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Proposal for Indian Institute of Technology, Palakkad

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ABSTRACT: Growing time brings a challenge in front of the Architects to choose between traditional and contemporary ideas of Architecture. This has been tackled by many people through combining both ideas into design solutions. The idea of contemporizing the vernacular elements of Architectural space making is a growing avenue now on. This paper looks into the aspect of contemporizing the vernacular elements. The focus of the study is about the institutional space of IIT and pick the vernacular elements region of Kerala is been considered. This paper is part of the Design Proposal created for the final dissertation of Architecture. The idea of the study was to evolve the spaces through the experiential journey of the perceiver, right from the status of the institute of perseverance to its architecture. To decode and contemporize the vernacular architectural essence of Kerala, by designing the proposed Indian Institute of technology in Palakkad. The paper sums up with Planning process, Development of the character, and Visual journey proposed.

KEYWORDS: Contemporary, Indian Institute of Technology, Learning Spaces, Palakkad, Kerala, Vernacular Architecture.

I. INTRODUCTION

The architectural practice carried out in the traditional fashion of construction by the local craftsmen with the locally available materials and skills inherited; is known as Vernacular Architecture. The vernacular architecture focuses on the function of the building type and it evolves through responding to the context [1]. The Vernacular Architecture of any region is associated with the climatic situation of that place. While Designing or creating any vernacular built-form; certain specific concerns in relation to climatic data are considered which are as listed below:

- The maximum temperatures of the summers;
- The minimum temperatures of winters and;
- The rainfall average of the region.

A slight deviation in the temperatures of the place might deviate from the regional condition due to the micro-climatic conditions. It is always been tried by humans to achieve the most comfortable situation within the built forms [2]. Vernacular Architecture proves to be the most experienced style evolved through the line of time providing the most comfortable spaces [3]. This makes us understand that climate responsiveness is an important aspect while looking at Vernacular Architecture. One can understand climate responsiveness by looking at a built space designed concerning the weather conditions of the specific location [4].

The focus of this is to design according to the region's annual weather patterns, and factors like seasonality, the intensity of the sun, wind, rainfall, and humidity. While designing a climate-responsive Architectural space following needs to be considered.

A. Site Analysis

- Layout of the building
- Plan with consideration of the Sun Path
- Window Consideration
- Building for a geographic area
- Minimizing the building footprint
- Design for natural ventilation
- Occupants comfort standards

"Architecture can play a pivotal role in improving the quality of education. Applying architectural principles, effective learning environments can be collaborative, sustainable, flexible, and filled with daylight." It is always believed that one is more likely to get influenced by his surroundings [5]. Hence, the architecture of the school or the place of learning also creates a deep impact on an individual's mindset and regulated the mood accordingly [6]. For example, if a student is studying in an environment where the surrounding is serene and peaceful and he is likely to study with more concentration while studying in a chaotic or distracting place. Daylighting is also an important aspect of educational spaces. Natural daylighting has a very different influence on comfort in a particular space [7]. The ability to concentrate and better Performance with a healthy and happy environment is achieved. Thus, it is the building type, user type, and climatic condition which help to derive the function and form of built space, and incorporation of the vernacular element can make the built spaces most functional and suitable to their context [8].

B. Discussion on Design Proposal

The idea of contemporizing the vernacular elements is explored through a design proposal for The Indian Institute of management, at Palakkad, in the State of Kerala. A space in the lap of nature with green land and green hills of Palakkad in the surrounding better known as the Palakkad Gap.The project was announced in the Union Budget list on 2014-15 and would be funded by The Ministry of Human Resource Development, for the Indian Institute of Technology, Palakkad as shown in Table 1. The users of the campus shall be the undergraduate, postgraduate and the doctoral, and other executive students along with the teaching and the non-teaching staff.

C. Proposed Program

The master plan of the campus was to be planned, but the detailed buildings were too planned in phases. As only the first phase of the IIM Palakkad has been proposed, the given program has been designed keeping in mind the further requirements of the academic and the residential zone and the other shared amenities shall be incorporated in the fourth-coming phases.

Table 1: Shows the total expanded area division of Indian Institute of Technology, Palakkad:

	Area to be provided (sq. m.)	No. of Particulars	Remarks
S. no	Academic Zone:	2400 sqm 12	Unit area of 200sqm.
1	Classrooms	2400 sqm 12	Unit area of 200sqm.
2	Workshops	1200 sqm 12	Unit area of 100sqm
3	Laboratories	17000 sqm 12	
4	Administration & Departmental building	17000 sqm 1	
5	Auditorium	10000 sqm	3000 capacity
6	Library	9000 sqm	
7	Total	26,700 + 9345 = 36,045 sqm	
8	Housing:		
9	Faculty Housing	9800 sqm8	Each of 35 x 35m
10	Student Housing	9800 sqm8	Each of 35 x 35m
11	Guest House	3600 sqm4	30 x 30 sqm.
12	Total	23,200 + 8120 = 31,320 sqm	

II. DISCUSSION

The Indian Institute of Technology in the country is an institute of prestige and respect and contains some of the best students-engineers of the nations. To withstand the pride and the reputation of the institute, the architecture, and the infrastructure of the campus needs to respond to the type of Institution [9]. The Main design challenge of the project is to design a campus that is iconic with the considerations of the natural features of the site as shown in Figure 1.

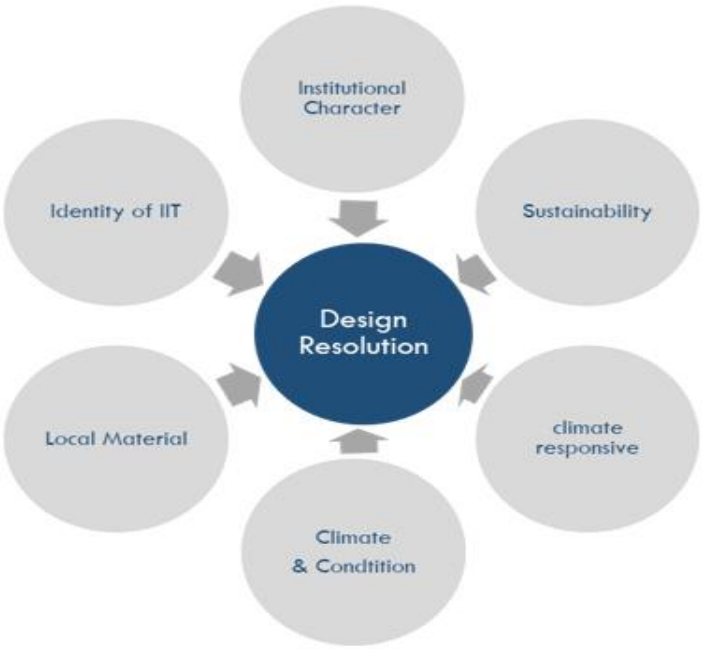

Figure 1: Shows the design resolution.

D. Design Guidelines

Based on the studies of the institutional projects and the climatic conditions of Palakkad and the inferences derived; the following design guidelines have been framed towards achieving the design for the project undertaken:

- The most important factor to be considered while designing in Kerala is the climatic conditions of the region and the microclimate of the site.
- The design development of the Indian Institute of Technology shall be iconic in its type, with the state-of-the-art facilities along with the use of vernacular materials in the design.
- With the vernacular materials, a factor that follows with is climate responsiveness, as the local material is well-treated with the climatic conditions of the region;
- The design of the buildings shall be concerning the natural terrain and the topography of the site.
- The built area must be such that it gives the sense of iconic building, at the same time is climate responsive.
- The elements of design to be incorporated must be the jaalis, the sloping roof, courtyards, columns, etc.
- The residential blocks must be designed considering the various user groups and the categories of the users.
- The master planning of the campus must be carried out such that the site is well-utilized with the considerations of the various spaces to be provided.
- The pathways must be designed such that they are shaded with the trees as design elements, to shade during the hot heat waves and also act as a protective barrier during the monsoon.
- The classrooms and the laboratories must be designed in an inter-relation such that they are in the nearest proximity with the provision of noise insulation.
- Courtyards shall be provided near these spaces for better air and light ventilation in the classrooms;
- The subtlety in the design shall be maintained concerning the design elements and the materials.
- The gathering spaces should be provided at certain intervals for the better interaction of the students with the students; the teachers with the teachers and the student-teacher interactions.
- The considerations of light and air ventilation are the most important factors.

E. About Kerala and Palakkad

Kerala is a south-western State of India, located on the Malabar Coast. The southern state is marked as a contrast from the rest of India. India is a subtropical country; that receives very hot summers, heavy rains, and mild winters. While Kerala is blessed with water in abundance, lush green forests, and rich-fertile lands [10]. The proposed project of the Indian Institute of Technology is in Palakkad, West Puducherry which is known as the gateway to Kerala due to the existence of the Palakkad Gap, in the Western Ghats. The climate of Palakkad is tropical wet and dry. Palakkad is pleasant for most parts of the year with moderate temperature, except during March and April being the hottest months [11]. The district also receives a sufficient amount of Rainfall and at times extreme. The amount of precipitation is very high; mainly due to the monsoons from the southwest. July receives the highest amount of rainfall.

Ideas to utilize vernacular elements in the proposed design:

Architectural elements are responsible to create the image of the building which remains in the mind of the viewer or user for a long time as shown in Figure 2. Vernacular Architecture of Kerala also provides such elements as the Sloping Roof, Walls & Columns as well as For the purpose of the exploration at the proposal level, all the elements are used as inspiration and they are carried forward in the design in form of contemporizing it.

Figure 2: Shows the architectural view of roofs, walls and columns In Traditional Keralian architecture style.

F. Section of roof

a sloping roof, with low eaves to keep the shade from the rains as well as sunlight A similar concept of roof design has been adopted in cases of several building blocks of the proposed campus, where sloping roofs have been provided to allow easy flow of heavy rainfall from the roof, thus reducing the overall load upon the building structure. The roof structure would be made of RCC, which would complement the red laterite stone building walls beneath.
Cutouts in the roof structure have been provided to allow entry of daylight into the building structure, along with providing natural stack ventilation thus making the use of Active cooling techniques like Fans and Air conditioners minimal. Dedicated water channels have been provided in the roof structure which helps in the easy flow of rainwater into the provided waterbodies that act as rainwater reservoirs, which help in increasing the groundwater level of the region.

G. Walls

The Site is located in a warm and humid region, it is necessary to design a layout that is porous, and thus allows the flow of wind throughout the campus as shown in Figure 3. Thus, several layers in vertical wall placements have been created to generate small openings in the walls such as jaalis to act as visual barriers as well as wind flow enhancers. Green Pockets have been provided between the two walls which help in allowing the flow of wind through the inside of the building. The uniquely characterized form of the wall, attributes a distinct sensual quality to the space within. It also generates a sense of curiosity. This system also helps in maintaining much-needed privacy in the academic zones and would also act as sound barriers between workshops/ Labs and the outer circulation Spaces.

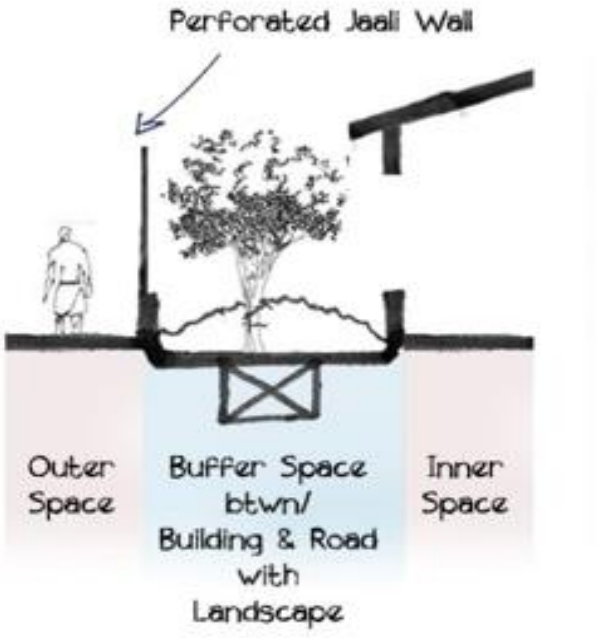

Figure 3: Shows the Diagram of perforated jaali wall.

H. Columns (As Movement Guides)

Columns Play an Important role in generating the identity of any building, be it on the exterior façade of the building or in the interiors. Traditional Keralan Columns are wooden and circular supporting the sloping roof above. Such columns also provide a visual movement as well as a sense of enclosure. A contemporary version of the columns can

represent the structural variation and use of new materials as illustrated in Figure 4.

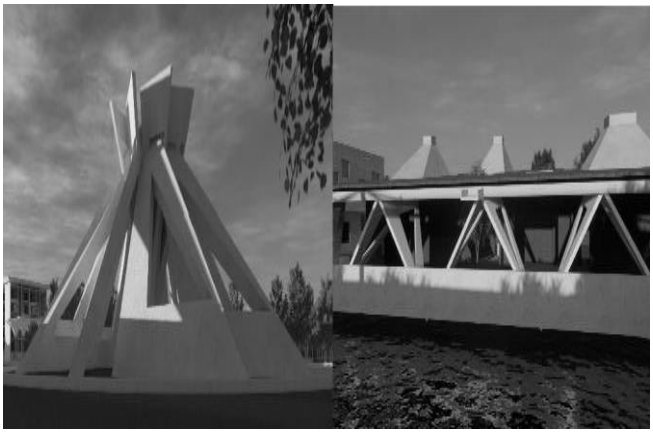

Figure 4: Illustrated the use of columns as Identity Generators and Movement Guides.

I. Water Bodies

Water bodies always play an important role in enhancing the overall ambiance of a space. Thus, making it useable and likable [12]. Such pockets have been created around a naturally low-lying land, which acts as a water reservoir, near the academic zone, where the students, as well as visitors, can spend some leisure time during the day.

J. Steps forming the Amphitheatre

Figure 5: Shows Steps forming the Amphitheatre Space.

As for the Amphitheatre in the campus, the steps acquire a Module conjuring the possibilities of convenient seating and A place for social interaction which is shown in Figure 5.

K. The proposed designs

Evolution of the Concept The sketch highlights the arrangement of classroom blocks in clusters with undulating and varying roof heights to give a sense of curious thoughts when entering the area. Gathering Spaces are designed to promote healthy interaction among all the users of the campus and to reduce the disturbance to the academic activities as shown in Figure 6 and Figure 7. The core idea was to create spaces that contain green shaded areas.

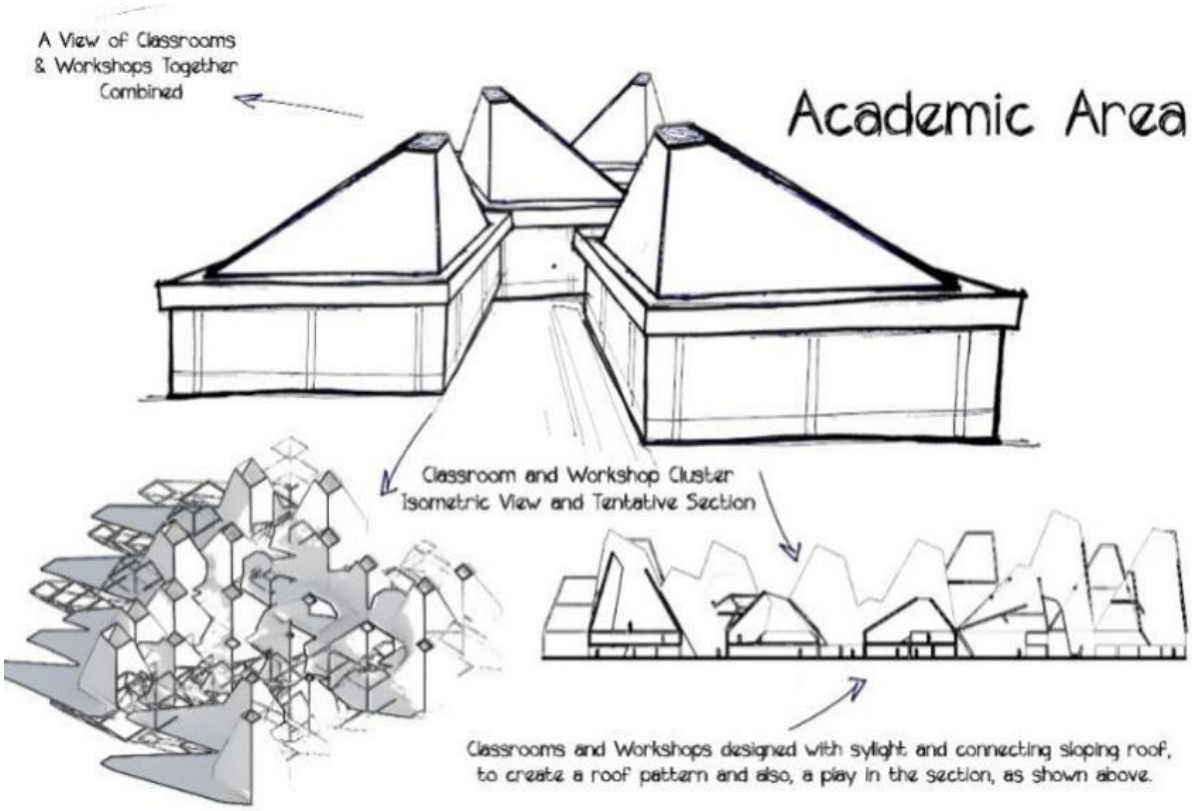

Figure 6: Shows Conceptual Sketch of Academic Area with Clusters of Classroom

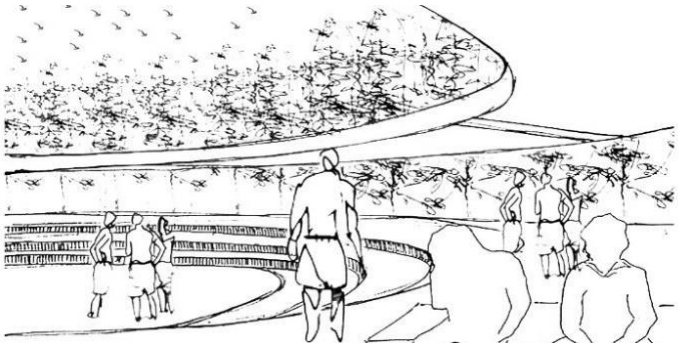

Figure 7: Shows the Gathering space of the institution.

Derivation of Roof Skyline for Academic Classrooms:

The Above schematic sections and sketch highlight the derivation of inspiration for the overall roof form of the classrooms as shown in Figure 8. The classrooms being places of imparting knowledge are similar to that of a 'Mandira' which is often looked up as a place to gain ultimate knowledge and knowhow of the universe, thus leading a successful life ahead [13]. Thus, the highest point above the 'Garbhagriha' i.e., the 'Shikhara' acts as the highest point in the roof of the classroom, as a source of divine light from above, which falls directly into the teaching space of the classroom. Whereas the lower roof structure or the 'Mandapa' which is often used for gathering spaces, in the case of a 'Mandira' is the sitting space in the classrooms, where the students will sit [14].

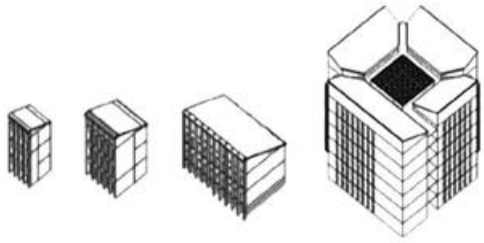

Figure 8: Derivation of Roof Skyline for Academic Classrooms.

One single unit for 2 occupants to repeating those units horizontally and vertically to form a Single Unit of Housing Block which suits both the Student Housing Blocks as well as Faculty Housing Blocks. The use of Courtyard Spaces to bring light to keep the interiors lit has been taken into consideration. The Tentative Sketches of placement of academic units of the classroom, labs and workshops to form Academic Street are included as shown in Figure 9.

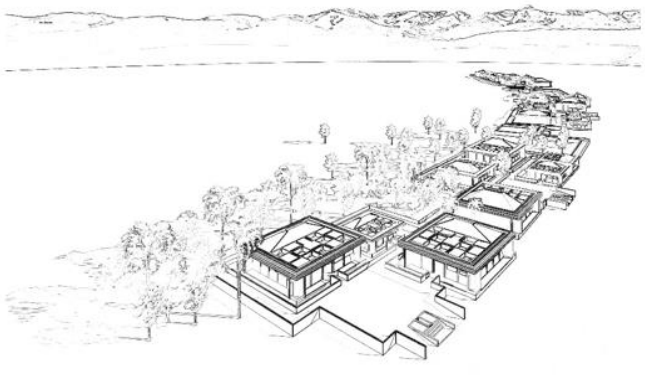

Figure 9: Illustrates the Tentative Sketches of placement of academic units of the classroom, labs, and workshops to form Academic Street

L. Planning process

The overall idea of campus planning has evolved from several attempts to design a Masterplan best suitable for the project as well as to create an identity of the place. The overall stages have evolved from symmetrical layouts to organic to formalized layout to a final option that incorporates all the learnings of the previous layout into designing a suitable layout that satisfies the need of the project both functionally as well as in terms of ambiance and atmosphere. The idea was to design a campus, which connects with the existing site conditions at all levels, since the overall surroundings of the site have extensive forest covers, those covers of dense trees have also been included in the campus itself, to make the visitors feel connected to the Outside. Activities have been divided into 3 parts, Namely Academic Zones where the actual teaching processes will take place, Residential Zones which are much more private with the student, faculty residences, and their leisure spaces [15]. Third, comes the public amenities that have been scattered all around the site to provide similar kinds of services at different points in the campus, this includes, Cycle Stands, Souvenir Kiosks, Banks, Post Offices, Health Care Units, etc. The above image shows the initial view of the academic classroom designed as a cluster of singular units with individual roofs of similar characters having slopes and skylights. However, the cluster felt to be a lot longer in terms of circulation when it came to the ease of the students. The above image shows the aerial view of the cluster surrounding the departmental buildings in the new layout option, however, the overall idea of making the circulation spaces compact was still not resolved along with the idea of separating vehicular and pedestrian approaches in the academic zone as shown in Figure 10 and Figure 12.

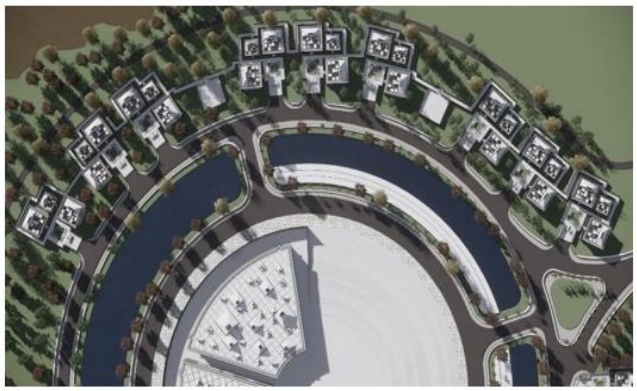

Figure 10: Shows Formation of Academic Street in the New Layouts.

The images show the revisions incorporated in the process of designing the master plan, especially the academic zone area which evolved by ultimately designing a layout that provides separate entry for academic blocks with a peripheral vehicular access road to allow visitors to have a glance at the overall block as shown in Figure 11.

Figure 11: Shows the Formation of Academic Street in the New Layouts

Figure 12: Show the aerial view of Final derived Academic zone

The above images depict how 'Column' as an element has been used in several spaces and building blocks in the campus, where they act as movement guides for the visitors and outsiders visiting the campus.

M. A Narrative of the Envisioned Experiential Journey of Moving through the campus

Architecture is a journey of movement and an unfolding of a mystery that conditions your mind and calms your temper, through a sequential unfolding of spaces. It is an act of 'Experiential Journey'. (Pandya, Workshop on 'Space-making in Architecture', 2014) [16]. Architecture is a celebration of life. It encodes messages and emotes feelings. It may communicate through spatial tools, whether they be the space sequences and their organization; elements of space- making and their scale and form; or the symbolism of surface articulation. It sets off an instantaneous dialogue between the user and the architectural product. (Pandya, Concepts of Space in Traditional Indian Architecture, 2013). "The Most Important things are the experience, the 'rasa' which is the subtle experience of the space that makes the space memorable".

An effort is made to explore learning spaces through the medium of architecture in the divine land of backwaters – Kerala. The Architecture of the state of Kerala is soothing in its characteristics, which influences any person who visits there. The lush green forest cover, along with the rainy season for most of the year, makes the place a much-favored destination by all age groups. The site sits on the foothills of the Western Ghats, thus, giving it a natural backdrop of serene green beauty. The site does not have any kind of city bounds on the northern edge, which makes it a suitable space for designing a campus, having as minimal connection with the noise and chaos of the city as possible. On the southern edge, the site is separated from the city bounds by the railway track through Kanjikode Railway Station. From a Distance, the site is envisioned as a dense jungle space with a Single Sculpture of Columnar Pattern located in the center of the site, which welcomes anyone who enters the site. Wherein, from the center, a person or a visitor can have an entire look at the campus, and where the activities are placed adds the auditorium complex pathway leading to the only visible building in the front being the library, with the Academic Pillar at the back. On the left he is greeted with the festive lawns, with different intricate patterns of hard and Soft Paved areas, having both sitting and gathering spaces. While on the right side he views natural mounds with dense tree cover which connects him with nature and its serene beauty of calmness as shown in Figure 13.

Figure 13: Shows the View of Classrooms and the landscape.

At a distance, the visitor can see a raised platform with clusters of leisure activities occurring at the place, which creates a sense of curiosity for him/her. Moving towards the place, the visitor realizes the presence of Waterbody beneath those raised platforms, which thus, raises his/her wish to be in that place. Moving ahead of the library, the person is greeted by the grandness of the academic zone, through the central pillar in the center and an extended slab over, which creates a sense of grandeur. A visible series of columns on both sides of the building, covered by dense trees, generate curiosity among the visitor, and he/she moves forward to discover what lies behind it. Moving ahead into the colonnade, one discovers the grand Academic Zone of Classrooms, Laboratories, and Workshops that lies behind the Departmental Building, connected in the center by the mega amphitheater which can accommodate the entire population of the campus as shown in Figure 14.

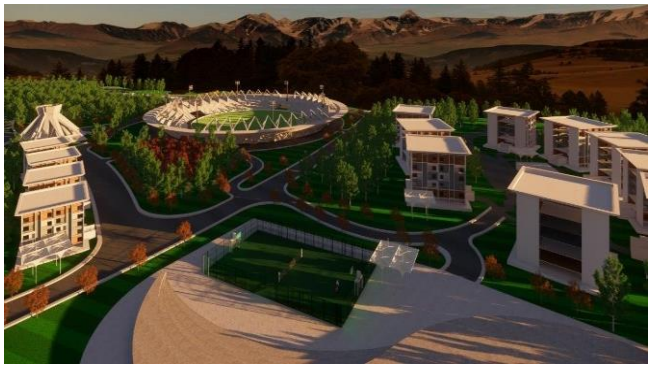

Figure 14: Illustrates the View of Housing Cluster.

Moving Left from the Central Circle, one enters a completely separate zone of the campus, where most of the students, faculty, and staff members of the institute reside. The path is a narrow road, with dense tree cover on both sides, which again generates curiosity in the minds of the visitors, wherein moving forward they enter the housing clusters. Which are separated by a common shared space for students and faculties that lie in the center, partially separating both Student and Faculty Residences. Thus, constantly changing axis and points of view, would keep appealing to the visitor through different visual perspectives. Such an idea of kinesthetics helps to create architecture more experiential. As the visitor completes his / her journey, he/she would have to follow the same path back to the entrance, to exit and end their journey. This is when he/ she would bid farewell to the campus. But on the way back, he /she would recollect the remnants of the encounters rendered while exploring those spaces earlier. He /she by then would have conditioned his/ her mind with everlasting impressions of the journey.

III. CONCLUSION

The Indian Institute of Technology, Palakkad is committed to fostering an atmosphere in which students and staff may pursue knowledge, dream, think, and invent, and therefore become change agents for a better world. IIT Palakkad began with only 120 students in July 2015 and has now expanded to a student body of around a thousand students with the finest personnel in important roles. By its tenth year, IIT Palakkad hopes to be a multi-disciplinary college with 5000 students. The Institute recognizes the need of collaborative growth in conjunction with industry and other academic institutions, and emphasizes blue-sky research and guided research as two fundamental pillars of technological development. It aspires to be a pioneer in cross-disciplinary research and to contribute to the promise that India's demographic dividend has for the nation and the globe, as encapsulated in the institute's slogan, "Nurturing brains for a better world." The idea of the study was to evolve the spaces through the experiential journey of the perceiver, right from the status of the institute of perseverance to its architecture. To decode and contemporize the vernacular architectural essence of Kerala, by designing the proposed Indian Institute of technology in Palakkad. The paper sums up with Planning process, Development of the character, and Visual journey proposed.

REFERENCES

[1] T. K. Biswas, S. Chaki, and M. C. Das, “Mcdm technique application to the selection of an indian institute of technology,” Oper. Res. Eng. Sci. Theory Appl., vol. 2, no. 3, pp. 65–76, 2019, doi: 10.31181/oresta1903065b.

[2] “Indian Institute of Technology Ropar,” in The Grants Register 2022, 2021.

[3] D. H. Schildt, “The traditional kerala Manor.” https://www.exoticindiaart.com/book/details/traditional-kerala-manor-architecutre-of-south-indian-catuhsala-house-nad813/.

[4] A. Kumar and R. K. Bhatt, “A study of using informal learning spaces at Indian Institute of Technology, Delhi,” Libr. Philos. Pract., 2015.

[5] R. Jagatramka, A. Kumar, and S. Pipralia, “Sustainability Indicators for Vernacular Architecture in India,” ISVS E-journal, 2020.

[6] A. T. Nguyen, N. S. H. Truong, D. Rockwood, and A. D. Tran Le, “Studies on sustainable features of vernacular architecture in different regions across the world: A comprehensive synthesis and evaluation,” Front. Archit. Res., 2019, doi: 10.1016/j.foar.2019.07.006.

[7] “Indian Institute of Technology (IIT),” in The Grants Register 2021, 2020.

[8] A. T. Bera, “An Overview Of Vernacular Architecture In India,” Think India J., 2019.

[9] R. Jagatramka, A. Kumar, and S. Pipralia, “Transformations of Vernacular Architecture of India: Problems and Prospects,” ISVS E-journal, 2021.

[10] S. Bid, “Indian Institute of Technology, Kharagpur: A Scientometric study of Research Output,” SSARSC Int. J. Libr. Inf. Netw. Knowl., 2016.

[11] E. Creangă, I. Ciotoiu, D. Gheorghiu, and G. Nash, “Vernacular architecture as a model for contemporary design,” WIT Trans. Ecol. Environ., 2010, doi: 10.2495/ARC100141.

[12] F. Harris, “Outdoor learning spaces: The case of forest school,” Area, 2018, doi: 10.1111/area.12360.

[13] E. J. Baum, “Learning space design and classroom behavior,” International Journal of Learning, Teaching and Educational Research. 2018, doi: 10.26803/ijlter.17.9.3.

[14] A. Turner, B. Welch, and S. Reynolds, “Learning Spaces in Academic Libraries - A Review of the Evolving Trends,” Aust. Acad. Res. Libr., 2013, doi:

10.1080/00048623.2013.857383.
[15] M. K. Singh, S. Mahapatra, and S. K. Atreya, “Bioclimatism and vernacular architecture of north-east India,” Build. Environ., 2009, doi: 10.1016/j.buildenv.2008.06.008.
[16] D. B. Doshi, “Walk the talk.” https://dezignark.com/blog/walk-the-talk-with-dr-bv-doshi/.