

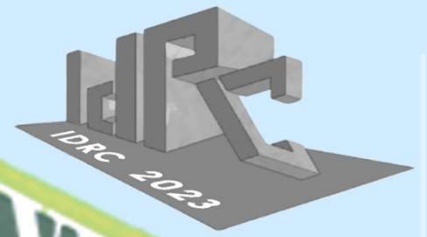
ADITYA COLLEGE OF ARCHITECTURE, MUMBAI, PRESENTS

ACA'S 3rd INTERNATIONAL DESIGN RESEARCH CONFERENCE

IDRC 2023

THEME :

BUILDING ENVELOPE



**COMPENDIUM OF SELECTED
'ABSTRACTS' OF RESEARCH**

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VISION, MISSION & QUALITY POLICY

- *To be globally recognized as an epitome of learning and innovation.*
- *Imparting multifaceted architectural education driven by social sensitivity and supported by state of the art of infrastructure.*

- *To impart quality education that encourages students to be competent enough for best fit job roles.*
- *To provide faculty members with facilities to research, experiment and implement contemporary learning tools.*

“ We, the Management, Faculty and staff of Aditya College of Architecture are committed to offer excellence in architectural education, by pledging to our core value of Agility, Innovation, Integrity our academic environment and state of the art facilities and infrastructure to our students, thereby ensuring mutual respect and trust for them.

We will work as a team and interact with the students in pro-active manner to achieve our institutional quality objectives and fulfill all academic , statutory and regulatory requirements to continually enhance the satisfaction of our students. ”

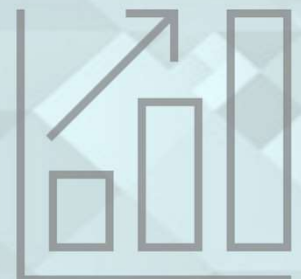
VISION



MISSION



QUALITY POLICY



ADITYA COLLEGE OF ARCHITECTURE



Aditya College of Architecture established in 2013 is affiliated to Mumbai University, India. Since its inception, the college has continuously been working towards a vision to take architectural education ahead of traditional curriculum and achieve higher goals in grooming better professionals every year. The primary objective of the school is to create 'global practices with local concerns' to achieve excellence in architectural design, practice and profession.

The campus has infrastructure comparable to the best in the world. An ideal environment for exploring new ideas that encourage creative and independent thinking of young minds. It also provides platform for promoting innovation and research for students and faculty. The pedagogy of the school is building professional capacity and cherished individual interest of the student.

With the vision that educating professional requires close coordination of industry and academic the institute encourages collaboration with eminent academicians and industry professions in the way of conducting workshops, seminars, and webinars in the present pandemic situation. The Institute has collaborated with Sri Lanka Institute of Architects by the way of exchange program and combine studios.



ABOUT ACA



ADITYA COLLEGE OF ARCHITECTURE

Theme:

Building Envelope

This year Aditya College of Architecture (ACA) brings its 3rd International Design Research Conference (IDRC 2023) with the theme 'Building Envelope'. A building envelope is everything that separates the internal building from the external environment. architecture comprises of various building elements including the roof, the fenestration, floors, and walls. At first glance, it defines the characteristics of the built form and imparts the aesthetic. More importantly however, it facilitates climate control within the indoor environment, reduces its dependence on mechanical systems and increases its economic viability. The building envelope is not just one component, but a variety of independent facets that create the system. Design intervention on any of its entities positively or negatively impacts the structures performance, thereby measuring its contribution towards a greener planet.

Few practices around the globe believe in developing building envelopes that supports policies and practices that will lead to government and business solutions that work for all, ultimately creating new industry standards and sustainable future for the world. Some believe that the facade design plays an important role in the functionality of a building. A carefully designed facade will also play a central role in determining the energy efficiency of the building.

Functions:

A building envelope serves many functions. These functions can be divided into 3 categories

Support:

To ensure strength and rigidity, providing structural support against internal and external loads and forces.

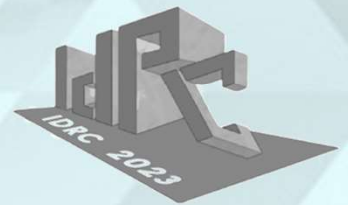
Control:

To control the exchange of water air, condensation, and heat between the interior and exterior of the building.

Finish:

This is for aesthetic purposes. To make the building look attractive while still performing support and control functions.

The IDRC conference intends to cover an array of topics that enables students, researchers, academicians, and practitioners, to express their thoughts, hypotheses and ideologies and demonstrate their designs through research and practice. It will also enable notable speakers to showcase their experience, expertise, and knowledge on the subject.



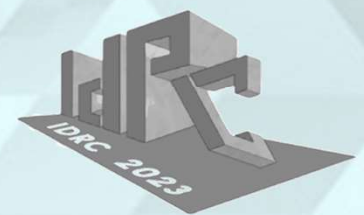
ABOUT IDRC

IDRC 2022-23 invited original research papers related to the theme “Building Envelope” and the sub-themes mentioned below from undergraduate and post-graduate students, researchers, academicians and professionals belonging to the architecture and building construction industry. We received a positive response of abstracts from all categories which were reviewed by our expert review committee. The selected abstracts have been compiled in this compendium. Full papers were later received and reviewed, and a few selected full papers will be presented in the conference, while all selected papers will be published in our journal, Shodhaditya Research Journal (ISSN No.: 2347-8403).

Building Envelope

Sub-themes:

- 1. Building Thermal Envelope**
- 2. Sustainable Building Envelope**
- 3. Facade Designing**
- 4. External Environment**
- 5. Adaptive Building Envelope**
- 6. Life Cycle Assessment For Alternative Building Envelope**



ABOUT IDRC



ADITYA COLLEGE OF ARCHITECTURE, MUMBAI, PRESENTS
ACA'S 3rd INTERNATIONAL DESIGN RESEARCH CONFERENCE

IDRC BUILDING ENVELOPE

We welcome participation of students of B.Arch & M.Arch courses from all the National and International Colleges, Academicians, Researchers, Industry Professionals, Consultants practicing Urban Design, Transportation, City and Regional Planning, Construction management, Project Management, Landscape Architecture, Environmental Design, MEP services, Heritage and Conservation to submit their original research papers relevant to the theme of the conference.

All accepted research papers will be published in Research Journal with ISSN no. and the complete proceedings will also be published on the ACA website.

CALL FOR PAPERS REGISTER SOON

Conference coordinator :
Ar. Rasika Chodankar
Associate Professor
Ar. Varsha Swar
Assistant Professor

Contact :
✉ idrc@aditya-arch.edu.in
☎ +91-22-352-06135
📱 @ADITYA_IDRC_IDRC

ADITYA
COLLEGE OF ARCHITECTURE
ISO 9001-2015 CERTIFIED



IDRC

International Design & Research Conference

A Leader is one who shows great perseverance, integrity, determination. They are the ones with the ability to guide and encourage others to achieve their goal. However, it is the traits of mental strength, high moral character, authority, and ability to find new solutions that forces others to look up to them.

Aditya College of Architecture (ACA) is fortunate to have such a leader. Our chairman, Shri Harishchandra Mishra, a leader who is proactive and driven by his passion for education. One that effectively takes his team along with him to scale the heights of success.

It gives me immense pleasure to see how Aditya College of Architecture has flourished with its abundant academic knowledge, immense industry exposure, and innovative strategies in the field of education and research.

I heartily congratulate Aditya College of Architecture for organizing the 3rd International Design Research Conference 2023 (IDRC 2023) on the theme "Building Envelope." This year, IDRC aims to highlight the architectural need of the society by utilizing the concepts of building envelope design to derive at simple, sustainable, time-efficient, and cost-effective architectural design solutions.

We hope that IDRC 2023 will educate and nourish everyone with valuable message and insight. I wish all the prosperity and fortune to the institution and to the students who will take the baton ahead, to illuminate the world with their spark. On behalf of Aditya College of Architecture, I wish International Design Research Conference 2023 a grand success. May our team succeed in transferring knowledge.



**Shri Harishchandra
Mishra**

Founder Trustee &
Chairman

Message From The Founder Trustee



Since 2011 with Aditya Group of Institutions is a conglomerate of several educational Institutions, with the motto to create the fusion of academic knowledge with practical skills for the students. Quality programs and experiences are planned, implemented and evaluated to manifest student learning, development and academic success. The commitment is to make a better world through education, research and innovation.

Located within the Aditya Educational Campus, in Mumbai, the Aditya College of Architecture boasts of cutting edge, unmatched infrastructure including a separate library and reading zone with thousands of books, magazines and periodicals, amphitheater style airconditioned classrooms, fully airconditioned studios, an airy atrium for informal activities, an auditorium with seating capacity of 600, a computer and language lab with 250 computers, circular classrooms with LCD projection, special classrooms for conducting group discussions and interviews, and a cafeteria to accommodate 300 students. Coupled with this unmatched infrastructure, the Aditya College of Architecture is led by a group of experienced architecture professionals.

Having expert-led conferences, educates students on critical issues, inspires their innovative visions, and provide them the tools necessary to create positive environmental, societal and economic changes.



Shri Ashish Mishra
Trustee



Shri Aditya Mishra
Trustee



ADITYA COLLEGE OF ARCHITECTURE

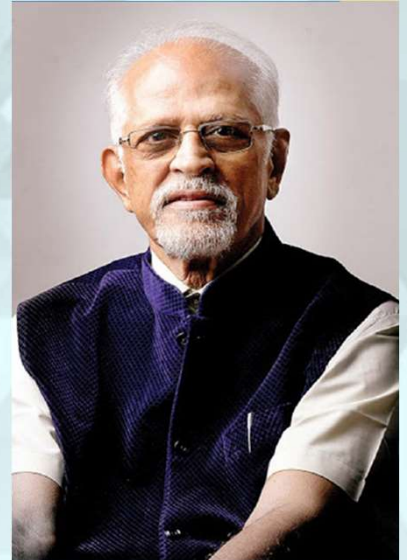
As a Mentor of Aditya Collage of Architecture for last 11 years, I take great pride to keep on record that the college, after successfully organizing International Design Competition consecutively for last 9 years and launching the 1st International Design Research Conference in 2020, is majestically organizing 3rd International Design Research Conference on January 21st, 2023.

The management, faculty and students deserve all praises and compliments for spending their enormous time and putting their efforts for the success of conference, in-spite of calamity of pandemic.

ACA is known for its vision and has been nurturing its students making them think out of the box. A plethora of themes for last all IDRCs and IDCs proves the truth. The theme selected for the 3rd IDRC 2023 - "Building Envelope" is the record very apt for current global situation.

Understanding the need of the time, ACA came forward and shouldered the responsibility to bring all concerned together to deliberate on the design challenges mentioned under respective sub themes.

I wish the Conference a grand success.



Ar. Gurunath Dalvi
Mentor & Advisor

Message From The Mentor

It gives me great pleasure as the Principal of Aditya College of Architecture (ACA), Mumbai, Maharashtra, to announce the 9th edition of ACA's International Design Competition 2022 and the 3rd International Design Research Conference - IDRC 2022-23.

ACA has been organizing the International Design Competition annually for the past eight years since its inception in the year 2013; and it provides an international platform for showcasing the works of young Designers and to establish connections amongst the global architectural student's community and academia.

*As a part of this initiative, we have been hosting the IDC competition and IDRC conference. IDRC 2023, 3rd conference which focuses the theme **BUILDING ENVELOPE**. The building envelope or a skin of a building is the physical separator between the interior and exterior of a building. The building envelope comprises of all the visible elements like facades, fenestrations, windows doors, roofs.*

*The design of the envelope is very complex, and many factors must be evaluated and balanced to ensure the desired levels of thermal, acoustic and visual comfort together with safety, accessibility and aesthetic excellence. The building envelope contributes to the aesthetic view of the building and needs to meet certain architectural requirements and adhere to cultural preferences. Last year the conference was online due to pandemic. This year we are looking forward to a hybrid mode. Let us gear up to brainstorm upon the "**Building Envelope**".*



Ar. Sarita Deshpande
Principal

Message From The Principal

In its third consecutive year, we the team of IDRC are pleased to host IDRC again this time under the theme “Building envelope”. Since its inception; it is the first time we are having the same in the physical mode and we have tried to reach out to international extents. We are thankful and appreciate our speakers, review committee member, our collaborations and associations for their effort and commitment.

For any built form, the primal feature that comes in contact with the human eye is its envelope. In a way, it establishes an identity of the entire structure, in the minds of the viewers. Building envelop is the physical barrier between the exterior and interior spaces/ settings enclosing a structure. it makes the building look appealing while also carrying out functions associated with control and structural support. Thus, it is an important component that separates the exterior façade of the building from its interior and thereby affects the ventilation, climate, energy consumption and protection of occupants and interiors. Thus, its designing is of vital importance; as if this is not designed well then it would result in other systems not working well and will affect the sustainability parameter as well.

A building envelope is commonly defined as the separation of the interior and exterior of a building. It helps facilitate climate control and protect the indoor environment. Overall, it is the entire exterior building system. As you all are aware of energy efficient bulbs, energy efficient appliances, and updated mechanical systems such as heating and cooling systems. If the building envelope is not in good shape all the updates to other systems will not matter. The reason for this is the building envelope can account for a substantial amount energy loss if not properly attended.

The benefits of a good building envelope include reduced stress, wear, and tear on mechanical systems. This results in turn to reduce energy bills. Unfortunately, the building envelope is not just only component, but a critical component and a variety of other independent parts that make the system. Hence, replacing one part of the system will increase your efficiency, but to a minimal degree if you do not address all parts of the system your efficiency will not be as high as it should be with all components operating efficiently.

*The theme for 2023 is ‘**BUILDING ENVELOPE**’ that majorly focuses on exterior element of any building which allows an attempt to inculcate this need of the future and encourage young minds to embrace/inculcate these methods in their design. On behalf of our team, I, thank all our participants and readers to have build their trust upon us to deliver work and share.*

Message From The IDRC Coordinator



Ar. Varsha Swar
Assistant Professor

Message From The Publication In Charge



Ar. Disha Barik
Assistant Professor

*We here at ACA are proudly launching the 3rd International Design Research Conference (IDRC 2023), along with the constant success of our International Design Competition. It gives me an immense pleasure and I also feel honored to be a part of this venture while leading as well as working with a team of passionate and hard-working colleagues. For IDRC 2023, we decided to opt for a relevant and meaningful theme - **Building Envelope**. The concept of 'Building Envelope' has been a key, prominent component since ages in the architecture realm. According to C.E. Hagentoft in his book *An Introduction to Building Physics*, the building envelope acts as a physical barrier between the interior and exterior environments that enclose a structure.*

The 3rd IDRC 2023 conference has reached out to international extends, where architects and building scientists and researchers from India and other nations have been invited. We strongly appreciate our collaborations and associations with such industry stalwarts, whose work strongly sync with our theme at large.

Like last year, this year too, we have received immense response from the architectural fraternity. We are thankful to the enthusiastic participants and to the esteemed review committee for their continuous effort and commitment. The plethora of topics selected by the researchers based on the sub-themes of the conference highlight the need, significance and sensitivity felt by the community about this concept. It strengthens our ideas to nurture the ideas within ourselves as mentors, for upcoming generations.



Ar. Rasika Chodankar

Associate Professor

**Message
From The
IDRC
Coordinator**

3rd INTERNATIONAL DESIGN RESEARCH CONFERENCE

“Building Envelope”

Mumbai – January 21st, 2023.



ADITYA COLLEGE OF ARCHITECTURE 3rd INTERNATIONAL DESIGN & RESEARCH CONFERENCE		
Programme schedule - 21st January 2023.		
Session details	Timings	
Inauguration of the IDRC 2022 -23 in Banquet hall, ACA Campus; lighting of lamp and felicitations of dignitaries	09:30 am - 09:45 am	Ar. Varsha Swar, IDRC Co-ordinator.
Welcome Address by Principal	09:45 am - 10:00 am	Ar. Sarita Deshpande, Principal, ACA.
About IDRC	10:00 am - 10:15 am	Ar. Rasika Chodankar, IDRC Co-ordinator.
Address by Guest of Honour	10:15 am - 10:30 am	Ar. Deepak Chitnis, Head of Design, Lodha Group
Address by Chief Guest	10:30 am - 10:45 am	Shri. Kedarnath Rao Ghorpade, Independent Consultant, Former Chief Planner MMRDA.
Inauguration of the IDRC Compendium of selected abstracts by Chief Guest		
About IDC Review	10:45 am - 11:00 am	
Announcement of IDC winners		Guest of honour - Ar. Deepak Chitnis
Address by Key Collaborators	11:00 am - 11:15 am	Immediate Past President PEATA (I) – Ar. Samir Hingoo
Key Note Speaker 1	11:15 am - 12:00 am	Ar. Damith Premathilake, Founder DPA Studio, Sri Lanka.
QnA and Concluding remarks /Vote of Thanks		
Key Note Speaker 2	12:00 am - 12:45 pm	Ar. Sanjay Patil, Director, Principal Architect, Environ Planners
QnA and Concluding remarks /Vote of Thanks		
Key Note Speaker 3	12:45 pm - 01:30 pm	Ar. Ujjwala Haware, Haware Engineers & Buildings Pvt. Ltd.
QnA and Concluding remarks /Vote of Thanks		
LUNCH BREAK - 01:30 pm - 02:00 pm		
Introduction of review Committee	02:00 pm - 02:15 pm	Ar. Rasika Chodankar, IDRC Co-ordinator
Address by Reviewer		Dr. Roopal Deshpande, Principal - Smt. Manoramabai Mundle College of Architecture, Nagpur.
Research paper presentations	02:15 pm - 03:30 pm	Paper presentations sequence: 1) Rajratna Jadhav - Phd Student participants 2) Chris Thurlbourne - Phd Student participants 3) Sakshi Ghodake - UG Student participant
TEA BREAK - 03:30 pm - 03:45 pm		
Research paper presentations	03:45 pm - 05:15 pm	Paper presentations sequence: 1) Arsheen Palkar - PG student participant 2) Shraddha Kapadia - Academician 3) Pruthviraj Bhople - Practitioner 4) Akshay Joshi - PG student participant
Valedictory	05:15 pm - 05:30 pm	Ar. Varsha Swar
Vote of thanks and end of the day's session		

ONLINE CONFERENCE DATES

January 21st, 2023.

VENUE

Aditya College of Architecture,
Aditya Educational campus,
R M Bhattad Road, Ram Nagar,
Borivali West, Mumbai,
Maharashtra 400 068.

REGISTRATION

12/9/2022

CALL FOR PAPERS

Abstract submission

3/10/2022

Full paper submission

10/12/2022

FURTHER DETAILS

REGISTRATION LINK

EMAIL

idrc@aditya-arch.edu.in

CALL

+ 91 22 6110 6135

CONFERENCE

CO-ORDINATORS

Ar. Rasika Chodankar

Associate Professor
rasika.c@aditya-arch.edu.in

Ar. Varsha Swar

Asst. Professor
varsha.s@aditya-arch.edu.in

IN ASSOCIATION WITH

ADITYA COLLEGE OF ARCHITECTURE, MUMBAI PRESENTS
ACA's 3RD INTERNATIONAL DESIGN RESEARCH CONFERENCE

IDRC 2023
THEME
**BUILDING
ENVELOPE**

**IDRC
CONFERENCE**

21.01.2023
SATURDAY



CHIEF GUEST

Shri Kedarnath Ghorpade
Independent Consultant,
Former Chief Planner
MMRDA.



GUEST OF HONOUR

Ar. Deepak Chitnis
Head of Design,
Lodha Group

SPEAKERS



Ar. Damith Premathilake
Founder, DPA Studio,
Sri Lanka



Ar. Sanjay Patil
Principal Architect,
Environ Planners



Ar. Ujjwala Haware
Director, Haware Engineers
& Buildings Pvt. Ltd.



Kedarnath Rao Ghorpade is the former Chief Planner of Mumbai Metropolitan Region Development Authority. He has been engaged by large corporate houses as President and other senior positions. Currently he is the Chief Strategy Officer at Terracon Ecotech Pvt. Ltd., an environment consultancy firm. He is NABET accredited professional for land use and socioeconomic development. Shri Ghorpade has Master's Degrees in Geography and Urban and Regional Planning as well as Post Graduate Diplomas in International Housing, Local Economic Development and Environment Law. He is also a Visiting Faculty at the Amity University for Architecture, Interior Design and Planning, He was awarded Dutch Fellowship in 1991 and was also nominated for Eisenhower International Fellowship during 1989. Shri Ghorpade was engaged in large low-income shelter projects, formation of urban local bodies and capacity building, infrastructure planning, financing, coordination, and management, development management permissions and systems, heritage and environment management, EIA, SIA and FDP proposals, port development, Smart cities, expressways, urban rivers rejuvenation and restoration management. Large part of the professional experience is in projects financed by the World Bank, Asian Development Bank, UNESCO, Government of India, and Government of Maharashtra.

Shri Ghorpade is currently pursuing his PhD on Urban Sustainability from University of Mumbai. Shri Ghorpade has published numerous articles in national and international journals and has contributed articles for edited books. He is a regular speaker at national and international conferences. He was the Panel Discussant in Conference of the Parties to the United Nations Convention to Combat Desertification (COP14) during 2019. He was also a panel discussant at the celebration of 75 years of United Nations - UN75 initiative organised in 2020, by Confederation of Young Leaders, in the sphere of Public Diplomacy, International Relations, Government, Public Affairs and Public Policy.



Kedarnath Rao Ghorpade
Independent Consultant,
Former Chief Planner
MMRDA

Chief Guest's Profile

Ar. Deepak Chitnis is currently heading a strong team of 150 professionals, as the Head of Design department at Lodha Group. A graduate from the JJ School of Architecture, and as the head of the Design department, he's a key decision maker in the entire design process right from design conceptualization to execution of design at site.

Ar. Chitnis joined the Lodha Group in February 2007. He has supported, witnessed and been integral part of the top management of an incredible growth story of a real estate company. A strong believer in Organization Building, he's driven by ownership and performance, going beyond the departmental silos to create leaders with decision making abilities by motivating, leading, mentoring, imparting values and empowering his team and mentees.

Ar. Chitnis currently heads the design team for all projects undertaken by the Lodha Group across all portfolios and locations. He has completed various residential and commercial projects with an area of around 15 million sq.ft., across all segments. He is also responsible for supporting the Annual sales revenue of INR 6000 Cr. – INR 9000 Cr, leading the design process and deliverables of Annual construction spend to the tune of INR 3500 Cr to 4000 Cr.

Prior to his stint at the Lodha Group, he was a Senior Architect with the Oberoi Group, a Co-founder at the Collage Design Pvt. Ltd., and worked as an architect at Ratan J Batliboi Architects (RJBA).



Ar. Deepak Chitnis
Head of Design, Lodha Group

Guest of Honour's Profile

Damith Premathilake received his Bachelor's Degree (B. Sc.) in Built Environment in 2001 and his Masters Degree in Architecture in 2006 from the University of Moratuwa, in which he received commendation for his final design projects. In 2008, he advanced professionally as a Chartered Architect by completing the AIA (SL) and completed his post graduate degree in Landscape Architecture at the University of Moratuwa in 2013.

He is an Associate Member of the Sri Lanka Institute of Architects and a Member of the Sri Lanka Institute of Landscape Architects. He is also an International Associate member of American Institute of Architects (AIA) and International Member of Royal Institute of British Architects (RIBA). At present he is a Council Member of the Sri Lankan Institute of Architects (SLIA). His contribution to the field extends to being a visiting lecturer at University of Moratuwa, Faculty of Architecture and City School of Architecture – Colombo.

His Architectural style has been renowned by being awarded both locally and internationally. World Architecture Community Awards in 2012, 2014 and 2022, winner of Architecture Asia awards for Emerging Architects in 2014, Young Architects of the Year 2016 and being a winner of the Ten Outstanding Young Persons of Sri Lanka in 2016 are some of the achievements which he has gained within his career as a young professional. Also, his practice published among the best 50 practices in the world by the book, "Fifty under Fifty-Innovators of the 21st Century, 2015".

Ar. Sanjay M. Patil, the principal architect of the firm Environ Planners has graduated from Sir J.J. College of architecture. The firm has always worked towards environment conscious architecture seeking inspiration from nature and tradition. Respecting nature has always been an integral element of the firm's approach. The need of the hour being sustainable development, the firm's efforts is consciously directed towards application of energy efficient principles to the building design. The firm has always over the years has designed for various institutional, industrial, residential, projects with each of those holding their own distinctive identity. The approach, to craft an environment together has expressed the ability to integrate landscape (symbolizing nature) with the built environment, which amalgamates interior and exterior to create a series of interactive spaces. The firm takes up the inspiration from vernacular architecture and fuse with modern technology to get the desired results, where simplicity prevails and nest with the nature.

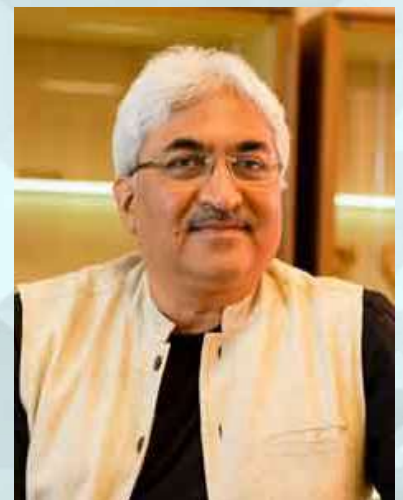
Ar. Sanjay M. Patil has been a recipient of various awards which includes Dharmasthala Manjunatheshwara award, Nomination for Aga Khan Award, 2009, 23rd and 25th JK Architect of the Year Award (AYA), 2013, Green Architecture Award in 2013 and 2015 respectively, ARCASIA Awards for Architecture 2017, Global Architecture & Design Awards 2018 to mention a few.

About Our Speakers



Ar. Damith Premathilake

Founder, DPA Studio,
Sri Lanka



Ar. Sanjay Patil

Principal Architect,
Environ Planners

About Our Speakers

Ar. Ujjwala Haware has contributed to real estate industry for over 20 years. She has been felicitated with multiple awards including Iconic Redevelopment Project award by “CNBC Business for Project Grand Edifice (Dindoshi)”. Also, by the former President of India, APJ Abdul Kalam.

She has completed her Bachelor of Architecture from Amravati University in 1997 with 2nd in the order of merit of Amravati University. She further pursued MBA from school of management IIT Powai, Mumbai. Currently she is the Director of Haware Engineers & Builders Pvt. Ltd. and Secretary of New City Education Trust, Navi Mumbai.

She has been working in Residential Projects, Commercial Complexes and Redevelopment Projects of almost 100 Buildings. in Mumbai. Her work also includes Info Tech Parks, Multiplexes, Shopping Malls, Mass Housing Projects in Navi Mumbai, Nano Housing Schemes etc.



Ar. Ujjwala Haware

Director of Haware Engineers & Builders Pvt. Ltd., Secretary of New City Education Trust, Navi Mumbai

About Our Reviewer

Ar. Roopal Deshpande, architect-planner, doctorate and an academician for 19 years and currently Principal of Smt. Manoramabai Mundle College of Architecture, Nagpur. She was the PhD department coordinator at SMMCA between 2017 to 2022. She did her Masters in Environmental Planning from SPA, New Delhi in 2003 and was awarded PhD from Visvesvaraya National Institute of Technology, Nagpur in 2017. The title of her Doctoral research is “Investigating Privacy in Traditional and Modern Houses through Spatial Analysis”. Along with B. Arch. she is faculty at M. Arch. (Architecture Education) and M. Arch. (Urban Design). She is Ad hoc-Chairman of Architecture Board of Studies (BoS) (Faculty of Science and Technology), RTMNU, Nagpur



Dr. Roopal Deshpande

Principal, Smt. Manoramabai Mundle College of Architecture, Nagpur

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IMPACTS OF GREEN FACADES ON MODERN ARCHITECTURE

*Aaryaman Singh – B. Arch Student, Avitesh Vaishnavi Nayak - Assistant Professor,
School of Art and Architecture, Sushant University, Gurugram Haryana, India
aaryamansingh1910@gmail.com, aravitesh13@gmail.com*

Modern architecture was an architectural movement or style centered on cutting-edge construction technologies, particularly the use of reinforced concrete, glass, and steel. The foundational goal of 21st century architecture is to create better structures that are inherently sustainable by utilizing better materials and technologies. Facades are the outermost covering of a building which have the maximum interaction with the environment. A wall that is completely or partially covered with vegetation is known as a green façade. Green facades enhance the urban environment in terms of economy, environment, aesthetics, and physiology. There are many aspects associated with the built environment such as energy efficiency, pollution levels and ecological responsiveness, these issues need to be addressed to create element of the built of the modern environment. Analyzing of different type of façade systems can lead towards a complex dynamic sustainable facades system that not just acts as the skin of the building but performs more functions. This study talks about the integration of modern architecture with green facades and the impacts of green facades in different climatic conditions. Outcomes of this study will be helpful to understand modern green facade systems and exploring new design innovations for a better and more efficient future.

KEYWORDS: Sustainable buildings, Green facades, Passive design strategies, Modern Architecture, Aesthetics.

STUDYING THE IMPACT OF GEOGRAPHICAL LOCATION ON THE LIFE CYCLE ASSESSMENT OF A CASE BUILDING

*Sakshi Ranjeet Ghodake, B. Arch student
Dr Bhanuben Nanavati College of Architecture, Karve Nagar, Pune*

Building envelope plays a critical role in making design decisions by determining its environmental impacts. Life Cycle Assessment (LCA) is used to holistically analyze the environmental performance of the whole building. The Life Cycle Assessment of a building based on similar material palette has different environmental impacts due to various aspects like location, operational costs etc. The present research work is aimed at evaluating the Life Cycle Assessment of a case, built at two different locations in India (Pune and Kolkata) with the help of sensitivity analysis used to generalize the method with respect to life cycle assessment parameters. The study will help understand various possibilities for reducing carbon footprint. Oneclicklca is used for this study of a hypothetical design case for evaluating the environmental impacts of the building during its construction and operation stage. The study will help to prioritize the optimization efforts on an informed basis and assess the individual processes against the larger perspective of the building's total life cycle.

RETHINKING HIGH RISE BUILDING ENVELOPE: COLLABORATIVE DESIGN APPROACH

Varsha Annadate, Vinita Deshmukh

Building envelope, the skin of the structure, is a physical barrier between the inside & outside. From ages, creativity & innovation being the two main key elements of design, the design of building envelopes has changed from linear, monotonous & typical to geometrical, dynamic & smart etc.

In architecture, Building envelope is the aesthetic feature distinguishing one building from another. A good building envelope involves designs that are climate-appropriate, structurally sound and aesthetically pleasing. It sets the impression on the perceiver, expressing the type of use within, need, demand & cultural background of the society in a particular period and provides sensory pleasures.

Change is the essential component of any development. It is the need of the time to suit the demands of the progressive world. Building envelopes are no exception to this. Design approaches for envelopes have moved towards a collaborative building approach. Envelopes are not seen as an independent element as in history. These are to manage energy with modeling and monitoring technologies. With the technological advancement the envelopes have changed drastically from static to smart envelopes. i.e., envelope technology with interior mechanical systems and architectural forms (designed to meet the aesthetical and environmental needs).

This paper is about understanding the need for rethinking the designs of envelopes for high rise buildings - from wall & window type to curtain walls, from stick systems to smart systems, based on modularity for ease in construction etc. The paper also speaks about rethinking the envelopes for outdoor pedestrian welfare, and for the public health as an added function to benefit both the indoor & outdoor public sphere, use of vernacular, sustainable materials and their applications in high rise building envelopes, their structural and physical properties, limitations, construction technological changes, adoption in real time to environmental changes for a better performance. If we consider the huge total surface area of a city's building envelopes, its public contribution may not only make outdoor areas comfortable, clean, and enjoyable, but also help to alleviate the bigger problem of rising temperatures in cities.

KEYWORDS: High Rise Building Envelope, Collaborative Design Approach. Building Envelope
Sub-Theme: facade designing

SUSTAINABLE BUILDING ENVELOPE

Vishakha V. Kallianpur

Contemporary architecture, today, is highly trounced by modern influences. Due to growing concern of global warming, there has been an immediate need for understanding our responsibilities towards living in harmony with nature and how we can smartly adapt traditional as well as contemporary design elements to protect our structure from the prevailing vulnerable climatic conditions of wind, solar, humidity, temperature etc. Many dimensions have been attributed towards '**Sustainable design**', and one of it is '**Building envelope**'. Sustainable building envelope is understood as a tough outer shell to the structure which takes care of the inner environment and protects it from the outer harsh conditions of climate by using creative sustainable facade elements. It not only helps in energy efficiency of the building but also gives it a contemporary look. With the kind of modern innovations and different innovative and attractive elements being used for façade beautification, the comfort level of the inner environment and subsequently, the energy consumption is greatly affected creating a negative impact on the performance of the building. Today, we simply build thinking about the attractive facade treatment ignoring the comfort level of the users and also how it contributes to our carbon footprint.

The research in this study is based on the analytical comparison between recently built sustainable designs in tropical climates and climate of different places in the world. This study aims at explaining how we can plan envelope designs in articulate and coherent way with sustainable techniques.



THE VISUAL CHARACTERISTICS OF RAILSIDE LANDSCAPE FOR TOURISTS' SATISFACTION

External Environment ,S.P.G.D.K. Guruge, Student ,University of Moratuwa, Sri Lanka,

E-mail - dilyakethakiguruge@gmail.com

Visual characteristics of Railside Landscape can be captured using indicators derived from seven theory-based concepts related to landscape perception. Visual characteristics of Railside Landscape aim to establish links between landscape aesthetic theory and visual indicators, thus exploring what landscape indicators are really indicating intentions of the tourist satisfaction. The steps from abstract visual concepts to measurable visual indicators are described, and links are made to theories of landscape preferences and perception. The focus of the paper is on information in human landscape perception which will add value to the moving Railway Landscape.

This paper includes a discussion of six case studies selected for the survey by analyzing the Colombo Fort to Badulla railway landscape by suggesting the filtering process of the geomorphology and the spatial character of in landscape. Findings revealed that the moving landscape character of the railway journey inspires the revisit intentions of the tourist, and it affects the tourist satisfaction.

KEYWORDS: moving landscape, tourist satisfaction, landscape indicators, rail side landscape, landscape character

EXAMINING THE BENEFITS AND BARRIERS FOR THE IMPLEMENTATION OF NET ZERO ENERGY SETTLEMENTS

Ar. Kuntal Shah – Urban Planner & Architect, Affordable Housing Mission – Gandhinagar.

Email: ar.kuntal@oxfordbrookes.net (M): 8460543690

Studies indicate that worldwide buildings consume up to 40% of the total global energy and 36% of carbon dioxide emissions. By the year 2030, the consumption is expected to increase up to 50%. In India building sector consume a total of 70% of the electricity generated in the country. More than 50% of energy is used in buildings for occupants' comfort like cooling and lighting. Together with the finiteness of conventional energy and recent developments in sustainability have drawn attention towards Net-Zero Energy Building definition system being future buildings. A net-zero energy building or community is defined as one that, in an average year, produces as much energy from renewable energy as it consumes. Net-zero energy buildings and communities and the manner in which energy sustainability is facilitated by them are described and examples are given in paper. The aspiration is to observe these buildings contribute less overall greenhouse gas to the atmosphere during operations than similar non-ZNE buildings. They do at times consume non-renewable energy and produce greenhouse gases, but at other times reduce energy consumption and greenhouse gas production elsewhere by the same amount.

This paper aims to review the fundamental aspects for approaching net zero energy consumption buildings (NZEB) keeping into consideration the effect of building physics and challenges faced in the pathway and its feasibility. The study evaluates the sustainability of net-zero energy building (NZEB), in terms of ecosystems development in a local context, with ecological indices and metrics. Also, it addresses various policies and plans that can be effective for the future of developing nations like India toward a zero-emissions energy system. The results show that the realization of net zero energy building should not only depend on the traditional energy-saving technologies but should also depend on the transformation of the energy system and the combination of information technologies. The achievement of net zero energy building should not be conducted in an individual building but should be conducted in scale of a whole urban energy system. In summary, net zero energy buildings are one of opportunities for the construction industry to undertake country-wide energy revolution and further integration with technology.

KEYWORDS: Energy-efficient building, Net-zero energy building, Communities, Building energy policy, NZEB

SUSTAINABLE BUILDING ENVELOPE

Kshitija Pramod Ugale, 5th Year Student

Shri Shivaji Maratha Society's College of Architecture, Pune, Maharashtra, India.

E-mail:- kshitijaugale15@gmail.com Phone:-7028658589

Sustainable facade is an important concept in today's architecture and will be even more so in the future. The main motive of this research is to study the importance of sustainable facade materials in sustainable building with respect to its benefits, maintenance and climatic response. Facade have a very deep impact on to the minds of the viewers as well as the end users of particular building, and it adds a unique personality, character to it. Buildings are considered to be the largest users of energy. This consumption of energy can be reduced by a sustainable approach towards facade design and material selection for the same. The paper is aimed at examining the role of sustainable building facade material in building design by investigating the impacts of sustainable facade design on building using sustainable materials and to focuses on the deepening of technology of building facade elements, and how the building facade can control the thermal comfort as part of the indoor environment in a building that carries sustainability architecture. The secondary data is collected using references from various research papers, articles about sustainable facade and some internet sites and analytical studies are done. It was found that the principles of passive design on building envelope have a great influence on the comfort level in the building. The goal to be achieved in sustainable design is to minimize the use of the design that takes much energy to address the issue of energy crisis lately. With the focus on the proposal of vocational training institute(at Shirur, Pune) this is the final year Architectural Design Project to be submitted at the final exam in May 2023 the author supports architectural elements and designs based on this research.

KEYWORDS: sustainable facade materials, thermal comfort, energy saving, sustainable design.

FAÇADE DESIGN AND MATERIALS PLAY AN IMPORTANT ROLE IN FUNCTIONALITY OF A BUILDING

Ar. Arsheen Palkar, Ar. Muktai Gaikwad, and Ar. Akshay Joshi

A façade plays a vital role in any building. A good façade grabs attention due to its unique style and stands out from the surrounding buildings.

A well-designed façade and material selection helps the building to be sustainable and energy efficient. The facades work as an interface between the interior and exterior of a building. An architect is exposed to various building materials that enhance the appearance of building envelope such as ventilation elements, windows, glazing, aluminium features, etc. and gives protection in reference to external environment.

Building materials add personality and character to a building and gives life to any structure. Facade design was started with use of materials like stone, mud, and bricks which were sustainable and now it has updated with newer materials like aluminium, glass, copper finishes, etc. which is leading to rigid facades. The above research paper shows a significant information about façade materials in high rise buildings.



SUSTAINABILITY FROM CORE TO SHELL

Traditional sustainable envelope for future

By Ar. Bhakti Sawant Salunke, Asst. Professor, LTIADS, Navi Mumbai

An envelope to a building is a shield that not only safeguards the building from external impacts, forces, weathering conditions but creates an environment within the building to facilitate better indoor environment conditions. The design principals, ideologies, constructional techniques and building materials need to be integrated in order to create synergy with its occupants and their comfort. However, the problem remains as to what constitutes towards sustainable envelope design that would enhance building thermal conditions and adaptability to the local climate. Therefore, the aim of this research paper is to identify and compare traditional building envelope with local climate of specific region which are significantly sustainable from core to shell. This will be validated by envelope study of various cases that are local and traditional in their architectural inputs. It is expected that , the selected examples would promote the traditional building envelope significance and bring about building sustainability.

KEYWORDS: Sustainability, Core, shell, traditional, microclimate.

A DESIGN TEMPLATE FOR ENERGY EFFICIENCY BASED ON ORIENTATION AND MATERIAL COMPONENT IN RESIDENTIAL BUILDINGS IN DRY ZONE

Paranitharan. A, Undergraduate Student (Bachelor of Architecture)

Upendra Rajapaksha, Senior Lecturer, University of Moratuwa, Moratuwa, Sri Lanka

paraniamal001@gmail.com, rajapaksha_upendra@yahoo.com

Today world faces a challenge where the discussion of energy supplementation and energy use is in the rise. Building industry is one of the main contributors which increases the energy production, and the buildings absorb large amount of energy in many aspects. Especially residential buildings which are being designed today consume an excess amount of energy. Designing energy efficient building template helps to minimize the energy usage in buildings. Building orientation and Material usage play an important role to adopt energy efficient design strategies in building. The material aspect of external envelope with the combinations of orientation will contribute as a factor of building heat generation which directly contribute to increase energy consumption. Preparing a design template based on the building orientation and materiality is the best option for the existing energy requirement in residential buildings.

This research concentrated to analysis, how the combination of building orientation and material aspects of residential building affect the energy efficiency of building performances and try to create an Energy efficient template based on orientation and material components. For this study, 21 different individual houses in dry region were selected. Utilizing collected information, a simulation matrix prepared, and the simulation was conducted by combining the simulation matrix using Design Builder software. By reviewing the result, the proper material mixtures of roof, wall and window for different orientations was identified and presented as "A design template for energy efficiency based on orientation and material component in residential buildings in Dry zone"

KEYWORDS: Energy efficiency, Building Orientation, Materiality, Design Template.

ECO FRIENDLY BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES USED FOR CONSTRUCTION OF SUSTAINABLE BUILDINGS.

ECO FRIENDLY MATERIALS FOR SUSTAINABLE BUILDINGS CONSTRUCTION.

Ar. Akshay Joshi, Ar. Muktai Gaikwad, and Ar. Arsheen Palkar

Eco – friendly building materials doesn't harm the environment, in form of production use or disposal and can easily be recycled. A sustainable green building reduces carbon emissions and helps in saving energy which in term helps in saving money. It is necessary to reduce our energy consumption and choose wise construction materials and techniques in reference to increase in global climate changes. Building materials like cement, steel, bricks, etc. produces large amount of green house gases & CO₂. So, it is necessary to use energy efficient material & techniques that helps to save energy. The above research paper gives a significant information about eco – friendly materials & construction techniques that are locally available and helps maintaining healthy environment.

BUILDING ENVELOPE, SUSTAINABLE BUILDING ENVELOPE

Ar. Pallavi Deshmukh, Assistant Professor, Bharati Vidyapeeth College of Architecture Navi Mumbai,

Contact: 09820398534, ar.pallavideshmukh23@gmail.com

A very common debate in the urban planning sector has always been the need of development against the necessity of preserving the natural environment. Our cities have become the centres of growth and development, which in-turn has given rise to problems such as pollution, scarcity of resources, poor living conditions, etc. We have modern medicine to help eradicate the diseases, but what we do not have is a disease free, healthy lifestyle.

The green zones within these cities have been acting as their lungs for a long time now, maintaining the balance between the development and preservation of natural resources. But the speed at which development is taking over is overwhelming the natural ecosystems, making it difficult for them to maintain the same pace, to preserve the sacred balance between these two necessities. These lungs have become overloaded with the task of providing fresh clean air to the occupants of these spaces.

Is there a way to provide a reinforcement to the existing natural system in maintaining this balance? Can buildings become units which would carry out the function of maintaining a balance between their need and the environment? Can our buildings or the facades become entities which together make the cities healthier? This research paper is a small step take towards searching solution to this imbalance through various interventions. Metropolitan Cities like Mumbai, Delhi have been facing problems of degrading air quality, waste management, etc. It has become a need of the hour to find solutions to tackle these problems and maintain the balance so as to achieve a better standard, quality of life and sustainable development.

KEYWORDS: Sustainable, Building envelope, Green Lungs, Balance



ADITYA COLLEGE OF ARCHITECTURE

IMPACTS OF GREEN FACADES ON MODERN ARCHITECTURE

Sanyogita Murkumbi; Architect

(PG student, Ashoka School of Planning & Architecture Hyderabad Telangana)

Email: yogji.6@gmail.com, sanyogitamurkumbi@gmail.com

The building envelope defines the characteristics of the built form, influencing cultural appearance as well as having a significant impact on total building performance. The key issue in building envelope design is balancing aesthetics and performance. The research focuses on building envelope design strategies and approaches, as well as the role of its various components in creating a sustainable built environment. The study's methodology is carried out through a discussion on various building typologies, their importance, and façade systems demonstrating green building attributes, material selection, and technological innovations. The purpose of this paper is to discuss and recommend the importance and benefits of integrating and implementing energy-efficient strategies for the type of building envelope of sustainable development in the design of future buildings.

KEYWORDS: Building Envelope; Façade Design; Material; Energy Efficiency; Sustainable.

SUSTAINABLE BUILDING ENVELOPES – A VERNACULAR APPROACH

Ar. Aditi Vidyadhar Sontakke, Associate Professor, Thakur School of Architecture and Planning, Mumbai, aditisontakke0@gmail.com

Mrs. Trupti Ghag, Junior Clerk, Thakur School of Architecture and Planning, Mumbai

Jay Dharmendra Kukadia, II Yr. Student, Thakur School of Architecture and Planning, Mumbai

Vernacular Architecture is all about rudimentary practices proven for centuries that are climatically responsive, culturally adaptive as well as economically effective. These practices are proven their resilience against various adverse factors and hence sustained for centuries-long. Also, they are outcomes of society's physiological and psychological needs. The term vernacular architecture covers multiple aspects; local climatic conditions, topographic profile, geological characteristics, ecological traits, social requisites, functional use, technical solutions, economic viability, and its very own aesthetic attributes. The building elements such as walls, roofs, fenestrations, semi-open and open spaces in and around the buildings, local construction materials, and construction techniques give a distinct character to the buildings. The building enclosures represent not only the character of the building but reflect many factors such as the local environment, socio-economic character, cultural trends, as well as technical wisdom of the community in the region. The paper illustrates the elements of vernacular architecture in five climatic zones in India. Also, it justifies the social requisites, environmental responsiveness, and economic viability of the vernacular buildings. The study is carried out through various references from reliable sources of information. The conclusion is based on inferences derived from data analysis and other relevant information.

KEYWORDS: Vernacular, Enclosures, Materials, Environment, Sustainability.

BUILDING ENVELOPES AND HEALTH & WELLBEING IN SUSTAINABILITY FRAMEWORKS: A COMPARATIVE STUDY OF WELL V2 AND THE LIVING BUILDING CHALLENGE

Rajratna Jadhav B. Arch (India), M. Arch (USA) FIIA, MPEATA ,PhD Researcher, Dr. Babasaheb Ambedkar Technological University, Lonare, Maharashtra

Professor, Rachana Sansad's Academy of Architecture ,Mumbai, India .rjadhav@gmail.com +91.9819007049 ,October 2, 2022

Building envelopes and health and wellbeing of occupants are strongly interrelated. United Nations' SDG3 relates to Good Health & Well-being. There are specific sustainability frameworks for health and wellbeing.

I compare two such frameworks, the WELL Building Standard (version 2) and the Living Building Challenge1 (LBC) to identify their strengths, weaknesses, omissions and enhancements. Special attention is given to criteria modulated by the building envelope. Each framework is examined for its approach, objectives and methods and is related to the 17 SDGs of the UN. Both the frameworks compare well in the areas of indoor environments, air quality and more. However, LBC goes beyond conventional targets to achieve significantly higher targets.

WELL, has detailed goals for achieving some of their ratings and includes some criteria which are absent in LBC like emergency preparedness, for example. LBC is particularly strong in the areas of urban agriculture, use of responsible materials, fair labor practices and more. It is found that both the frameworks have strengths and weaknesses. In the end, a hybrid framework is developed that is more elaborate, more holistic, more inclusive and more detailed in its scope, enhancing the objective of SDG3 and highlighting the importance of the building envelope.

The Living Building Challenge is, primarily, a sustainability framework. However, like all sustainability frameworks, the LBC also gives high priority to the health and wellbeing of a building's occupants. To enable a fair and equivalent comparison with the WELL Building Standard, I use only those criteria of LBC that relate to the health and wellbeing of occupants and users.

KEY WORDS: Building Envelopes, Health & Well-being, SDGs, WELL Building Standard, Living Building Challenge

FACADE DESIGN -REPRESENTING BUILDING TYPOLOGY

Hrishikesh Jitendra Bhavsar, 5th Year Student, Shri Shivaji Maratha Society's College Of Architecture, Pune, Maharashtra, India.

E-mail: hrishikeshbhavsar1412@gmail.com Phone: 7020187443

From the ancient history of architecture, the facade of the structure is the most important part of it, as it's the first impression of that structure. The basic need of facade designing for any particular structure is to increase the visual value of that structure and also to define its functional use as well as the context, surrounding, patronage, period, and construction of the structure.

Since the history of modernization, we can see lots of deviations in the facades, to fulfill various parameters like the trends in facades are ever-changing and mainly depends upon architectural design, construction typology, cost factors, availability of the material in the market. This research study analyzed regional building materials, decorative elements, and contextual design, through the representative case studies of facade expression. This research study identified some modern architectural trends for new facade design for temple architecture in Jalgaon like

- Attempts to create decorative facade expressions that stimulate human senses or expand perceptions and increase aesthetic sense.
- Forming complementary relationships with the city by demonstrating regionality.
- Enhancing the performance of facades with adaptive facades.

With the focus on the redevelopment of temple precincts (case of Mangal Grah Dev Mandir at Amalner, Jalgaon) this is the final year Architectural Design Project to be submitted at the final exam in May 2023 the author supports architectural elements and designs based on this research.

KEYWORDS: Decorative Facade, Modernization, Structure Context, Typology, Material, Architecture.



COMPARATIVE ENVELOPE ANALYSIS BETWEEN TRADITIONAL AND CONTEMPORARY CONSTRUCTION FOR ENERGY EFFICIENCY IN A HOTEL IN MATHERAN

Ar. Shraddha Kapadia, Bharati Vidyapeeth College of Architecture, Navi Mumbai

Buildings are usually skin dominated, having smaller internal heat generation as compared to the heat gain/loss through the envelope (Givoni 1998). The building envelope can contribute up to 73% of the total heat gain/loss (DOE 2004). Energy efficient building envelopes can reduce dependency on fossil fuel and environmental pollution.

This paper explores the analysis of thermal performance of envelope in a hotel in Matheran with respect to energy efficiency. The essence of tourism in Matheran is environment and so to conserve its quality, there is a need to induce environmentally sound development and operations. All this underlines the implementation of green sustainable measures and need to achieve greater efficiency in existing hotel envelopes as no new construction is allowed in Matheran.

It is very important to investigate heat gain parameters for different envelopes based on their material characteristics. Thus, the objective is to make a comparative analysis of two different building envelopes, the traditional load bearing Laterite stone construction and contemporary RCC framed brick structure (traditional and contemporary) in the Matheran hotel and determine the most energy efficient one from their energy-saving potential.

Both the envelopes are investigated through ECOTECT and eQUEST software's simulation modelling for thermal performance. The analysis of the simulations implied that the traditional construction building envelope has better thermal performance, thus more energy efficient.

Further, the study concludes by making the contemporary envelope more energy efficient by modifying it (roof, wall and fenestration properties) and simulating the same for better thermal performance.

SUSTAINABLE BUILDING ENVELOPE OF DHAKA CITY

Tanveer Ahamed Bin Ali Naser¹, Lecturer, Department of Architecture, BRAC University, Bangladesh

Rafia Rukhsat Tohfa², Lecturer, Department of Architecture, BUET, Bangladesh

Tansen Alam Sangit³, Lecturer, Department of Architecture, State University of Bangladesh, Bangladesh

A building's envelope is the final realisation of the design, and a huge factor in how successful it is as an environment, for work or leisure. The envelope is the building's outer skin and its connection to the city – it must make sense in both roles at once. Recently, sustainable building systems have been introduced in developed countries to improve the overall performance of buildings and to prevent greenhouse gas emissions, the main reason for climate change. For achieving building sustainability building envelope treatment plays a major role. It is very important contributor to the comfort parameters and attractiveness of any building.

As a developing country till recent decade Bangladesh was following the western building architecture which was creating unsustainable condition and the temperature of the cities are increasing day by day where the glass box like buildings can be considered as one of the culprit. But in recent decades some of the architects of Bangladesh working on this and designing sustainable building envelope to reduce the temperature of the building alongside the beauty. This paper aims to highlight the innovation of Bangladeshi architects on sustainable building envelope to encourage the society to create more sustainable building envelope treatment to reduce global warming.

KEYWORDS: Building envelope, Building Facade, Sustainability, Thermal.

EVALUATING THE BIOPHILIC QUALITY OF DESIGNED GREEN SPACES IN HIGHRISE RESIDENTIAL CONDOMINIUMS IN COLOMBO

*Dasanayaka. D.M.K.S. 1, and Rajapaksha R.M.K.U21, 2Department of Architecture, University of Moratuwa, Sri Lanka
k.s.dasanayaka@gmail.com , upendra@uom.lk*

Both Architecture and Landscape Architecture are also using new techniques as other fields do with the development and digitalization of the world. But considering the urban human being, the innate need to stay close to nature is fulfilling through a weekend getaway to the countryside or by visiting the nearby urban park. Due to their tight schedules, they might not get time to go out even at times, and all they can have is walk to their balcony in the apartment and have a cup of tea. Because of this in the global context, they try to add innovative techniques to create more friendly environments for the urban dweller. Bringing greenery or nature to the living environment has become a considerable practice under the title of biophilia for over two decades. In Sri Lanka, there are only a few researches have been done on biophilic concepts and even lesser research on biophilic dwelling. There are few practices that we can see currently on the functioning high-rises in the urban context, but they were not purposefully designed for biophilic applications. Researchers have given some metrics as that there should be greenery per some population or square meter. But in Sri Lanka, most of the residential high-rises are designed for the maximum economic benefit. Also, they are in the places that get the most beautiful views of the surrounding context. Live walls, Rooftop gardens, and having some personal mini landscapes in their balconies are current practices additional to that. In the designing phase, they must be aware of how should be the depth of troughs for each plant, what are the suitable plants for upper floors, and what are the innovative ways that they can add greenery rather than just planting in troughs and pots. Also, live walls have become a trending practice in Sri Lanka in most of the building facades. Due to the cost of maintaining difficulties they implement green walls on small areas which are not enough. This study was done to provide suggestions and innovative solutions that can be practiced on implementing and maintaining greenery on upper floors. The selected case studies are representing a residential Highrise that has vertical greenery already, a residential Highrise that is functioning currently which doesn't have vertical greenery, and a residential Highrise that is in its construction stage and has some proposals for vertical greenery.

KEYWORDS: Residential high-rises, Biophilic design, Vertical greener

ROLE OF BUILDING ENVELOPE: UNDERSTANDING THE TENSILE STRUCTURE AND ITS DESIGN PROCESS.

Author 1: Pratik Dattatray Shedage 4th Year Student Dr. D. Y. Patil College of Architecture, Akurdi, Pune.

Email- pratikshedage9696@gmail.com

Author 2: Ar. Nupur Chichkhede Assistant Professor, Dr. D. Y. Patil College of Architecture, Akurdi, Pune.

Email- nupurchichkhede.dypcoa@gmail.com

Tensile fabric structures are characterized by the tension of the membrane system, especially with wire or cable. The use of tension throughout the structure gives the screen a critical structural support. Tensile architecture is the most common type of thin-shell structures. The features of this system, its loading and the structural material from which it is made were also studied. The paper begins with a brief history of evolution and an explanation of the variety of fabric structures that were previously built. It starts with the introduction of tensile structure, including the history of tensile structure and different types of structure. This is followed by a discussion of major loadings that need to be considered for tensile structure elements. Then, the general design process theory. Detailed analysis theories for form finding and equilibrium are illustrated. In this paper, some fabric materials are given with their properties. Finally, two case studies from around the world have been presented to validate and clarify the direct use of design and construction methods of various modern trends and tensile structure systems.

KEYWORDS: Tensile Structure, Lightweight, Building Envelope



SCREENS OF INDIA

Ar. Shivani Gaikwad, Assistant Professor – Marathwada Institute of Technology, Aurangabad, Maharashtra.

Ar. Chinmay Pade Assistant Professor – Marathwada Institute of Technology, Aurangabad, Maharashtra

Climatic conditions and natural factors along with dynamic lifestyles are frequently creating an impact on the structures. Our traditional architecture has always provided simple solutions for the tough challenges posed by such conditions. The building facades constructed are static and hence are not capable to adapt to these dynamic changes. Although, they are adjusting and adopting to the requirements of the gradual changes that the lifestyle goes through. Hence it is rightly said that change is always constant.

Now a days, the simplest solution is to install HVAC system, which leads the structure ignorant of its background. This prototypical style of architecture has started spreading even in places that cannot afford to use energy due to the introduction of this luxury. This leads to the necessity for looking back at the broken link of the traditional architecture and borrowing some of its elements after understanding its complete potential.

In doing so, an element that is found, that is used beyond geographic borders and climatic restrictions are the perforated screens that are known as “Jaali” in India. By altering the depths and the apertures of jaali patterns one could control the glare and solar insulation as well as give an unobstructive view. Making the envelop of the building more dynamic, rather than just a container.

The research introduces an experimental study to evaluate the concepts of different jaali patterns through stimulation and modelling.

The aim is to explore the intricacies and complete potential of this element and exploit its abilities in order to adapt it in present context.

The research provides information about the experimental study that is performed to evaluate the thermal and visual comfort. Optimized façade pattern to achieve well-lit, thermally comfortable spaces.

KEYWORDS: Optimization, Dynamic Facades, Kinetic Patterns, Daylight Analysis.

IMPORTANCE OF TRADE-OFF DECISIONS IN THE BUILDING ENVELOPE

Ar. Suhasini Pugalenth, Associate Professor

The trade-off is a situation that involves losing one quality, aspect, or amount of something in return for gaining another quality, aspect, or amount. This paper discusses the importance of trade of decision in building envelope, and an example of different alternatives that need to select. Explaining the process that can be used for trade-off analysis, described with a case example considering the problem scenario. In trade-off decisions understanding what are the motives, drivers, objectives, and requirements led to having more than alternatives. Role of stakeholders for taking decisions, consideration, or recommendations and biased for, known technology, vendor, or process. other internal or external factors, for example, resources, suppliers, environmental, legislative ...etc. that may affect the decision. Importance and Use of digital tools to set all the thoughts and research results visible to the team involved in making the decision. The final decision is based on defining the alternative, criteria, setting the criteria weight, and scores, and analyze the result, and take the final decision.

HUMAN INTERACTION WITH THE BUILDING ENVELOPE -HOW THE SKIN OF A BUILDING AFFECTS HUMAN PSYCHOLOGY

Shreshtha Bhadra, B.Arch Undergraduate, shresthabhadra2007@gmail.com

Saloni Jain, B.arch Undergraduate, salonirjain111@gmail.com

Visvesvaraya National Institute of Technology

Whenever we think of buildings or architecture in general, we tend to associate it with materials, colour, design, technology but there is one prime factor that is often left out- us, human beings. From the occupants, the stakeholders involved to simply the passers-by who have a fleeting interaction with any building, this is one vertical of architecture that is not so often pondered upon. There lies a complex interaction between buildings and human beings. Especially the building envelope, which is literally the first impression human beings have of any building, it's like judging any book by its cover. This paper tends to delve deep into the human psychology to check how the building skin effects human psychology, whether it has any deep-lying impact on human society and does it manage to evolve culture and society and if so, how can it manage to achieve so. Does grandeur matter, is color psychology relevant in this case, are there any gender or social bias?

KEYWORDS: Human Psychology, Building-human interaction, Façade architecture, Public realm, Environment & behaviour.

BIO- SOLAR ROOFTOPS FOR SUSTAINABLE BUILDINGS

Avitesh Vaishnavi Nayak - Assistant Professor, Tejwant Singh Brar - Professor

aravitesh13@gmail.com, tejwantbrar@sushantuniversity.edu.in

Sushant School of Art and Architecture, Gurugram

A green or sustainable building is one that fulfills the functional requirements of its users without any or minimum harm to environment because of its design and characteristics. As per the world green building council, Green buildings may save energy up to 30 - 40%. Energy demand is growing across many countries in the world, dealing with the energy problem is one of the challenges humanity confront in the twenty-first century. While energy consumption is expected to rise in all end-use demand sectors, the buildings sector is expected to grow rapidly with an average annual growth rate of 1.6 per cent globally. Renewable energy is often seen as a cornerstone in our move towards a more sustainable future. Bio roof integrated with solar panels is not only good for thermal performance of buildings but also produce clean energy. This paper presents an overview of the role of PV green roofs (bio-solar rooftops) as part of sustainable buildings and their advantages worldwide. Study also tries to assess the challenges and opportunities for Bio-solar roof tops in Indian climatic conditions.

KEYWORDS: Sustainable buildings, Green terraces, Renewable energy, Energy efficiency, Bio-solar rooftops, Energy demand.



WEATHERING; PATINA, AND OTHER MEANS. REVEALING MATERIAL'S EXTERNAL CLIMATE ADAPTATION PROCESSES

Chris Thurlbourne, Associate Professor. The Aarhus School of Architecture, Denmark

Materials used in building facade assembly are materials that have been man-processed into specific elements. All materials start as crude material, raw and sourced from our earth. A process of production demands crude material to change state - in wood for example - it is felled. Chopped down, killed and reprocessed under specific controlled processes. We assume control of all building materials through rigorous quality control specifications and regulations to ensure materials perform under specific constraints. Yet facade materials confront an external environment that is not controlled, and are susceptible to heat, to rain, to snow, to wind, to UV. All live forces undetermined, and of which materials naturally act and react through weathering, patination, discoloring promoting natural chemical reactions such as rusting. The purpose of the paper is to present recent research that explores the after-life of specific material types and how understanding of materials' natural processes of transformation when exposed to the external climate can inform initial design decisions. The research follows iterative prototyping processes where knowledge has been accumulated via explorations of specific material performances, from laboratory to construction mock-ups focusing on the architectural qualities embedded in control of production techniques and facilitating longer term patinas of material surfaces to extend the aesthetic beyond common judgements. Experiments are therefore focused on how the inherent material qualities drive a design brief towards specific investigations to explore aesthetics induced through production and patinas obtained over time while exposed to external climate conditions.

KEYWORDS: Patina, Climate, Material Performances

AUTOMATIC DYNAMIC FAÇADE OF PNEUMATIC COMPLAINT MICRO-ACTUATORS FOR CONTROLLING DIRECT AND INDIRECT DAYLIGHT

Ar. Pruthviraj Bhopalea, Architect, Fresco Design Studio, Pune, India.

+91 8446400750, bhoplepruthviraj@gmail.com

Ar. Sneha Dilwaleb, Director, Fresco Design Studio, Pune, India.

+91 9561311183, archsneha1985@gmail.com

The sun changes direction continuously which makes traditional fixed facades and apertures efficient only for short period of time. Currently available dynamic façade has many moving parts. As the number of moving parts increases linearly, number of failure points and chances of failure increases exponentially resulting in very high maintenance and low reliability. Also, such moving parts require energy which makes the façade less efficient and unreliable. This creates the need for a building envelope solution which is dynamic, energy efficient and has no moving parts.

Pneumatic compliant micro-actuators create movement with help of controlled air pressure which requires very low energy to operate and as there are no moving parts, this technique becomes highly reliable and requires low to none maintenance (no bearings, no oiling, no friction, etc.). In layman's term, basically, it is a flexible sheet of certain material which changes shape and size as per requirement and inputs.

Research methodologies used in this paper focuses on operating principles of pneumatic complaint micro-actuators, overview of automation model, building performance analysis regarding daylight before and after the installation of façade. Also included are various simulation driven results and reports as proof of concept

KEYWORDS: Pneumatic complaint micro-actuators, Adaptive façade, Model and analysis of Dynamic façade, Responsive complaint façade, Sustainable responsive façade

The Council of Architecture (COA) has been constituted by the Government of India under the provisions of the Architects Act, 1972, enacted by the Parliament of India, which came into force on 1st September 1972. The Act provides for registration of Architects, standards of education, recognized qualifications and standards of practice to be complied with by the practicing architects. The Council of Architecture is charged with the responsibility to regulate the education and practice of profession throughout India besides maintaining the register of architects. For this purpose, the Government of India has framed Rules and Council of Architecture has framed Regulations as provided for in the Architects Act, with the approval of Government of India.

Established in 1965, PEATA India is a forum for Practising Engineers, Architects and Town Planners Association. Formed with the aim to safeguard the interest of practising professionals, it is a unique effort to bring several complementary and supplementary disciplines under a single umbrella in order to cater to their day-to-day needs.

Right from requests to persuasion and insistence from authorities as well as the fraternity, the PEATA has paved its way to safeguard the interest of practising professionals. The norms, conventions, and experience of hundreds of representations, discussions, negotiations, workshops, seminars and recommendations have enriched the Association with extensive experience and valuable expertise. With its rational approach towards assessing policies and their effect, the Association has carved a niche in the hearts of professionals and bureaucrats at the local, state and national levels. PEATA believes in the continuity of approach and actions towards the envisaged direction, one step at a time.

About Our Associations



PRACTISING ENGINEERS ARCHITECTS
AND TOWN PLANNERS ASSOCIATION



ADITYA COLLEGE OF ARCHITECTURE

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

The council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes. The council also organises Green Building Congress, its annual flagship event on green buildings.

The council is committee-based, member-driven and consensus-focused. All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters. The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.

About Our Associations



The International Design Competition (IDC) annually hosted by ACA is in its 9th successive year. The aim of the competition is to develop a sensitivity towards prevailing social and environmental exigencies, from the onset of their architectural careers. We at ACA believe that without this key trait neither can the world be ecologically restored, nor can it fulfil its ecological needs.

The IDC is a platform that reaches out to students across globe, inciting them to express through design their thoughts and notions taking nascent steps towards a better world. This year's theme "Building Envelope" is based on arriving at building solutions through the design of building envelopes.

A building envelope is the physical separator between the conditioned space and external environment. Building envelopes play key role in a structure's energy efficiency and can account for up to 30% of the primary energy consumption. However, building envelopes are significantly more than this as they act as an integral part of the overall design and contribute to the identity of the structure in the skyline.



ABOUT IDC

List of IDC 2022-23 winners (Student Category):

1. *First Winner - 2022_IDC2017 - Sharanniya Rajeev, Chennai*
2. *Second Winner - 2022_IDC2016 - G. Abinaya, Chennai*
3. *Third Winner - 2022_IDC2041 - Aditi Ranawre, Pune*

List of IDC 2022 winners (Young Architect Category):

1. *First Citation - 2022_IDC2029 - Minal Shamim, Pakistan*
2. *Second Citation - 2022_IDC2028 - Sana Hassan, Pakistan*

Today the building façade is much more than a mere surround that provides protection & shelter to the interior structure from natural elements; it represents a high-tech component that must meet various criteria in terms of planning, energy efficiency, quality, buildability & value. It requires a balancing act between, meeting the architectural and aesthetic requirements of the project.

Buildings today are responsible for emitting around 40 % of global greenhouse gas emissions making them a major contributor to current climatic crisis, thus bearing upon the building envelope a great responsibility i.e., to reduce energy consumption and create a comfortable, healthy, secure, and safe environment.

Climate-orientated architecture is related to all aspects of building. It will affect the design as well as the building process and the construction itself. Hence building envelope design has developed as a specialized discipline which must meet various requirements as well as constraints and calls for the building envelope designer to coordinate with various agencies.

The role of the building envelope related to the energy performance of a building under the aspect of sustainability, is becoming increasingly topical.

This year theme INTERNATIONAL DESIGN COMPETITION (IDC)-2022 focuses on Building Envelopes. The primary objective of ACA has been to be cognizant of 'Global practices with local concerns'.

'BUILDING ENVELOPE'; an attempt to investigate the various possible design outcomes based on various functions the envelope. A building envelope is the physical separator between the conditioned space and external environment. Building envelopes play key role in a structure's energy efficiency and can account for up to 30% of the primary energy consumption. However, building envelopes are significantly more than this as they act as an integral part of the overall design and contribute to the identity of the structure in the skyline.

Our 9th IDC brief was floated in September attracted the like of many minds Pan Asia. It encouraged young minds to conceptualize and evolve and resolve the pertinent issues in participants choice of setting, place, country.

ACA has been organizing IDC for students and young professionals, for the past eight years aiming to build connections among the global architectural student community and academia, to create reference points much beyond its immediate context and have a meaningful and progressively enriching dialogue on architecture by breaking regional and contextual boundaries that we create for ourselves.

We thank all our participants and readers to have built their trust upon us to deliver work and share.

Message From The IDC Team



Ar. Tejashree Wagh

Associate Professor, IDC Head



Ar. Anjuri Agrawal

Associate Professor, IDC Head



Ar. Manali Rane

Assistant Professor,
IDC Team Member

IDC Winning Entries

First Winner - 2022_IDC2017 - Sharanniya Rajeev, Chennai

WHY FACADE

A building envelope is a seal of protection for the people and things inside a structure. It's like a shell — a barrier against the world outside of the building. In the winter, the building envelope helps prevent the transfer of heat from inside to outdoors. A building envelope is commonly defined as the separation of the interior and exterior of a building. It helps facilitate climate control and protect the indoor environment

WHY SUSTAINABLE FACADE

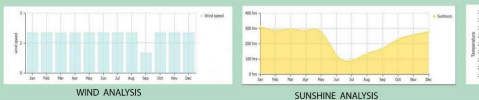
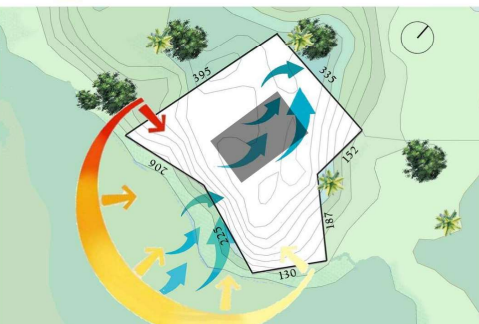
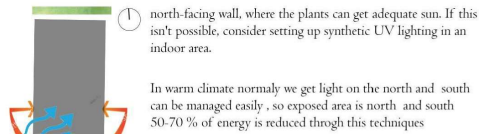
A SUSTAINABLE COOLING SYSTEM WITH MODERN TECHNOLOGY
A sustainable green building can be described as structures with minimal to no negative environmental impact. In addition, these structures consume much less energy when compared to traditional structures. Use Greener Materials—A sustainable building should be constructed of materials that mini-mize life-cycle environmental impacts such as global warming.

SITE STUDY

LOCATION - CHENNAI, ANNA NAGAR
BUILDING - LIBRARY
HEIGHT OF THE BUILDING - 15M

GEOGRAPHY

As of 2018, Anna Nagar zone had a green cover of more than 20 percent, as against the city's 14.9 percent average.



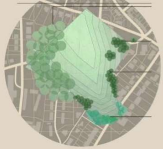
SITE ANALYSIS



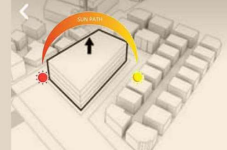
WIND ANALYSIS



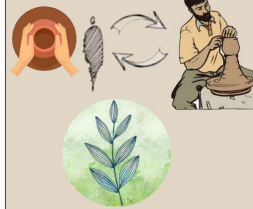
SOLAR ANALYSIS



BUILDING ANALYSIS



RETHINKING WITH NATURE.....



NEW IS NOT ALWAYS GOOD

We have rich cultural and heritage which has beautiful methods. we want to enhance our traditional method

TRADITIONAL METHOD WITH NATURAL METHODS

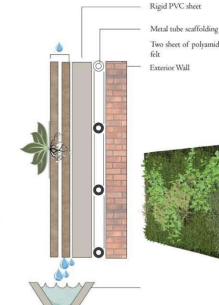


Traditionally earthen pots are used to cool water when we looked at the ancient times egyptian slaves were fanned the pots filled with water to blow cold on to the furns .



Similarly in our own country all the havelis and forts are popular for channelizing air through stone and forts are popular through stone jaielars and jerokas

DETAILS

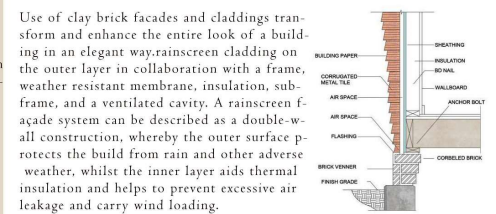


GREEN LIVING WALL

Maintain a comfort environment for the building occupants without having any negative impact. Designed as an enclosure that use least possible amount of energy to maintain comfort environment for the building. Improves the building aesthetic value
How a green wall installed?
Green wall construction :Protect all floors and surfaces. Install frames. Install irrigation controller and hardware. Install pre-planted pots. Install irrigation drip lines and sensors. Test the irrigation system of the living wall construction. Initiate plant maintenance.

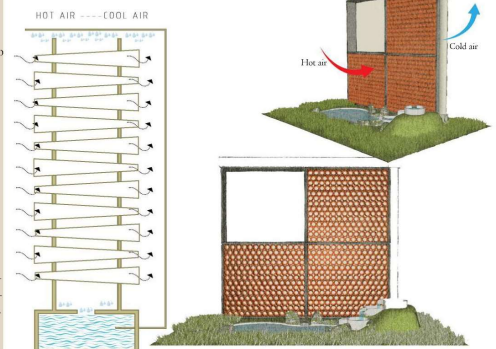


CLAY BRICK -RAINSCREEN FACADES



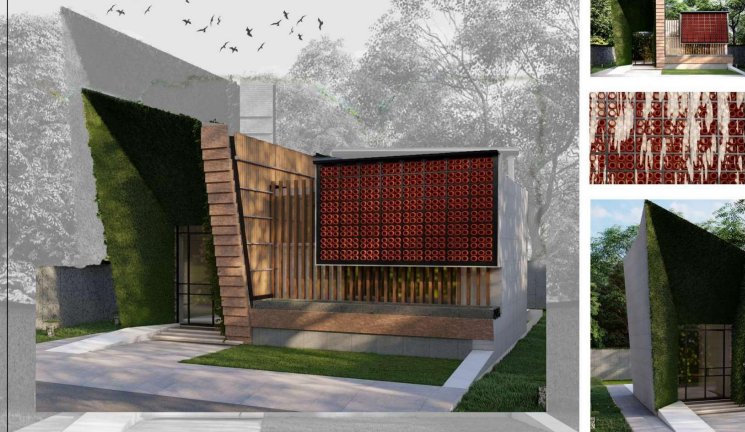
A SUSTAINABLE COOLING SYSTEM MADE WITH WET TERRACOTTA CONES.....

When the air passes through the terracotta cones and comes out, it's naturally cooled the same way the water stays cool in the pot." The cooling system passes water through earthen cones that facilitate evaporative cooling.



IDC CODE IS- 2022_IDC2017

NATURE AS THE CENTRE UNIT



ADVANTAGES

Most significant ,instead of giving out waste heat it consumes the accessive heat around it .

It is not only a cooling device or system it is rather a solution how we can actually reduce the energy that we consumes in cooling operate spaces .

No harmful emissions is released .

Only needs natural materials

Affordable

DISADVANTAGES

It is applicable to only small and medium sized

It produces more aerodynamic noise.



ADVANTAGES

Durability.

Clay facing bricks are calined from clay at high temperature so that they are anti-weathering and anti-corrosive.

Excellent thermal Insulation.

Enhancement of construction efficiency.

High safety.

Sustainability and Low-maintenance.

DISADVANTAGES

Clay brick's soundproof effect is poor.



ADVANTAGES

Purify the Air.

Decrease the Ambient Temperature.

Decrease Noise.

More Productivity.

Make a Building More Fire-Resistant.

Extend the Life of Your Wall.

Give Your Building More Value.

Create a Community Feel.

DISADVANTAGES

Living Walls Require Maintenance

They Can Damage Your Home if you Choose the Wrong Plants. ...

IDC Winning Entries

Second Winner - 2022_IDC2016 - G. Abinaya, Chennai

Third Winner - 2022_IDC2041 - Aditi Ranawre, Pune

UNDERSTANDING AND DESCRIPTION OF BRIEF

BUILDING SKIN VISUALLY SETS THE EMOTIONS AND BEHAVIOUR OF THE BUILDING AND THEIR ENVIRONMENT. ENVELOPE SHOULD BE DEVELOPED BASED ON THE FORM AND MATERIAL. FACADE OF THE BUILDING DECIDES THE THERMAL COMFORT OF THE INTERNAL ENVIRONMENT. THE DESIGN OF THE FACADE SHOULD REPRESENT THE SOCIAL, ECONOMIC AND CULTURE OF ANY REGION INSIDE THE COUNTRY.

THEY ARE STRUGGLING FOR THEIR BASIC NEEDS SUCH AS FOOD, SHELTER, EDUCATION AND HEALTHCARE FACILITIES. BUILDING ENVELOPE AS THE SYMBOL OF STRENGTH AND POWER. EMOTION FOR ART CAN BE DEPICTED AS THROUGH MATERIALS.

PROPOSED INTERVENTION

TODA PEOPLE ARE A DRAVIDIAN ETHNIC GROUP WHO LIVE IN THE INDIAN STATES OF TAMIL NADU, KERALA AND KARNATAKA. NILGIRIS IS A PART OF THE WESTERN GHATS. COYI ARE THE THREE HILL STATIONS OF THIS DISTRICT.

THEY ARE STRUGGLING FOR THEIR BASIC NEEDS SUCH AS FOOD, SHELTER, EDUCATION AND HEALTHCARE FACILITIES. BUILDING ENVELOPE AS THE SYMBOL OF STRENGTH AND POWER. EMOTION FOR ART CAN BE DEPICTED AS THROUGH MATERIALS.

TODA SETTLEMENT IS DECLARED AS THE UNESCO WORLD HERITAGE SITE.

SITE DESCRIPTION

NEIGHBOURHOOD UNITS

THE BUILDING HAS ROAD ON SOUTH AND WEST SIDE AND SURROUNDED BY EMPTY LAND ON EAST AND RESIDENTIAL UNITS ON SOUTH.

CLIMATE ANALYSIS

AVERAGE SUN HOURS

AVERAGE WIND SPEED

AVERAGE TEMPERATURE

AVERAGE PRESSURE

AVERAGE RAINFALL

CONCEPT

CONCEPT - TODA CULTURE

TODAS LIVE IN SMALL HAMLETS CALLED MUNDIS

IN ANNUAL JANUARY - E 0880 (0VH15QJ) - S 1628 (0VH15QJ) - W 1436 (0VH15QJ) - N 084 (0VH15QJ) THEREFORE MAX HEAT GAIN IN EAST AND SOUTH FACADE

CONCEPT, SITE & ELEVATION

MATERIALS USED

TANTALUM CARBIDE - HIGHEST HEAT RESISTANT CAN BE MIXED WITH CONCRETE IN CERTAIN RATIO TO MAKE IT MORE HEAT RESISTANT

PANCHALOKHA METAL IN FACADE THIS CONSISTS OF COMBINATION OF FIVE METALS SUCH AS COPPER, IRON, ZINC, GOLD AND SILVER. CAN BE USED AS COATING IN THE FACADE.

GASOCHROMIC FACADE AND HYDROCHROMIC FACADE STRATEGIES CAN BE ADOPTED

SITE ANALYSIS

FORM DEVELOPMENT

SHADOW ANALYSIS

FEB - 05:00 AM FEB - 05:00 PM

VEHICLE PEAK LOAD

WIND DIRECTION

ACCESS TO SITE

PROPOSED SITE WITH SURROUNDING AREAS

RAINFALL

WIND SPEED

HUMIDITY

TEMPERATURE

CLIMATE ANALYSIS

Strengths

- Set back from main road reduces noise level.
- Good connectivity.
- Weaknesses
- Area is yet undeveloped.
- May have traffic issues.

Opportunities

- Good developed spaces.
- Growing IT sector, area yet undeveloped.

Threats

- Presence of a lot of neighboring commercial spaces may lead to increase in amount of carbon footprint.

STRATEGIES USED

Vertical Greenery

Green Roof

Water Harvesting

How does Facade Create An Energy Efficient Building?

Section of wall covered with vegetation

Water Harvesting

Thermal Comfort

Air Quality

CONCEPT, SITE & ELEVATION

MATERIALS USED

TANTALUM CARBIDE - HIGHEST HEAT RESISTANT CAN BE MIXED WITH CONCRETE IN CERTAIN RATIO TO MAKE IT MORE HEAT RESISTANT

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GASOCHROMIC FACADE AND HYDROCHROMIC FACADE STRATEGIES CAN BE ADOPTED

VIEW

DETAILS

SPECIES IDENTIFICATION

PERFORMIA CHINQUELENSIS IS ONE OF HABITAT SPECIES IN NILGIRIS THAT NEEDS TO BE CONSIDERED.

HOMEO HERBS IN NILGIRIS

GROUND FLOOR

SCALE 1:750

PREVIOUS GROUND FLOOR

SCALE 1:1500

MODIFIED GROUND FLOOR

SCALE 1:1500

LOUVERS

GREEN FACADE

VIEW

VIEW

VIEW

VIEW

VIEW

VIEW

ENTRANCE TO BUILDING

HEADROOM

SKYLIGHT

VIEW

VIEW

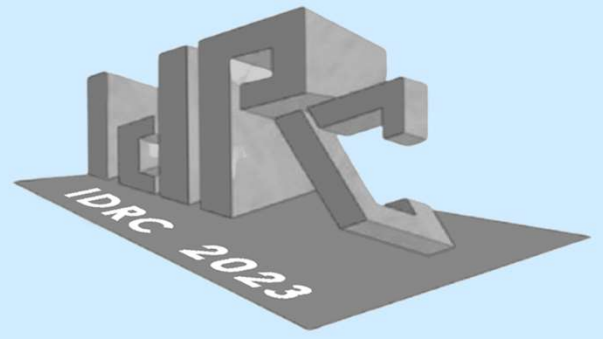
VIEW

VIEW

GREEN ROOF WITH SKYLIGHTS

Team Mates
-Aditi Ranaware
-Ankita Tambade

-Samiksha Bhosale
-Priya Shinde
-Sakshi Shedge



CONTACT :

Tel : 022-35206135

E-Mail : info@aditya-arch.edu.in

Web : www.aditya-arch.edu.in

ADDRESS :

**ADITYA COLLEGE OF ARCHITECTURE,
6th FLOOR, ADITYA EDUCATIONAL CAMPUS, R.M. BHATTAD ROAD,
RAM NAGAR, BORIVALI (W), MUMBAI - 400092**

IN ASSOCIATION WITH

