traditions, for instance, the thatched tree house in which the main character is shown, or the steps of the building that a character mysteriously dies on, these being important motifs in the telling of the tale. Also, architectural designs and spaces are sometimes employed to convey societal changes, cultural shifts, and themes of class divide and urbanisation. For instance, films such as Karan Johar's "Kabhi Khushi Kabhie Gham" (2001) feature a large restored heritage villa as a prominent setting, symbolising wealth, luxury and familial bonds with the bungalow itself playing a prominent part in the narrative. Also, in contemporary cinema there is a unique representation of urban architecture, contrasting densely populated areas like scenes from Dharavi with upmarket apartment spaces in Mumbai, as seen in films like Zoya Akhtar's "Gully Boy" (2019) where an entire sequence is dedicated to this, oscillating between Dharavi and the apartment highlighting the symbolic use of architectural spaces in reflecting the complexities of today's Indian society. The use of these different kinds of architectural spaces helps convey the characters' journeys, aspirations and struggles. Another example of this is the film "Gadar" (2001) wherein the contrast between Sunny Deol's character and Amisha Patel's character is shown in terms of where they live, the former of humble background in a simple home in the village and the latter in a palatial, almost royal setting respectively.

Built Heritage in Cinema

There is also an interplay between built heritage and cinema, that can be observed over the course of history. The portrayal of what is termed in today's times as 'Colonial' architecture can be seen in films such as "Lagaan" (2001) and "RRR" (2022). These films use architectural spaces to drive the narrative forward, depicting power dynamics and cultural clashes between characters. It is interesting to note how Colonial architecture becomes a character in itself, representing the oppressive British regime and acting as a catalyst for the protagonist's journey in the cases of both films. Also, the use of architectural spaces helps establish historical context, immersing the audience in the world of the film and creating an ambience that one is living in the bygone era. "Mughal-E-Azam" (1960) and its portrayal of palatial architecture have a striking impact on the storytelling

Fig. 4: Chandini Chowk in "Fanaa" (2006).
Source: Yash Raj Films

Fig. 5: The Golden Temple in Amritsar in the song "Tujh Mein Rab DIkhta Hai" from "Rab Ne Bana Di Jodi" (2008).
Source: Yash Raj Films

of the film, almost playing a character in the song "Jab Pyar Kiya Toh Darna Kya" capturing the imagination of millions with mirrors. Art director A. K. Sayyad recreated the Sheesh Mahal, which took him two years to build from scratch. More recently, one can see this in the magnum opus, director and filmmaker Sanjay Leela Bhansali's, "Padmaavat" (2018) and the depiction of royal Rajputana architecture in Indian Cinema. The film utilises architectural elements such as mirrors and the play of light. Also, the water elements create a sense of grandeur, scale, and beauty. The symbolic use of architectural features in the film and their contribution to each and every frame, makes the film look like a painting and has a huge emotional impact. These intricate details of Rajputana architecture enhance the storytelling, reflecting the opulence and cultural richness of the era. Another example of director Sanjay Leela Bhansali's vision of grandeur, which often includes elaborate sets and intricate architectural designs to create the perfect frame in his films, is his latest outing "Gangubai Kathiawadi" (2022) in which he has tried to bring back the old world charm of Kamathipura into his frame, even showing film posters from the time period the film is set in. This is visible in the backdrop of the scene where Alia Bhatt as "Gangubai" is shown taking part in a political rally and every frame of the film on the big screen looks like a painting.

Another interesting example here would be the film "Aaja Nachle" (2007) and its use of the amphitheatre

Fig.6: A frame from "Gangubai Kathiawadi" (2022).
Source: Bhansali Productions

Ajanta, created by the writers as a narrative tool. Ajanta, as a plot device has an immense contribution to the progression of the story and all its iconic songs highlighting its cultural importance in the world of the film, which essentially talks about the demolition of heritage structures to pave the way for the development, which is a big part of the narrative, this enhances the visual aesthetics and emotional impact of the film, creating a connection between past and present. Also, another interesting example that can be cited here is Shoojit Sircar's "Gulabo Sitabo" (2020) and its portrayal of the Nawabi architecture of Lucknow. The architectural setting of the film impacts the narrative and adds depth to the characters, for instance, the beautiful use of the motif of a haveli, shown as the fictional Fatima Mahal reflecting past glory and grandeur, becomes an integral part of the storytelling, crafting the nuances of the characters and their relationships.

On the Role of Architects in Films and the Way Forward

Concerning the examples mentioned above, the collaboration between architectural experts such as architects, interior designers, conservation architects and filmmakers becomes invaluable. We, as professionals are invaluable in providing our expertise for film set designs and selecting locations, ensuring the film appeals visually to the audience in terms of aesthetics and also historical accuracy of the representation of built heritage in films. Architectural consultants can also act as a part of the technical crew in enhancing the visual aesthetics and maintaining the integrity of the architecture and built heritage in cinematic depictions, for instance, in the case of period films how a conservation architect could be invaluable in providing factual inputs on the validity and authenticity of the locations shown as per the time period the script is set in as these mistakes are oft pointed out in films post-release. Cinema can serve as a form of conservation by immortalising architectural heritage on screen and also raising awareness about its historical and cultural significance. By using cinema as a platform

Fig.7: A still from the film "Aaja Nachle" (2007) and its use of the amphitheatre Ajanta, created by the writers as a narrative tool.
Source: Yash Raj Films

to celebrate and promote Indian architectural heritage, these two art forms can mutually benefit and contribute to a deeper understanding and appreciation of India's cultural identity, referencing India's rich cultural diversity in terms of architecture: the built and the unbuilt.

References

Mughal-E-Azam: Lesser known facts, *The Times of India*. Available at: https://timesofindia.indiatimes.com/entertainment/hindi/bollywood/photo-features/mughal-e-azam-lesser-known-facts/mughal-e-azam-lesser-known-facts/photostory/47654228.cms (Accessed: 19 March 2024).

Red Fort: Film facilitation office (2020) *Red Fort | Film Facilitation Office*. Available at: https://ffo.gov.in/en/locations/location-information/151 (Accessed: 19 March 2024).

Ar. Savar Suri (A23239) is an Architect with more than ten years of experience across varied projects and domains. He has also been writing and publishing on Architecture and Heritage, having completed his master's in Built Heritage Architectural Conservation aiming to contribute to Architectural Discourse in India and beyond.
Email: savarsuri@gmail.com

ARTICLE

New Avenues in Design

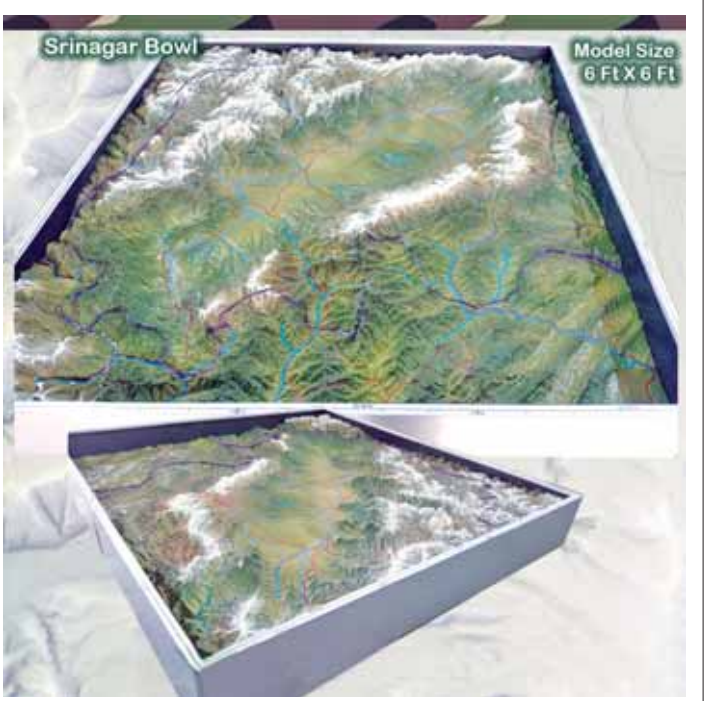
By Ar. Keshav Chikodi and Ar. and Major Vinay Degaonkar (Retd.)

Architects and architectural firms typically are engaged in providing professional services for the construction of a wide variety of buildings, crafting interior spaces, landscaping, project management consultancy, etc. This traditional role may not be every architect's cup of tea. Some may be interested in new age technology. The younger generation is tech savvy, has smart phones at their disposal and is interested in using technology to the maximum extent possible.

Architecture is a unique domain with multidimensional input requirements, right from psychology to geometry, geography to climatology to physics, chemistry for materials to art and aesthetics to many more; and the outcome is equally diverse and plural. Yet every design is exclusive with the respective designer's watermark on it. In short, it creates a poem out of chaos. So is the environment of every budding architect who has studied many dimensions of the design process and product in their curriculum and can create harmony.

Yet, in today's excessively competitive professional world, many freshers seem trapped at the decisive point of their career. The solution is simple - when in a dilemma, stick to basics – identify the problem, diagnose the root cause, dissect the crisis and formulate the problem statement, carry out a SWOT analysis, apply your basic instinct, use your intuitive capacities to the maximum of, apply all the logic that you have learnt all these years, study market conditions and plan your future, that's it – the solution is simple … easier said than done, isn't it? Again, when in dilemma, stick to basics, till you find the rational and logical conclusion and solution.

The market is already saturated with core architecture practitioners and more so in the field of interior design and execution work. There are many niche markets. Looking for key appointments in administration may be a good solution to avoid the race of mainstream architecture. Assistant Town Planners are appointed through state screening exams and interviews and the channel thereof. After B.Arch., one can aim for it, as and when vacancy is published. The notification is published in leading newspapers and websites. Similarly, one can aim for



Terrain model showing Srinagar valley and surrounding areas for defence planning purposes
Source: Ar. and Major Vinay Degaonkar

Parametric conceptual design chair
Source: Ar. and Major Vinay Degaonkar

Parametric conceptual design TV Unit
Source: Ar. and Major Vinay Degaonkar

Laser cutting of figures done in the auditorium of Model English School at Pandurang Wadi, Dombivli East
Source: Ar. Keshav Chikodi

the post of Assistant Director of Town Planning (ADTP) who is typically head of town planning departments in municipal corporations. For the post of A.D.T.P the eligibility criteria is *'… possess a degree in civil engineering or civil and rural engineering or urban and rural engineering or architecture or construction technology or urban planning of a university or equivalent qualification and have experience not less than five years in Town Planning or Town Planning and Valuation of Lands and Buildings in a responsible position, after obtaining the above qualification'*. As on date most of these posts are grabbed by civil engineering graduates as young architects are not aware of these opportunities. Architects in these key positions of town planning can make a huge difference in shaping our cities.

Also, public administration including IAS and IPS offers young graduates diverse lifetime experiences. The rationale and logical reasoning learnt during B.Arch. comes very handy in these spheres. One gets exposed to the larger canvas of society at a young age with decision-making authority that influences the life of almost every citizen under your jurisdiction. That proves to be a major leap in your career. Instead of shaping a single structure or building, one can start shaping society at large. For additional information, visit the website of Union Public Service Commission at *www.upsc.gov.in*. Similarly, there are opportunities with military entry schemes for architects. Almost every quarter of year, based on vacancies, one to four architects are selected for Army Officer's entry at *www.joinindianarmy.nic.in*. The work profile changes a bit, but the lifetime experiences and diverse avenues thereafter are unparalleled. It overhauls your perspective towards life and its goals. Targeted efforts backed with perseverance is the key to success in these fields.

For those who intend to remain in mainstream architecture yet create their own space, have to further study markets in detail and find suitable niches for themselves. Many supporting avenues are available in markets which need deliberation, like exclusive architectural model making, which further creates a niche of 2D and 3D designing for CNC works involved in the process. This field is growing rapidly as builders and developers are using it for sales and marketing of mega townships and high-rise projects in addition to three dimensional renderings. Three-dimensional printing technology is developing exponentially; one can start from this end of this service-and-supply chain. As of now, the void is filled by entrepreneurial engineers and non-engineers. Architects can create wonders once they enter this arena and apply their out-of-box rationale and designing skills. Parametric architecture is one such field waiting to be explored. This field has many inner folds, for exterior, for interiors, for artifacts and so on.

Another such unexplored avenue is the study of geography and application of it for mainstream architecture. Post-graduation in GIS will be instrumental for those seeking a career in this. Most of us have developed layered contour models during our academics and the requirement of a contour model for architecture need not be explained. Yet, the field of model-making is not explored by architects. As we deliberate on this, we can foresee

various methods, viz., conventional layered contour model, layered with satellite imagery overlay, vertical sliced model for slope analysis, 3D printed model, 3D CNC carved models on MDF or PUF sheets, etc. This field can be clubbed with drone services, 3D scanning services, various maps' overlay analysis, like revenue maps, geological maps, demographic maps, etc. Also, one can club it with parametric designs and execution.

These few non-conventional areas which are the tip of the iceberg of available ones. One needs to take a deep dip into the ocean of markets to find the best suitable avenue. The analytical capacities built during academics, logical reasoning developed through various academic assignments, temperament achieved through participation in NASA and like activities and versatility achieved through diverse design problems will definitely help each one of you to find the right avenue for yourself.

Aapruchchasva puranam Aamantrayasva
Ch navam aasha-suswapna-Jigishabhihi

Say goodbye to the old and embrace the
New with hope dreams and ambition

Cheers and enjoy chasing your dreams and ambitions.

References

- MPSC advertisement number: 003/2022. Accessed from: *https://mpsc.gov.in/downloadFile/english/4422*
- Shubh Gudi Padwa, Ugadi and New Year! Accessed from: *https://resanskrit.com/blogs/blog-post/happy-gudi-padwa-ugadi-and-new-year?_pos=1and_sid=018a4888aand_ss=r*

Ar. Keshav Chikodi (F13515) is the Chairman of IIA Kalyan-Dombivali Centre (2023-2025). He has graduated from the Academy of Architecture, Mumbai and done his M.Arch. from the University of New Mexico (2001). He is empanelled with banks and financial institutions as an architect valuer and has won several design competitions including ARCI, Hyderabad (GOI) and the Science and Innovation Activity Centre at Amaravati, Maharashtra. He has also been invited as a guest speaker by various colleges and professional organisations. He has been the Secretary of IIA KD Centre (2020-2023).
Email: chairman.iiakdc@gmail.com

Ar. and Major Vinay Degaonkar (Retd.) (A14668) is a member of IIA Kalyan-Dombivali Centre. He has completed B. Arch. from Mumbai University and has a PG Degree in GIS from Pune University. He has seven years of military service with the Corps of Engineers, Indian Army. He holds the patent for GIS Based Physical 3D Terrain Model; supplying the same to Indian Defence Forces since 2018.
Email: vinaydegaonkar@gmail.com

Integration of Photovoltaics with Green Roofs for a Sustainable Future

By Ar. Avitesh Vaishnavi Nayak and Dr. Tejwant Singh Brar

1. Background

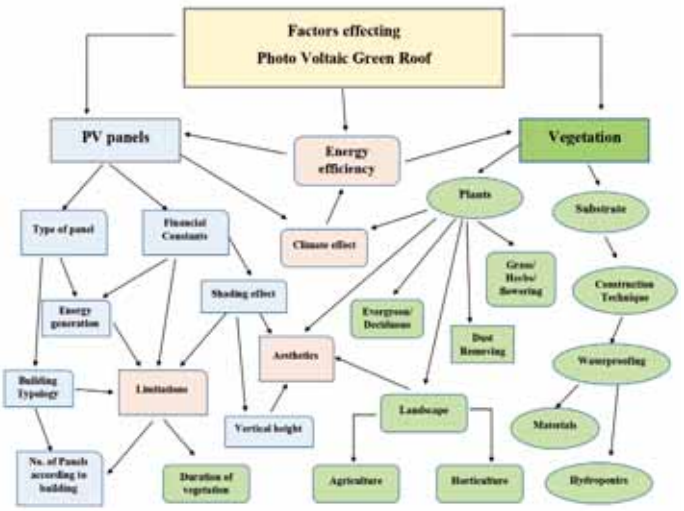
Solar energy is a fasting growing renewable energy which is not only is helpful in the overall development of the country but also in producing electricity and reducing carbon emission. According to the solar market, India is leading the chart and is placed third in the production of solar energy. The world is growing at an enormous pace with new and renewable energy systems. This is really important as we are using 1.75 times of the earth's resources. The Paris agreement also focuses on the use of renewable energy so that every country can achieve the basic goal of the UN Framework Convention on Climate Change (UNFCCC) to control global warming preferably to 1.5 degree or below 2 degree Celsius (Lakshmanan et al., 2017). India is a fast-growing country and the growth of the economy is directly linked with the consumption of electricity and most demand will be from real estate and transportation sectors.

According to the annual report of Ministry of New and Renewable Energy 2019, India is one the leading nations in terms of installed solar capacity (Mission & Institutions, 2021; Wahl, 2020). The word "solar power'' does not mean only solar panels integrated on a building or in a solar farm in the desert. Traditional utility-scale and rooftop solar panels have dominated the solar market so far but there are now several exciting new solar panel technologies in the market or in the pipeline. Floatovoltaics, BIPV solar technology, solar skins and solar fabrics are some of the new promising technologies. Solar power generation no longer requires large parcels of land or roof space nor does it need to look boring (Sandhu 2021).

Terrace garden and photovoltaic (PV) rooftop systems are considered sustainable solutions for buildings as both are satisfactory in energy efficiency. Both technologies are beneficial for the environment. Both can be applied on the terrace of any building and will be useful as the roof is the part which is directly exposed to the sun (Jahanfar et al., 2019). Results of the first study on photovoltaic green roofs revealed that these techniques can reduce surface temperatures and produce approximately 6% more electricity in the comparison to bitumen roof. (Kohler M. et al 2007; Cook & Larsen, 2021; Avitesh, 2021). Building form, orientation, compactness, dimensions, geometry and construction materials have a substantial effect on energy consumption for heating and cooling in buildings. Building configuration in form and orientation can reduce energy loads up to 40% and energy consumption is proportional to building compactness (Mission & Institutions, 2021). All typologies are different in characteristics – glazing area, construction materials, living space layouts and orientation – so energy consumption will be different and it will affect the power generation of solar panels (Tibermacine & Zemmouri, 2017).

Collaboration across multiple disciplines is essential for the implementation of photo-voltaic green roofs, spanning architecture, engineering, hydrology, and agriculture. Public awareness is crucial for

Process of Methodology
Source: Authors



Factors Affecting Latest Trends of Photo Voltaic Green Roof
Source: Authors

widespread adoption, yet a significant gap exists between solar technology firms and green roof manufacturers. Government policies play a pivotal role, acting as facilitators to adoption. The rapid evolution of techniques can pose affordability challenges for the general population, relegating advancements to theoretical discussions rather than practical implementation.

As technology evolves steadily, it brings forth numerous benefits through continual improvements. Keeping abreast of the latest trends is crucial for gaining insights into advanced techniques and materials, enhancing their efficient utilisation. This knowledge not only addresses current limitations but also lays the groundwork for future investigations and necessary enhancements. There is a need to study the latest trends to understand the enhancement in the energy production rate of PV panels as well as materials for substrate and type of vegetation for green roofs. The purpose of this study was to assess a strategy for the implementation of the bio-terrace and PV in order to reach the net zero-energy target. The proposal included a green PV roof designed to reduce building energy use by reducing thermal losses and a more efficient heating approach together with energy-efficient lighting and appliances. After the installation of a photovoltaic roof with on-site production from panels, the energy use of the building would decrease (Gremmelspacher et al., 2021).

2. Aim and Objectives

The purpose of this study is to investigate the viability of installing PV green roofs in a variety of climate zones using a variety of PV panel types in conjunction with a variety of plant species.

The objectives of the study are:

1. To study the different type of PV panels and their generation with energy performances over a decade.
2. To assess the comparison of experimental studies on PV green roofs and plants used for these experiments.
3. To understand the role of building typology and climate effect for PV green roof.

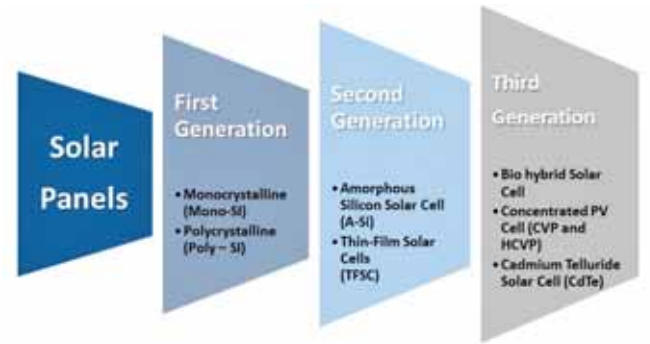
3. Literature Review

This review comprises a study of over 100 journal publications covering green roofs, solar photovoltaic systems and bio-solar technologies, aesthetics, future directions and building typologies, from 2010 to 2020. A literature study can provide important information about the basic understanding of PV-green roof applications in sustainable construction, its benefits and directions of future research. The study finds prospective routes for green energy use through interaction between different renewable energy buildings in order to boost the production of energy from green photovoltaic rooftops.

After the investigation of factors which are affecting the trends of integration of PV green roofs, papers which met the criteria were selected and a deep review done by the authors.

a. Types of panels and energy performance

With increasing adoption rates, the solar industry is also updating day-by-day. The progression of solar technology has gone through three distinct phases or stages of development. Out of the seven types of solar panels, there are three types available in the market which are high in adoption– monocrystalline solar panels, polycrystalline solar panels and thin film solar panels. The difference between these three panels is monocrystalline solar panels are made up of pure silicon and appear black in colour. These panels reach up to 20% of efficiency but are the



Generations of Solar Panel
Source: Authors

most expensive. On the other hand, polycrystalline solar panels are a new development and made from fragments of silicon crystals melted together. These panels appear blue in colour and reach 15-17% efficiency. Thin films are the cheapest in the market and reach approximately 11% efficiency. This is a recently developed product in the market and can be advanced with a variety of materials including silicon. It can appear in black or blue colour and is easy to install due to weight difference (Ranabhat et al., 2016; Arun, 2019; Mohammad Bagher, 2015).

The selection of the appropriate type of solar panel depends on the specific details and condition of one's property. For properties with ample roof space, polycrystalline panels are recommended due to their lower cost, despite their lower efficiency. Conversely, for limited roof space, high-efficiency monocrystalline panels are advised, despite their higher cost, as they can lead to savings on electricity bills. Thin-film panels are preferable for large commercial roofs, as their lower efficiency is compensated by the abundance of available space (8MSolar 2020; Elibol et al., 2017).

Power generation of PV panels depends on many aspects such as climate, building typology, vegetation, vertical height of PV panel, etc. Seasonal performance of panels with vegetated roof would vary (Schardt & te Heesen, 2021). Bio-roof integrated with solar panels is not only good for thermal performance of building as they are highly capable to produce clean energy but also helpful to manage heat waves. According to experimental research, the maximum specific yield is achieved by PV systems with a tilt angle of 30 to 40 degrees and an azimuth angle of

Types of Vegetation for PV Green Roof
Source: https://stroudcenter.org/about/facilities/mec/stormwater/green-roof-plants

180 to 200 degrees (El Helow D, 2018; Kaewpraek et al., 2021; Schardt & te Heesen, 2021). Integration of photovoltaic panels and green roof is a sustainable solution for energy efficiency and production (X. Zhang et al., 2012; Olowu et al., 2018).

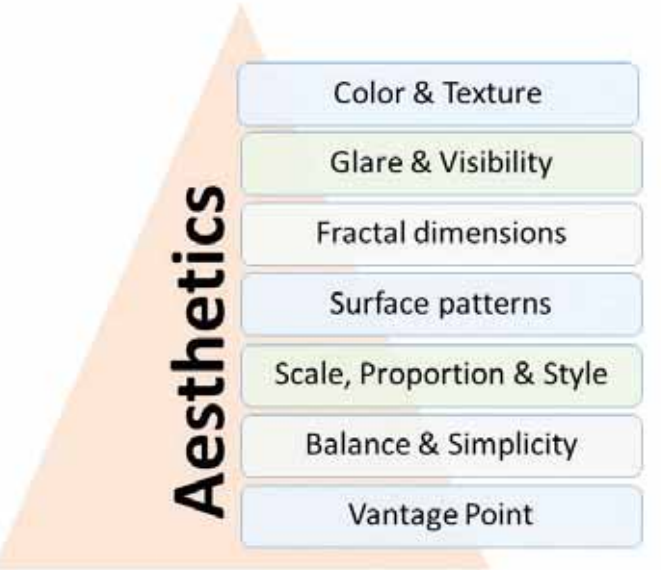
b. Vegetation and Shading effect

Planting greens on a roof surface is an age-old practice. The Hanging Gardens of Babylon, built circa 500 BC, were the most famous example of ancient green terraces. In recent years, people have begun to cover their roofs with sod to protect themselves from adverse weather conditions. However, technical developments make modern green roofs significantly more effective, practical and helpful than their ancient predecessors. As an effective and practical technique to counteract urbanisation, green roofs have been recommended in a number of nations. The rooftop garden system is alive with plants at the uppermost layer. How healthy the plants are determines the success of a green roof. Water quality is improved by using plants. They also improve air quality and provide better thermal efficiency (Vijayaraghavan, 2016; Cook & Larsen, 2021; Dimond & Webb, 2017; Schindler et al., 2018).

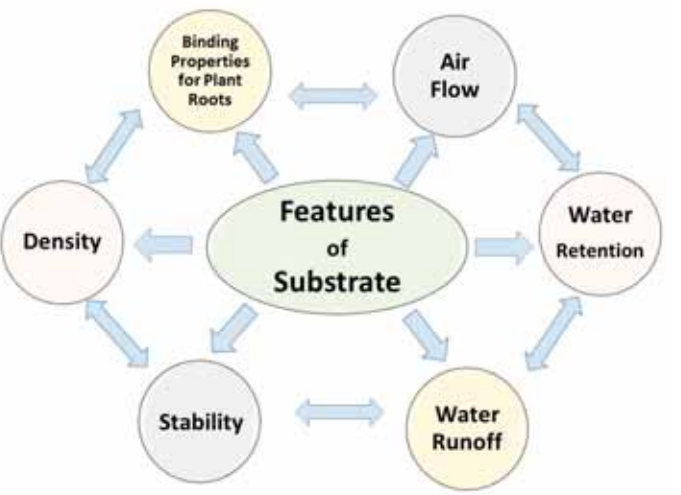
As shown in experimental researches, a 7-centimetre depth was found to be sufficient for good growth and absolute cover for sedum plants, commonly used in green roofs. After years of experiments, other plant species have started to be introduced for different climates. As the flowering substrate must not be accessible to direct sunshine and gusty winds, proper ground coverage is an important factor for plant selection. Plants that grow on slanted roofs inhibit weed development and soil erosion. Biomass and hydrologic efficiency of grid-type roof-top photovoltaic (GR-PV) system are improved by the shadowing effects of PV panels. Due to the lower solar radiation in the shadowed portions of the roof, solar cell shading is believed to impact evapo-transpiration (ET) rates. There is a difference in the size and thickness of the leaves when they are growing in shade. Experiments are required with other types of vegetation species and different sizes of panels (Lamnatou & Chemisana, 2015; Ramshani, Li, et al., 2020; Ali et al., 2018; Barreca, 2016).

c. Aesthetics

The Aesthetic Creation Theory is an intriguing method that connects landscape architecture with art. According to this idea, art's job is to have an attractive effect as a result of aesthetic qualities. Hence non-aesthetic features would be dependent on artistic value, which must be defined with regard



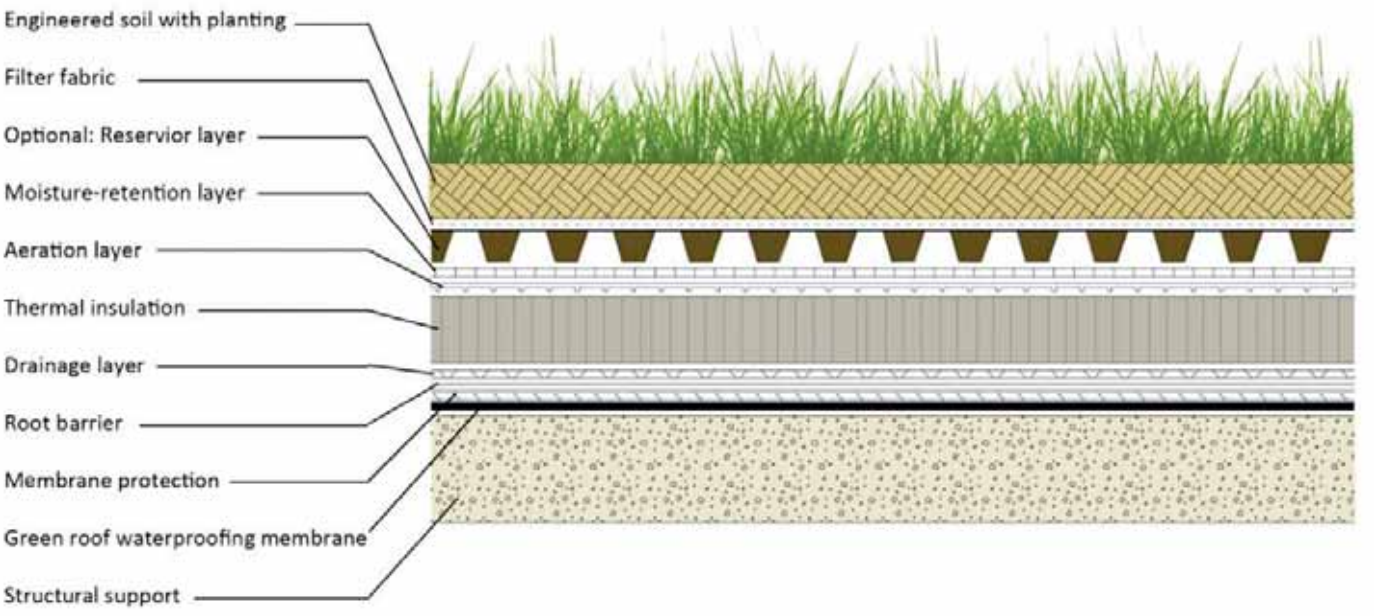
Factor of Aesthetics
Source: Authors



Features of Substrate
Source: Authors

to elegance and unpleasantness as the primary aesthetic qualities. Aesthetics of any building or place depends on many factors such as colour, glare, fractal dimensions, visibility, surface patterns, frame, shape, point of view etc (Sánchez-Pantoja et al., 2018; Hoseinzadeh et al., 2021).

Colour contrast has believed to be an important aspect in interactive perception. The impression of a colour is continually influenced by its surroundings. In this regard, the colour of the walls and the roof are critical to the overall harmony. Intense and unregulated light causes glare and that can be debilitating and inconvenient. The unpleasant glare is caused by an extreme contrast between light and dark regions in the field of vision, which leads to



Section Detail of green roof
Source: https://architizer.com/ blog/product-guides/product-guide/green-roofs/

"progressive loss of visual function and premature fatigue of the eyes with the subsequent onset of a sense of discomfort or other symptoms such as migraines." Numerous researchers have examined into texture/pattern but all of them deemed the surface appearance to be an important aspect in aesthetic judgement. For example, the term "surface complexity" has been used to describe varying levels of roughness and decoration on the façade in order to measure their impact on subjective impressions (Catalbas et al., 2021; Jahanfar et al., 2020).

The findings of experimental and simulation research are that texture and preference have a strong relationship. The most crucial aspects of solar energy systems with green roof are visibility and, in particular, the degree of integration. Additionally, colour and pattern can aid with integration. In order to produce strong visual continuity with the environment or, in any event, artistically acceptable contrasts, it will be required to investigate simpler aspects such as colour, shape or texture. In the unique instance of on ground systems in rural contexts, a prior consideration of the position will be required in order to mitigate the impact of land usage (Ramshani, Li, et al., 2020; Karakaya & Sriwannawit, 2015; Kaewpraek et al., 2021).

d. Substrate and water management

Growth of plants and vegetated roof effectiveness are directly affected by substrate choice. Because of this, we must pay close attention to this aspect, taking into account the climate and the type of flora expected. It has been noted that the substrates used have a direct impact on water bio-filtration, noise reduction etc. It is important to choose substrates carefully because distinct and complex effects might occur at the rooftops. It also depends on market availability, client's demand for the planned vegetation, climate conditions of the location and expected maintenance levels (Petrović et al., 2017; Lamnatou & Chemisana, 2015).

Construction of green roofs is a typical construction process in which avoiding steps can be harmful for building as well as it will fail the purpose of thermal insulation and other benefits of the green roof. The concrete slab acts as the structural support on which the green roof is laid. After this, there can be a layer for insulation if needed or requirement by client. Above this layer, a waterproofing layer or membrane is to be set on the existing construction with a protection layer for waterproofing. Waterproofing is really important to protect building from dampness and it can be done in two ways – physical protection or chemical protection (Chemisana & Lamnatou, 2014; Ramshani, Khojandi, et al., 2020; Movahhed et al., 2019).

The drainage layer is used for draining surplus water from the roof surface. It comes in a variety of shapes and sizes; however, the working process is the same. Material thickness is reduced to roughly 1-1.5 cm for large rooftops to reduce the weight. Roofs that are heavily loaded have a thicker material and a higher layer height of around 4 cm or more. Primary role of the drainage layer is to cleanse the water from substrate without clogging (T. Zhang et al., 2018; Chow et al., 2019).

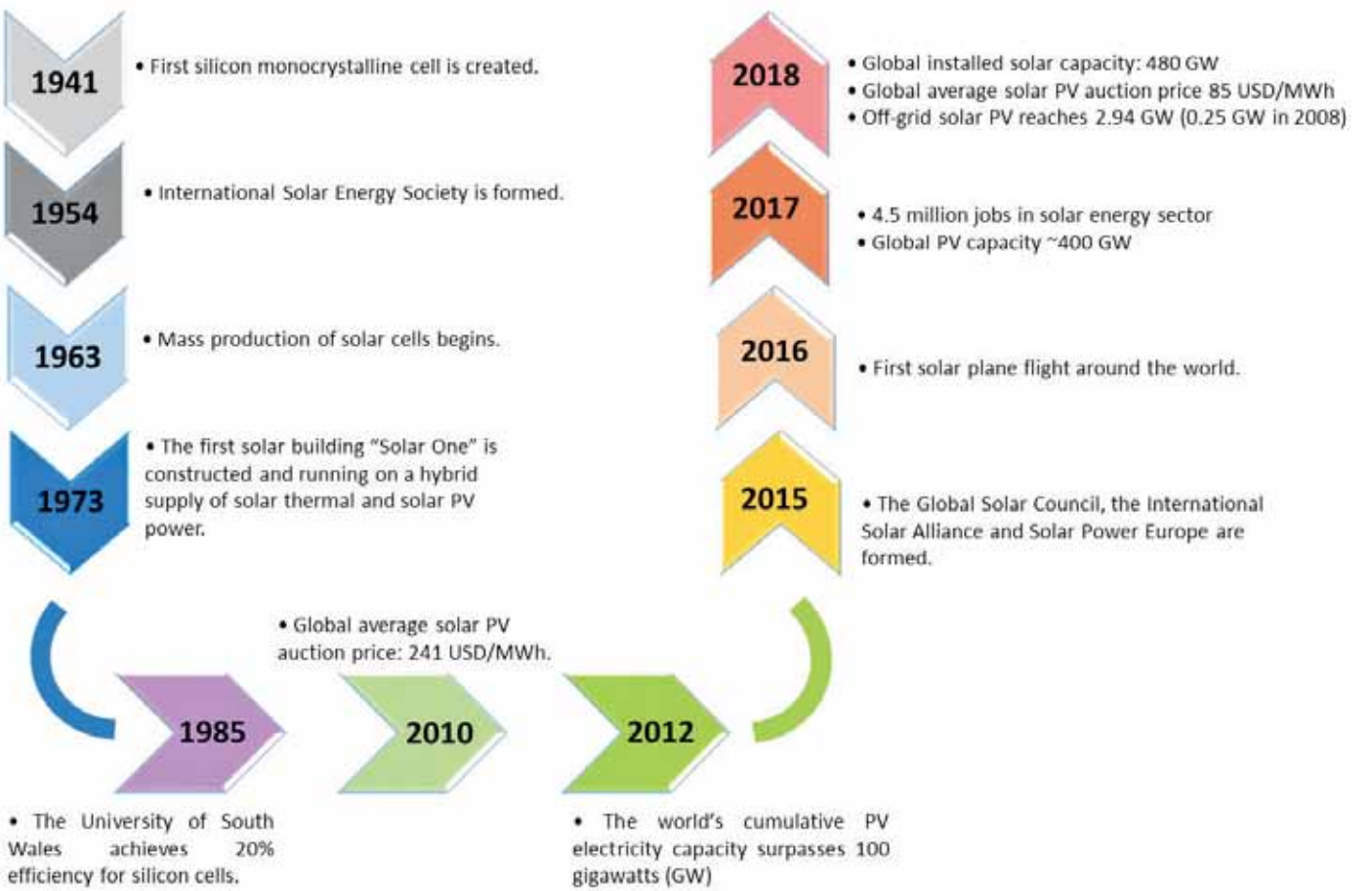
Substrate is a layer which retains water for the green roof. A layer of substrate is required for all green roofs and it is located beneath the vegetation layer. It is indeed the maintenance and nurturing of the plant layer which has an impact on the temperature regulation system. The energy savings increase as the substrate layer becomes thicker. For a green roof with flora, this layer can be as thick as 7 to 80 centimeters depending on the vegetation type. The top-most layer is the vegetation. Green roofs can be planted with any type of plant but the choice of is determined by factors such as thickness of nutrient substrate, environment, object statistics, design and the budget; hence the vegetation layer varies from place to place. This also depends on the vertical height of solar panels and shading effect of these panels in different climates (Li & Yeung, 2014; Sattler et al., 2020; Barreca, 2016).

e. Policies and Adaption rate

Tax incentives, rebates, and a mandated SREC market are all policies that assist the solar PV business. These regulations all add to the ambiguity about the net advantages of solar adoption in different ways. Rebates and tax credits lower the initial investment cost but profit from a solar renewable energy credit (SREC) market boosts benefits while also increasing annual benefit volatility. Uncertainty in future installation costs which include not only the price of materials but also the labour and managerial costs. Policies directly affect residential adoption rate. In urban areas, it is very difficult to adopt solar panels without subsidy. As a result, household adoption is slower than it would be if they chose primarily on the cost of capital of the opportunity to make money. Other renewable energy investments, such as wind and solar, are susceptible to high upfront investment costs and unpredictable rewards that depend on energy prices and output. Moreover, most forms of renewable energy systems are eligible for government subsidies that lower the net cost of implementation (Bauner & Crago, 2015; Awadh, 2017; Asmone et al., 2019)

4. Discussion

The nanotechnology era is upon us. Despite this, energy is the most crucial factor today, as a shortage of energy is a major hindrance to the



Key Milestones of Solar Energy
Source: IRENA, 2019

current civilization. It is necessary to create and operate efficient systems for the generation and storage of energy as well as the transformation and transportation of energy into its many forms in order to keep up with renewable power developments. Despite the fact that global fossil fuel reserves have not yet been depleted, the severe social, health and environmental consequences of our present unsustainable energy usage patterns are clear. Large-scale alternative means of producing the huge amounts of energy required to sustain our level of living will be required in the future. Future society will demand more electrical energy if current patterns continue. Over the next 50 years, it appears extremely likely that greenhouse gas emissions will result in considerable global warming. Climate change is taking place; it is the most pressing threat to our species and we must work together to address it (Ranabhat et al., 2016; Bauner & Crago, 2015; Bauner & Crago, 2015).

Solar energy is equally vital to humans, animals and plants. Solar energy is hailed as an endless, pollution-free fuel source. PV technology presents a technologically possible answer to society's existing health and environmental crisis caused by fossil fuel-based electricity generation. Solar energy is currently economically feasible in a variety of applications and its use will grow as production scales up. Solar PV is one of the few low-carbon energy sources that has the ability to scale up rapidly. According to the most recent data on PV technology, none of the sectors have expanded as quickly or as unexpectedly as the PV business in recent years. Today, only PV technology performs better in all three essential unique features: high power conversion efficiency, low material consumption and low production additional complexity (Elibol et al., 2017; Olowu et al., 2018)

The development in PV panel technology has been growing at a rapid pace in the past few decades. Among all renewable technologies, solar PV power installations have been dominating the renewables industry for many years. The solar PV sector has progressed rapidly as a result with many major moments in terms of placements (including off-grid), capital investments, and technology breakthroughs, as well as the formation of important solar energy organisations (IRENA, 2019; Lamnatou & Chemisana, 2015).

In addition to its ecological, technological and economic benefits and aesthetic features, green roofs are becoming widely attractive. Green roofing infrastructures with landscaping and environmental components are becoming increasingly popular in metropolitan areas. There are several variables that need to be considered while planning and constructing green roofs. Highly-populated cities have developed a number of technologies to reduce emissions and adapt to climate change and recover from natural disasters (IRENA, 2019; Mission & Institutions, 2021).

In a number of experimental research works around the globe, sedum is the dominant genus on most green roofs. Monoculture results in competition for the same resources but diverse and complex plant communities are more drought tolerant. While sedums have traditionally been the dominating plant on green roofs, there is a need to extend the palette in order to create a greater variety of green roof plants. At present, green roof experts are working with sedum with natives, perennials and shrubs. Experiments are being conducted on extensive and intensive roof structures, healing gardens, turf lawns, semi- intensive green roofs, and modular roofs including commercial waterproofing organisations with green roof manufactures. Climate change will continually challenge the plant materials, making a reliable definition problematic (Catalbas et al., 2021; Lakshmanan et al., 2017).

5. Conclusions and Recommendations

Solar PV is one of the critical renewable technologies needed to achieve the global energy transition required to meet the Paris climate targets. The technology is currently accessible, can be swiftly applied on a wide scale, and is cost-effective. Despite this tremendous pace, solar PV power projects continue to confront significant challenges that might slow down the rapid development required in the coming decades. Development and integration policies are responsible for adoption rate, community engagement and quality assurance mechanisms. Colouration is required at different levels between solar tech companies and green roof manufacturers. While energy transformation has the potential to provide significant overall socio-economic advantages at a worldwide scale, a closer examination of the benefits (and costs) of the transformation in different regions of the world reveals how the benefits (and costs) of the transformation would differ. These disparities are primarily attributable to:

- various energy transition starting points,
- supply chain depths, strengths, and variety,
- the degree to which economies rely on fossil fuels, and
- varying degrees of national ambition and methods of execution.

The main considerations that have been outlined in this article about PV systems is to review improvements in PV panels and green roofs. Integration with architecture will help in material selection which should be cost effective and helpful.

References

Arun, M. (2019). Types of Solar Cells and their Applications. *IJSDR1902043 International Journal of Scientific Development and Research*, *4*(2), 260–267. www.ijsdr org (date of accession - July 17, 2022)

Asmone, A. S., Conejos, S., & Chew, M. Y. L. (2019). Green maintainability performance indicators for highly sustainable and maintainable buildings. *Building and Environment*, *163*(July), 106315. https://doi org/10.1016/j.buildenv.2019.106315

Avitesh, A. (2021). *Bio Solar Terrace: A Review on Benefits of Photovoltaic Green Roof*. *November 2020*. https://the new-arch.net/index.php/journal/article/view/260 (date of accession - Jan 01, 2023)

Awadh, O. (2017). Sustainability and green building rating systems: LEED, BREEAM, GSAS and Estidama critical analysis. *Journal of Building Engineering*, *11*(August 2016), 25–29. https://doi.org/10.1016/j jobe.2017.03.010

Barreca, F. (2016). Rooftop Gardening. A Solution for Energy Saving and Landscape Enhancement in Mediterranean Urban Areas. *Procedia - Social and Behavioral Sciences*, *223*, 720–725. https://doi.org/10.1016 jsbspro.2016.05.248

Bauner, C., & Crago, C. L. (2015). Adoption of residential solar power under uncertainty: Implications for renewable energy incentives. *Energy Policy*, *86*, 27–35. https://doi org/10.1016/j.enpol.2015.06.009

Catalbas, M. C., Kocak, B., & Yenipınar, B. (2021). Analysis of photovoltaic-green roofs in OSTIM industrial zone. *International Journal of Hydrogen Energy*, *46*(27), 14844 14856. https://doi.org/10.1016/j.ijhydene.2021.01.205

Chemisana, D., & Lamnatou, C. (2014). Photovoltaic-green roofs: An experimental evaluation of system performance. *Applied Energy*, *119*, 246–256. https://doi. org/10.1016/j.apenergy.2013.12.027

Chow, M. F., Ling, L., Tan, W. L., Arenanda, V., Aziz, K. A. A., & Yusof, Y. M. (2019). Performance of Green Roof Integrated Solar Photovoltaic System. *International Journal of Recent Technology and Engineering*, *8*(4), 6529–6533. https://doi.org/10.35940/ijrte. d5169.118419

Cook, L. M., & Larsen, T. A. (2021). Towards a performance-based approach for multifunctional green roofs: An interdisciplinary review. *Building and Environment*, *188*(September 2020), 107489. https://doi. org/10.1016/j.buildenv.2020.107489

Dimond, K., & Webb, A. (2017). Sustainable roof selection: Environmental and contextual factors to be considered in choosing a vegetated roof or rooftop solar photovoltaic system. *Sustainable Cities and Society*, *35*(April), 241–249. https://doi.org/10.1016/j.scs.2017.08.015

El Helow D. (2018). *Performance of Green Roof Integrated Solar Photovoltaics in Toronto 2018.* 89. https://mail-attachment.googleusercontent.com/attachment/u/0/?ui=2&ik=c7f1664b14&attid=0.2&permmsgi d=msg-a:r-6856861535270160025&view=att&disp=inline&saddbat=ANGjdJ8QvDbXxnlpa-PtaBVzF-MZDm_NofTvyNUfu8He8GvnXRkzIC1pYAreyQX4B6TZXVMrW4N2Ea1UNBMlj-pmb0zfSotl (date of accession - Oct 14, 2022)

Elibol, E., Özmen, Ö. T., Tutkun, N., & Köysal, O. (2017). Outdoor performance analysis of different PV panel types. *Renewable and Sustainable Energy Reviews*, *67*, 651–661. https://doi.org/10.1016/j.rser.2016.09.051

Gremmelspacher, J. M., Campamà Pizarro, R., van Jaarsveld, M., Davidsson, H., & Johansson, D. (2021). Historical building renovation and PV optimisation towards NetZEB in Sweden. *Solar Energy*, *223*(February), 248–260. https://doi.org/10.1016/j.solener.2021.02.067

Hoseinzadeh, P., Khalaji Assadi, M., Heidari, S., Khalatbari, M., Saidur, R., Haghighat nejad, K., & Sangin, H. (2021). Energy performance of building integrated photovoltaic high-rise building: Case study, Tehran, Iran. *Energy and Buildings*, *235*, 110707. https://doi.org/10.1016/j. enbuild.2020.110707

IRENA. (2019). Future of solar photovoltaic: Deployment, investment, technology, grid integration and socio-economic aspects (A Global Energy Transformation: paper). In *International Renewable Energy Agency: Vol. November*. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Oct/IRENA_Future_of_wind_2019.pdf (date of accession - Sept 17, 2022)

Jahanfar, A., Drake, J., Gharabaghi, B., & Sleep, B. (2020). An experimental and modeling study of evapotranspiration from integrated green roof photovoltaic systems. *Ecological Engineering*, *152*(July 2019), 105767. https:// doi.org/10.1016/j.ecoleng.2020.105767

Jahanfar, A., Drake, J., Sleep, B., & Margolis, L. (2019). Evaluating the shading effect of photovoltaic panels on green roof discharge reduction and plant growth. *Journal of Hydrology*, *568*(October 2018), 919–928. https://doi. org/10.1016/j.jhydrol.2018.11.019

Kaewpraek, C., Ali, L., Rahman, A., Shakeri, M., Chowdhury, M. S., Jamal, M. S., Mia, S., Pasupuleti, J., Dong, L. K., & Techato, K. (2021). *The Effect of Plants on the Energy Output of Green Roof Photovoltaic Systems in Tropical Climates*. 1–10. (date of accession - Sept 17, 2022)

Karakaya, E., & Sriwannawit, P. (2015). Barriers to the adoption of photovoltaic systems: The state of the art. *Renewable and Sustainable Energy Reviews*, *49*, 60–66. https://doi.org/10.1016/j.rser.2015.04.058

Lakshmanan, P. K., Singh, S., & Asta Lakshmi, S. (2017). The Paris Agreement on Climate Change and India. *Journal of Climate Change*, *3*(1), 1–10. https://doi.org/10.3233/jcc-170001

Lamnatou, C., & Chemisana, D. (2015). A critical analysis of factors affecting photovoltaic-green roof performance. *Renewable and Sustainable Energy Reviews*, *43*, 264–280. https://doi.org/10.1016/j.rser.2014.11.048

Mission, N. S., & Institutions, S. (2021). *Ministry of New and Renewable Energy, Government of India: Annual report 2020-2021*. *53*(9), 1689–1699. (date of accession - Sept 17, 2022)

Mohammad Bagher, A. (2015). Types of Solar Cells and Application. *American Journal of Optics and Photonics*, *3*(5), 94. https://doi.org/10.11648/j.ajop.20150305.17

Movahhed, Y., Safari, A., Motamedi, S., & Khoshkhoo, R. H. (2019). Simultaneous use of PV system and green roof: A techno-economic study on power generation and energy consumption. *Energy Procedia*, *159*, 478–483. https://doi.org/10.1016/j.egypro.2018.12.037

Olowu, T. O., Sundararajan, A., Moghaddami, M., & Sarwat, A. I. (2018). Future challenges and mitigation methods for high photovoltaic penetration: A survey. In *Energies* (Vol. 11, Issue 7). https://doi.org/10.3390/en11071782

Petrović, N., Radosavljević, ; Jasmina, Tošić, N., & Vukadinović, A. (2017). Types and features of green roof substrates. *10th International Scientific Conference "Science and Higher Education in Function Of Sustainable Development,"* 29–35. (date of accession - Oct 10, 2022)

Ramshani, M., Khojandi, A., Li, X., & Omitaomu, O. (2020). Optimal planning of the joint placement of photovoltaic panels and green roofs under climate change uncertainty. *Omega (United Kingdom)*, *90*. https://doi.org/10.1016/j.omega.2018.10.016

Ramshani, M., Li, X., Khojandi, A., & Omitaomu, O. (2020). An agent-based approach to study the diffusion rate and the effect of policies on joint placement of photovoltaic panels and green roof under climate change uncertainty. *Applied Energy*, *261*(December 2019), 114402. https://doi.org/10.1016/j.apenergy.2019.114402

Ranabhat, K., Patrikeev, L., Revina, A. A. evna, Andrianov, K., Lapshinsky, V., & Sofronova, E. (2016). An introduction to solar cell technology. *Journal of Applied Engineering Science*, *14*(4), 481–491. https://doi.org/10.5937/jaes14-10879 Sánchez-Pantoja, N., Vidal, R., & Pastor, M. C. (2018). Aesthetic impact of solar energy systems.

Renewable and Sustainable Energy Reviews, *98*(August), 227–238. https://doi.org/10.1016/j.rser.2018.09.021

Sattler, S., Zluwa, I., & Österreicher, D. (2020). The "PV rooftop garden": Providing recreational green roofs and renewable energy as a multifunctional system within one surface area. *Applied Sciences (Switzerland)*, *10*(5). https://doi.org/10.3390/app10051791

Schardt, J., & te Heesen, H. (2021). Performance of roof-top PV systems in selected European countries from 2012 to 2019. *Solar Energy*, *217*(June 2020), 235–244. https://doi.org/10.1016/j.solener.2021.02.001

Schindler, B. Y., Blaustein, L., Lotan, R., Shalom, H., Kadas, G. J., & Seifan, M. (2018). Green roof and photovoltaic panel integration: Effects on plant and arthropod diversity and electricity production. *Journal of Environmental Management*, *225*(July), 288–299. https://doi.org/10.1016/j.jenvman.2018.08.017

Tibermacine, I., & Zemmouri, N. (2017). Effects of building typology on energy consumption in hot and arid regions. *Energy Procedia*, *139*, 664–669. https://doi.org/10.1016/j.egypro.2017.11.269

Vijayaraghavan, K. (2016). Green roofs: A critical review on the role of components, benefits, limitations and trends. *Renewable and Sustainable Energy Reviews*, *57*, 740–752. https://doi.org/10.1016/j.rser.2015.12.119

Wahl, D. C. (2020). *" Rejuvenating Resilient Habitats ." 6*(7). (date of accession - Oct 10, 2022)

Zhang, T., Wang, M., & Yang, H. (2018). A review of the energy performance and life-cycle assessment of building-integrated photovoltaic (BIPV) systems. *Energies*, *11*(11). https://doi.org/10.3390/en11113157

Zhang, X., Shen, L., & Chan, S. Y. (2012). The diffusion of solar energy use in HK: What are the barriers? *Energy Policy*, *41*, 241–249. https://doi.org/10.1016/j.enpol.2011.10.043

Ar. Avitesh Vaishnavi Nayak (A23741) is a doctoral research scholar, architectural blogger and Assistant Professor at Sushant School of Art & Architecture in Gurugram India. She has won the Young Achiever Award in Architecture from A3 Foundation, Chandigarh in 2020. Her areas of research include new trends in construction details and materials, renewable energy systems and black architecture.
Email: aravitesh13@gmail.com

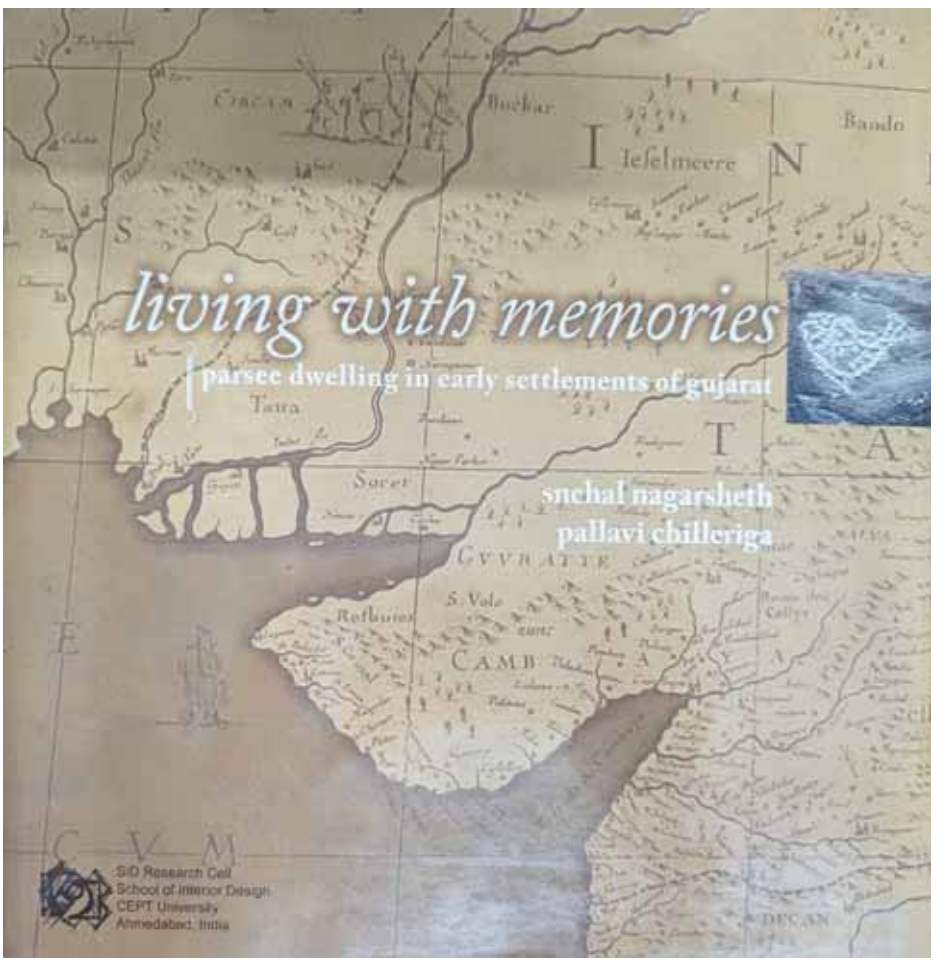
Dr. Tejwant Singh Brar is a Senior Professor in Sushant School of Art & Architecture in Gurugram, India. He is an architect and urban planner with expertise in urban water resource management, GIS, remote sensing, urban design and planning and architecture and planning pedagogy. He did his B.Arch. from GZSCET, Bhathinda and M.Tech (Urban Planning) from IIT Roorkee. He is the founding partner of MAP Solution, a firm dealing in Urban Planning and GIS Consultancy. He has more than 40 publications in national and international journals and conferences.
Email: brartejwant@yahoo.com

BOOK REVIEW

Living with Memories

Parsee Dwellings in Early Settlements of Gujarat

Authors: Prof. Snehal Nagarsheth and Ar. Pallavi Chilleriga
Reviewer: Dr. Sunny Bansal



Living with Memories: book cover

ISBN : 978-81-904096-3-6
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Language : English
Publisher : SID Research Cell, School of Interior Design, CEPT University
No of pages : 348
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Conventionally, Indian history has always been about the glorious dynasties that ruled the country, often overlooking the regional and local developments which have significantly contributed to the historical narrative in some capacity. In the book, **Living with Memories – Parsee Dwelling in Early Settlements of Gujarat,** the authors aim to bring to light these 'lesser developments', the Parsee community being one of them. The work explores the life and times of the Parsee community settled in Gujarat, especially in and around Ahmedabad. The study mostly examines the physical realm in accordance with its socio-cultural context.

The authors explore the evolution of the Parsee community in India in three stages. The first stage looks at the Parsee story, which is a few years after they arrived in India. This period coincides with the Mughal rule. The second stage explores the time when the Parsee community was trying to carve their own identity in a new land. The third stage explores the idea of dwelling, indicating the final settling and formation of ties by intermingling with the native community.

The book starts with the history of Persia in 1000 BC, characterised by the times of extreme chaos in the western part of Asia. Those were the time of wars with only brief periods of political stability. The continued invasions and political changes forced the Zoroastrians to flee from their country. It is noted in the book that ancient trading relations with India might have been the reason for the Zoroastrians leaving their country and eventually settling on Indian soil. Thus, the authors aim to understand the history of Parsees in India and unravel the layers which have been hidden in the annals of history.

"*The position of priest within the community was used as a conduit to implant the group within the larger social structure of the land"*

In the Parsee community, the priests are at the top of the social hierarchy. They are called *Dasturs* and *Mobeds. Dasturs* took care of *Atash Behram* or the highest grade of fire that can be placed in Zoroastrian fire temples and *Mobeds took* care of *Atash Adaran* or the second grade of fire that is kept in an *Agiyari*. The social structure was similar to that which existed in the Indian context. Hence, the Parsee community was able to connect with the native community as it was familiar with the social structure. The social exchanges of those times can be found in the Parsee *Rivayats* and *Qissa.* It was the time of building identity in a new land through the means of faith. The period established the priesthood as the supreme in the community. It is said that Dastur Meherji Rana, during his time, represented the Parsee community in the court of Akbar. The Panchayats of the Parsee community also had Dastur as their heads.

Gradually, the social structure started accommodating people who were not priests, into the various aspects of decision-making. One such story mentioned by the authors is that of Changa Asa and his influence in shifting of *Atash Behram* from Sanjan to Bahroch. The 18th century saw a rise in the *Shethia* or *Shreshthin* among the Parsee community. It is noted in the book that Parsee charity assumed a greater political and social influence under the colonial rule. Parsee merchants, through their philanthropy, rose to elite status in British Indian society. During these times, Panchayats had Dastur and rich Parsee merchants as the head of the community. Panchayats and *gambhar* (an event during the death of a Parsee community member) used to be fundamental for the social cohesion of the community.

The authors delve extensively into the architectural heritage of the Parsee community in India. This included *Agiyari* or fire temples, *madrassas* or schools focussing on religious scriptures, *Dokhma* or towers of silence, a place for Parsee funerary activities, among others. The religious built form and social built form indicated the thought process of the community. The building of religious structures established the community's social relevance in the larger context when they arrived in India. As time changed, the community felt a need to shift from an orthodox religious identity to a more modern outlook which led to the establishment of social built forms, including libraries, hospitals and sanatoriums, schools, resting houses or *dharamshalas*, etc. The first of its kind is the Dasture Meherji Rana Library, which is situated in Navsari in Gujarat. The book explores the architectural characteristics and its relationship with the community.

The authors have included ten Parsee dwellings from the cities of Saronda, Tadgam, Navsari, Bharuch, Surat, Udwada, Bhuj and Porbandar. It explores the traces of inhabitation and finds the narrative of identity building through understanding the habitation patterns of the Parsee community. The narrative weaves in the evolution of the nomenclature of Parsee family names. The names originating from the professions find a mention in the book, like *Batliwala*, *Furniturewala*, etc., where the prefix denotes the profession and *Wala* denotes the person. It signified another attempt by the Parsee community to develop a marker of their identity. The other nomenclature featured names adopted from the place of belonging, like *Khambatta, Sarondana, Bharucha*, etc. Parsees also adopted surnames that were similar to Gujarati surnames, like Desai, Patel, etc., which were essentially titles bestowed on the community.

"The process of home-making is a cultural one"

The author then takes the reader on a journey of the Parsee villages and cities. The quaint mud houses with traditional wall motifs represent the ancient charm of the Parsee culture. The story starts with a 250-year-old house in Saronda. The people who are the descendants of the original owners interweave their narratives, animating the physical-social-cultural milieu of the dwelling that must have existed in the past. The village life of the past showed how Parsees adopted traditional Gujarati cultural elements like playing Garba during the community *papad* (Indian savoury snack) making ritual at Saronda house.

"A characteristic cultural space may not have 'meaning' per se, but it is cultural and has the effect of shaping space and therefore the experience of the space"

The chronicles are supplemented with architectural drawings and illustrations that make it a holistic work. Spatial elements like the Parsee *otla, kathedo, jhanpa, mori* and other spaces are mentioned in this work. Each section explores the spatiality of the dwellings, its organisation and planning, interiors and living patterns, room and associated customs. It takes the reader on a journey to the past to reflect on the lifestyle of that time. The houses of Tadgam, Nargol and Udvada were also explored. The book mentions the time when *Iranshah* was consecrated in Udvada and the way it made the place more significant.

"*The city is large*

The city is dense

The city is numbers"

The later chapters explore cities like Navsari, Surat and Bharuch along with the princely states of Bhuj, Porbandar, Jamnagar and Bhavnagar, which became home to the Parsees who adopted the style of Gujarati Indian homes. Traditional urban typology made its way into the Parsee way of living too, with their *mohalla, wad, para, pol* and gate. The individual in the Parsee community was seen as a part of the larger collective and the dwelling was a physical manifestation of the extension of the self.

The authors explore the interiors of the houses in detail to understand the brief and timeless living patterns of the Parsee people. Here, placemaking is epitomised by associating each space with a defined function or meaning and hence carving a place out of a space. The village houses resemble the mannerism of the English bungalow with a distinct element of spatiality, for instance, the interweaved and overlapping central space like *ubho ordo,* imparting a sense of openness to the dwelling. The city houses, on the other hand, emphasise the interiority, with each room increasing its sense of privacy as one moves into the house.

"There is great distinction in no pattern at all"

The authors conclude by inferring that the Parsees settlers were different from other foreign settlers who set foot on Indian soil. Their story is that of acceptance by the locals, both ordinary and extraordinary. It is also a story of their adaptation and absorption of the local culture and making it part of their own, analogous to how *"sugar mixes with milk"*. The authors also make suggestions regarding the limitations of their work and leave some clues to take it forward.

Authors

Prof. Snehal Nagarsheth is the Dean at the School of Architecture, Anant National University, Ahmedabad. Prior to this, she was a core faculty at the Faculty of Design at CEPT University. An architect, educator and urban designer, she has around 40 years of experience in teaching and practice. She has supervised more than 70 UG and PG students across various universities in Gujarat.
Email: snehal.nagarsheth@anu.edu.in

Ar. Pallavi Chilleriga is an educator and writer. She has been working in the area of heritage and history for 15 years. She has been particularly involved in history education for the last five years. She was previously involved with the Indian National Trust for Arts and Culture, Bangalore, leading important heritage documentation programs within the city.
Email: palmurthy@gmail.com

Reviewer

Dr. Sunny Bansal (A24815) is an architect, educator and researcher. He pursued his B.Arch. from MANIT Bhopal, M.Tech. (Infrastructure Design and Management) and PhD from IIT Kharagpur. He has been a DAAD Fellow and completed his postgraduate research at TU Darmstadt, Germany. His key areas of interest are architectural design, pedagogy, infrastructure design and management, urban and peri-urban planning, spatial analytics and transportation planning and management.
Email: ar.sunnybansal@gmail.com

Architectural Designing for the New Frontier-Mars

By Ar. Vedika Adukia and Ar. Geevith Raghavan

Abstract

Traditional spatial disciplines such as architecture, landscape architecture, and urban design can all benefit from space science. Here on Earth, meticulous consideration is essential when crafting and constructing spaces. Almost every element is governed by regulations, including the precise control of temperature, humidity, and airflow within our buildings. A slight oversight in these aspects can unintentionally exclude individuals from the spaces we shape. These challenges and regulations take on added significance in the harsh environment of space, where habitable structures like the International Space Station must not only be functional but also comfortable for those who inhabit them. These designs must also shield occupants from external threats and the potential for failures, misuse, and internal errors. As a result, things taken for granted here on Earth while designing habitats need to be reconsidered.

Architects designing for extreme conditions understand the need of designing habitats that support culture and purpose in addition to meeting basic needs and protecting human life. They not only contribute to the on-going debate among architects, landscape architects, and urban designers about how we develop habitats for future habitation, but they also create designs that influence technologically advanced designs on Earth.

1. Introduction

Technological advancements in the twentieth century have propelled us to explore distant realms, even sending rovers to places as remote as Mars. It's only a matter of time before a human takes that historic step onto its surface.

That's one small step for man, one giant leap for mankind

Neil Armstrong

Mars, however, presents formidable challenges for human habitation due to its inhospitable, cold, desert-like environment and elevated levels of radiation. As a result, humans will have to spend the majority of their time indoors and in spacesuits. In this context, architecture emerges as a paramount discipline, wielding the potential to craft spatial environments conducive for humans to thrive (Modin, 2019). Current extra-terrestrial designs predominantly emphasise engineering considerations (refer Figure 1), often overlooking the crucial element of human factors, making the involvement of architects essential for future outer space missions. Outer space architecture is not just about constructing a protective shell; it is also about meeting the needs of those embarking on every outer space mission.

Up to this point, missions to Mars have been exclusively unmanned endeavours, but this status quo is on the precipice of transformation. The forthcoming era of human presence on Mars requires re-evaluation of architectural paradigms to address the unique challenges and opportunities that arise in this extra-terrestrial context. In the light of this, the thesis delves into unexplored areas of creative potential exploring the extreme environment of Mars beyond the realms of Earth through the lens of an architect. It seeks to understand the need for a changed vocabulary of thinking to conceptualise inherently human-centric design solutions for extra-terrestrial architecture, ensuring the well-being and productivity of its inhabitants.

Figure 1: ISS Interiors that emphasise engineering considerations
Source: https://www.theguardian.com/artanddesign/gallery/2020/nov/10/gimme-some-space-inside-the-international-space-station-in-pictures

If the human race is to continue for another million years, we will have to boldly go where no one has gone before
Stephen Hawking

1.1 Hypothesis

The future of outer space human exploration relies on the pivotal role architects play in designing spaces for this endeavour. Additionally, the synergy between designs for outer space and their potential benefits on Earth poses a significant opportunity for architects to contribute to space exploration while simultaneously enhancing the well-being of humanity.

2. Research methodology and framework

The design process involves crafting a narrative and employing a research-through-design approach, gathering insights from diverse sources to address the unique challenges of space exploration. It includes in-depth studies of Mars and its environmental challenges, alongside a comparative analysis of Martian design case studies. Prioritising human-centric design principles, the process integrates innovative ideas and develops a tailored architectural vocabulary for outer space. Technical details, spanning plant growth, environmental conditions, lighting, hydroponics, electrical systems, artificial ecosystems, site selection, materials, and construction techniques, are meticulously examined to ensure project viability. A well-defined design program sets goals and objectives, guiding the creation of intricate drawings and models that breathe life into the envisioned Mars habitat.

3. Case Studies

The thesis analyses and compares hypothetical (Marsha, Ice House, 3-D Printed Habitat) and practical space habitat case studies. The goal is to identify current strengths and areas for improvement in achieving human-centered design. Additionally, Fuller's geodesic dome is explored as a potential concept for future Mars colonies.

4. Design intent

- Location: Candor Chasma, Mars
- Year Vision: 2120
- Year first Crewed Mission: 2052
- Crew members: 6 Astronauts
- Specific characteristics: A hybrid 3-D printed dual shell habitat
- Pressurised area: 850.08 m^2
- Pressurised volume: 2328.632 m^3

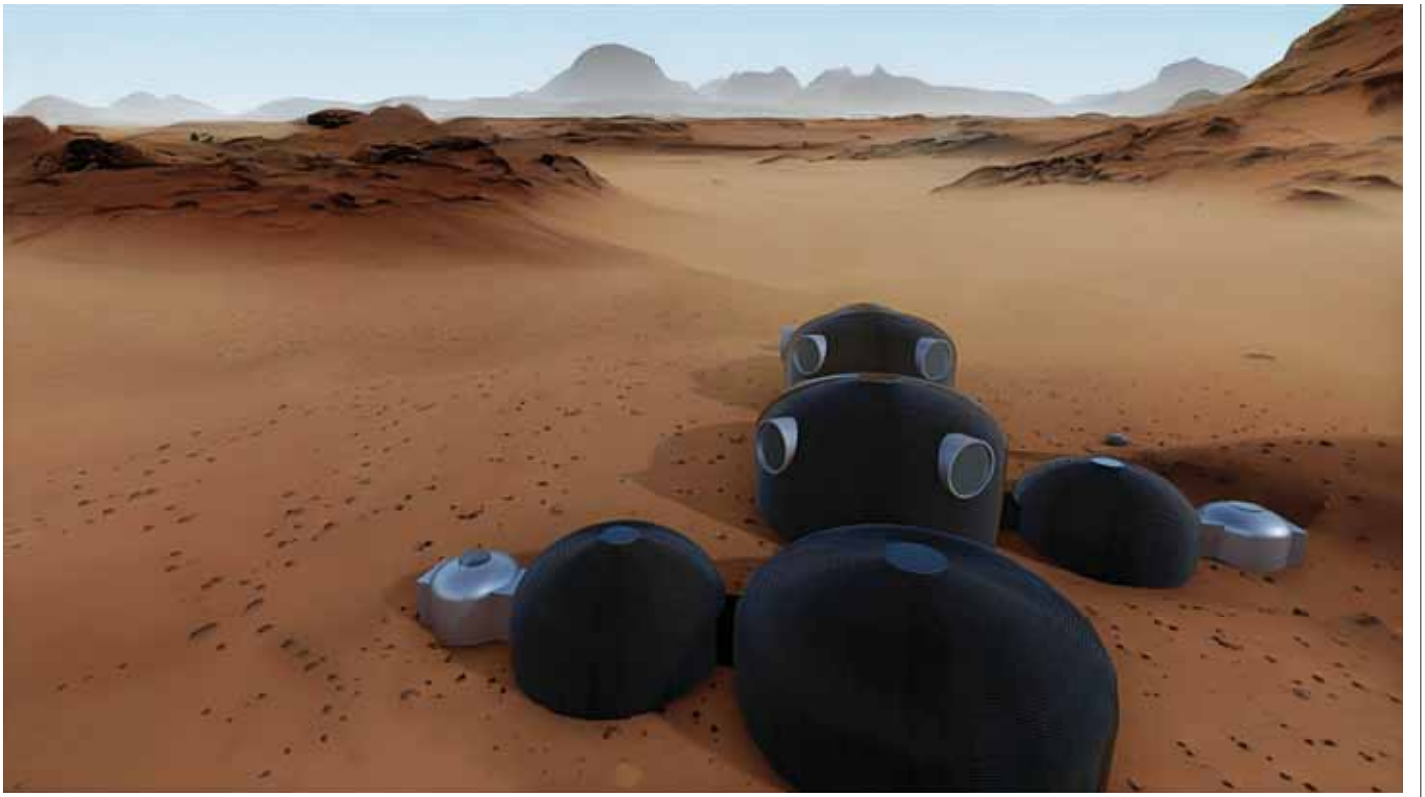


Figure 2: Design proposal
Source: Authors

4.1 Site

The chosen location is in the eastern part of the Candor Chasma (refer Figure 3). Candor Chasma is one of the most significant canyons in Valles Marineris on Mars. It is approximately 810 kilometres long and is divided into two regions: eastern Candor and western Candor.

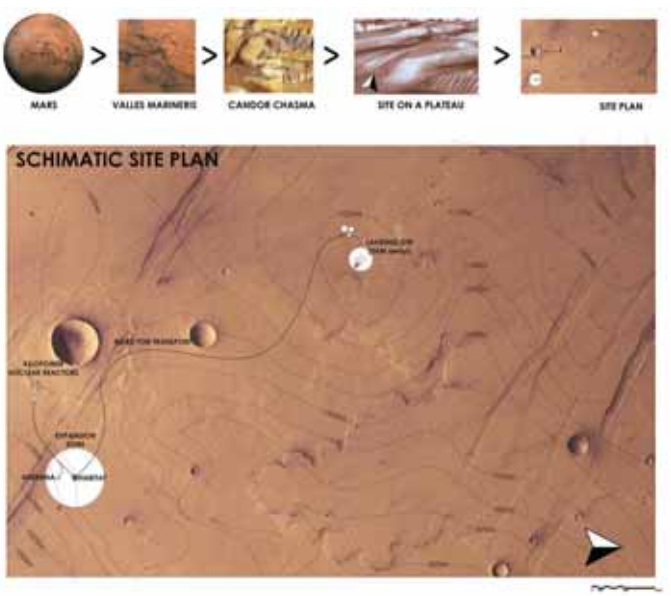


Figure 3: Zooming in to the site and schematic site plan
Source: Authors

Strength

- Lower ground would lead to less radiation
- Underground water and water sources available nearby
- Elevated enough to be above water in case of terraforming
- Close to big plateaus for ease of landing spaceships
- Variety/interesting landscapes
- Building materials on site

Analogue missions are field tests that are conducted in locations on Earth that are physically similar to extreme Space environments. The site chosen on Earth would mimic the site on Mars and would be similar to the Martian site in every way, as was done for the Apollo missions. After studying a number of sites based on multiple factors the site that best fit the design brief is McMurdo Dry Valleys in Antarctica that resembles the chosen site on Mars in a number of ways as discussed in Figure 4.

4.2 Design brief

Mars is the new frontier. Architecture for human missions to Mars is not luxury, but a need. Where humans go architecture is needed to help them adapt and thrive. The design proposal (refer Fig 2) looks

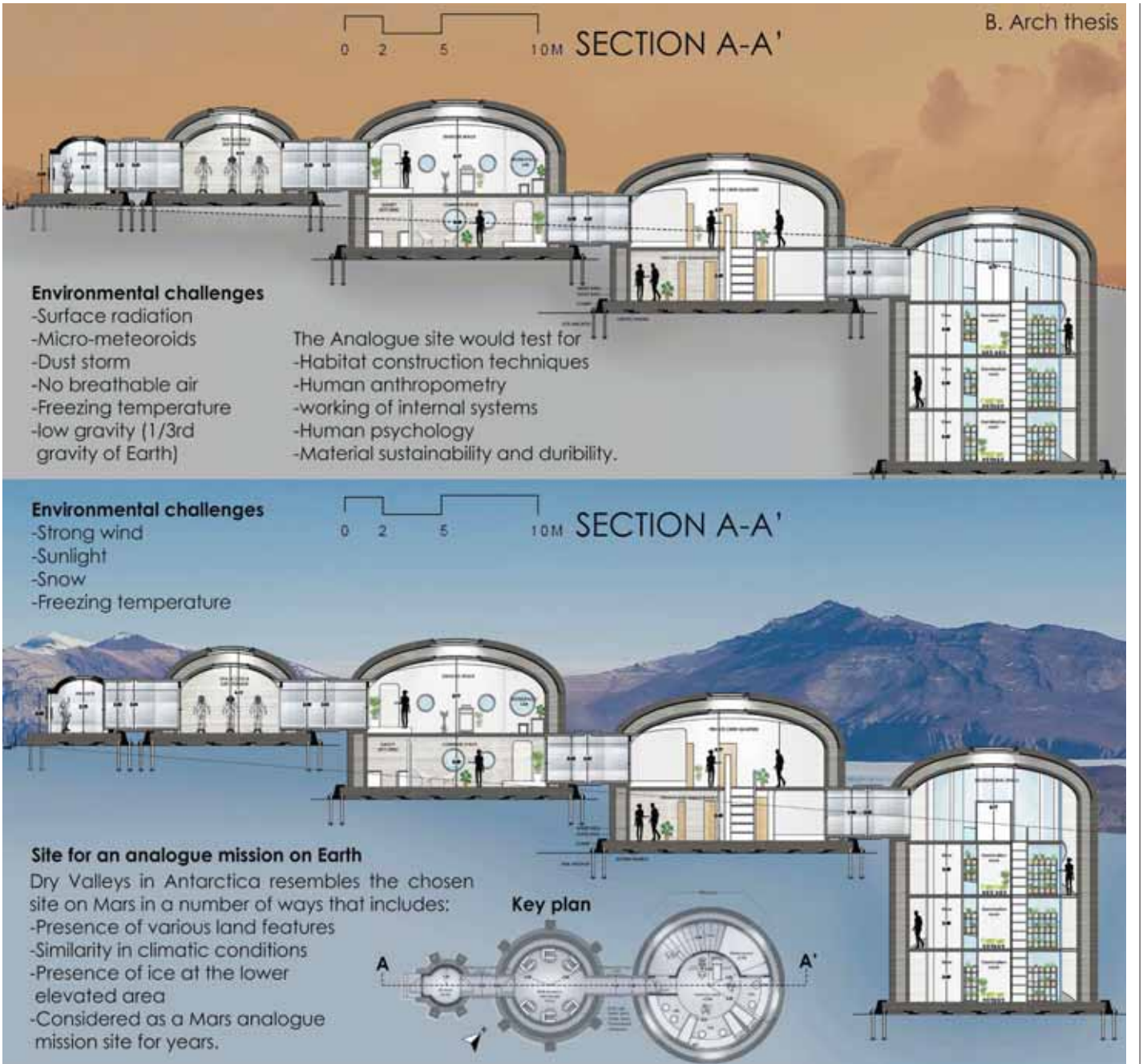


Figure 4: Detailed section through site (Mars) and detailed section through analogue site (Antarctica, Earth)
Source: Authors

into establishing architecture for humans on Mars by proposing a permanent 3-D printed shelter for 6 crew members that will help them thrive on an unknown planet with a lethal environment. The design aims at future human to Mars missions after a few initial missions to explore more advanced techniques and concepts of designing that would eventually help us here on Earth. Once on the surface of Mars, resupply will be difficult therefore the shelter will have to include all aspects of survival. The shelter will have to be self-sufficient and to create a self-sufficient shelter the spaces required are as follows:

Master plan spatial requirement:

1. Landing zone
2. A road to transport pay loads from the spacecraft to the habitat.
3. Energy production zone
4. Control facility outside the crater
5. In-situ resource utilisation production plant
6. Greenhouse (integrated or non-integrated)
7. The main Habitat module
8. Flexible pressure tunnels between modules (optional)
9. EVA access modules
10. Extended scientific sample storage facility

Habitat zone spatial requirement:

1. Main entrance
2. Sleeping quarters with sleeping pods
3. Hygiene/shower/bathroom unit
4. Workout area
5. First aid/hospital
6. Storage and store
7. Auditorium/meeting area
8. Community hall/dining
9. Kitchen/pantry
10. Workshops
11. Laboratories
12. Studios
13. Knowledge storage/server hall/study area
14. Leisure
15. Hydroponics/vertical gardens
16. Life supporting systems
17. Vehicle access/rover dock?
18. EVA suits access
19. Airlocks, entry, egress airlock (Modin, 2019)

4.3 Zoning

The zoning is carefully organised into four distinct categories: quiet, noisy, social, and private. Each space is thoughtfully designed to align with one of these categories, creating a harmonious environment (refer Figure 5). The layout prioritises seamless circulation, ensuring ease of movement throughout

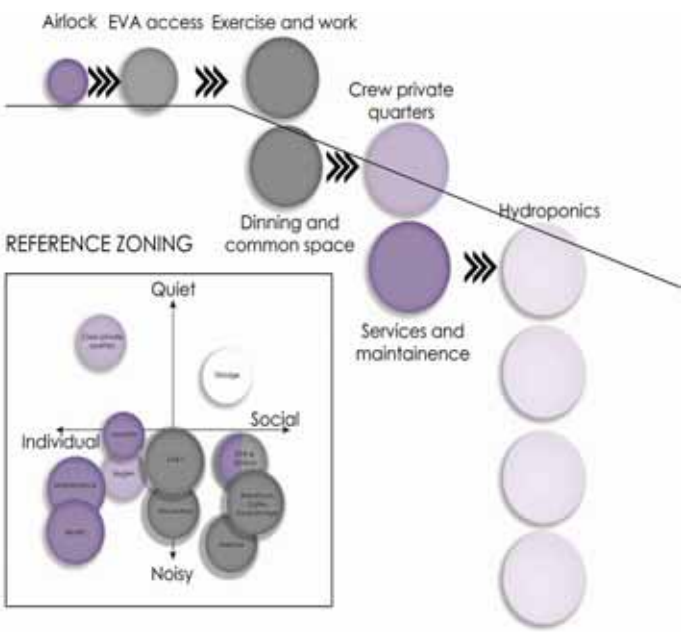


Figure 5: Zoning
Source: Authors

while strategically placing spaces that complement each other. The area statement for the habitat design can be referred to in Table 1

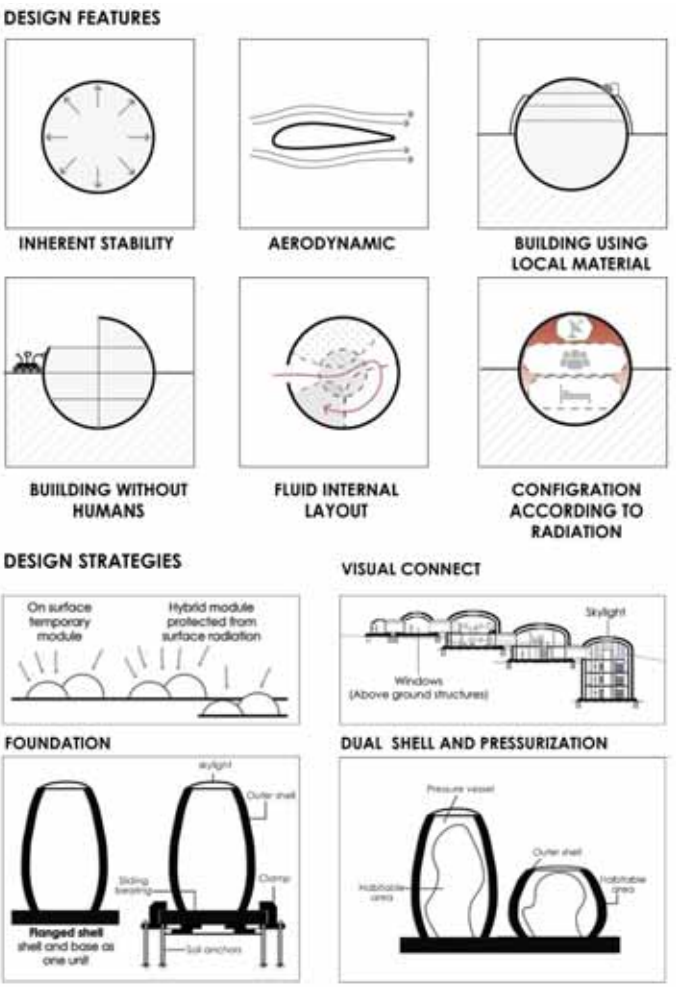


Figure 6: Design features and design strategies
Source: Authors

4.4 Design feature and strategies

Unlike structures on Earth, which are primarily designed for gravity and wind, Martian conditions necessitate a structure optimised to handle several other environmental challenges like, radiation, internal atmospheric pressure, thermal stresses, etc. Therefore, the design incorporates several features and strategies (refer Figure 6) to withstand surface challenges, ensuring the habitat's resilience, as discussed below.

Circular layout: The circular layout serves a dual purpose by ensuring an even distribution of pressure across the modules. This not only enhances structural integrity but also contributes to optimal functionality.

Aerodynamic efficiency: The dome-shaped modules exemplify aerodynamic brilliance, enabling a harmonious flow of air around the structure.

Table 1- Area Statement
Source: Authors

Area and volume statement				
Ground level				
Spaces	**Habitable Area(inclusive of internal walls) m²**	**Approx. Habitable volume (inclusive of internal walls) m³**	**Pressurised area m²**	**Approx. Pressurised volume m³**
Air-lock	5.64	12.45	5.64	12.45
EVA access and suit storage	22.3	52.56	40.3	99.481
Exercise and work space (inclusive of staircase)	64.93	164.9	67	257.09
Transitional space	10.92	25.11	10.92	25.11
Underground level 1				
Spaces	**Habitable Area(inclusive of internal walls) m²**	**Approx. Habitable volume (inclusive of internal walls) m³**	**Pressurised area m²**	**Approx. Pressurised volume m³**
Common area, dinning and galley	51	130	85.4	217.8
Staircase (included in above level)	50.2	135.54	50.2	135.54
Private crew quarter(inclusive of staircase)	78.63	200.73	101.11	300.91
Transitional space	5.47	12.6	5.47	12.6
Underground level 2				
Spaces	**Habitable Area(inclusive of internal walls) m²**	**Approx. Habitable volume (inclusive of internal walls) m³**	**Pressurised area m²**	**Approx. Pressurised volume m³**
Air-lock (x2)	5.64	12.45	5.64	12.45
EVA access and suit storage (x2)	22.3	52.56	40.3	99.481
Staircase (included in above level)	3.25	8.77	3.25	8.77
Services and maintenance	75.21	190.76	97	246
Leisure space, wardroom	58	150.68	76.34	238.14
transitional space	27.31	62.81	27.31	62.81
Underground level 3				
Spaces	**Habitable Area(inclusive of internal walls) m²**	**Approx. Habitable volume (inclusive of internal walls) m³**	**Pressurised area m²**	**Approx. Pressurised volume m³**
Hydroponic garden (inclusive of staircase)	58	147.9	78.4	200
Underground level 4 and 5				
Spaces	**Habitable Area(inclusive of internal walls) m²**	**Approx. Habitable volume (inclusive of internal walls) m³**	**Pressurised area m²**	**Approx. Pressurised volume m³**
Staircase (included in above level)	3.25	8.77	3.25	8.77
Hydroponic garden (without staircase included above)	54.25	139.13	74.65	191.23

This design feature not only enhances the overall aesthetics but also minimises wind load, ensuring stability in Mars' unique environmental conditions.

Fluid internal layout: The fluid internal layout is a testament to thoughtful design, seamlessly integrating spaces and complementary activities. The modular interior design not only adds a dynamic element but also allows for adaptability to meet the evolving needs of the Martian inhabitants.

Flexible spaces: Spaces are carefully designed with a keen focus on user functionality, providing a platform for users to personalise their environments according to their needs. For instance, the workspaces feature innovative movable storage units on tracks, allowing crew members to dynamically adjust the space dimensions based on their requirements. Additionally, convertible spaces are seamlessly created through retractable partition walls and modular furniture, fostering the development of versatile and adaptable environments.

Configuration according to radiation: Prioritising the safety of Mars' residents, the spaces are strategically designed with redundancies to mitigate the impact of radiation. The most crucial and private areas are ingeniously located underground, providing crew members with secure retreats during periods of elevated surface radiation events.

Built using local material: Embracing self-sufficiency, the design utilises a 3-D printer and locally sourced Martian regolith. This forward-thinking approach not only reduces dependency on Earth's resources but also promotes sustainability in construction methods.

Dual shell: The design employs an innovative dual-shell method to shield the habitable portions from structural stresses generated by Mars' severe temperature variations. As a result of this split, the interior environment is no longer constrained to the rigidity required by the outside shell, which retains its simple and utilitarian form. As a result, the interior can be designed with human needs in mind—a design that is prevalent on Earth.

Foundation: The unique foundation design developed by AI SpaceFactory has been used to mitigate surface stresses on Mars. To minimize material warping, the foundation base is printed in concentric rings that begin from the outside, as opposed to complete area plates, where the material would predominantly shrink in plane. This produces predictable joints that can be backfilled without causing the slab to shrink as a whole. A toping slab is then placed over this layer and secured with tie down clamps.

Visual connection: The structure is partially above ground to establish a visual connection for the inhabitants with the exterior. The inclusion of several windows facilitates this visual connection and allows natural light to flood the interiors, enhancing the spatial quality. However, windows can pose a risk of air or pressure leaks and are therefore designed and placed carefully in the structure.

4.5 Creating functional spaces

On entering the habitat one must pass through an airlock. An airlock becomes critical to sperate the interor from the exterior environment when external environments are no suitable for survival. The airlock is attatched to a suitport storage space that allows crew member to prepare before performing Extravehicular Activity (EVA) (refer Figure 7). Moving further into the habitat, a dedicated exercise space is provided for the crew. Research has shown that altered gravity conditions can impact individual performance, human-equipment interaction and design (refer Figure 7). A long 8-9 month space travel (travel time from Earth to Mars) in Zero-G can cause physical changes. Moreover, the crew would take some time to adjust to the Martian gravity (about 38% of the gravity of Earth) and hence exercise

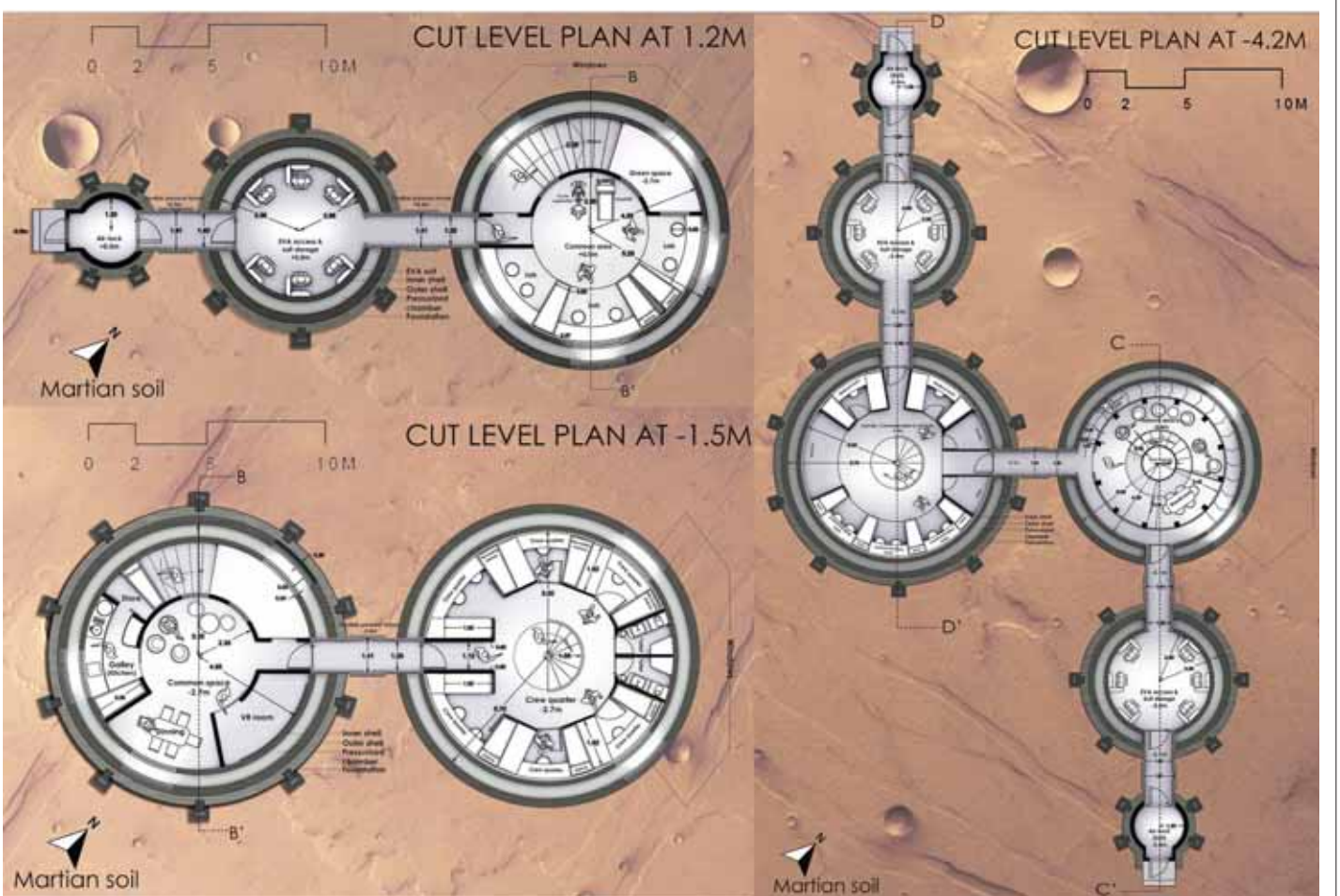


Figure 7: Cut level plans
Source: Authors

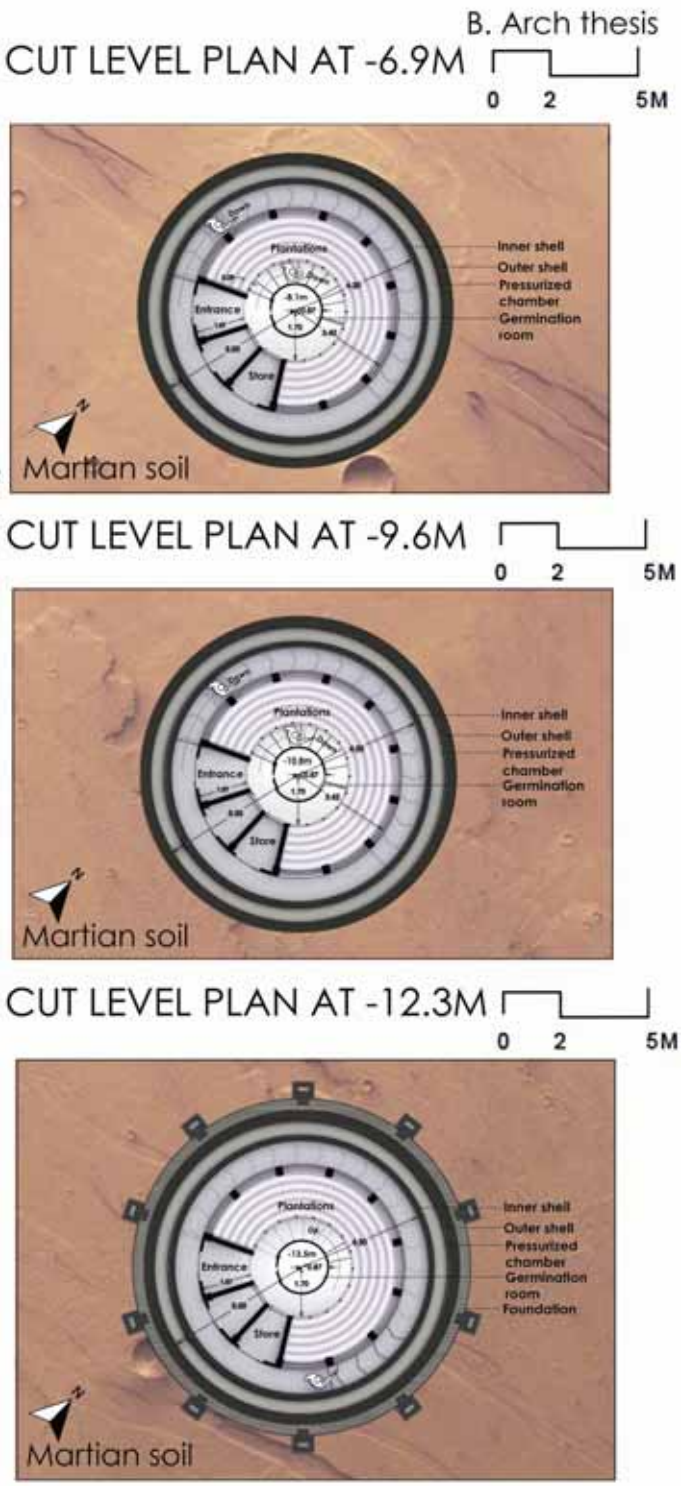


Figure 8: Cut level plan of the hydroponics section
Source: Authors

becomes critical for outer space missions to maintain the physical health of the crew.

The crew quarters offer flexibility for modification and personalisation according to individual needs. The design maintains a thoughtful balance, ensuring spacious interiors while optimising space to accommodate budget constraints. Further, isolation and confinement have serious psychological and social consequences. Hence, social interaction amongst the crew members is critical for the psychological health of the crew and is facilitated through common spaces provided (refer Figure 7).

Prolonged isolation during a mission to Mars poses serious well-being risks for the crew, impacting the mission's success. Virtual reality (VR) emerges as a solution, offering a diverse experience in confined spaces. VR can help to broaden the landscape of constrained spaces and provide access to unfamiliar landscapes such as Mars. It enables study of otherwise inaccessible environments on Earth and fosters familiarity for Mars-bound crew. By simulating familiar Earth landscapes, VR becomes a tool to alleviate stress and combat homesickness in the challenging Martian environment. Also, incorporating artificial ecosystems and indoor vegetation, common on Earth, becomes pivotal. To elevate the indoor experience, the design strategically incorporates indoor vegetation, creating an illusion of free movement and seamlessly connecting indoor and outdoor spaces. By integrating landscape features indoors, we can provide a sense of escape and liberation akin to the outdoors.

A notable design feature includes flexible pressure tunnels between modules. These tunnels enable movement during Mars quakes and external loads. In emergencies, these pressure tunnels can be detached from redundant modules without compromising the functionality of others, ensuring adaptability and safety.

4.6 Hydroponics

Another critical element in the design for long-duration missions is the provision of a greenhouse. Hydroponics proves a space-efficient solution for growing food in outer space, owing to its indoor farming techniques and minimal space requirements. Beyond practicality, green spaces play a vital role as hubs for community engagement. To ensure crew safety, hydroponic chambers are kept separate from the main module. This design allows for isolation in case of chamber failure or a rise in CO^2 levels, ensuring the well-being of the crew remains uncompromised (refer Figure 8 and 9).

4.7 Services

Long-term space mission survival relies on human self-sufficiency, requiring a compact, integrated ecosystem with shelters. A recycling system, like MELiSSA (Micro-Ecological Life Support System Alternative), holds promise. By integrating MELiSSA into the habitat design, we can establish conditions in outer space conducive to human well-being.

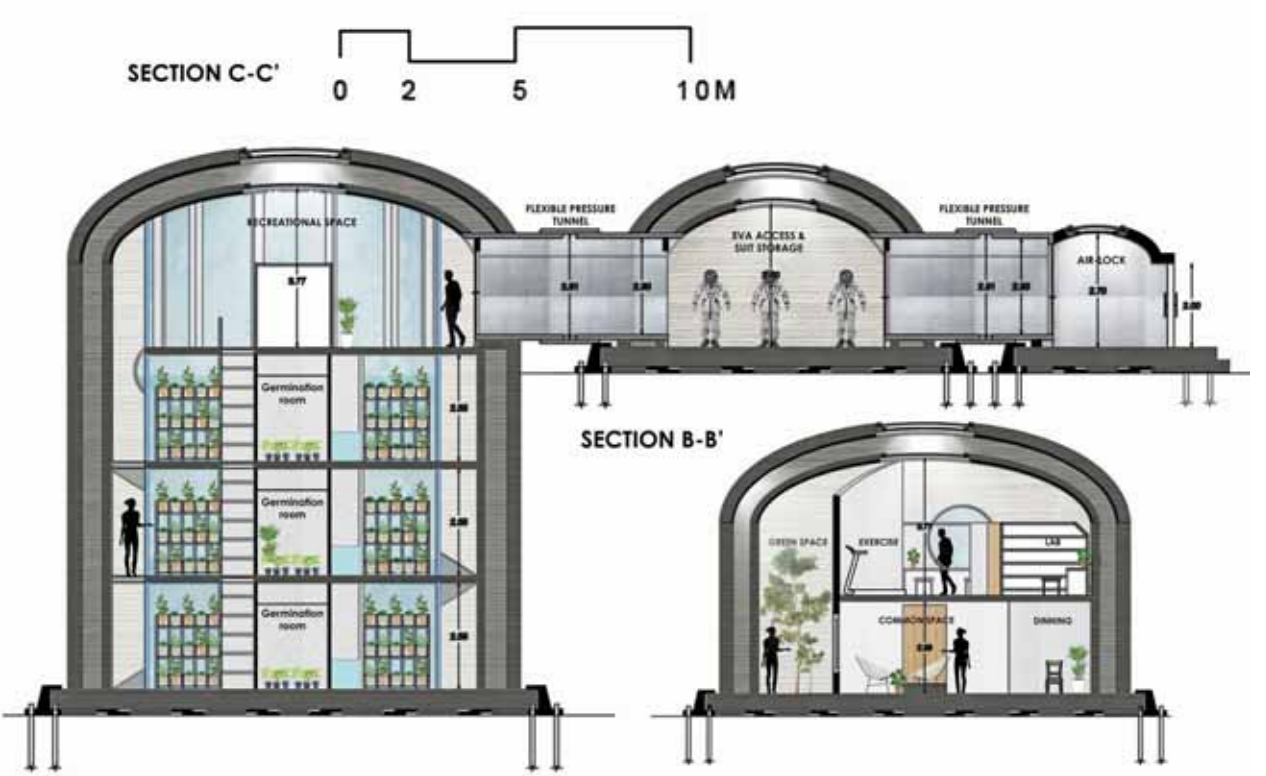


Figure 9: Section B-B' and Section C-C'

Source: Authors

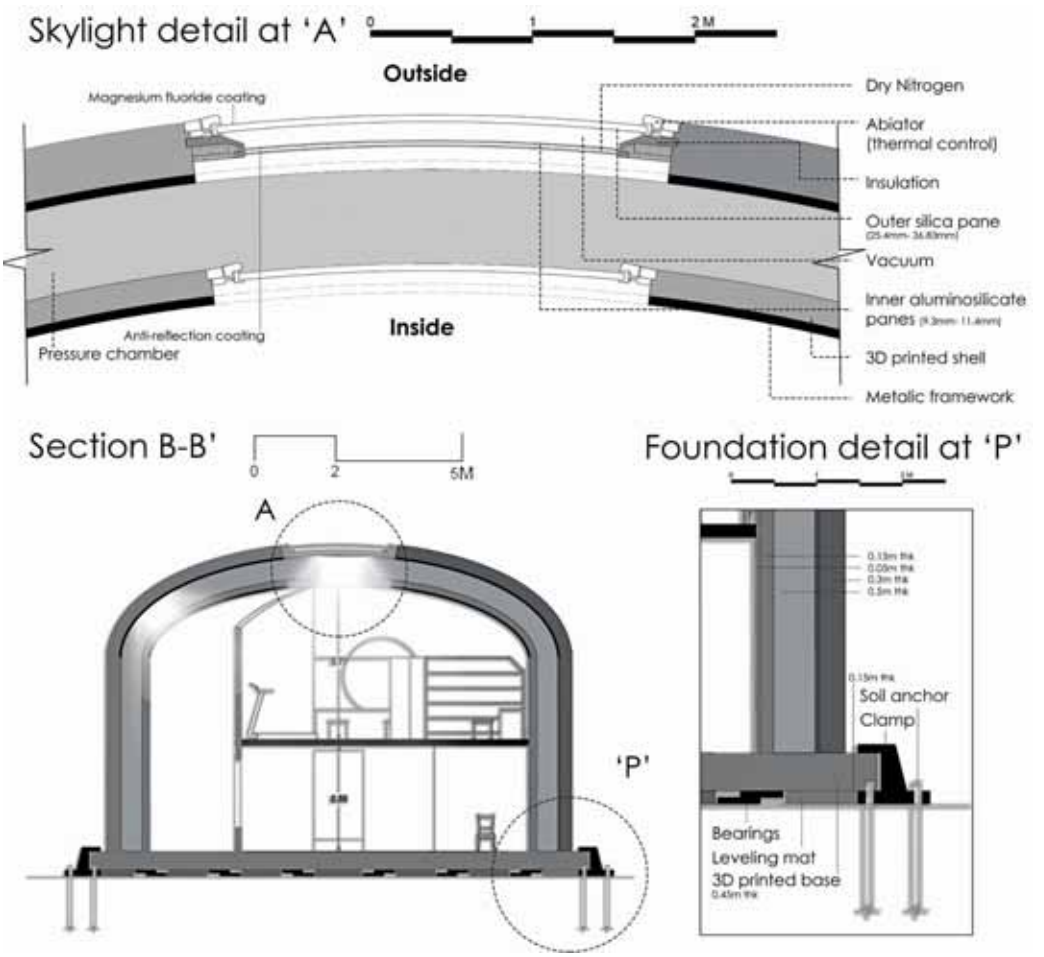


Figure 10: Details - skylight details inspired from the Apollo spacecraft windows, foundation design has been inspired from AI Space Factories design

Source: Authors

4.8 Construction

The 3-D printed structure's elegant curves impart an organic touch to the space, balancing its highly technical nature. As the structural foundation takes shape, 3-D printers seamlessly continue building the rest of the habitat. Constructed in successive layers with integrated voids, the printed dome culminates in a sealing skylight, akin to a keystone. Pressurisation precedes human occupation, therefore, roof of the dome structure had to be carefully designed. Drawing inspiration from geodesic domes, the structural system employs lightweight triangular facets, distributing stresses within the framework (refer Figure 10).

5. Key findings

The first manned mission to Mars will establish prerequisites for subsequent endeavours. Initially, habitats will serve as outposts, emphasising astronaut safety and comfort, evolving towards more permanent 3-D printed shelters. Key research conclusions highlight the need for an interdisciplinary approach for long-term habitation, a phased design based on supply missions, the effectiveness of 3-D printed modules as self-sufficient shelters and the significance of modular systems for flexibility and expansion. The design should incorporate redundancies, allowing modules to detach from the core and form self-contained units in emergencies. Furthermore, design elements should prioritise user needs, optimise space utilisation and minimize airlocks for pressure integrity. Strategic foundation design is vital to withstand Marsquakes and external pressures. A proposed hybrid system, partly underground, aims to mitigate radiation exposure. Mars analogue missions are essential for testing habitat modules and advancing technological readiness for human-centric habitats on Mars.

6. Conclusion and research paradigm

On Earth, design adheres to established standards, but it's vital to recognise that architecture is centered on human needs rather than rigid standardisation. Over time, architecture has evolved to adapt to changing spaces, landscapes, and environmental conditions, but at its core, it remains driven by human requirements. Space architecture serves as a unique teacher, imparting lessons in problem-solving that can be applied on Earth. It challenging us to unlearn and relearn architecture to create distinctive structures that prioritise human well-being. Designing for extreme environments highlights the need for adaptive design, where architectural solutions evolve with shifting environmental factors and human perceptions. The lessons from space design have wide-reaching effects, improving architecture even on our home planet. Architecture exists in places without traditional reference points and endures wherever humans venture.

7. How will it be applicable for the benefit of humanity and on Earth?

Investing in Mars research and designing extra-terrestrial habitats amidst Earth's pressing challenges might seem counterintuitive initially. However, NASA's visionary approach, seen in initiatives like the Centennial Challenge and lessons from Apollo 11, has a historical trickle-down effect. Visualising necessities for other planets drives innovation, pushing boundaries and sparking progress in construction methods and architecture (NASA Centennial Challenge, 2019). Mars exploration and designing for extra-terrestrial habitats offers a unique chance to revolutionise present-day architecture, shaping today's world and preparing for tomorrow's challenges. The thesis research benefits humanity and Earth's design in various ways, a few are outlined below.

7.1 Micro Housing Design

In design, both outer space habitats and micro-housing share innovative concepts like convertible and compact spaces. Crafting self-sufficient habitats for space mirrors challenges in micro-housing, focusing on affordability, comfort, privacy, and group efficiency. The proposed Martian habitat serves as a prototype for both frontiers. The current trend of high-density cities and micro-apartments underlines the necessity for space-optimised housing that can be adopted from outer space designs. Furthermore, space businesses give novel approaches for modifying Earth's construction strategies. This enhances both space research and the future of terrestrial housing by infusing designs with advanced and future-ready concepts and technologies (Bondre, 2023).

7.2 Closed Loop Systems as the future of housing

Designing self-sufficient dwellings on Mars necessitates the development of artificial ecosystems and closed-loop technologies. While complete closed-loop systems do not yet exist, they are critical for Martian habitats, driving innovation in habitat design and inspiring new construction tactics. To achieve self-sufficiency in space, a small, man-made life-supporting ecosystem incorporated into shelters must be established. This includes waste recycling and research into topics such as hydroponics for food and

oxygen production. Incorporating this artificial web into habitat design results in self-sustaining systems that benefit humans. Using space-inspired closed-loop technologies in Earth's designs allows us to go off the grid, reducing pressure on our ecosystem and restoring balance. Exploring extra-terrestrial design concepts not only prepares us for space exploration, but also for the future of humanity.

8. Bibliography

1. Reading List | The Architecture of Outer Space. (n.d.). Places. https://placesjournal.org/reading-list/the-architecture-of-outer-space/?cn-reloaded=1
2. NASA Centennial Challenge. (2019, October 21). Retrieved 2021, from ntrs.nasa.gov: https://ntrs.nasa.gov/api/citations/20190032475/downloads/20190032475.pdf
3. AISpace Factory. (n.d.). MARSHA. Retrieved August 9, 2021, from aispacefactory.com/marsha: https://www.aispacefactory.com/marsha
4. Bondre, S. (n.d.). Micro housing: Affordable Aesthetics in Architecture. Retrieved 2021 from Re-thinking the future: https://www.re-thinkingthefuture.com/designing-fortypologies/ a3025-micro-housing-affordable-aesthetics-in-architecture/
5. Closed loops in ecological architecture and everyday life. (n.d.). Retrieved 2021, from Pressbooks: https://jtisenegal.pressbooks.com/chapter/closed-loops/
6. Dry Valleys Antarctica. (n.d.). Retrieved 2021, from Coolantarctica: https://www.coolantarctica.com/Antarctica%20fact%20file/antarctica%20environment/dry-valleys-blood-falls-don-juan-pond.php
7. Häuplik-Meusburger, S., & Griffin, B. (2021). The Interesting Challenges of Designing for Humans in Space. SPOOL, 8(2), 87–104. https://doi.org/10.7480/spool.2021.2.5267
8. Sandra Häuplik-Meusburger TU Wien. (2011). Architecture for Astronauts - an activity based approach. SpringerWien, NewYork. https://www.researchgate.net/publication/236218029_Architecture_for_Astronauts_-_An_Activity_based_Approach
9. Häuplik-Meusburger, S., & Bannova, O. (2016). Space Architecture. In Häuplik-Meusburger, S., & Bannova, O. (Eds.), Space Architecture (p. 332). Switzerland: Springer Nature.
10. Modin, I. (2019). Life on Mars - Chalmers Open Digital Repository. Retrieved May 17, 2021, from Google: https://odr.chalmers.se/handle/20.500.12380/257079
11. Sarkama, S. (2016, November 1). The Marscape Project. Retrieved 2021, from Issuu: https://issuu.com/sannasarkama/docs/the_marscape_project
12. Exploremars. (n.d.). Human to Mars Summit 2021. In Exploremars [Explore Mars is a global community to establish a human presence on Mars]. Human to Mars Summit 2021, Washington DC, United States of America. https://www.exploremars.org/h2m-2021-video/
13. School of Disruption. (n.d.). The role of architecture and system engineering in space colonization [Video]. Webinarjam. https://event.webinarjam.com/register/57/4qy23cg1

Ar. Vedika Adukia completed her B. Arch at L.S. Raheja School of Architecture (LSRSOA), Mumbai. Through her designs, Vedika wants to push the boundaries of architecture beyond the realms of Earth in order to discover how outer space designs can help humanity and designs on Earth. She believes that natural materials, detailing and faultless execution can give structures their own voice. She has more than 15 publications to her account.
Email: adukiavedika@gmail.com

Ar. Geevith Raghavan (A13177), an alumnus of LSRSOA, Mumbai, brings over 25 years of professional experience. Since 1996, he has been a visiting faculty at renowned design colleges in Mumbai. He has served on diverse educational committees and have been invited to deliver lectures in architectural colleges across India. Currently, he is a visiting faculty at LSRSOA for final year Architectural Design and Design Dissertation subjects.
Email: trgeevith@gmail.com

STUDENT WORK

SENSORY APPROACH FOR VISUALLY IMPAIRED

By Jasreen Kaur and Prof. Archana Singh Rathore

1. INTRODUCTION

Design is often perceived primarily through a visual lens, but it is essential to recognize that design is fundamentally a cognitive process. This study emphasizes that while the visual element is a crucial tool, there are alternative ways to gather information for inclusive designs.(Pallasmaa, 1996) Physical barriers in the built environment can lead to social exclusion and inequality, particularly for the visually impaired. The research focuses on understanding sensory cues in the environment to enhance accessibility and comfort for individuals with disabilities. By expanding beyond the visual dimension, the study seeks to identify key elements contributing to a more inclusive design, fostering a sense of belonging and breaking down barriers in the built environment.

The research hypothesis aims to predict that the sensory approach in the design of a public space for visual impairment promotes easy accessibility and greater comfort.

The research objectives encompass an exploration of disability types and design approaches for public spaces catering to visual impairment, considering challenges, standards, and guidelines. Additionally, the study aims to analyse diverse design approaches for visual impairment, assessing their perception and satisfaction levels through best practices and surveys.

"Disability is not in the person, but in the constraint of the physical space" - author

1.1 BACKGROUND OF STUDY

25% of the world's population is Near or Distant Visually Impaired

Total Population: 7.9 billion

Near or distant Visual Impaired: 2.2 billion

In India, visually impaired: 18 million, (0.018 billion) (Blindness and Visual Impairment, n.d.)(Figure 1)

1.1.1 Impact of Visual Impairment

Personal impact

Young children with early onset severe vision impairment can experience delayed motor, language, emotional, social and cognitive development, with life long consequences. School-age children with vision impairment can also experience lower levels of educational achievement.

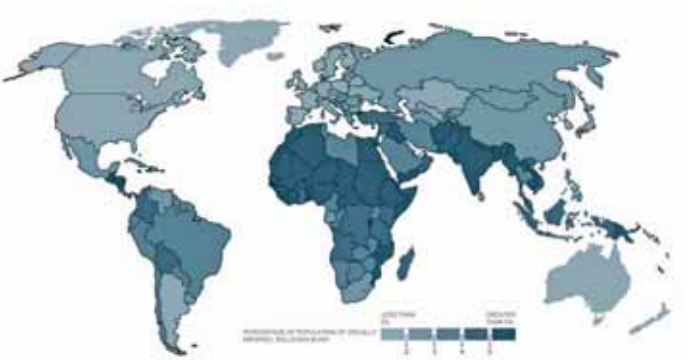


Figure 1: Percentage of Visually Impaired including Blinds
Source: WHO

Adults with vision impairment often have lower rates of workforce participation and productivity and higher rates of depression and anxiety. In the case of older adults, vision impairment can contribute to social isolation, difficulty walking, a higher risk of falls and fractures, and a greater likelihood of early entry into nursing or care-homes.

Economic impact

Vision impairment poses an enormous global financial burden. For example, the annual global costs of productivity losses associated with vision impairment from uncorrected myopia and presbyopia alone were estimated to be US$ 244 billion and US$ 25.4 billion, respectively.(Blindness and Visual Impairment, n.d.)

2. PUBLIC SPACE

"*Public space is central to political and social life in cities. Streets, squares, and parks are places for protesting, socializing, and encountering differences. They contribute to the reputation of cities for vibrancy and livability, and the well-being of urban residents.*"

(Damian Collins, 2020)

"*Public space is property open to public use. It can be privately or publicly owned.Public space are relations of inclusion and exclusion for different groups of people –under conditions of political-economic change; gentrification, urban redevelopment,and corporatization; protest and resistance; the role of public space in shaping relations of gender, race, sexuality, and (dis)ability*."(D. Mitchell, 2009)

2.1 Perception of public space

Public space allows people of all backgrounds to benefit from it, regardless of their personal, social, or cultural differences. Furthermore, public space serves a variety of societal needs by providing various functions and features that connect people to the rest of the world.(Stephen carr, 1992)argues that, in addition to bridging this gap,"public spaces are important because they provide avenues for movement, a means of communication, and a common ground for enjoyment and relaxation."

A variety of variables influence the criteria for developing perceptions of public spaces:

1. Diversity: Humans interact with the built environment while considering a variety of values. Human behaviour is also associated with it. The more relatable the space, the more functional it will be.
2. Age group: Each age group's anthropometry, as well as its variants, will necessitate attention.
3. Comfort factor: The comfort factor of a place is defined by the personal association of the surroundings as well as its orientation.
4. Senses: Public spaces become more meaningful if they are more adaptive in nature. That adaptability can be achieved by the simulations of different senses in that space. It can be more emotional, or visual or can cater to haptic systems.(Chaturvedi, n.d.)

Therefore, the perception of a public space depends on

Table 1: Showing the factors responsible for perception of public space *(Source: authors)*

Accessibility	**Comfort**
Physical accessibility to understand and grasp the environment	Physical and psychological comfort for building confidence

3. ACCESSIBILITY

In architecture, accessibility means creating spaces that are inclusive and usable by as many people as possible, including those with incapacities.Individuals who have impairments face numerous obstacles in their physical environment. People are unable to fully exercise their rights and engage in a range of social, cultural, and professional activities on an equal basis with the rest of society because of these hindrances. However, common perceptions of what disability and accessibility look like are still constrained and frequently only include those who are physically disabled and use wheelchairs. Particularly among architects, accessibility is frequently pictured as requiring the installation of ramps, spacious hallways, and elevators. Accessibility in architecture, however, encompasses much more than just providing space for wheelchair users because disabilities can manifest in a variety of ways, some of which are less obvious than others. (Figure 2)

3.1. Barriers to accessibility

1. **Attitudinal barriers** are actions, attitudes, and false assumptions that prejudice people with disabilities.
2. **Organisational or systemic barriers** are regulations, guidelines, or strategies that unfairly discriminate and may limit how fully a person can participate in a situation.
3. **Architectural or physical barriers** are attributes of buildings or outdoor areas that put obstacles in the way of people with disabilities. These obstacles include things like how stairs or doorways are built, how rooms are organised, or how wide hallways and sidewalks are.

Figure 2: Accessibility criteria catering to different Disabilities –
1. In 1972, Julia Child's "The French Chef" became the first televised program made accessible for the deaf or hard of hearing.
Source: Screen capture and composite from "The French Chef" reruns via Amazon.com
2. The picture shows an entrance hall, on the left, next to
the wall there is a disabled access ramp. Next to it is a set of small stairs. The hall walls and floor are grey while the ceiling and the back door at the far end are white *(Source: Archdaily)*
3. The picture shows a grey pavement, in the middle there are
yellow navigation tiles for visually impaired users *(Source: Archdaily)*

4. **Information or communication barriers** occur when sensory impairments, such as those that affect hearing, vision, or learning, are not considered. Both the sending and receiving of information are hampered by these obstacles.
5. **Technology barriers** occur when a technological platform or device cannot be used with an assistive device and is not usable by its intended audience.

3.2 Types of accessibility

1. Physical Accessibility: Caters to Attitudinal barriers, Organisational or systemic barriers, Architectural or Physical barriers.
2. Sensory accessibility: Caters to Information or communication barriers and Technology barriers.

4. CONCEPT OF SENSORY DESIGN

According to Collins Dictionary, Multisensory means, "involving more than one sense". A significant proportion of our daily life experiences are multisensory in nature, consisting of what we see, hear, feel, taste, smell, and much more. Almost any experience, such as eating or going to the movies, involves a magnificent sensory world.

When the author relates, multi-sensory with Architecture: The architecture of a space should be able to capture the feeling of the users with such ease, comfort, and relaxation that it entices them to revisit the space. This is when the architecture of a space is proven useful for users. To achieve it in a space, an architect must understand and deliver the function of its user to provide the best possible experience. So, when a body moves through or experiences a space, it is not only the body that is moving there but also, the mind that is visualising or interpreting the data gained by the space. Everyone interprets space differently.

4.1 Senses

1. Sight: It is the most dominant sense which allows us to see through our eyes it helps to measure depth, and identify colour, texture, height... etc around us. It absorbs the visual quality of a space. It is also capable of stimulating other senses in our body. Architects focused only on the appearance of the building or space which has been the priority since we started creating built-up structures, there is an unfortunate gap between other senses of the human body and buildings to communicate all senses to understand the built environment especially to feel the space.
2. Hearing: done by the ears which allow us to detect vibrations and sounds present around us. Without viewing the space, we can say a blind person can understand spaces by reflected sound and echo produced in space. It can tell the volume of space from narrow to large, near too far. Our senses can identify that there is a space behind us if we haven't seen it yet because of the sensation of sound on our eardrums. If we want to create curiosity for a hidden space, we just must create a passage for sound toward our eardrum and we can easily sense the space without seeing. Acoustics can tell us the value of space, if some people are sitting around a table and the discussion is not noisy human sense will tell you to move in that space until there is an invitation, opposite to it if there is a noisy space so our senses do not givea signal to stop by moving in space.

3. Smell: Usage of this sense is done by our nose, which allows us to smell whether it is bad or good, pleasant or not, smell has the strongest connection with memory therefore it leaves some image with the kind of smell we experience. Every space has its smell that defines its properties. Which acts as a powerful tool for identifying. To remake an image of the past or memory smell plays an important role, if we want to give a sense of tragedy, happiness, or fear, we can put fragrances that connect our memory to them, and it moves us to that feeling. The smell can capture you in space to sit and think or enjoy the space, and opposite to it can make you uncomfortable in a space to sit or move. the smell of wood, soil, flowers, and fabrics can connect us to nature and make space vibrant and comfortable for us.
4. Taste: this allows us to sense -hot, cold, sour, or sweet or to develop a taste via using our tongue also known as oral sensation. This is a sensitive transfer between touch and taste experiences. Taste is generated when there is a combined action of the nose and tongue. It is also said that visual sensation also collaborates with oral sensation. Our mind usually forms an image, remembers it by its smell, and then develops its taste. A texture or rendering material can create a metallic taste or salty taste by looking at it or by smelling the material. Some images textures or smells can fill your mouth with saliva, which has a long-term impact on your conscious or subconscious mind.
5. Touch: we feel touch with our skin it helps us to sense what is in contact with our body also known as tactile sense, which can recognize the texture, and temperature of an object. The interpretation of light and colour also relates to the "touch or tactile" sense. Touch a solid object, for example, a staircase handrail can give you the feeling of comfort as well as uncomfortable depending on the texture carved on it. The soft fabric of the sofa can make you sit on it for hours in comparison to poor nylon fabric which creates heat by rubbing your body or hand on it. Our mind collects knowledge from these senses and makes a conclusion by processing it, we can put a thought or feeling by using the texture or temperature in the surrounding environment. (Reghukumar, 2019)

4.2 Five senses graph

These senses differ from one another, but they influence one another; the term multisensory broadens when these various senses are combined for sense inhibition.To understand the senses better we have the "five senses graph". By JinsopLee. In which you grade each one of them on a scale of 1-10 based on how much they affect you.

(TedTalk for Architects design for all 5 Senses by Jinsop Lee)

The greater the area / multi-sensory footprint; the better the user experience
(Figure 3)

Figure 3: The graph showing the multi-sensory footprint for various activities
Source: authors

5. SURVEY AND ANALYSIS

Two surveys were conducted to identify the problems associated with accessibility and their perception of a space (how they perceive a space without sight). The first survey consisted of 10 questions conducted at Rajasthan Netraheen Kalyan Sang and the sample frame consisted of 15 students ranging from 12 years plus. Individuals with visual impairment and no

other disability were selected. The frame consisted of people with various degrees of visual impairment and complete blindness. 11 students were Visually Impaired, and 4 students were blind. Students were accompanied by teachers and caretakers during the questionnaire to help them understand and answer a few questions.The survey findings revealed that a significant majority of respondents possess the ability to perceive colours and utilise their senses to discern changes in spatial surroundings. When it comes to navigating within a space, the respondents consistently ranked hearing as the most crucial sense, followed by touch and smell. These results underscore the importance of auditory cues and tactile sensations in facilitating effective navigation and spatial orientation, indicating a reliance on sensory modalities beyond vision for a substantial portion of the surveyed individuals.

The second was an experiment and participatory survey. The following experiment is based on empirical data collected during the visit to Jawahar Kala Kendra. The same participants who participated in the survey conducted at Rajasthan Netraheen Kalyan Sang participated at JKK to observe their reactions when subjected to the same situations at different places. The sample frame consists of three students with varying degrees of visual impairment as

1. Mild visual impairment
2. Severe visual impairment
3. Blindness

In the second experiment, participants encountered challenges in an inaccessible built environment, hindering path determination. Background noise from others masked essential audio cues for navigation, while insufficient lighting posed difficulties for partially blind individuals. These findings emphasize the complex barriers faced by visually impaired individuals, underscoring the importance of addressing environmental accessibility, noise management, and lighting in comprehensive design solutions.Another notable observation was the significance of specific sensory cues such as temperature, haptic feedback, olfactory sensations, and auditory cues in aiding the identification of different spaces. This highlights the diverse range of sensory information that individuals with visual impairments rely on to navigate and comprehend their surroundings, emphasising the importance of incorporating these multi-modal cues in design for enhanced spatial awareness and accessibility. (Figure 4)

Figure 4: Photograph taken at Jawaharlal Kala Kendra during the experiment
Source: authors

The analysis encompassed two literature studies, focusing on the Centre for the Blind and Visually Impaired in Mexico and Hazelwood School in Glasgow, as well as two experiments conducted at Rajasthan Netraheen Kalyan Sang and Jawahar Kala Kendra in Jaipur. The evaluation centred on the parameters of accessibility (physical and sensory) and comfort (physical and psychological), considering key characteristics of space such as spatial organization, scale and proportion, the proximity of spaces, colour, texture, signages, sonic environment, somatosensory sensation, and olfactory environment. The impact of each characteristic on accessibility and comfort was categorized as high, medium, or low. Literature studies concluded architectural reviews and blogs, while experimental data relied on the author's observations during the survey.

6. RESULTS

Based on the survey, the accessibility and comfort of a space depend on various factors that can be categorised into 2 themes namely:
(Gavin R. Jenkins, 2015)

1. Promotor: People with visual impairment require specific sensory cues associated with the auditory, olfactory, and somatosensory (haptic and temperature) systems for orientation and mobility to participate in various activities.
2. Obstacles: People with visual impairment face difficulty in processing information or getting clues from surroundings because of Designs that are population-specific, insufficient lighting etc. making the environment less accessible.

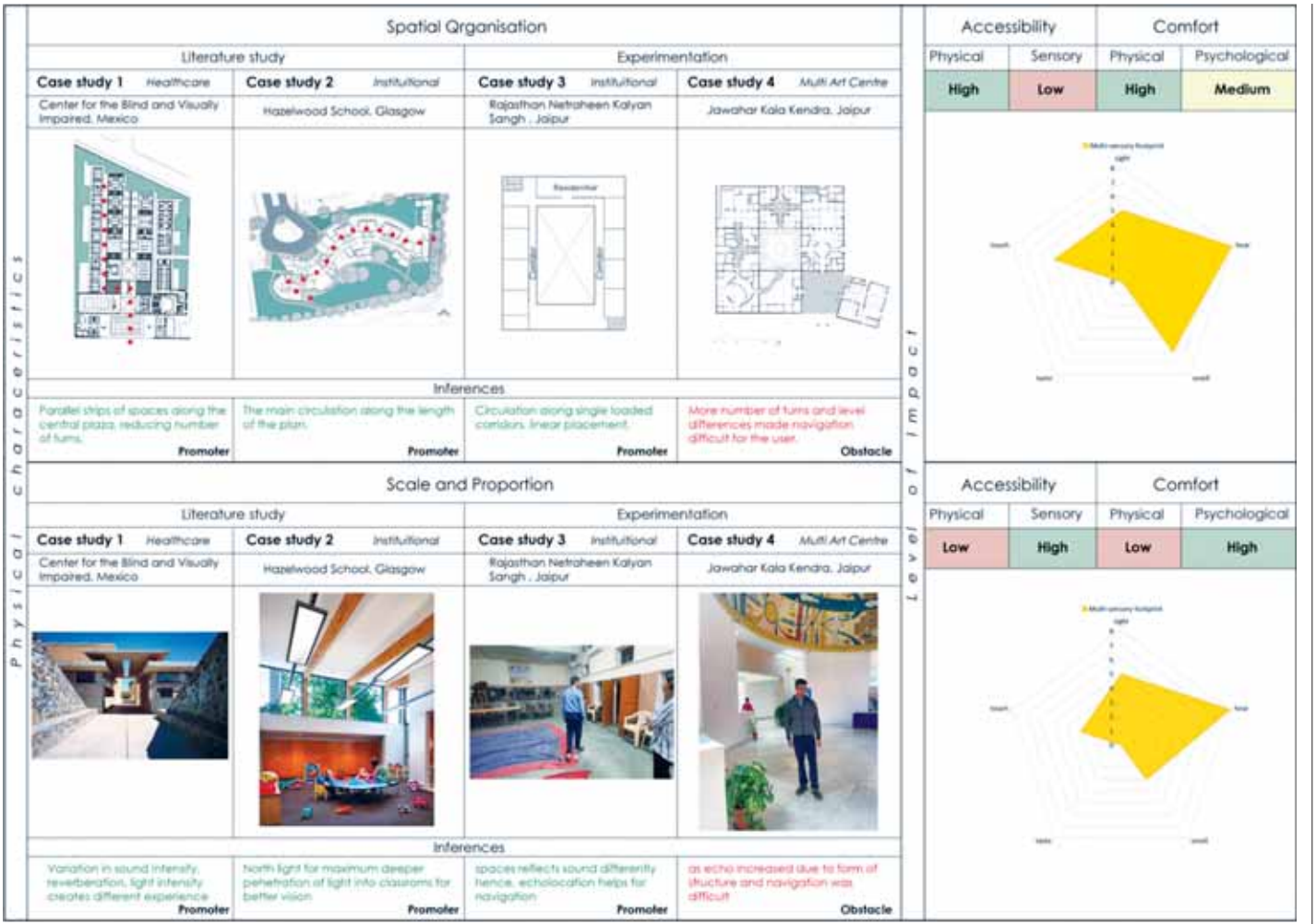


Figure 5: Showing analysis and inference parameters of accessibility and comfort based on Spatial Organisation and Scale and proportion
Source: authors

Table 2: Showing factors that obstruct or promote the accessibility and comfort of a public space *(Source: authors)*

Obstacle	Promotor
Design is not disable-friendly	Auditory Clues (characteristic of sound input – Intensity, Pitch, Tone)
Background with excessive sensory acuity	Olfactory clues
Uneven Ground Surface	Somatosensory clues (Haptic and Temperature)
Insufficient Lighting	Proximity of the clue

The following matrix represents which characteristic of a space can be used to overcome the obstacle, enhance the potential of a promotor.

The colour represented at the intersection depicts the impact on its corresponding factor as a resultant of the two. (Figure 6)

7. DISCUSSION AND CONCLUSION

The essence of a sensory design approach in constructing spaces, as advocated by Chris Downey, lies in creating a robust, accessible city that fosters inclusivity. Challenging the traditional visual-centric view of design, Downey underscores design as an intellectual endeavour, with the visual aspect as a tool rather than the sole source of information. Daily life involves multisensory experiences, and architecture should evoke emotions, ensuring ease and comfort for users. Successful designs comprehend user functions, providing optimal experiential outcomes. Navigating a space involves both physical and mental aspects, with the interpretation of space being subjective, highlighting the inherent variability in spatial experiences. Thus, it can be concluded that 'accessibility' and 'comfort' are factors that must be focused upon while designing space advocating an inclusive environment for all.

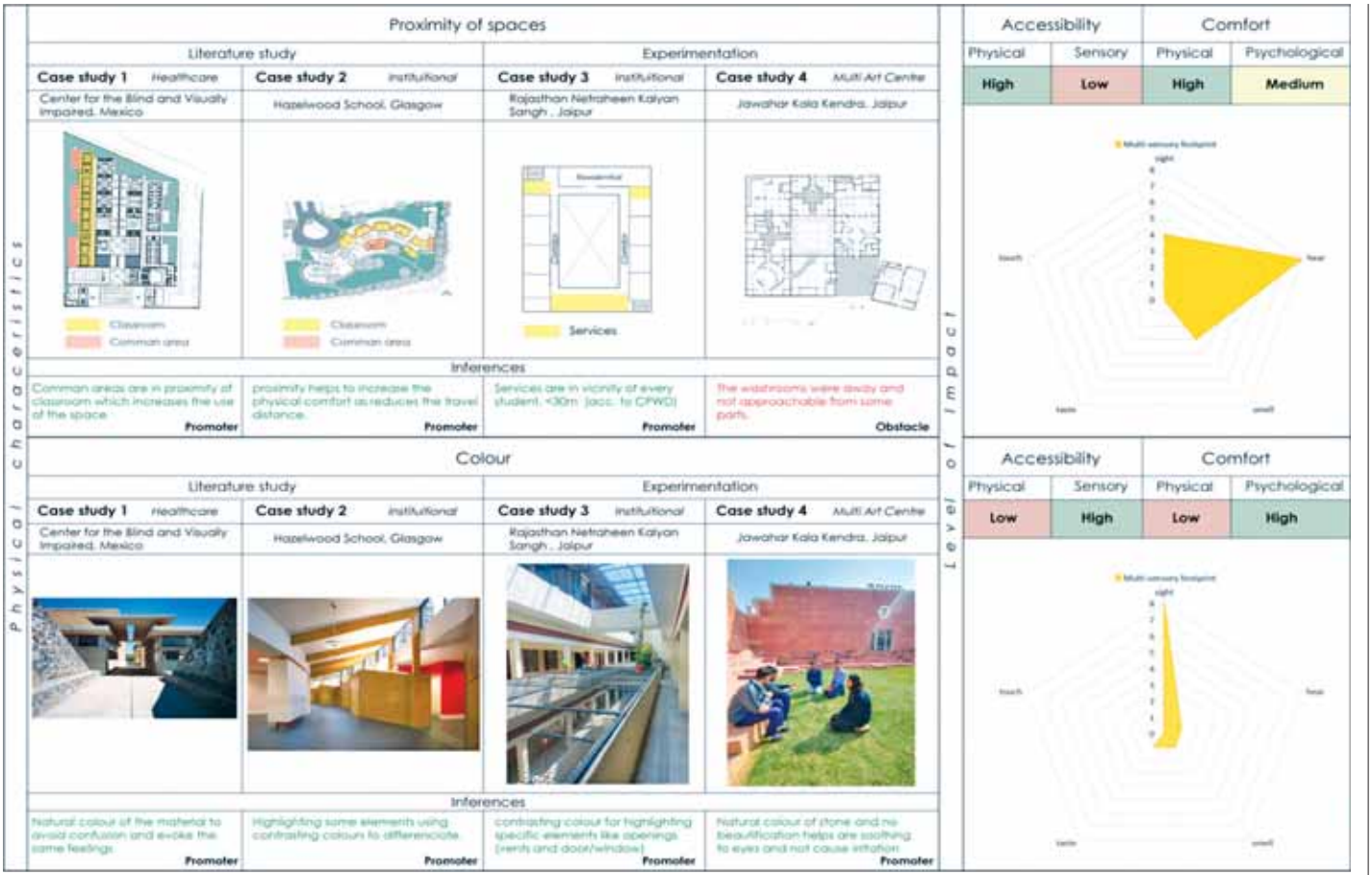


Figure 6: Showing analysis and inference parameters of accessibility and comfort based on proximity of spaces and Scale and Colour
Source: authors

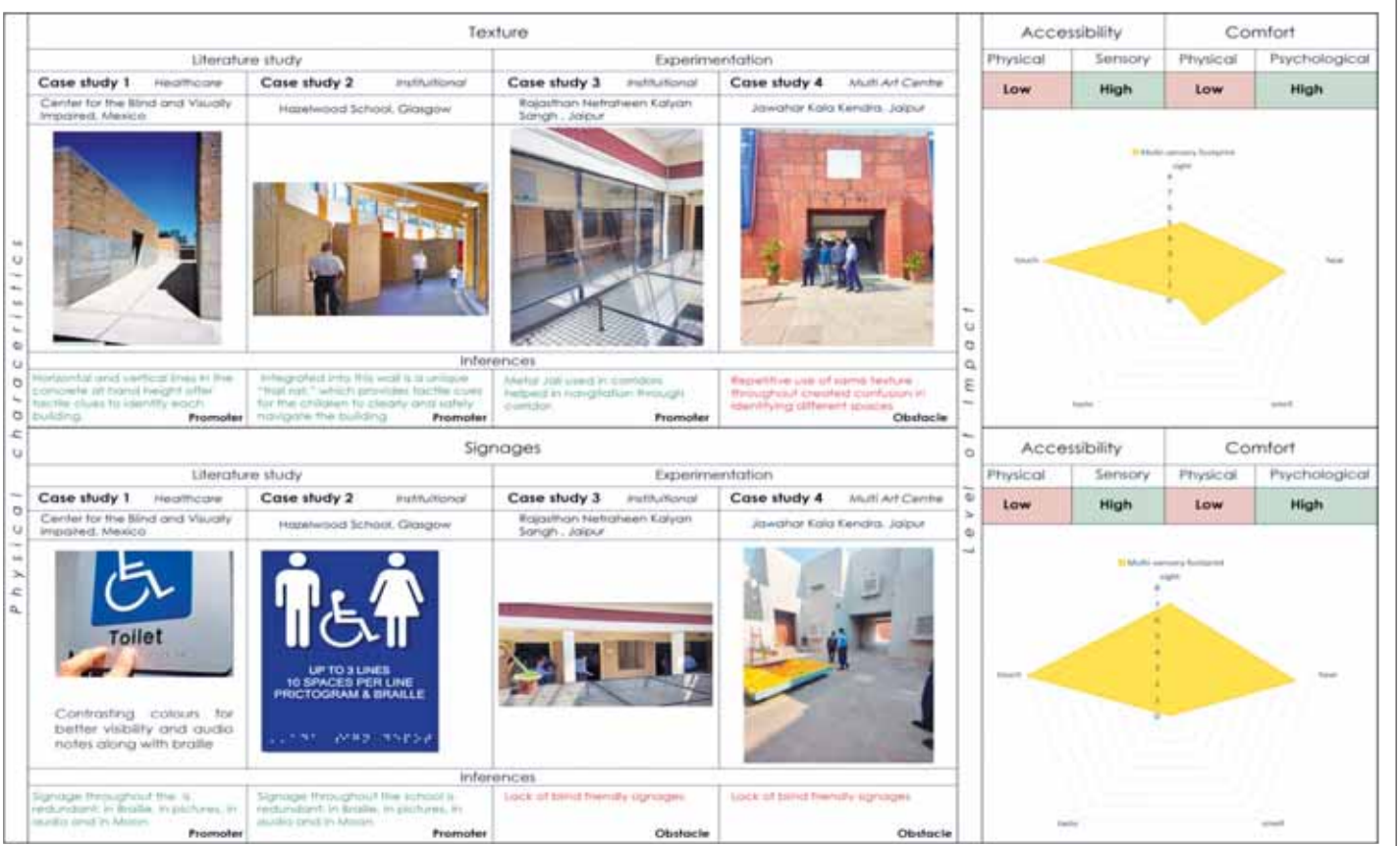


Figure 7: Showing analysis and inference on parameters of accessibility and comfort based on Texture and Signages
Source: authors

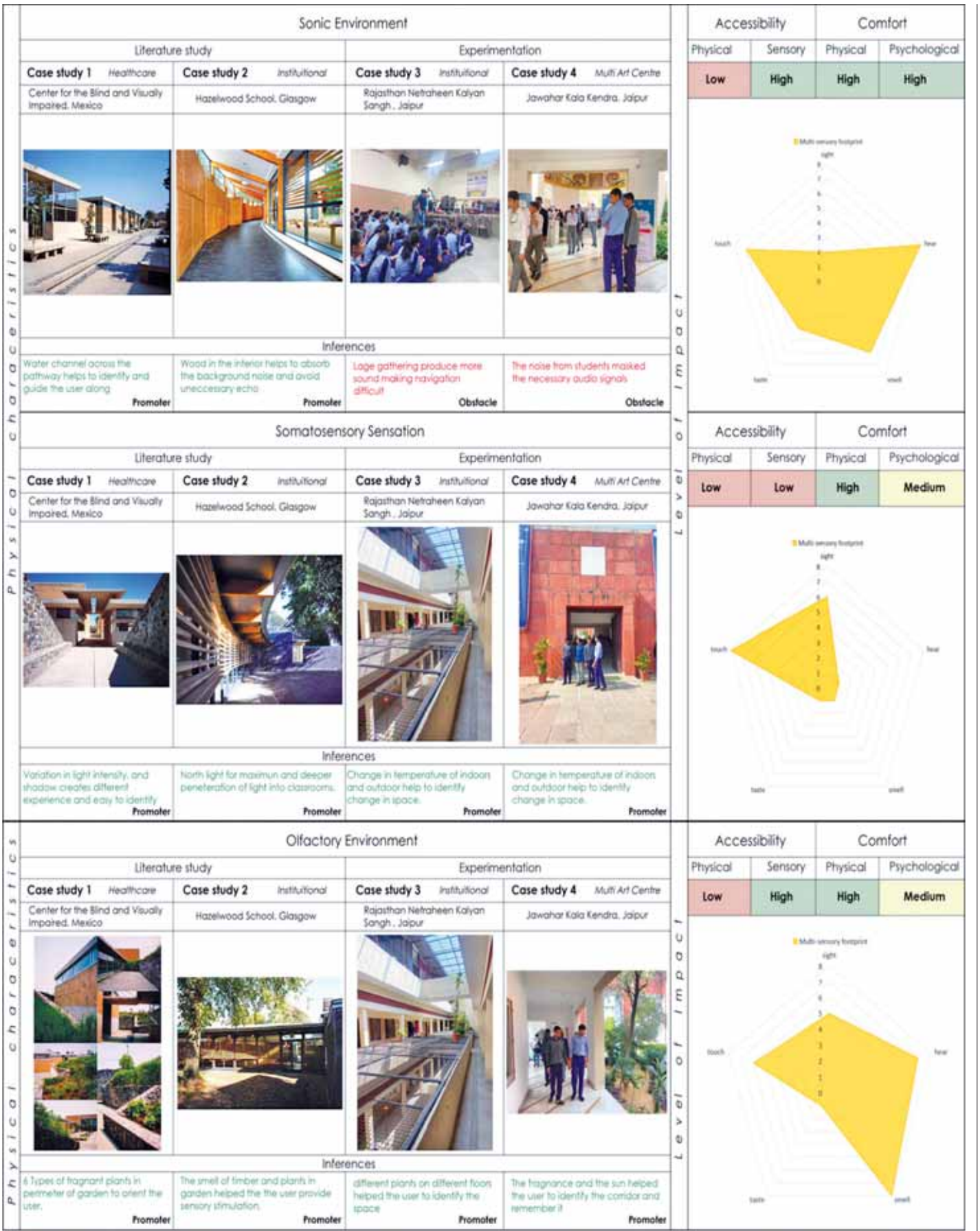


Figure 8: Showing analysis and inference parameters of accessibility and comfort based on sonic environment, somatosensory sensation and olfactory environment
Source: authors

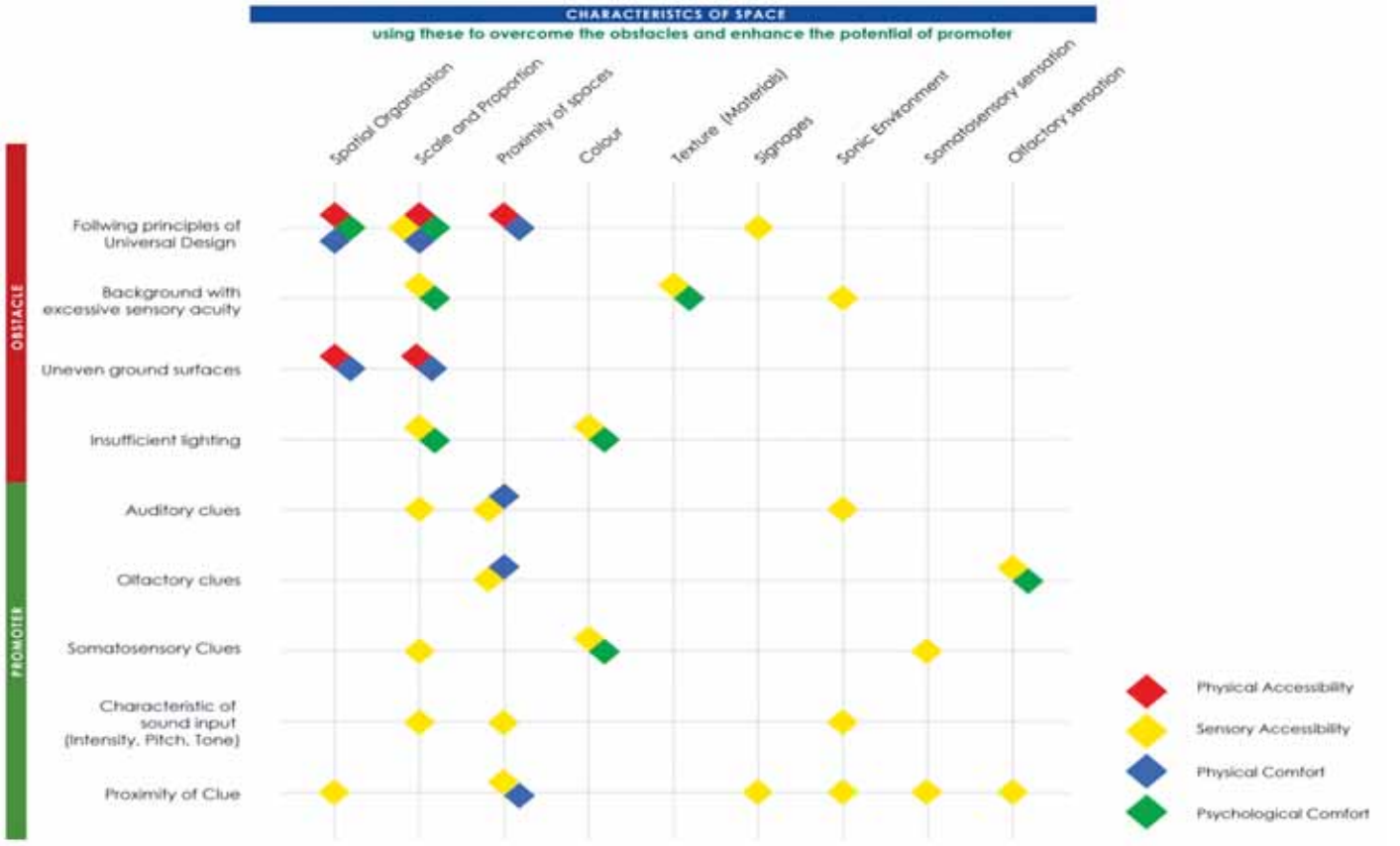


Figure 9: Data matrix showing the relationship between situations in the built environment to characteristics of the space
source: authors

Works Cited

1. Chaturvedi, a. (n.d.). *Public Spaces with potetial and impact on people's perception*. Retrieved from Rethiking the Future: https://www.re-thinkingthefuture.com/narratives/a5430-public-spaces-with-potential-and-impact-on-peoples-perceptions/
2. Pallasmaa, J. (1996). *The eyes of the skin.*
3. Damian Collins, S. L. (2020). *International Encyclopedia of human Geography.*
4. D. Mitchell, L. S. (2009). *International Encyclopedia of Human Geography.*
5. Stephen carr, L. G. (1992). *PUBLIC SPACE, (Environment anf Behaviour Series).* Cambridge University press .
6. *Blindness and Visual Impairment*. (n.d.). Retrieved from World Health Organisation: https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment
7. Reghukumar, A. (2019). Sense and sentivity in architecture - The use of 5 senses in space making. *International Research Journal of Architecture and Planning*.
8. Gavin R. Jenkins, H. K. (2015). Experience of Multisensory Environments in Public Space among People with Visual Impairement. *International Journal of Environmental Research and Public Health*.

Jasreen Kaur, is an Aayojan School of Architecture Jaipur, graduate qualified in the year 2023. She embodies a fervent passion for architectural innovation. Her commitment to crafting spaces that intricately shape human behaviour reflects a dedication to design excellence. With a collaborative mindset, she envisions architecture as a dynamic force, driving positive transformations in the built environment.
Email: jasreenkaur1002@gmail.com

Prof. Archana Singh Rathore (A16640), an Architect and Urban Planner, with over 25 years of teaching experience at Aayojan School of Architecture, Jaipur. Holding degrees in Architecture and Town, and Country Planning, she's pursuing a Ph.D. at MNIT. With committee roles at the Council of Architecture, she contributes significantly to architectural education and research, specialising in building science, technology, and climate-responsive design.
Email: asr@aayojan.edu.in

Certifications for Graduating Architects as a Career Trajectory

By Ar. Dhiraj Salhotra and Ar. Smit Goghari

Background

We are living in a digital era driven by skills. As we continue to progressively move towards being a technologically advanced society, adapting and upskilling has become the need of the hour. As we progress and develop further, the need for skills and knowledge in a plethora of fields has been increasing greatly. Not only are we able to complete the same tasks faster, but with the availability of new technologies, they can be more enhanced and detailed.

Over time, industries across the world have looked at increasing productivity and quality. To achieve this, industries, including architecture and the building industry, have been ensuring tracking and monitoring of the quality of the products and refining them based on feedback, inspections and audits. Audits and evaluations as benchmarks for performance, efficiency and quality are being either mandated or desired by various governing and industrial bodies. These evaluations are to be taken up by niche specialists who understand the field in detail. Candidates possessing such skills or certificates can have a unique advantage in pursuing a career in these specific fields.

Gaining Expertise through Specialised Training

A master's program is domain-specific which means it can become related to the environment, sustainability, history, landscape, building information modeling (BIM) and so on. Each of these domains covers various industries. Candidates who understand the concepts of the domain can learn and get certified with various skills that can allow them to pursue a niche within the domain. A full time master's program can be supplemented with many short-term market-ready certification programs that are available and are sought after as they have a demand in the industry for their niche specialisation. These certification courses can also allow professionals to upskill in their domain while allowing them to continue to work.

Today, one of the most preferred certifications being pursued by students and professionals in the field of environment and sustainability is LEED AP or IGBC AP or GRIHA Certified Professional. These certifications allow the individual to develop into auditors or team members of auditing firms that work on LEED, IGBC or GRIHA certifications. The clear guidelines for the course content, competitive nature of examination and universal acceptance of the certification are the hallmarks of these courses.

The WELL AP certification is gaining great demand in the industry as real estate developers view it as a unique feature for the projects that address the component of wellness of its inhabitants. As more

Figure 1: GIS workshop for students for advanced mapping and spatial study
Source: Authors

Figure 2: Students on fieldwork to learn about the implementation of sustainable techniques
Source: Authors

Figure 3: Field work on advanced construction using BIM and its implementation
Source: Authors

and more projects seek to become WELL compliant, there is a growing demand for expertise of WELL experts for guiding the design and execution or contributing as advisors or certification experts.

Environmental Social and Governance (ESG) professional training can open a floodgate of opportunities for architects and can pave the way for top positions in a short period of time. Though architects are the best fit, however, they usually undermine the value of ESG certification.

This also holds true for professional certifications in BIM, where professional certificates in Revit are sought after by architectural firms for their prospective employees. Increasing number of offices are adopting an internationally recognised pattern of work culture of integrating participation of various consultants on a robust software-based platform. There is a steep rise in demand for competent BIM professionals in the industry. Interestingly, companies desire candidates who are certified in operating and using these software. Software companies issue certificate programs as validation of skill required to optimally and correctly use the software, such as Autodesk Certified Professional (ACP).

Another skill that is usually forgotten and not really focused on is the understanding of writing tools like MS Word and spreadsheet processors like MS Excel. Good writing skills are needed as almost all processes require submission of reports. Artificial intelligence and writing aids can help, but they need to be used in tandem with basic writing, formatting and researching skills that word-processing software allows. This discussion also continues in the case of spreadsheets. FSI calculations, load calculations, tenant details and inventory are all case points where basic or advanced skills in a spreadsheet software are required. Students or professionals interested in pursuing a career in residential or high-volume architectural projects need to master these software. A number of certification courses are available which can advance one's understanding on these topics.

Gaining proficiency through certification in project management by undertaking specialised training in operating software such as Primavera and Microsoft Project helps develop core competencies that enhance performance of managers. The certifications gained as Project Management Professional (PMP) and or Certified Associate in Project Management (CAPM) could act as a stepping stone in forming a career as an effective project manager. Some of the other similar domains of training and certifications with immense market value are Scrum Master, Lean Six Sigma Green Belt and Agile. At the super-specialty level, TOGAF and Archimate can also be explored as lucrative ventures and currently very few professionals are available in this league.

The developments in parametric architecture have changed the focus of architectural design abilities. Rhino, Python and Grasshopper are widely used for 3D modeling of designs that have a huge demand, not only limited to the core domain of architectural practice. The technology is best suited for adopting 3D printing and creating designs that have immense aesthetic appeal and an outcome of digital and machine engineering.

Use of Geographic Information System (GIS) software is now an academic necessity for graduating architects. The advantages of using the software for

Figure 4: Students learning about parametric architecture
Source: Authors

site analysis and terrain studies makes knowledge of GIS mandatory, however, very few professionals are available in the industry that can perform all the operations that the software has to offer. A short-term certificate program can add value to the CV and especially open a box of opportunities for architects seeking career growth in areas of research, urban design and planning.

The robust framework for certification programs is based on the thorough syllabus content that is periodically updated to meet the industry requirements, continual learning through follow-up programs and the competitive nature of the examinations.

Conclusion

Foreign education campuses attract talent from across the globe. Most of these students have an advanced understanding of various CAD, rendering, modelling and management software. This allows them to excel in their academics and greatly enhances their career prospects. In a reference and continuation to our earlier article titled "*International Post Graduation as the Trajectory of Career Path" (published in JIIA. September 2023, Vol. 88, Issue 9),* pursuing higher education abroad is becoming a significant choice for students of architecture. The most common desire of such candidates is to pursue employment in the new country with a few desiring an opportunity to reside in the country. In this pursuit, it can be a game changer if a student can hone these skills during the course of study itself. In many international placements, continual improvement and regular certifications are mandatory for survival in the industry. Upskilling programs for aligning with latest regulatory norms, policies and implications of techno-legal updates on the profession require periodic improvement through refresher courses. Certified programs that create chartered proficiencies is the most effective way a company can ensure continuation of competent staff. In all, upskilling through specialised trainings and certified programs can help jumpstart your career as well as climb the ladder in your chosen career path.

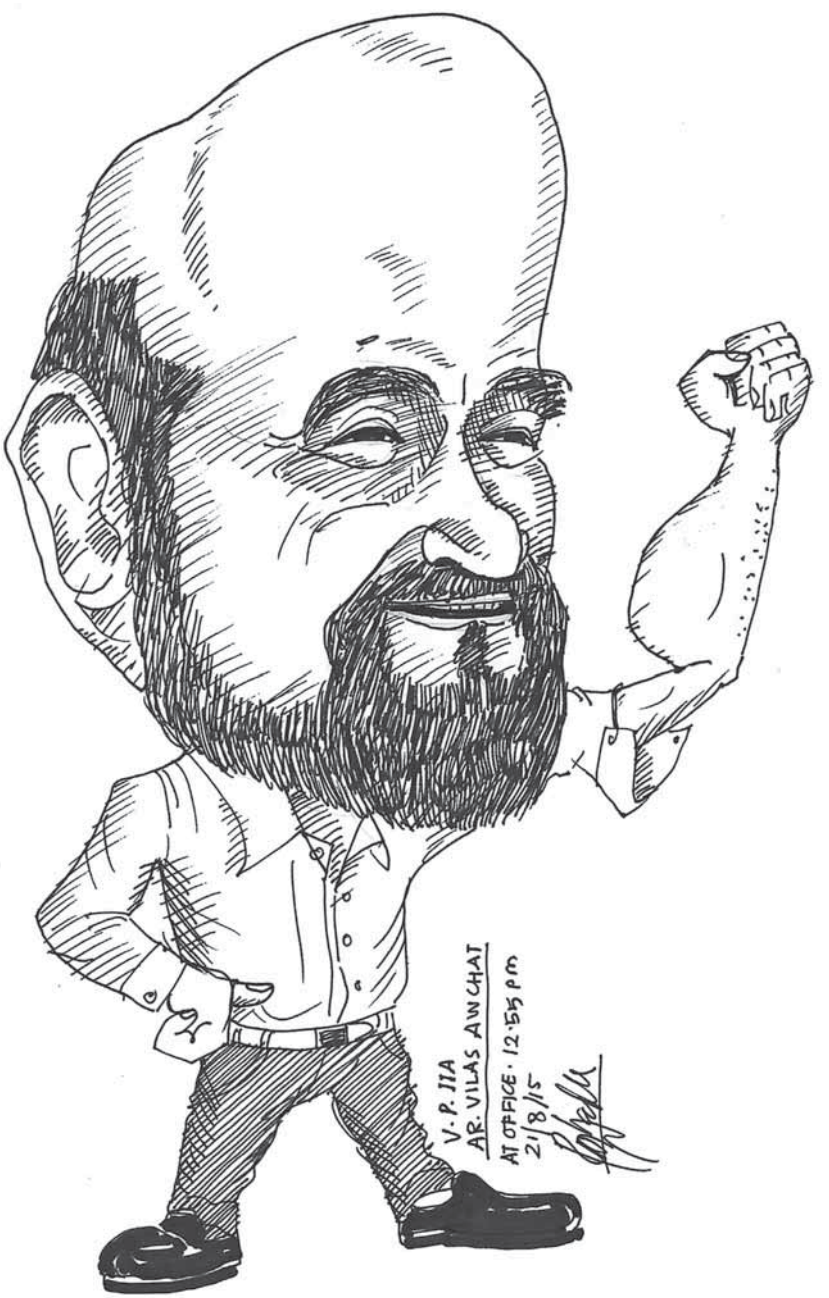
Prof. Dhiraj Nandkishore Salhotra (A11237) holds M.A. (History) and M. Arch. (General). His area of research is identifying design pedagogy and creating a social response while attempting to demystify innovative ways to adopt appropriate methods in managing urbanisation. He has made presentations on sustainability and humanising agenda at several national and international conferences and seminars. He is the Principal at Thakur School of Architecture and Planning (TSAP), Mumbai.
Email: tsap.dhiraj@gmail.com

Ar. Smit Goghari is an Assistant Professor at Thakur School of Architecture and Planning (TSAP), Mumbai. He has industry experience and being entrepreneurial, has started his own firm. He is an architectural critic and a voracious reader, committed to addressing issues of the profession. He is currently the coordinator of the TSAP Career and Advisory Cell.
Email: tsap.smit@gmail.com

CARICATURES

By Ar. Ravi Gadre

Drawing caricatures and cartoons has been a source of inspiration for architectural thought processes.



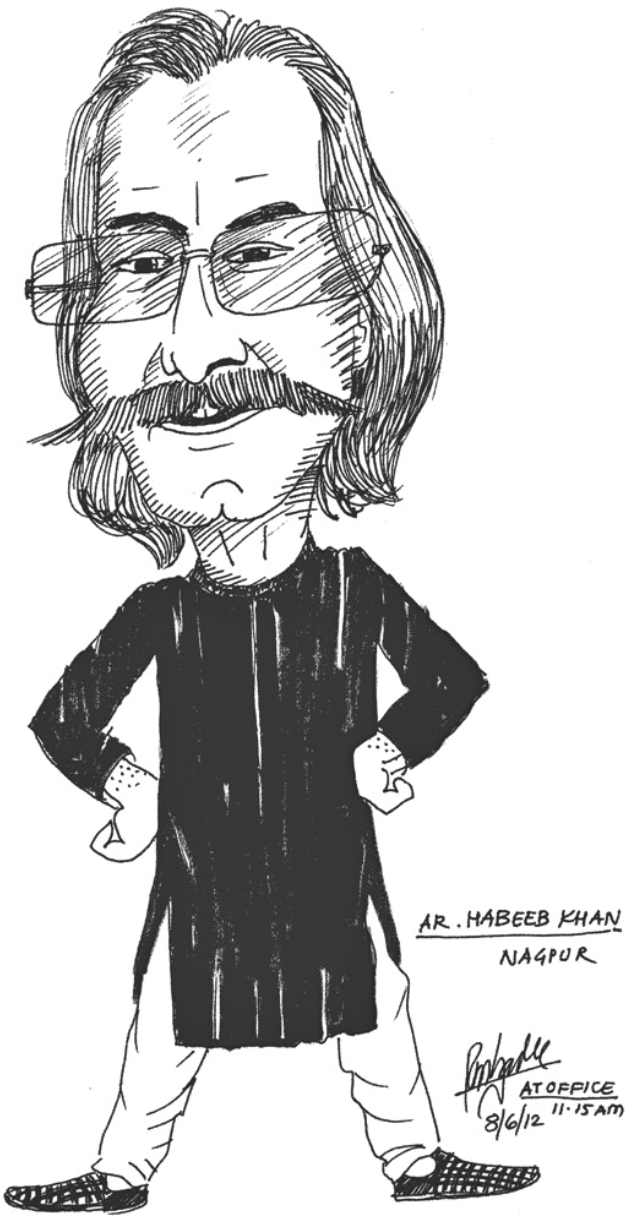
Ar. Vilas Avachat

Ar. Prem Nath

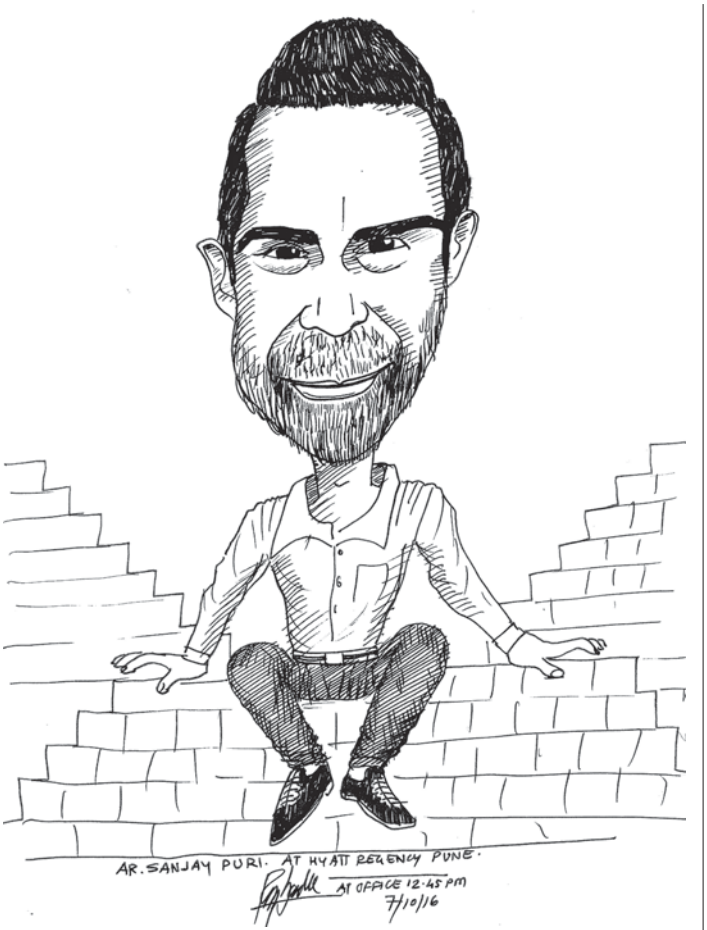
Ar. Christopher Benninger

Ar. Kamal Malik

Ar. Karan Grover



Ar. Habeeb Khan



Ar. Sanjay Puri

Ar. Ravi Gadre (F-07871) has completed his G.D.Arch from Abhinav Kala Mahavidyalaya of Architecture, Pune. He started a partnership practice in 1979 as *M/s. Gadre Limaye & Associates* and his own firm as *M/s. Ravi Gadre & Associates* in 1998.

He has been visiting professor at BKPS CoA, Pune and BVCoA, Pune. He is fond of photography, music, travelling and reading. He has been awarded several times for his architectural work, as well as for his sketching.

Cheerleading Women Empowerment

By Ar. Archana Khanna and Ar. Rajkunwar Nayak

Each time a woman stands up for herself, without knowing it possibly, without claiming it, she stands up for all women.

- Maya Angelou

What does Women Empowerment imply?

Empowerment is a process, a transition, by which anyone who has been denied the ability to make strategic life choices acquires the same. Women's empowerment is enshrined in Sustainable Development Goal 5- Gender Equality- 'End all forms of discrimination against all women and girls everywhere.'

Women's empowerment includes women's sense of self-worth, their right to have and exercise choices, their right to have access to opportunities and resources, their right to have the power to control their own lives, both within and outside the home, and their ability to influence the direction of social change to create a more just social and economic order.

Empowerment involves removing any constraints that impede women's ability to determine and realise their goals.

These constraints include the capacity for goal-setting and follow-through, indicative of their level of self-efficacy and self-esteem, access to the inputs (such as capital, assets, tools, and information) that individuals have at their disposal to enable decision-making and actions to achieve their goals and an enabling environment for equitable decision-making, including institutions and social arrangements. The empowerment and autonomy of women and the improvement of their political, social, economic and health status is an important vertex in itself.

What does Women Empowerment mean for Women Architects?

The profession of architecture today is transforming. Women architects participate in the field in increasing numbers as designers, as teachers and researchers, and as policy and decision makers. Many women architects have opted to establish successful partnerships in practice, balancing a tough existence. Women are now far more visible than ever in positions of academic and professional leadership, and as heads of governmental and non-governmental organisations. At the same time, as their social position and financial power rises in different fields, women are now taking over as clients and promoters.

There is a societal shift in perceiving the role of women, both as designers and as consumers.

It has been observed however, that while societal changes have ensured a better gender balance in our educational institutes with some even boasting of a higher female student ratio, this involvement of women in the profession dwindles rapidly over their early few years in the profession.

Globally too, although some architecture schools may not be free of discrimination, it is probably the least discriminatory environment women encounter in their careers. The early years in practice too bring little differentiation between men and women. It is as they advance that difficulties arise, when firms and clients shy away from entrusting high-level responsibility to women. Women are generally

less aggressive to demand promotions and salary increases unlike their male counterparts, and believe if they work hard it will be recognised at some point. Hence issues such as pay disparity, unequal opportunities, unrecognised extended responsibilities and unequal work environments continue to persist and hinder women in the profession.

Last, but not the least, the unbalanced expectation of women's role in childcare and the lack of institutional support for parental leave and childcare contributes immensely to prolonged career breaks. Very few women are seen to be able to mainstream back into the profession after the maternal break, losing out on career and salary advancements.

It is in this context that awareness raising, building self-confidence, expansion of choices, increased access to and control over resources, and actions to transform social institutions are critical for empowering women to claim their rights and sail right back into the profession, while enhancing their decision-making capacity for their own lives.

Institutions such IIA and COA can play a major role, and be the catalysts of change, enabling and encouraging women professionals to return to the profession, and build their careers.

Women architect members of these professional bodies already active in the profession, can be a source of inspiration for others. They can help, support and extend hand holding to fellow women architects, thereby contributing to a more inclusive and supportive environment for the 'fence-sitters' to come back to the fold.

Career women are often trying to manage a household and raise a family and in constant pursuit to achieve a work life balance. That is reason enough for saluting their outstanding achievements. acknowledging their immense contribution through recognitions, felicitations and awards, thereby showing approval and gratitude, making them feel that their work is valued. It is also a tremendous encouragement for other women architects, implying that the profession is a safe, inclusive place to work, where women can also look forward to progressing their careers and celebrate their own achievements.

We have already come a long way in this journey. Our predecessors have worked very hard, shaking off conservative beliefs and rigid perceptions in our favour.

The torch is now in our hands, and we need to endeavour to make it burn as brightly as possible before handing it over to the future generations.

Ar. Archana Khanna (F-10958) Founder-Partner of the Delhi-based award-winning practice *First Principle*, is also a visiting faculty at SPA, New Delhi. She is a trained GRIHA certified professional, a member of the Heritage Conservation Committee at MoHUA, Government of India, a member of the Women Empowerment Committee at IIA national level, an Office Bearer of the IIA Northern Chapter, while championing several other causes and commitments.

Email: archana@firstprinciple.org

Ar. Rajkunwar Nayak (F-09751) Chairperson, IIA Women Empowerment Committee, a well-known architect, urban planner and educationist for the past 3 decades and has held many pivotal positions in the academic as well as professional spheres. She has been the recipient of the IIA Presidential Recognition, Neptune Glitz Award for Design Excellence, Silver Honour PMCA-ABIT Group of Institutions, Inspiring Women of Odisha Award by Aditya-Birla Ultratech Cement, Rotary Best Teacher's Award and others for her achievements, dedication and passion to the profession and society time and again.

Email: rajkunwar.nayak@gmail.com

Nationwide Celebration of International Women's Day

Compiled by the IIA Women Empowerment Committee

IIA Bihar Chapter's celebration of Women's Day with the Woman Mayor of Patna as Chief Guest

IIA Chhattisgarh Chapter's Celebration of women architects held on 16 March

Patiala Centre of IIA Punjab Chapter got together to honour and celebrate its women

The three day Celebration of International Women's Day at the IIA J & K Chapter with interactions between the inmates of Neha Ghar (Swadher Greh) followed by felicitations, cake-cutting ceremony, panel discussions and presentations by women architects of the region and yoga session.

Kalyan Dombivili Centre of IIA Maharashtra Chapter celebrated its women architects with a site visit to Amber One Complex, Dombivli.

IIA Kerala Chapter wishes everyone on International Women's Day

Ludhiana Centre of the IIA Punjab Chapter celebrating women's day with fun and frolic

Kolhapur Centre of IIA Maharashtra Chapter celebrated with a keynote talk on organic and natural methods of farming by Monika Mohite at Mohite Agro Farm

Women's Day Celebrations at the IIA UP Chapter with an enlightening panel discussion.

IIA Maharashtra Chapter's Navi Mumbai Centre celebrates Women Empowerment with their extravaganza- 'Design Her'.

The IIA Odisha Chapter International Women's Day Celebrations included felicitation of women architects, mesmerising fashion show entitled NAARI - Woman's Journey through the Ages and cake cutting by women of eminence.

IIA Rajasthan Chapter celebrated the day with a Food Walk- a gastronomic experience discovering the city's vibrant art, craft and architecture.

Srinagar Centre of the IIA Jammu & Kashmir Chapter hosted a vibrant event on 8 March 2024 to celebrate and honour remarkable achievements of women bringing together architects, engineers, members of business community, journalists and radio personalities.

The International Women's Day Celebrations by the IIA Uttarakhand Chapter at the Jim Corbett National Park.

Panel discussion at the IIA Jharkhand Chapter moderated by the Chairperson with women architects of Jharkhand held at Ranchi.

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IIA CHHATTISGARH CHAPTER

Honouring Women in Architecture: A Celebration of Diversity and Excellence

On the occasion of Women's Day, the members of the IIA Chhattisgarh Chapter came together to celebrate the remarkable contributions of women in the field of architecture. The event, held on 16 March in Raipur, served as a culmination of the IIA Durg-Bhilai and IIA Bilaspur Sub-Centre events organised on 8 March 2024. It was a fitting tribute to the indomitable spirit and creativity of women architects.

Honouring Women in Architecture: A celebration of diversity and excellence by IIA Chhattisgarh

To honour the significant contributions women have made throughout history, the ceremony began with a moving reading of a poem written by Ar. Vishwanath Agrawal, reciting the accomplishments and names of women who have made a lasting impression on the world through architecture.

Ar. Sangeeta Bais, main architect of the famed heritage conservation firm *Dharohar*, gave an interesting talk discussing her work throughout her career, including topics such as research-led initiatives, adaptive reuse and building conservation. While discussing the successes and failures that occurred during the construction of important projects, she shed light on places like Nandi Dwar, the Mahakal Dwar Corridor, the Barracks at Chatta Bazar near Red Fort and others.

Following this, Ar. Parampreet Kaur led an engaging panel discussion. Members of the panel included eminent experts from a range of fields, such as Dr. Swasti Sthapak, Shilpi Sonar, Meenal Choubey, Tripti Nagaria, and Namrata Ghai. Their varied backgrounds in academics and interior design brought new depth to the discussion, clarifying the many facets of women's responsibilities and obstacles in the field of architecture.

The significance of mentoring, methods for encouraging diversity and gender equality in the field were among the important topics covered by the panel. It was an engaging discussion that brought to light the strength and will of female architects in the face of adversity, allowing them to shape the built environment. A *nukkad natak* (street performance) portraying the dreams and realities of women architects was performed. The show struck a chord with viewers and served as a powerful call to action to value diversity and advance women in all areas of the workforce.

Participants gathered for a touching group picture session as the day came to a close, reflecting the spirit of unity and friendship among architects and supporters dedicated to promoting gender equality in the field. The Women's Day event that the IIA Chhattisgarh Chapter planned was a true reflection of the Chapter's dedication to recognising and empowering women in the field of architecture. The event brought attention to the significant achievements of female architects and the need to make the field more welcoming and equal for all people by means of thought-provoking presentations, lively debates and artistic displays.

IIA ODISHA CHAPTER

Empowering Women Architects: An Inspiring Women's Day Celebration

On 17 March 2024, IIA Odisha Chapter held a remarkable event to commemorate *International Women's Day* at Hotel Lyfe in Bhubaneswar. This celebration served as a powerful tribute to the remarkable women architects of Odisha, recognizing their profound contributions to the dynamic field of architecture and design. The event commenced with insightful technical presentations delivered by leading women architects of Odisha, highlighting their innovative approaches and groundbreaking projects. Distinguished guests, including Mrs. Yamini Sarangi, IAS and Mrs. Roopa Roshan Sahoo, IAS graced the occasion, adding prestige to the celebration.

One of the highlights of the evening was a captivating theme-based fashion show titled *Naari - Women's Journey Through the Ages*. Various women architects of Odisha donned apparel representing different

eras, from the ancient period to post-independence India, to the present day. The fashion show served as a poignant portrayal of the evolving roles and empowerment of women throughout history.

Women architects of Odisha wearing apparel representing different eras, from the ancient period to post-independence India, to the present day.

In a heartwarming gesture, the Chapter felicitated esteemed senior women architects, including Ar. Prof. Dr. Bharati Mohapatra, Ar. Namita Mohapatra and Ar. A.Subhalaxmi Pattajoshi, acknowledging their exemplary leadership and contributions to the profession.

Following the formal proceedings, the event transitioned into a networking session, providing a platform for professionals to connect, share insights and forge meaningful collaborations.

The celebration of International Women's Day 2024 by IIA Odisha Chapter underscores the organization's commitment to recognising and empowering women in architecture, paving the way for a more inclusive and diverse industry. Through this initiative, the Chapter has created a powerful platform to celebrate the achievements of women architects and inspire future generations to pursue their dreams in this field.

IIA PUNJAB CHAPTER

International Women's Day Celebrations with a Tribute to Women Architects

IIA Punjab Chapter, in collaboration with various Centres, celebrated International Women's Day with a profound focus on honouring women architects. Under the theme of 'Honouring Women Architects and giving them the Centre-stage', the event aimed to emphasise the inclusivity and respect for the involvement of women in the architectural profession.

Ar. Pritpal Singh Ahluwalia, Chairman IIA Punjab Chapter while addressing the attendees, highlighted the importance of inclusiveness within the IIA and stressed the need for the active participation of all members in various activities. He reiterated that the day was a perfect occasion to recognise and celebrate the contributions of women architects, ensuring they feel valued and respected within the profession.

The series of events, inspired by the IIA National team, witnessed active participation and collaboration from various Centres and Committees. Ar. Indu Arora, Convenor of the *Women Architects Working Committee*, played a pivotal role, alongside Centre Chairpersons including Ar. Balbir Bagga from Ludhiana, Ar. R.S. Sandu from Patiala, Ar. Anomol Garg from Bathinda and Ar. Paramjit Singh from Mohali. The celebrations commenced on 28 February in Patiala, where renowned architect and academician Ar. Sangeeta Goyal spoke on the strengths of women in architecture. This was followed by insightful talks by Ar. Yashica Goyal and Ar. Indu Arora, shedding light on the unique abilities and perspectives of women architects.

Capturing the visionary essence: Women architects at Ludhiana Centre in the vibrant tapestry of IIA Punjab's International Women's Day events. This celebration was also held at Patiala, Bathinda and Mohali Centres.

On 7 March, Bathinda hosted an interactive session focusing on the challenges faced by women in their professional and personal lives. Students actively engaged in discussions, pledging to promote awareness about women empowerment and various social issues.

The festivities continued at Lodhi Club, Ludhiana on 8 March with fun games and award ceremonies recognizing the achievements of women architects. Ar. Shubham Popli addressed the gathering, emphasising the importance of women empowerment and gender equality. The eight awards were given in different categories to architects- Ar. Aanchal, Ar. Gupta, Khushboo, Ar. Nidhi Ar. Raheja Ar. Shubham Popli, Ar. Amrita Taneja, Divnoor Kaur, Shweta Khosla and Ar. Akanksha Sharma were awarded prizes.

The grand finale took place in Mohali, with over 200 participants attending. Guest speakers delivered motivational talks on visualisation and life transformation through brain reprogramming. Women architects from the Tricity were honoured for their exceptional contributions, with special recognition given to Ar. Prabhjot Kaur for her lifelong dedication to the field of architecture. Special award of eminence was given to Ar. Sarab Marwaha, Ar. Reshmi, Ar. Swati Behl Uppal, Ar. Preeti Bathia, Ar. Madhu Garg and many more. Notable attendees included A.R. Manmohan Khanna, Chairman of IIA Chandigarh, Ar. Kapil Setia, Chief Architect of Chandigarh and Ar. Surinder Bagha, Former Chairman IIA Chandigarh-Punjab, among others. The event concluded with heartfelt thanks to all participants, panelists and architects for their contributions towards making the celebrations a resounding success.

IIA Punjab Chapter's Executive Team and members are committed to promoting excellence in architecture and providing a platform for architects to collaborate, innovate and contribute to the built environment. With a focus on inclusivity and diversity, the Chapter strives to recognise and celebrate the achievements of architects in the region.

IIA WEST BENGAL CHAPTER

International Women's Day Celebrations by the IIA West Bengal Chapter on 23 March 2024

IIA West Bengal Chapter celebrated International Women's Day on 23 March 2024 with the theme 'Embrace Equity'. In the field of architecture, equity means ensuring equal opportunities for women to participate at all levels, from conceptualising ground-breaking designs to leading major projects to fruition. It means fostering a more inclusive environment where diverse voices are heard and where creativity thrives.

The Keynote Speaker for the evening was Ar. Chitra Vishwanath, Principal Architect, Founder and MD of *Biome Environmental Solutions*, presented her architectural works and shared the experiences of her three-decade journey as an architect, revolving around the themes of 'inclusivity' and 'sustainability'. Internationally renowned elevator manufacturer *Kone*, sponsor of the event, also presented their products and services to the guests.

The programme began with a brief welcome note by the IIA West Bengal Chapter to all present, followed by the felicitation of Ar. Chitra Vishwanath, along with officials of *Kone Elevators*. The award for the *Best Outgoing Student of the Year 2023* was given to Ms Urbi Jana of IIEST, Shibpur. The programme continued with a brief welcome note from Ar. Ritam Sarkar, Chairperson of IIA West Bengal Chapter, who spoke of the achievements and work of women architects worldwide, and especially those of Indian architects such as Ar. Chitra Vishwanath, who have made us proud through their career accomplishments.

Observance of International Women's Day 2024 with Ar. Chitra Vishwanath by IIA West Bengal Chapter on 23 March 2024.

Ar. Chitra Vishwanath delivered her Keynote Address for the evening, narrating her *Biome Diaries*, a documentation of her architectural works, focused on compressed stabilised earth blocks as a primary building material. She highlighted how each of her projects used natural earth obtained mostly from the construction of basements or waterbodies for the manufacture of the earth-blocks. This, when compounded with the extensive use of natural lighting and ventilation, rainwater harvesting, wastewater management and recycling, creates wonderful spaces that are not only functionally suited to the users, but also ecologically friendly and sustainable.

Ar. Vishwanath then took the audience through various projects, including residences, offices, schools, various campuses including one for ISKCON, an office building for a NGO and various other projects, where themes of equity and sustainability were on display, irrespective of the functionality of the project. It was enlightening to observe how these themes of basements, mezzanines, inward-looking spaces, courtyards and sustainable design were interwoven into the design of each project, to resolve the unique and diverse challenges that each project presented to her team.

The programme concluded with a vote of thanks to the keynote speaker, Ar. Vishwanath, our sponsor *Kone* and all members of the audience, with a pledge to carry the theme of 'Embracing Equity' into the future of our profession. This would help to champion initiatives that create a truly inclusive profession as architects, where women have equal opportunities to thrive at every stage of their careers.

5th Com Meeting Held at Lucknow, Uttar Pradesh on 09-02-2024 for the Term 2023-2025.

Sr. No.	Associate to Fellow	City	Place	Membership No.
1	Ar. Keshav Arvind Chikodi	Kalyan	Maharashtra	F13515
2	Ar. Uphar Chibber	Chattarpur	Northern	F15342
3	Ar. Chaudhari Nishikant Sharad	Dombivli	Maharashtra	F08670
4	Ar. Nandgirikar Sarvesh Balkrishna	Dombivli	Maharashtra	F16842
5	Ar. Anil Vinayak Bhingarde	Dombivli	Maharashtra	F08212
6	Ar. Aniruddha Shashikant Dastane	Kalyan	Maharashtra	F12020
7	Ar. Sandeep Shrikrishna Paranjpe	Thane	Maharashtra	F17207
8	Ar. Dhanashri Rajesh Bhosale	Dombivli	Maharashtra	F21630
9	Ar. Uday Ramakrishna Satavalekar	Dombivli	Maharashtra	F20417
10	Ar. Sudesh Menon P	Bangalore	Maharashtra	F18418
11	Ar. Rohit Garg	Noida	Uttar Pradesh	F19906

Sr. No.	Direct Fellow	City	Place	Membership No
1	Ar. Abiraami Kosalraman	Chennai	Tamil Nadu	F28211
2	Ar. Minal Kishore Mardikar	Mumbai	Maharashtra	F28212
3	Ar. Khandadai Sivaraman Shankar	Chennnai	Tamil Nadu	F28213
4	Ar. Ravikiran Gandeti	Visakhapatnam	Andhra Pradesh	F28214
5	Ar. Bikramjit Chakraborty	Kolkata	West Bengal	F28215

Sr. No.	Associate	City	Place	Membership No
1	Ar. Patil Vivek Bhagwan Jaimala	Ambernath	Maharashtra	A28216
2	Ar. Donald Cyril Helen Dsouza	Mumbai	Maharashtra	A28217
3	Ar. Samiksha Dnyaneshwar Mokal	Navi Mumbai	Maharashtra	A28218
4	Ar. Vaibhav Sahebrao Nalini Nalawade	Mumbai	Maharashtra	A28219
5	Ar. Ankit Kiran Jagruti Patil	Navi Mumbai	Maharashtra	A28220
6	Ar. Abhay Vinayak Mhatre	Mumbai	Maharashtra	A28221
7	Ar. Bhavin Arvind Modi	Mumbai	Maharashtra	A28222
8	Ar. Prasenjit Purnachandra Debnath	Ulhasnagar	Maharashtra	A28223
9	Ar. Tejaswini Devendra Marode	Nashik	Maharashtra	A28224
10	Ar.Rajal Nishith Soneji	Kandivali	Maharashtra	A28225
11	Ar. Vishakha Keshav Hade	Navi Mumbai	Maharashtra	A28226
12	Ar. Poorva Hiren Gosalia	Mumbai	Maharashtra	A28227
13	Ar. Tanaya Nitin Nadkarni	Dombivli	Maharashtra	A28228
14	Ar. Mugdha Anupam Sathe	Mumbai	Maharashtra	A28229
15	Ar. Mehta Vishal Ashwin Sandhya	Thane	Maharashtra	A28230
16	Ar. Neelam Suyash Chavan	Thane	Maharashtra	A28231
17	Ar. Anil Hastimal Jain	Navi Mumbai	Maharashtra	A28232
18	Ar. Chatterjee Archiit Rathin Antriksha	Nalasopara	Maharashtra	A28233
19	Ar. Onkar Jitendrakumar Sonal Jaju	Navi Mumbai	Maharashtra	A28234
20	Ar. Rishabh Jitendra Verma	Navi Mumbai	Maharashtra	A28235
21	Ar. Patel Anil Bhachu Santok	Navi Mumbai	Maharashtra	A28236
22	Ar. Fakih Suhail Ismail	Raigad	Maharashtra	A28237
23	Ar. Abhishek Rajendra Suhasini Bhave	Raigad	Maharashtra	A28238
24	Ar.Chaphekar Unmesh Pradip	Mumbai	Maharashtra	A28239
25	Ar. Swapnil Mohan Mohini Sawant	Mumbai	Maharashtra	A28240
26	Ar. Chitnis Kaiwalya Sanjay Shweta	Mumbai	Maharashtra	A28241
27	Ar. Shaikh Mahevash Riyaz Yasmeen	Mumbai	Maharashtra	A28242
28	Ar. Amita Anant Deshpande	Navi Mumbai	Maharashtra	A28243
29	Ar. Gohel Khushabu Vinod Bhavna	Buldhana	Maharashtra	A28244
30	Ar. Zore Pratik Ramchandra Reshma	Panvel	Maharashtra	A28245
31	Ar. Rajkumar Shantilal Kumavat	Navi Mumbai	Maharashtra	A28246

32	Ar. Patil Vedbhushan Suhas Sunita	Mumbai	Maharashtra	A28247
33	Ar. Neeta Sharad Pakdhane	Navi Mumbai	Maharashtra	A28248
34	Ar. Sharad Gunwantrao Shobha Pakdhane	Navi Mumbai	Maharashtra	A28249
35	Ar. Chinmay Niranjan Sangeeta Jani	Mumbai	Maharashtra	A28250
36	Ar. Patil Hemangi Sandesh Shweta	Panvel	Maharashtra	A28251
37	Ar. Mohammad Rakhshan Khan	Navi Mumbai	Maharashtra	A28252
38	Ar. Dongare Suyog Ramesh Suman	Navi Mumbai	Maharashtra	A28253
39	Ar. Aparna Joshi	Ahmedabad	Gujarat	A28254
40	Ar. Raman Vilas Aras	Ahmedabad	Gujarat	A28255
41	Ar. Amit Anil Mhetre	Pune	Maharashtra	A28256
42	Ar. Pooja Ashok Runwal	Vijayapura	Karnataka	A28257
43	Ar. Sufine Gazeeb	Ernakulam	Kerala	A28258
44	Ar. Vaibhavi Arun Math	Vijayapura	Karnataka	A28259
45	Ar. Priya Rose Mary	Cochin	Kerala	A28260
46	Ar. Ekta Shashwat Kapadia	Ahmedabad	Gujarat	A28261
47	Ar. Chinmay Prasanna Behera	Bhubaneswar	Odisha	A28262
48	Ar. Rajiv Babu	Thrissur	Kerala	A28263
49	Ar. Asha O S	Thrissur	Kerala	A28264
50	Ar. Reshma Mary Mathew	Kottayam	Kerala	A28265
51	Ar. Dipesh Panghal	Hisar	Haryana	A28266
52	Ar. Geo Thomas	Eranakulam	Kerala	A28267
53	Ar. Ajmal Sha Basheer	Kollam	Kerala	A28268
54	Ar. Delli Babu A	Bangalore	Karnataka	A28269
55	Ar. Zain Siddiqui	Lucknow	Uttar Pradesh	A28270
56	Ar. Chhaya	Lucknow	Uttar Pradesh	A28271
57	Ar. Utkarsh Shukla	Lucknow	Uttar Pradesh	A28272
58	Ar. Dain C Shine	Thrissur	Kerala	A28273
59	Ar. Arshi Parashar	Bhopal	Madhya Pradesh	A28274
60	Ar. Surabhi Jain	Bhopal	Madhya Pradesh	A28275
61	Ar. Manish Beohar	Bhopal	Madhya Pradesh	A28276
62	Ar. Vaishali Mangesh Anagal	Pune	Maharashtra	A28277
63	Ar. Ankeet Arvind Vandana Tagde	Nagpur	Maharashtra	A28278
64	Ar. Pramod Badshah Dube	Pune	Maharashtra	A28279
65	Ar. Ashish Sateesh Pitkar	Pune	Maharashtra	A28280
66	Ar. Reshmi Pandey	Faridabad	Haryana	A28281
67	Ar. Harsh Varshneya	Lucknow	Uttar Pradesh	A28282
68	Ar. Tasmia Alisa Quamer	Ranchi	Jharkhand	A28283
69	Ar. Harpreet Kaur	Ranchi	Jharkhand	A28284
70	Ar. Vipul Suresh Nikam	Pimpri-Chinchwad	Maharashtra	A28285
71	Ar. Sachin Balawant Barawade	Pimpri-Chinchwad	Maharashtra	A28286
72	Ar. Prashant Sadanand	Pimpri-Chinchwad	Maharashtra	A28287
73	Ar. Gajanan Vinayakrao Shetkar	Pimpri-Chinchwad	Maharashtra	A28288
74	Ar. Kiran Mudanna Kamble	Pimpri-Chinchwad	Maharashtra	A28289
75	Ar. Sreeraj P M	Cochin	Kerala	A28290
76	Ar. Maria Gigi	Tripunithura	Kerala	A28291
77	Ar. Vaidehi Vinayak Kotbagi	Ambernath	Maharashtra	A28292
78	Ar. Preeti Suryakant Sumita Ghorpade	Badlapur	Maharashtra	A28293
79	Ar. Atharva Heramb Varsha Desai	Badlapur	Maharashtra	A28294
80	Ar. Prathamesh Keshvanand Sangita Suryavanshi	Dombivli	Maharashtra	A28295
81	Ar. Varad Waman Smita Sathe	Dombivli	Maharashtra	A28296
82	Ar. Sailee Sunil Rekha Barhate	Dombivli	Maharashtra	A28297
83	Ar. Harsh Tushar Aruna Shah	Dombivli	Maharashtra	A28298
84	Ar. Darshan Chandrashekhar Upase	Pune	Maharashtra	A28299
85	Ar. Deepali Sureshchandra Agarwal	Pune	Maharashtra	A28300
86	Ar. Abdul Hameed Shabandri	Bengaluru	Karnataka	A28301
87	Ar. Harkesh Dewangan Paras	Raipur	Chhattisgarh	A28302

88	Ar. Ridhima Chopra	Jammu &kashmir	Jammu & Kashmir	A28303
89	Ar. Gurusha Mengi	Jammu &kashmir	Jammu & Kashmir	A28304
90	Ar. Vivek Patil	Bengaluru	Karnataka	A28305
91	Ar. Lalit Akash Verma	Varanasi	Uttar Pradesh	A28306
92	Ar. Bhavna Ankur Shetye	Dombivli	Maharashtra	A28307
93	Ar. Omkar Shishir Mathkar	Dombivli	Maharashtra	A28308
94	Ar. Darshana Dinanath Vitha Pawashe	Dombivli	Maharashtra	A28309
95	Ar. Sanjeev Kumar	Moradabad	Uttar Pradesh	A28310
96	Ar. Siddharth Rastogi	Moradabad	Uttar Pradesh	A28311
97	Ar. Arun Katyar	Ghaziabad	Uttar Pradesh	A28312
98	Ar. Viplav Rawat	Noida	Uttar Pradesh	A28313
99	Ar. Aditya Yadav	Noida	Uttar Pradesh	A28314
100	Ar. Deepak Kumar	Bhopal	Madhya Pradesh	A28315
101	Ar. Deepa Rahul Agrawal	Bhopal	Madhya Pradesh	A28316
102	Ar. Vishal Atri	Jammu &kashmir	Jammu & Kashmir	A28317
103	Ar. Hirdhay Mahajan	Jammu &kashmir	Jammu & Kashmir	A28318
104	Ar. Madhulika Nag	Lucknow	Uttar Pradesh	A28319
105	Ar. Aniruthan K	Karaikudi	Tamil Nadu	A28320
106	Ar. Ajith Chandran	Kollam	Kerala	A28321
107	Ar. Angshuman Borpuzari	Guwahati	Assam	A28322
108	Ar. Aravind T	Trivandrum	Kerala	A28323
109	Ar. Vivek S	Kollam	Kerala	A28324
110	Ar. Sandeep Rajendran	Bangalore	Karnataka	A28325
111	Ar. Harish R	Chennai	Tamil Nadu	A28326
112	Ar. Venkata Rahul G V	Bangalore	Karnataka	A28327
113	Ar. Muniyasamy K	Coimbatore	Tamil Nadu	A28328
114	Ar. Jayant Grover	Bathinda	Punjab	A28329
115	Ar. Bh Shikhar Singh Ratra	Gurdaspur	Punjab	A28330
116	Ar. Amborse Dass M I	Coimbatore	Tamil Nadu	A28331
117	Ar. Yash Jain	Bhubaneswar	Odisha	A28332
118	Ar. Sakthivel P	Chennai	Tamil Nadu	A28333
119	Ar. Bhuvaneshwari G	Bengaluru	Karnataka	A28334
120	Ar. Shailendra Pratap Singh Bhadaur	Gwalior	Madhya Pradesh	A28335
121	Ar. Vishal Pradip Madhulika Charjan	Navi Mumbai	Maharashtra	A28336
122	Ar. Vijit Yadav	Agra	Uttar Pradesh	A28337
123	Ar. Arjun Prasanth	Trivandrum	Kerala	A28338
124	Ar. Siva Nandan A	Kottayam	Kerala	A28339
125	Ar. Lini Mariyam Thomas	Pathanamthitta	Kerala	A28340
126	Ar. Akankshya Pattojoshi	Paralakhemundi	Odisha	A28341
127	Ar. N K Ayisha Nashath Pasha	Perumpilavu	Kerala	A28342
128	Ar. Prathyusha P	Kozhikode	Kerala	A28343
129	Ar. Sushanth S J	Thiruvananthapuram	Kerala	A28344
130	Ar. Richa Shrivastava	Indore	Madhya Pradesh	A28345
131	Ar. Shival Manchanda	Gurgaon	Haryana	A28346
132	Ar. Kumar Shashwat	Faridabad	Haryana	A28347
133	Ar. Vivek Tukaram Trupti Korlekar	Navi Mumbai	Maharashtra	A28348
134	Ar. Agosh Goyal	Patiala	Punjab	A28349
135	Ar. Namitha T	Calicut	Kerala	A28350
136	Ar. Abhishek Mittal	Patna	Bihar	A28351
137	Ar. Vijay Kumar	Saran	Bihar	A28352
138	Ar. Sidhardh Baji	Chennai	Tamil Nadu	A28353
139	Ar. Abhijit Janardan Deshpande	Pune	Maharashtra	A28354
140	Ar. Kannan G	Chennai	Tamil Nadu	A28355
141	Ar. Sindhu S M	Tiruchirapalli	Tamil Nadu	A28356
142	Ar. Shivangi Shukla	Chennai	Tamil Nadu	A28357
143	Ar. Hyderali M S	Palakkad	Kerala	A28358

144	Ar. Vinayak S Bilgundi	Kalaburagi	Karnataka	A28359
145	Ar. Ritesh Gandhi	Datia	Madhya Pradesh	A28360
146	Ar. Durga Pavamana	Bengaluru	Karnataka	A28361
147	Ar. Nishant Yadav	Rewari	Haryana	A28362
148	Ar. Surendra Singh Dhakar	Gwalior	Madhya Pradesh	A28363
149	Ar. Tushar Singhal	Gwalior	Madhya Pradesh	A28364
150	Ar. Bal Krishan Sharma	Agra	Uttar Pradesh	A28365
151	Ar. Saravanan J	Chennai	Tamil Nadu	A28366
152	Ar. Akash Kumar	Gaya	Bihar	A28367
153	Ar. Mayank Singhal	Gwalior	Madhya Pradesh	A28368
154	Ar. Wajed Rehman A N	Kannur	Kerala	A28369
155	Ar. Rini Agrawal	Gwalior	Madhya Pradesh	A28370
156	Ar. Shailly Singh	Gwalior	Madhya Pradesh	A28371
157	Ar. Nandan N Bhat	Mangalore	Karnataka	A28372
158	Ar. Aabha Chauhan	Gwalior	Madhya Pradesh	A28373
159	Ar. Monica Sharma	Lucknow	Uttar Pradesh	A28374
160	Ar. Pankaj Kumar	Gwalior	Madhya Pradesh	A28375
161	Ar. Vighnesh S V	Trvandrum	Kerala	A28376
162	Ar. Harsh Bajaj	Gwalior	Madhya Pradesh	A28377
163	Ar. Mahima Pandey	Gwalior	Madhya Pradesh	A28378
164	Ar. Nibras Ul Haq M	Malappuram	Kerala	A28379
165	Ar. Kriti Agrawal	Gwalior	Madhya Pradesh	A28380
166	Ar. Gautham S Pillai	Thiruvananthapuram	Kerala	A28381
167	Ar. Alok Kumar Verma	Lucknow	Uttar Pradesh	A28382
168	Ar. Falguni Agarwal	Lucknow	Uttar Pradesh	A28383
169	Ar. Anuj Gangwal	Pune	Maharashtra	A28384
170	Ar. Abhinand S U	Kollam	Kerala	A28385
171	Ar. Nitin Jain	Ashoknagar	Madhya Pradesh	A28386
172	Ar. Sumit Pradip Meena Dhake	Nashik	Maharashtra	A28387
173	Ar. Nihar Ranjan Debata	Cuttack	Odisha	A28388
174	Ar. Jazeel K	Palakkad	Kerala	A28389
175	Ar. Ashima A A	Kollam	Kerala	A28390
176	Ar. Rohan Kumar Bharti	Patna	Bihar	A28391
177	Ar. Anagha Sharma	Agra	Uttar Pradesh	A28392
178	Ar. Gaurav Anirudha Sharma	Agra	Uttar Pradesh	A28393
179	Ar. Deeparani Rangrao Chougule	Pune	Maharashtra	A28394
180	Ar. Rithika Reddy R	Bangalore	Karnataka	A28395
181	Ar. Shubhrangshu Chatterjee	Kolkata	West Bengal	A28396
182	Ar. Manorama K N	Bangalore	Karnataka	A28397
183	Ar. Adarsh S	Salem	Tamil Nadu	A28398
184	Ar. Dhruvin Bharat Ketki Merchant	Mumbai	Maharashtra	A28399
185	Ar. Nehal Kumar	Patna	Bihar	A28400
186	Ar. Subham Kumar Nayak	Bhubaneswar	Odisha	A28401
187	Ar. Rishab Mohammed	Calicut	Kerala	A28402
188	Ar. Sathya Siddharth M	Chennai	Tamil Nadu	A28403
189	Ar. Pranav Kumar S	Chennai	Tamil Nadu	A28404
190	Ar. Nitish Srivastava	Noida	Uttar Pradesh	A28405
191	Ar. Aswathy M R	Trivandrum	Kerala	A28406
192	Ar. Gayatri Pati	Bhubaneswar	Odisha	A28407
193	Ar. Roshni Balkrishna Bais	Ahmedabad	Gujarat	A28408
194	Ar. Lekshmi Mohan	Pathanamthitta	Kerala	A28409
195	Ar. Nishita Nitinkumar Chevli	Surat	Gujarat	A28410
196	Ar. Saiaaf Ahamed N A	Chennai	Tamil Nadu	A28411
197	Ar. Dinroop Pavithran	Kozhikode	Kerala	A28412
198	Ar. Aravindsai T	Kozhikode	Kerala	A28413
199	Ar. Abhishek N R Nayak	Bhubaneswar	Odisha	A28414

200	Ar. Sudeshna Guha	Kolkata	West Bengal	A28415
201	Ar. Haneen Pallathodi	Perintalmanna	Kerala	A28416
202	Ar. Navneet Arya	Noida	Uttar Pradesh	A28417
203	Ar. Ahammed Shakir K P	Perintalmanna	Kerala	A28418
204	Ar. Vidyasagar M S	Punalur	Kerala	A28419
205	Ar. Prasanth B	Kochi	Kerala	A28420
206	Ar. Mohammad Aamir	Varanasi	Uttar Pradesh	A28421
207	Ar. Kalindi P S	Thrissur	Kerala	A28422
208	Ar. Thabsheer M V	Kozhikode	Kerala	A28423
209	Ar. Karthik A S	Trivandrum	Kerala	A28424
210	Ar. Harilal S	Trivandrum	Kerala	A28425
211	Ar. Ashique PP	Malappuram	Kerala	A28426
212	Ar. Abhirami Murali	Kozhikode	Kerala	A28427
213	Ar. Aswini V V	Calicut	Kerala	A28428
214	Ar. Shajeeh K K	Malappuram	Kerala	A28429
215	Ar. Anand Vishnu B U	Kottakkal	Kerala	A28430
216	Ar. Fawaz	Perintalmanna	Kerala	A28431
217	Ar. Devi Syam	Trivandrum	Kerala	A28432
218	Ar. Sneha Sara Varghese	Ernakulam	Kerala	A28433
219	Ar. Jerry Sam Joseph	Thiruvananthapuram	Kerala	A28434
220	Ar. Annie Tresa George	Ernakulam	Kerala	A28435
221	Ar. Seerat Amin	Pulwama	Jammu & Kashmir	A28436
222	Ar. Adhila Arif D	Malappuram	Kerala	A28437
223	Ar. Mohammed Ali Vk Liakathali	Tirur	Kerala	A28438
224	Ar. Muhammed Sha Kp	Tirur	Kerala	A28439
225	Ar. Bismina Akbar	Kollam	Kerala	A28440
226	Ar. Roopa Mathew	Muvattupuzha	Kerala	A28441
227	Ar. Geeta Sharma	Noida	Uttar Pradesh	A28442
228	Ar. Mohammed Nihal V	Malappuram	Kerala	A28443
229	Ar. Tanvi Gupta	Jaipur	Rajasthan	A28444
230	Ar. Jiyan Vajid Pattharwala	Surat	Gujarat	A28445
231	Ar. Darshit Doshi	Rajkot	Gujarat	A28446
232	Ar. Petta Eswara Rao	Kakinada	Andhra Pradesh	A28447
233	Ar. Arka Prava Barik	Kolkata	West Bengal	A28448
234	Ar. Umaira	Valanchery	Kerala	A28449
235	Ar. Nandu K Babu	Wayanad	Kerala	A28450
236	Ar. Sarangan Ravi	Mumbai	Maharashtra	A28451
237	Ar. Stuti Mannurkar	Belagavi	Karnataka	A28452
238	Ar. Vismay Vasudev Wadiwala	Surat	Gujarat	A28453
239	Ar. Nishith Bharat Jariwala	Surat	Gujarat	A28454
240	Ar. Shivani Devangbhai Shah	Surat	Gujarat	A28455
241	Ar. Nikhil Vijay Vaishali Badrike	Panvel	Maharashtra	A28456
242	Ar. Amir Shahnawaz Malik	Srinagar	Jammu & Kashmir	A28457
243	Ar. Priyansh Seth	Jabalpur	Madhya Pradesh	A28458
244	Ar. Anima Chakraborty	Jabalpur	Madhya Pradesh	A28459
245	Ar. Vikas Kumar Chandra	Noida	Uttar Pradesh	A28460
246	Ar. Bhushan Ramesh Mantri	Nashik	Maharashtra	A28461
247	Ar. Himangshu Kedia	Jaipur	Rajasthan	A28462
248	Ar. Pooja Pannalalji Rathi	Aurangabad	Maharashtra	A28463
249	Ar. Shashank Shekhar	Noida	Uttar Pradesh	A28464
250	Ar. Joseph Ruban Antoni J	Kumbakonam	Tamil Nadu	A28465
251	Ar. Snehil Tripathi	New Delhi	Northern	A28466
252	Ar. Baiza Qayoom	Srinagar	Jammu & Kashmir	A28467
253	Ar. Kairav Shah	Surat	Gujarat	A28468
254	Ar. Sheikh Faizan Javid	Srinagar	Jammu & Kashmir	A28469
255	Ar. Shubani Noor	Srinagar	Jammu & Kashmir	A28470
256	Ar. Qazi Muqiet	Srinagar	Jammu & Kashmir	A28471

257	Ar. Priyanka Manohar Pohare	Akola	Maharashtra	A28472
258	Ar. Amruta Satish Daulatabadkar	Aurangabad	Maharashtra	A28473
259	Ar. Mrinal Kumar	Patna	Bihar	A28474
260	Ar. Ipsita Acharya	Gurgaon	Haryana	A28475
261	Ar. Pragyan Kar	Cuttack	Odisha	A28476
262	Ar. Abhey Kaushal	Chandigarh	Chandigarh	A28477
263	Ar. Megha Tarsolia	Jhansi	Uttar Pradesh	A28478
264	Ar. Yash Kumar Mittal	Jaipur	Rajasthan	A28479
265	Ar. Farhat Deeba	Srinagar	Jammu & Kashmir	A28480
266	Ar. Anil Tripathi	Lucknow	Uttar Pradesh	A28481
267	Ar. Mangesh Rajan Rohini Dervankar	Lonavala	Maharashtra	A28482
268	Ar. Vasim Akram J	Ramanthapuram	Tamil Nadu	A28483
269	Ar. Vaibhav Prateek Srivastava	Lucknow	Uttar Pradesh	A28484
270	Ar. Nilesh Radhesham Sabu	Aurangabad	Maharashtra	A28485
271	Ar. Armstrong A	Chennai	Tamil Nadu	A28486
272	Ar. Rahul Singh Kushwah	Gwalior	Madhya Pradesh	A28487
273	Ar. Anvesh Mishra	Gwalior	Madhya Pradesh	A28488
274	Ar. Pranjal Agrawal	Lucknow	Uttar Pradesh	A28489
275	Ar. Ram Kumar Gupta	Gwalior	Madhya Pradesh	A28490
276	Ar. Avantika Singh Kushwaha	Gwalior	Madhya Pradesh	A28491
277	Ar. Gorky Srivastava	Gautam Buddha Nagar	Uttar Pradesh	A28492
278	Ar. Manish Chitranshi	Gwalior	Madhya Pradesh	A28493
279	Ar. Rasul A K R	Kozhikode	Kerala	A28494
280	Ar. Himanshu Gupta	Gwalior	Madhya Pradesh	A28495
281	Ar. Yashica Goyal	Patiala	Punjab	A28496
282	Ar. Dhaya Karishma R	Coimbatore	Tamil Nadu	A28497
283	Ar. Gautam Madan Naik	Mumbai	Maharashtra	A28498
284	Ar. Shruti Nandkishor Gawade	Lonavala	Maharashtra	A28499
285	Ar. Navneet Saini	Mohali	Punjab	A28500
286	Ar. Ankit Rathore	Gwalior	Madhya Pradesh	A28501
287	Ar. Saket Singh Tomar	Gwalior	Madhya Pradesh	A28502
288	Ar. Aneesa S	Palakkad	Kerala	A28503
289	Ar. Kuchibhotla Venkata Sai Jyothi	Hyderabad	Telangana	A28504
290	Ar. Aditi Agrawal	Gwalior	Madhya Pradesh	A28505
291	Ar. Madhumitha C	Chennai	Tamil Nadu	A28506
292	Ar. Faraz Ahmed Khan	Jabalpur	Madhya Pradesh	A28507
293	Ar. Revan Sidharth K	Theni	Tamil Nadu	A28508
294	Ar. Ravina Kumari	Gwalior	Madhya Pradesh	A28509
295	Ar. Prathmesh Chourey	Gwalior	Madhya Pradesh	A28510
296	Ar. Harendra Rajawat	Gwalior	Madhya Pradesh	A28511
297	Ar. Vishva Dharani V M	Chengalpattu	Tamil Nadu	A28512
298	Ar. Ashwani Kumar	Agra	Uttar Pradesh	A28513
299	Ar. Zubair Manzoor	Srinagar	Jammu & Kashmir	A28514
300	Ar. Priyanshi Atre	Indore	Madhya Pradesh	A28515
301	Ar. Abhilasha Kujur	Jamshedpur	Jharkhand	A28516
302	Ar. Guldeep Singh Mourya	Gwalior	Madhya Pradesh	A28517
303	Ar. Utkarsh Goel	Meerut	Uttar Pradesh	A28518
304	Ar. Gagari Koley	Amritsar	Punjab	A28519
305	Ar. Latika Gangadhar Kalyani Ambekar	Mumbai	Maharashtra	A28520
306	Ar. Manish Kumar Nag	Ranchi	Jharkhand	A28521
307	Ar. Subhadeep Datta	Kolkata	West Bengal	A28522
308	Ar. Aman Anuranjan Topno	Ranchi	Jharkhand	A28523
309	Ar. Syed Ausaf Haamid	Srinagar	Jammu & Kashmir	A28524
310	Ar. Neeraj Sharma	Morena	Madhya Pradesh	A28525
311	Ar. Avinash Kachhap	Ranchi	Jharkhand	A28526
312	Ar. Rakesh Sharma	New Delhi	Northern	A28527
313	Ar. Hiba	Kozhikode	Kerala	A28528

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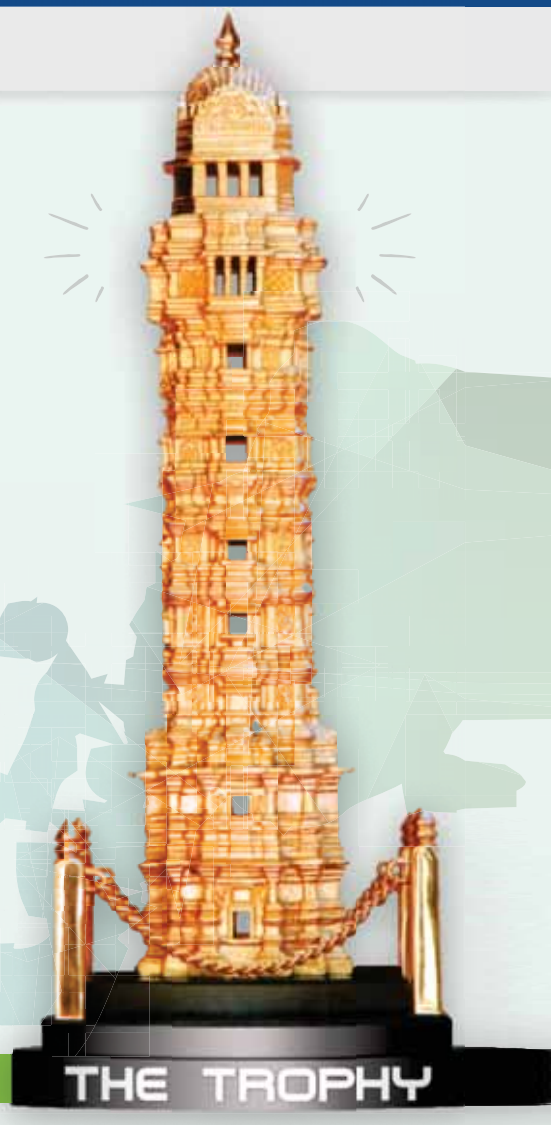

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RANA PRATAP SINGH
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