



CE - ಸಮಯ

Annual magazine - 2021



INDIAN ORIGIN CEOs LEADING THE WORLD



Edition 1

Department of Civil Engineering

MIT Thandavapura

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MANAGEMENT, MET



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Vice President



Dr. T Vasudev
Secretary



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Joint Secretary



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Dr. Y T Krishnegowda
Trustee

MITT is situated at a beautiful, enchanting and sprawling landscape. The institute is founded by a group of eminent people recognised for their eminence in the field of science and engineering technology. Many of them have served at the highest levels of AICTE and University.

The college is equipped with all modern learning aids to make teaching-learning process a pleasure. The highly qualified staff is its asset.

If you are interested in a quality, Maharaja Institute of Technology Thandavapura is the place for you. MIT Thandavapura is a career-focused college that will provide you with a comprehensive educational experience in a variety of growing areas of employment.

HIGHLIGHTS

- Built by renowned professors.
- IIT qualified Principal.
- ISO 9001:2015 & ISO 21001:2018
- Experienced & trained faculties.
- Day boarding system.
- Placement training from first year.
- Transport facility in and around Mysuru.
- 50% waiver of tuition fee for topper of the branch.
- Regular interaction with parents.
- State of the art laboratories.

Programs offered

B.E in CIVIL ENGINEERING

B.E in MECHANICAL ENGINEERING

B.E in COMPUTER SCIENCE & ENGINEERING

B.E in ARTIFICIAL INTELLIGENCE & DATA SCIENCE

B.E in ELECTRONICS & COMMUNICATION ENGINEERING

VISION

To be recognized as an institution known for its academic excellence and innovation towards creating future leaders in respective fields.

MISSION

- Imparting quality education with state of the art skills.
- Conducting research and development activities.
- Contributing technical and managerial services to the society.
- Adapting to ever-changing educational and societal

DEPARTMENT OF CIVIL ENGINEERING

VISION

To flourish as a centre of excellence which delivers quality Civil engineers with sound knowledge, professional skills and ethical values to serve the society.

MISSION

- To impart comprehensive knowledge of Civil Engineering through learner-centric teaching methodologies and industry-institute interactions.
- To conduct research & consultancy and inculcate spirit of entrepreneurship to succeed in wide range of careers with an emphasis on lifelong learning.
- To inculcate the highest standards of moral conduct and ethical behaviour for positive development of individual and society.

PEOs

- To acquire the knowledge of Civil Engineering practices to compete and match with the research and industrial requirements.
- To attain technical and professional skills in the field of Civil engineering for sustainable infrastructural development.
- To instil ethical approach and social awareness towards continuous development and growth of society.

PRESIDENT'S DESK



Dear Readers,

I am happy to note that the department of Civil Engineering of Maharaja Institute of Technology Thandavapura is coming out with a department magazine called CE-Samaya. If you read straight away this it looks to me ಸಿಹಿ ಸಮಯ means sweet time.

Yes, time is so sweet during student age. We elders always feel the best part of our life was college days and that is ಸಿಹಿ ಸಮಯ. Early on, college days, school days were also sweet but they were system-driven by parents and school. Post-college days are hectic and driven by many things like organization, work, family, environment, society, etc. The best time for any one could be these years of college.

There is great liberty for students to choose their career, choose right friends, right hobbies, right thinking, etc. Hence, this time is so sweet. Congratulations to all those students and staff who have contributed to make this magazine so sweet.

With best wishes,
Dr. S Murali

JOINT SECRETARY'S DESK

“You can boost happiness and positive emotions through the use of your talent, whether it can be singing, dancing or writing skills.”



I am pleased to know that the Department of Civil Engineering is coming out with the first department magazine by name “CE -Samaya”. I extend my greetings and blessings on this and congratulate the Editorial team for coming out with the magazine which is need of the day.

The magazine reflects the holistic development of the department. Today the role of the department is not only to pursue academic excellence but also to motivate and empower its students to be lifelong learners, critical thinkers, and productive members of an ever-changing global society.

Each student is an inherent talent that needs to be honed over time to become more refined. The magazine provides a platform to students to share their hidden talents - their creativity, self-expression, and learning experience. The good thing about the magazine is, it is not limited to students but also extended to teaching fraternity who can share their overall achievements.

All contributors and students deserve an applauded and congratulations. I hope in future other students will also feel inspired and motivated to build up their writing and presenting skills.

I congratulate the staff and the students for the commendable achievements.

I wish you all Happy reading....

With best wishes,
Dr. Chethan H K

PRINCIPAL'S DESK

Dear Readers,

It brings me great joy to present the annual magazine of Department of Civil Engineering, MIT Thandavapura, a window into the dynamic and enriching journey we have undertaken together over the past year. As the Principal of this esteemed institution, I am immensely proud of the collective achievements and unwavering spirit that define our college community.

Education is the cornerstone of progress, and at MIT Thandavapura, we have embraced this principle wholeheartedly. Our college stands as a cradle of knowledge, innovation, and transformative experiences, where students are encouraged to dream big, think critically, and explore their true potential.

Within the pages of this magazine, you will discover a tapestry of success stories, academic triumphs, and co-curricular accomplishments that showcase the outstanding talents of our students. As they strive for excellence, our dedicated faculty members have played an instrumental role in guiding and nurturing their growth. The enduring bonds between our faculty and students exemplify the essence of mentorship and the power of meaningful education.

We firmly believe in nurturing compassionate, responsible, and socially conscious individuals. Through various outreach programs, community engagement, and social initiatives, our students learn the value of empathy and the transformative potential of their actions. They are not only future professionals but also agents of positive change in society.

The success of our college is a collective endeavour, and we are deeply grateful for the unwavering support of our alumni, industry partners, and well-wishers. Their guidance, contributions, and belief in our vision have strengthened our resolve to create a nurturing ecosystem that fosters excellence in every domain.

As you flip through the pages of this magazine, I hope you are inspired by the achievements, camaraderie, and aspirations of our college community. Whether you are a student, a parent, a faculty member, an alumnus, or a friend, this magazine reflects the essence of [College Name] and the profound impact it has on shaping lives.

May this magazine serve as a catalyst for even greater aspirations and accomplishments, as we continue to march forward in our pursuit of knowledge, enlightenment, and societal progress.

With best wishes,
Dr. Y T Krishnegowda

Welcome to the Civil Engineering Department's annual magazine! It gives me great pleasure to present to you the Volume 1 of “CE-Samaya”, a compilation of the remarkable events, achievements and significant contributions made by our faculty, staff, and students over the past year.

The world of Civil Engineering is constantly evolving, driven by advancements in technology, emerging challenges, and the need for sustainable development. In this fast-paced environment, our department takes pride in nurturing young minds and preparing them to be future leaders and problem solvers in the field.

At our department, we have created a vibrant learning ecosystem that fosters creativity, critical thinking, and practical skills. Our dedicated faculty members, with their extensive knowledge and experience, strive to deliver quality education, imparting both theoretical and practical knowledge to our students. We are committed to developing a strong foundation of engineering principles and encouraging a multidisciplinary approach to problem-solving.

One of the key highlights of our department is the state-of-the-art infrastructure and well-equipped laboratories that facilitate hands-on learning experiences. From structural analysis to geotechnical engineering, from transportation planning to environmental sustainability, our students are exposed to a wide array of specialized areas within the Civil engineering discipline. We believe in providing a comprehensive education that prepares our students to tackle the complex challenges of the real world.

In addition to academic pursuits, the Civil Engineering Department encourages active student participation in extracurricular activities, technical events, and professional societies. These activities provide a platform for students to showcase their talents, enhance their leadership skills, and develop a strong network within the industry.

As we reflect on the accomplishments of the past year, we are filled with pride and gratitude for the unwavering support of our students, faculty, staff, and alumni. Their collective efforts have propelled our department to new heights and strengthened our position as a centre of excellence in Civil engineering education.

I extend my heartfelt appreciation to the editorial team for their diligent efforts in bringing together this magazine, showcasing the remarkable achievements of our department. I hope this compilation inspires and motivates all our readers to pursue excellence in their chosen paths.

I invite you to delve into the pages of the first volume of our annual magazine and witness the ingenuity and passion that define the Civil Engineering Department. Together, let us continue to build a better future for our society through the transformative power of civil engineering.

Dr. B C Nagendra Prasad
Head of the department

EDITORIAL BOARD



Dr. Y T Krishnegowda
Principal / Editor-in-chief



Mr. Rohith Jain
Assistant Professor / Editor



Chandan S Raj
Student



Sahana B
Student



Jashwanth Gowda
Student



Nikhil B M
Student



Ruthik Singh
Student

STAFF DETAILS



Dr. B C Nagendra Prasad
Professor & Head



Mr. Rohith Jain
Assistant Professor



Mr. Akshay N K
Assistant Professor



Mr. Manu S Gowda
Assistant Professor



Dr. M C Manjunatha
Assistant Professor



Mr. Mahadev Prasad N
Assistant Professor



Mr. Manjunath G S
Assistant Professor



Mr. Raghavendra A
Assistant Professor



Ms. Ganavi S
Assistant Professor



Mr. Chethan M B
Assistant Professor



Mr. Harshith M
Assistant Professor

Non teaching staff

1. Chandra S - Instructor
2. Puneeth Kumar - Lab Asst

3. Manu Y P - Attender
4. Naveen Kumar - Attender

TECHNICAL PUBLICATIONS

- Manjunatha M C, Siddaraju M S and Basavarajappa H T, “High Resolution Digital Elevation Model for Chamundi Hill of Mysuru city, Karnataka, India using Geospatial Technology”, Research Inventy: International Journal of Engineering and Science, Vol 10, Issue 10, Pp 64-71, Oct 2020.
- Basavarajappa H T, Abrar Ahmed, Manjunatha M C, Maruthi N E, Siddaraju M S, “Hyperspectral Signatures and Petro-chemical study on Steatite deposits around Vdrahalli village, Dharwar Craton, Karnataka, India”, JETIR, Vol 7, Issue 12, Pp 1148-1157, Dec 2020.
- B C Nagendraprasad and Savitha A L, “Ground water vulnerability assessment of Mahadevapura zone, Bangalore city - A GIS based drastic modeling”, RScopus activity journal, Vol 819.21.38041, Pp 962-969, 2021.
- Manjunatha M C, Maruthi N E, Siddaraju M.S and Basavarajappa H T, “Pre-monsoon Groundwater Trend Analysis in Mysuru taluk of Karnataka State, India using Geospatial Technology”, Journal of Chemical, Biological and Physical Sciences, Vol 11, No. 1, Pp 51-60, Jan 2021.
- Manu S Gowda and B C Nagendraprasad “Feasibility of domestic reclaimed wastewater for the production of concrete using different types of sand”, Seybold report, Vol 25, Issue 9, ISSN 1533-9211, 2021.
- Manjunatha M C and Basavarajappa H T, “Geospatial approach for Mapping of Dynamic LU/LC Classification in Piriapatna taluk, Karnataka, India”, International Advanced Research Journal in Science, Engineering and Technology, Vol 8, Issue. 1, Pp 19-26, Feb 2021.
- Manjunatha M C, Abrar Ahmed, Basavarajappa H T, “An Approach to delineate land use/land cover classification analysis through Geospatial technology: A case study of K R Nagara taluk of Karnataka State”, International Journal of Science, Engineering and Technology, Vol 9, No. 2, Pp 2-9, April 2021.
- Manjunatha M C & Basavarajappa H T, “Hyperspectral & Geochemical signatures study on late Archean of Indian High grade Manganese

TECHNICAL PUBLICATIONS

deposits in Halekal band of Bhahaddurghatta-Hosahatty village, Chitradurga Schist Belt (CSB), Karnataka, India”, Journal of University of Shanghai for Science and Technology, Vol 23, Issue 5, Pp 603-610, May 2021.

- Manjunatha M C and Basavarajappa H T, “ASTER Spectral reflectance for lithological discrimination in Central parts of Chitradurga Schist Belt (CSB), Karnataka, India”, International Journal of Geology and Mining, Premier Publishers, Vol 7, No. 1, Pp 355-366, May 2021.
- Manjunatha M C and Basavarajappa H T, “Artificial Recharge Structures for Groundwater sustainability in Krishna Raja Nagara taluk of Karnataka State, India using Geospatial Technology”, International Advanced Research Journal in Science, Engineering and Technology, Vol 8, Issue 7, Pp 355-366, July 2021.
- Manjunatha M C and Basavarajappa H T, “Comprehensive Model on Major litho-units in Central Parts of Chitradurga Schist Belt of Dharwar Craton, Karnataka, India for Indian Spectral Library Generation”, International Journal of Geo-informatics and Geological Sciences, Vol 8, Issue 2, Pp 89-105, Aug 2021.
- Manjunatha M C and Basavarajappa H T, “Forest mapping and its change detection analysis in Molkalmuru taluk of Karnataka state, India using Geospatial Technology”, International Advanced Research Journal of Science, Engineering and Technology, Vol. 8, Issue 8, Pp. 513-521, Aug 2021.
- Manjunatha M C and Basavarajappa H T, “Geospatial approach in Land classification analysis for Hunasuru taluk of Karnataka state, India”, International Advanced Research Journal of Science, Engineering and Technology, Vol. 8, Issue 8, Pp. 566-574, Aug 2021.
- Rohith Jain, Chirdeep N R, N C Balaji and G S Suresh, “Studies on the behaviour of Gabion Wall subjected to Lateral Monotonic Loading”, Springer, Lecture Notes in Civil Engineering, Sustainability Trends and Challenges in Civil Engineering, Vol 162, ISSN 2366-2557, Pp: 415-429, 2021.

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- Manjunatha M C and Basavarajappa H T, “Urbanization Threat on Mysore-Betel Leaf Extinction in Mysuru City of Karnataka State, India using Geospatial Technology”, Journal of Remote Sensing, Environmental Science & Geotechnical Engineering, ManTech Publications, Vol 7, Issue 1, Pp 1-12, Nov 2021.
- Rohith Jain, Nallaval Chinnaswamy Balaji, Chirdeep N R and G. S. Suresh, “Comparative study of Gabion wall using experimental and analytical methods”, International Conference on Civil Engineering Trends and Challenges for Sustainability (CTCS 2021), ISSN 2366-2557

CONSULTANCY

The department of Civil Engineering, MIT Thandavapura has a consultancy wing wherein the faculty of the department conduct consultancy works around Karnataka. The department conducts soil testing, building material testing, water and sewage quality testing, surveying, structural stability checks, analysis and design of structures and much more.

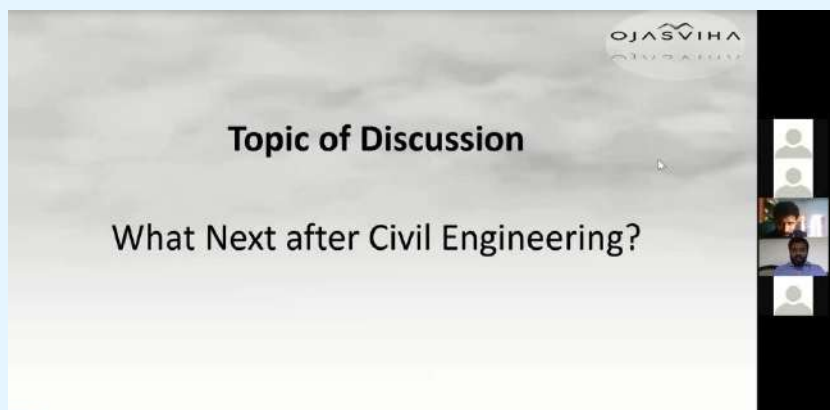
The following projects are successfully conducted in the year 2021.

Sl. No.	Project type	Number of projects
1	Tests on aggregates, bricks, tiles etc.	6
2	Tests on cement, concrete etc.	7
3	Test on steel reinforcement	5
4	Soil testing	3

CAPTURED MOMENTS



Webinar on "Advanced topics in sustainable concrete technology"



Webinar on "What next after Civil Engineering"



Mr. Sainath Habalkar, Alumini spoke on Entrepreneurship

CAPTURED MOMENTS



Site visit to L&T C-TEA Precast Units



Site visit to Sarala Industries



Seminar on "Estimation and billing in construction industry"



BARUNI
Civil
Consultants

Internships
Site visits
Placements



SHATHAYU
Constructions &
Consultants

Internships
Site visits
Placements
Consultancy



Inner Voice
CAD
Academy

Software training



YASHASWI
Consultants

Internships
Site visits
Placements

1. **A talk on Concrete Technology was delivered by Er. Raja K, Plant Manager, Sarala Industries to students of 5th semester on 8th January 2021. The lecture enriched the knowledge of students with respect to Principles of Concrete Mix Design on High Strength Concrete and Self Compacting Concrete which are trending materials in the field of construction.**
2. **An online webinar on “Advanced topics in sustainable concrete technology” was conducted to students of 4th, 6th & 8th semester on 3rd May 2021. The speaker Mr. Chethan Kumar B, Research Scholar, NITK delivered a lecture on importance of Geopolymer Concrete - Concrete without cement. The speaker enlightened about the sustainable development of concrete with reduction of Carbon-di-oxide in future to the students.**
3. **A webinar on “What next after Civil Engineering” by Er. Ranjan Kumar L G, Ojashiva Design and Construction Firm, Bangalore was organized on 10th May 2021 for 8th semester students. The speaker enlightened the students regarding opportunities in the field of Civil Engineering after the completion of their graduation to build their carrier.**
4. **Mr. Sainath Habalkar, Alumni of Department of Civil Engineering, MIT Thandavapura addressed the students of 8th semester to enrich the knowledge of Entrepreneurial skills on 21st June 2021. The talk helped the students gain the knowledge regarding Entrepreneurship and enlightened about the various government schemes which supports Entrepreneurship.**
5. **Students of 8th semester visited an ongoing project on residential building at Vijayanagar, Mysuru on 30th of June 2021. Er. Chiranthan Y, Baruni Civil Consultants explained students about the process of work execution in site. This helped the students to gain practical knowledge with respect to construction of a residential structure.**
6. **Students of 4th and 6th semester visited L&T C-TEA Precast Units on 27/07/2021. Mr. Dileep, Plant manager guided about process of raw**

material procurement, plant equipment and their functioning procedure to the students. Students gained knowledge about precast structural components manufactured in C-TEA precast units. Students were also enlightened about the quality of production.

7. **Mr. Ranjith E M, Partner, Shathayu Civil Consultants presented seminar on “Estimation and billing in construction industry” as exposure to finance in construction industry to the students of 7th semester on 15/12/2021 which was conducted in association with Builders Association of India. Speaker explained the key concepts of estimation and billing with respect to item of work to students. Students were also emphasized on preparing detailed estimates, bill of quantities, variations and claims, cost control and monitoring and legal aspects of estimation and billing.**
8. **2-Day Hands on training on "Analysis and Design of Multi-storey RCC Building" by Prof. Rohith Jain was conducted to 7th semester students from 15/11/2021 to 16/11/2021. The students were trained to model, analyse and extract the responses of a multi-storey RCC building by using STAAD Pro software. Also, students were guided to design the structural members as per IS456 using the responses obtained from the software.**
9. **Prof. Raghavendra A and Prof. Mahadev Prasad N conducted hands on training on total station surveying to the students of 5th semester on 18/11/2021. The motto of the training was to make students learn to carry out surveying using total station which would help them in their future and extensive survey project.**
10. **A seminar on Safety in construction was carried out to students of 5th semester on 07/10/2021 by Prof. Raghavendra A. The purpose of the seminar was to make students aware about the risks during construction and safety measures to be taken. The speaker emphasized on personal protective equipment (PPE), hazard identification, equipment maintenance, communication, and emergency response. The speaker**

provided practical tips and advices for students to implement these safety measures effectively.

11. **Students of 5th and 7th semester were taken to Sarala Industries located in Adakanahalli Industrial area for industrial visit on 06/10/2021. Mr. Rajath, Plant manager explained about raw material procurement, equipments used for block production and their functioning procedure. Technical specifications of 6" and 8" solid blocks were explained to the students. Plant used Columbia Vibration Technology which enabled them to produce high quality block which was witnessed by the students.**
12. **A lecture on Structural steel material was arranged for students of 6th semester on 06/10/2021. The lecture focused on structural steel material, its types commonly used in the construction industry and manufacturing process. It highlighted about manufacturing process such as preparation of raw materials by removing impurities, iron making, steel making, casting and finishing of steel products.**

ACADEMIC ACHIEVERS

ODD SEMESTER 2020-21

7 th semester		
Topper	Tejashree K P	9.33 SGPA
2nd topper	Sushma N S	9.04 SGPA
3rd topper	Navyashree G M	8.88 SGPA
5 th semester		
Topper	Bhoomika K	9.72 SGPA
2nd topper	Mohammed Junaid	9.12 SGPA
3rd topper	Chandana S Raj	8.92 SGPA
3 rd semester		
Topper	Varun Kumar M K	9.38 SGPA
2nd topper	Nikitha A	8.92 SGPA
3rd topper	Sanjay M R	8.79 SGPA

EVEN SEMESTER 2020-21

8 th semester		
Topper	Navyashree G M	9.80 SGPA
2nd topper	Madhuchand K M	9.70 SGPA
3rd topper	Damini S	9.45 SGPA
6 th semester		
Topper	Bhoomika K	10.0 SGPA
2nd topper	Mohammed Junaid	9.00 SGPA
3rd topper	Chandana S Raj	9.00 SGPA
4 th semester		
Topper	Ishwarya B	10.0 SGPA
2nd topper	Varun Kumar M K	10.0 SGPA
3rd topper	Nikitha A	9.0 SGPA

BAMBOO REINFORCED CONCRETE



Nature's material, bamboo, has been widely used for many purposes. Mainly as a strength bearing material. It has been used for building shelters from an earlier time. Bamboo is biodegradable and renewable in nature. It is energy efficient as it is of natural origin and environmentally sustainable in nature. These properties have forced us to use this in the construction field for centuries. Even though the existence of bamboo has been found for centuries, bamboo as reinforcement material is an innovation in the civil engineering construction field. A glance of properties of bamboo reinforcement, mix proportion of concrete, design and construction technique with bamboo reinforced concrete is discussed in this article.

Construction of bamboo reinforced concrete

Bamboo reinforced concrete construction follows the same design, mix proportions and construction techniques as used for steel reinforcement. Just steel reinforcement is replaced with

bamboo reinforcement. The material used as a reinforcement in concrete should show all the essential properties to make the element structurally active under load. In the case of steel, we manufacture steel to the desired proportion and test for the basic strength values as a quality check. Similarly, the process must be done for bamboo too. Bamboo is found in nature; they have different species. Each species differs in their characteristics, texture, thickness and strength. Hence it is essential to know which species is best for reinforcing and which is not.

Properties of bamboo reinforced concrete

The factors that play important roles in the bamboo reinforcement are

- Water absorption property of bamboo.

The main requirement of bamboo when used in reinforcement is the concern for water absorption. The water absorption capacity was studied in various species. Among which *Dendrocalamus giganteus*, known simply as DG and *Bambusa vulgaris* hard, BVS are the ones which absorbed less water. The rate of water absorption can also be reduced by certain treatments.

- Bamboo's strength towards bonding.

As in the case of steel rebar with ribs in it, which facilitates proper bonding with the concrete, bamboo too should have proper adhesion with the concrete. The bonding strength is based on this adhesive property of cement and the compressive forces that are formed on the surface of the reinforcing bars.

- Durability of bamboo material.

Its property of being a natural product makes it more exposed to environmental agents and insects. A remedy against this is to undergo bamboo curing. The curing process enables the treatment of humidity content and the starch within it, which is the main reason for insect attraction. The curing is effective only if the chosen bamboo is the right one. As mentioned in the selection of bamboo. The treatment must be done when the bamboo is in a dry state so that the penetration undergoes in the right way. The preservation treatment done on bamboo to take care of durability factor should have no effect on the chemical composition. The treatment itself

should last, without being washed away under high water conditions if any. Durability is a major concern for bamboo material. The physical and chemical properties of bamboo are found high with low content of humidity within it. This low content would keep away molds in bamboos.

- Material property of bamboo.

Bamboo is by its origin an orthotropic material. It possesses fibers within it. It gains high strength along the fibers and low strength in the transverse direction. The bamboo has a structure of a composite material with cellulose fibers aligned across the length. It has high thick fibers near to the outer length of the bamboo, which is the reason why they resist huge wind forces.

- Selection of Bamboo for Reinforced Concrete Construction.

Selection of bamboo for reinforcement can be done based on these factors:

Color and Age - Employ bamboo having an evident brown colour. This shows the age of bamboo to be at least 3 years.

Diameter - Use the one with long large culms.

Harvesting - Try to avoid those bamboos that are cut either during spring or summer seasons.

Species - Among 1500 species of bamboo, the best one must be checked, tested to satisfy the requirement as a reinforcing material.

Design of bamboo reinforced concrete

The design of bamboo reinforced concrete is like the design of steel reinforced concrete. Procedure and equations for the design of steel reinforced concrete can be used for the design of bamboo reinforced concrete by using the mechanical properties of bamboo reinforcement in place of steel reinforcement in the calculation. Bamboo in flexural members such as beams and slabs develops some cracking under normal service loads due to its low modulus of elasticity. If such cracks in bamboo are not tolerable for structural members, then the structural design can be carried then steel reinforced designs or designs based on unreinforced sections are required. Bonding between concrete and bamboo as reinforcement is a must for design. Split bamboo provides better bonding with concrete than whole culms when used as reinforcement. Bamboo

should be split and provided in more compact reinforcement layers for better bonding with concrete.

Steel as a reinforcing material is a demand that is increasing day by day in most of the developing countries. There are situations when production is not found enough to face the demand for steel. Hence it is essential to have an alternative that is worth compared to steel. Bamboo is found in abundant; they are resilient and hence these can face the demand as a reinforcing material and become an ideal replacement for steel. In this generation of increased pollution bamboo reinforced concrete would be a great initiative to adapt to nature friendly environment which was always there in our mankind's history.

By,
Varun Kumar H K

BURJ KHALIFA



A modern marvel of Engineering - The Burj Khalifa stands tall and proud on the Dubai skyline. It defines the limit of human imagination. As the world's tallest building, it represents triumph of human engineering architecture brilliance. This architectural marvel has captured the attention of people worldwide and has become an iconic symbol of Dubai's futuristic vision.

Construction and design

The Burj Khalifa's construction commenced in 2004 and was completed in 2010, spanning a total of 6 years. This skyscraper was designed by the Chicago based architectural firm, Skidmore, Owings and Merrill, with Adam Smith as the chief architect. The structures design draws inspiration from Islamic architecture, incorporating traditional motifs while comprising a contemporary aesthetic.

Height and Structural features

Soaring to an impressive height of 828 meters (2717 feet), the Burj Khalifa holds the title of world's tallest building. Its towering presence is made possible by the indigenous structural design that includes a reinforced concrete core and a perimeter exoskeleton. The exoskeleton,

composed of steel and aluminum, provides strength, stability and flexibility to the building, enabling it to withstand Dubai's extreme weather conditions.

Interior space and facilities

The Burj Khalifa houses have a variety of spaces, including luxurious residential apartments, corporate offices, World-class restaurants and high-end hotels. The observation deck, named "At the Top," offers breathtaking views of Dubai's skyline and the vast Arabian Gulf. The building also features the Armani Hotel, designed by fashion icon Giorgio Armani, which exudes elegance and sophistication.

Technological Innovations

The Burj Khalifa incorporates cutting-edge technology to enhance its functionality and sustainability. The building's facade is adorned with solar-reflective glass, which minimizes heat gain, reduces energy consumption, and provides natural light to the interiors. Additionally, it employs a state-of-the-art condensate collection system that collects moisture from the building's cooling system and uses it for landscape irrigation, reducing water usage.

Records and Achievements

The Burj Khalifa, apart from being the tallest building, holds various other accolades, including the highest occupied floor, highest outdoor observation deck, the longest elevator travel distance. It also boasts the world's highest nightclub, the highest installation of an aluminum and glass facade. The Burj Khalifa is more than just a skyscraper, it is a testament to human ingenuity and a symbol of Dubai's progress. Its breathtaking height, innovative design, and technological advancements have captivated the world's attention. The Burj Khalifa represents the boldness of architectural aspirations and serves as a reminder of what humanity can achieve when it dares to dream big.

By,
Harshitha P

SHAHBERI TWIN BUILDING COLLAPSE



Shahberi was primarily an agricultural land that had been notified by the Greater Noida Authority in 2008. The area had initially been acquired under the urgency clause and even leased out to builders, but the acquisition process stalled following a Supreme Court Order in 2011. No fresh acquisition took place after the court order, but the villagers who had been given compensation during the earlier process did not return the money and sold the land to builders at low price. Since the concerned authorities left the place unchecked, the builders started constructing the houses without licence and approved plans. Illegal structures are being developed in the area without following building codes or obtaining mandatory approvals.

INCIDENT

The building collapse incident happened in Shahberi village of Greater Noida on 17th July 2018 around 9:30 p.m. There were two buildings, 4 storey completely constructed building was two-year-old, and another was 6 storey under construction. The buildings stood next to each other on the marshy land and were separated by a 5 feet wide road.



The building under construction tilted into the older building, whose left side was the first to cave in and crumble into rubble due to water logging in foundation and too much of moisture in the walls of the basement of the collapsed buildings. The older building also disintegrated and caved in, barring a part of its right edge. One fell in pancake form and the other tilted to its side. Beams and slabs fell on the occupants of the building, sandwiching people and leaving all the occupants dead. Some bodies were pierced by iron rods and concrete and other were trapped under several layers of concrete. In all, 9 people died being trapped in the debris.

The twin buildings collapsed due to unapproved construction going on at that site. Local residents mentioned that the place where collapse has taken place had some water body which was filled to construct residential flats. The land of this area is not hard enough to withstand heavy construction and in absence of proper system of disposal of sewage and garbage the soil has become swampy because of water logging resulting weakening of foundation of building. Most of the buildings in that area are over five-storey and that too in water inundated land. Unplanned construction is rampant in the area over stepping all safety norms. The construction took place without any design by qualified engineers and reinforced concrete-framed structure.

The other reason for collapse was that the construction is done with the sub- standard building material including fly-ash bricks and pillars developing cracks even before any

substantial construction took place. And the moment six-storey under-construction building collapsed on fully constructed and occupied adjacent building, it leads to a complete fall.



LESSONS LEARNT

Densely populated illegal construction in Shahberi village with several multi-storey buildings along with furniture market in the vicinity has raised the serious safety issues of residents which needs to be addressed immediately otherwise there are more disasters of the kind waiting to happen. Some of the lessons we have learnt for timely action are:

- The constructed/under-construction building should be surveyed from hazard and vulnerability point of view.
- A strict action should be taken instantaneously on illegal/unauthorized construction to avoid the incidents.

- Concerned authorities should check the licence and approved plans before any construction take place by builders.
- Officers who overlook everything should be held responsible and strict action should be taken against them.
- The builders should not get benefitted by the lack of administrative action.
- The blind eye of administration against the complaints lodged regarding illegal construction encourage builders to use inferior construction material which eventually leads to the tragedy. It should be taken care of and administration must deal with the complaints pertaining to unauthorised construction and alterations to buildings.
- Strict measures need to be implemented for encouraging the builders/owners to follow NBC codes like soil testing, construction material etc.
- Structural audit of building should be done by the competent authorities. Unauthorized construction needs to be taken up as a punishable offence.
- Strict action should be taken against those involved in illegal constructions.
- Accountability of officials should be fixed who are violating the rules and they should be booked.
- The accountability of civil engineer and architect need to be fixed for the construction quality of building along with the builder.
- Occupancy without compliance should be made punishable.

By,
Yashika C V

CORROSION PROTECTION FOR UNDERWATER PILES

Corrosion protection of underwater pile is essential in aqua construction. Eliminating this corrosion problem is very hard, the corrosion is control by using corrosion protection methods.

Protective Coatings for Underwater Piles

Protective coating for underwater piles is necessary as it causes corrosion of piles. The Corrosion protection of underwater pile methods provides a great solution to corrosion of underwater piles.

When the surface of pile comes in contact with water, corrosion in piles forms. To protect the piles from coming in contact with water, the pile is cover with non-porous material which is anti-corrosive. There is some non-corrosive chemical materials use in corrosion of underwater piles. Several chemical coatings are used for corrosion protection.

The different types of coatings employ for underwater piles are mentioned below:

- High build Epoxy coatings
- Zinc Rich epoxy primer
- FRP composites
- Inorganic zinc silicate primers



➤ **High Build Epoxy Coatings**

These epoxy coatings are abrasion and chemical resistant. These epoxy coatings provide a high level of service and more tolerant ambient weather conditions. And most effective in maintaining the damage area and breakdown of a coating system.

➤ **Zinc Rich Epoxy Primers**

Zinc Rich epoxy primer is a mixture of Inorganic Zinc Silicates Primer and High Build Epoxy Coating. It provides a high level of service and more tolerant ambient weather conditions. And most effective in maintaining the damage area and breakdown of a coating system.

➤ **Application of FRP Composites for Corrosion Protection of Underwater Piles**

FRP a mix of wet concrete is economic to repair on substructure parts. Repair of this parts requires the enlargement to accommodate new ties. Completely corroded part of the elements should remove by using FRP. Spreading of corrosion to other piles are protected by FRP. The aesthetics of FRP repair is one of its unheralded benefits.

➤ **Inorganic Zinc Silicates Primers**

The structure below the splash zone always immerse in water are commonly not coat with cathodic protective layers. There are numerous types of anti-corrosive pigment primers in which inorganic zinc silicate is the best. It arrests rust creep or undercutting of the coating surrounding.

By,
Mahesh Kumar S

ECO FLOATING HOMES



The concept of floating buildings is not new, as they can be found all over the world, especially in traditional Asian villages. Although with modern civil engineering knowledge, these structures—and the infrastructure needed to make them sustainable—are gradually becoming more reliable and easier to maintain. However, introducing this concept in urban environments with large populations will prove to be somewhat tricky, as structures being built within or on above-ground water sources could impact environments negatively by disturbing the natural state of the land beneath bodies of water (e.g., lake bottoms or the ocean floor).

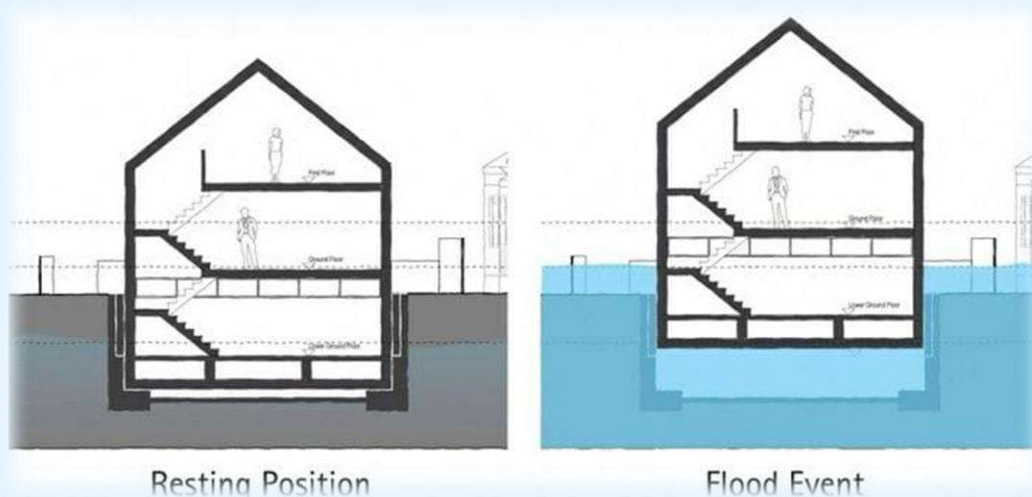
The effect of humans on the environment should not be underestimated either, so civil engineers will need to remain focused on creating systems that inhibit floating houses and their residents from disrupting local water ecosystems, while improving the viability of this technology for use in low-income areas.

Need of Floating Houses

In low lying country like Holland, planning was focused on separating and maintaining the division between land and water by reclaiming land from the sea by building dams and

heightening dikes. But the need to construct safe and economic houses where two-thirds of the population lives below sea-level, Dutch planners started looking to make use of water as a resource itself. The problem became further acute in the last decade due to global warming leading to rising water coupled with several unusually dry summers. The sea level is said to have risen by 20 centimeters in the last century and is expected to rise by three times that amount in the 21st century. Therefore, floating houses are becoming a necessity in the coming years.

Basic principles of construction



Generally, there are two basic principles for making floating houses. First is the pontoon principle in which one makes a solid platform, lighter than the water and the other based on the ship in which a hollow concrete box is created which is open on the top. The pontoon principle has the benefit of its use in shallow water, compared to the hollow concrete box while the concrete box has the benefit of higher space utilization within as a part of the building.

Both types of floating houses relate to a flexible connection to the quay, so the houses can rise with the water when the tide changes. When needed the floating system can be moved elsewhere at short notice without leaving any scar to the environment. Instead, a new house can be placed into the old situation which makes it the most sustainable and durable way to build. The floating house the floating houses built by +31 architects are based on a hollow concrete box.



Floating homes are almost permanently docked on the water. They are indefinitely moored and are connected to the city sewer and water. That means homes owners can't just cruise around in their home whenever they feel like it.

Floating houses may be the need for the future in coastal areas and flood prone areas in India also and thus researchers, architects and engineers should have capacity in designing and building such houses to meet the challenge of coming time. The concept of transportable ready-built houses should also be started particularly for row houses and for government aided schemes which would prove to be quality expandable homes and can be constructed in quick time as per the budget availability.

By,
Rekha S

ELECTRO KINETIC ROAD



As we all know, renewable energies are considered as proper alternative energy, which reduces carbon dioxide emission. This means renewable energy like wind energy, solar, tidal, biomass, geothermal which are not harmful for environment can be used as alternative. As a car passes over a speed breaker most of kinetic energy is wasted as heat in it. In this paper we will see that the speed-breaker at streets where, huge number of vehicles kinetic energy is wasting there. By conserving this kinetic energy and generating electricity we can supply this energy to the urban and remote areas for lightning purposes. In June 2009, one of the devices was installed in the car park at a Sainsbury's supermarket in Gloucester, United Kingdom where it provides enough electricity to run all the store's cash registers. The ramp was invented by peter Hughes, an electrical and mechanical engineer who is employed by Highway Energy System Ltd. This company says that under normal traffic conditions, the apparatus will produce 30 KW of electricity. Other proposed applications for the road ramps include powering streets and traffic lights, heating roads in the winter to prevent ice from forming and ventilating tunnels to reduce pollution.

First, we need to know about the concept of this technique. If we want to use the kinetic energy which is to be converted in electrical energy, we must make a mechanical mechanism to rotate a generator. And kinetic energy will come from the vehicles of the road.

The idea was dismissed as 'Talk of 'kinetic energy plates' is a total waste of energy in the Guardian by David MacKay, the professor of natural philosophy in the department of Physics at the University of Cambridge. MacKay wrote, "The savings from parking at the green car park thus amount to one four-thousandth of the energy used by the trip to the supermarket."

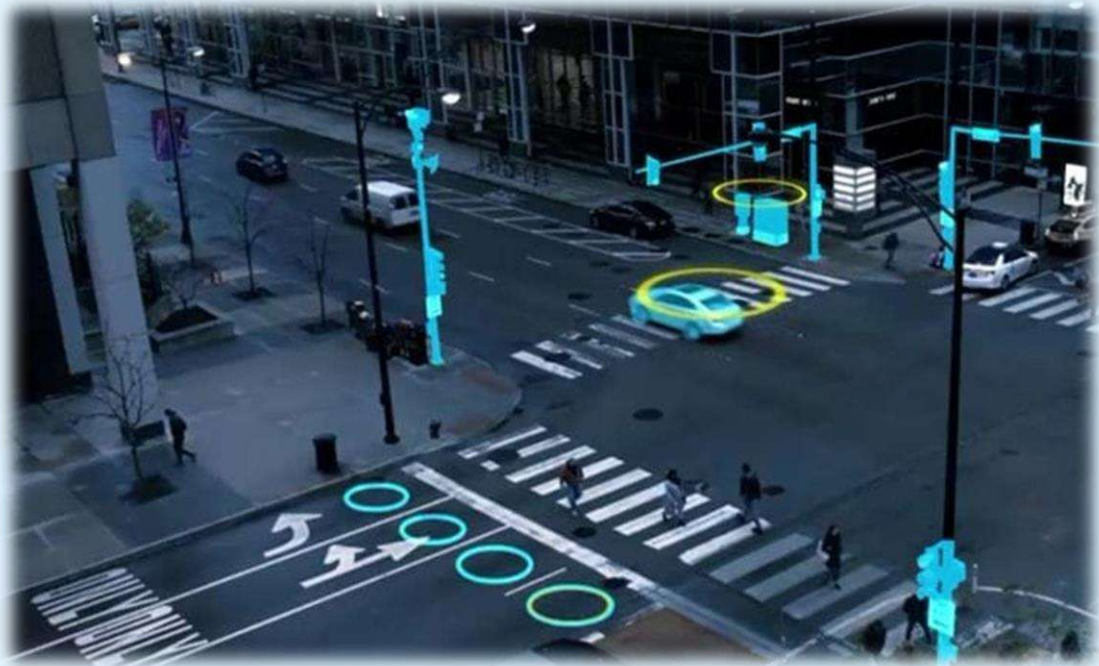
Methodology

- Road Power Generation (RPG) is a system designed to capture waste and kinetic energy from all vehicles. This device converts the kinetic energy of the vehicles into electric energy. This is done by pressure plates installed on the ramp.
- The first moving car passes over the ramp. Due to vehicle load pressure plates present on the ramp will be pressed down.
- All pressure plates are connected to the shaft using Rack and Pinion mechanism.
- Rack and Pinion mechanism convert the linear motion of pressure plate into angular motion and rotates shaft.
- The shaft is connected to Gearbox. This Gear Box is connected to the flywheel and DC alternator.
- Alternator converts the rotational energy to electrical energy.
- As a result, it produces electricity. And it stored in batteries.
- Whenever needed DC energy is converted into AC energy with the help of inverter and passed on.
- Overall, the overall Energy Ramp system is a combination of both software as well as hardware model. The information given below will describe the features of both the models.

TECHNICAL ARTICLES

Advantages

- Generation of power without polluting the environment.
- Simple construction, mature technology and easy maintenance.
- No fuel transportation required.
- no consumption of any fossil fuel which is non-renewable source of energy.
- Electricity generated from one vehicle around 8.175Watt which can be used for various energy of automobiles that drive over ramp.
- No external source is needed for power generation.
- Energy scarcity is the main problem in our country, so this may solve the problem to some extent.
- Energy produced from this ramp is pollution free and maintenance of ramp is more, so it can be used in Toll Plaza streetlights etc.
- We can get 24x7 supply of electricity without harming and polluting the environment.



Uses

- To create electrical energy for running our appliances which are used in day-to-day activities.
- To utilize freely available renewable resources for generating energy rather than using exhaustible non-renewable resources.
- Such ramps can be designed at every highway as an alternative source of energy the increasing demand of energy.
- This energy can be used for the lights on the either side of the roads and thus much power that is consumed by these lights can be utilized to send power to these villages. No external source is needed for power generation.
- Electricity generated from one vehicle around 8.175Watt which can be used for various purpose.
- Simple construction, mature technology and easy maintenance.
- Energy scarcity is the main problem in our country, so this may solve the problem to some extent.
- This technique is used to produce electricity which can be used in traffic lights and powering streets.

For development of country/world and for meeting up the day-to-day demand of energy electricity is common source of energy. For getting non pollution and economical source of energy the focus now is shifting more towards renewable source of energy which is essential now a day. So, using road transportation energy can be produced, stored, where the ramp is used for tapping the energy and generating power as a power generating unit. In which we can get 24x7 supply of electricity without harming and polluting the environment. The pressure plate is main mechanism used for generating the electricity.

By,
Bhanu Prasad H S

GREEN BUILDING



The building construction industry produces the second-largest amount of demolition waste and greenhouse gases (35-40%) the major consumption in a building is during construction of various amenities like lighting and air conditioner system they provide comfort to the occupants but consume an enormous amount of energy and add pollution. By switching to sustainable architecture not just for nature's sake but for us we could not only save the environment but also reduce our total ownership costs. Green building is also known as green construction or sustainable building, these include efficient use of energy specifically renewable energy, such as solar energy, water, and other resources, pollution and waste reduction measures, enabling of re-use and recycling, good environmental air quality indoor, use of non-toxic and sustainable materials, the environment-friendly design construction and operation design that allows adaptation to a changing environment and most important consideration of the quality of life of occupants, it eliminates negative impact and creates a positive impact on climate and life. The construction materials used in green building are wool brick, sustainable concrete, solar tiles.

TECHNICAL ARTICLES

Sustainable tools and technologies used in green construction are solar power, biodegradable materials, green insulation, cool roofs, and sustainable resource sourcing. Green building includes rainwater harvesting, solar energy, and produces less waste compared to conventional buildings. By promoting green buildings, the benefits are environmental, economic, and social. Environmental benefits include enhancing the ecosystem improving air and water quality, social benefits are enhanced occupants health and comfort whereas economic benefits include reducing operating costs and improving occupants' productivity. As of date, there are 5975 projects equivalent to 7.55 sq. feet of green building - Suzlon energy limited-Pune, ITC green centre-Gurgaon are some of the projects in India. With 'Americans spending nearly 90% of their time indoors,' it is not surprising that the WHO estimates 30% of all buildings will have IAQ concerns during the facilities occupancy. Environmental material used in green building or system assessment evolution has low toxicity, minimal emissions, low walk assembly, recycled content, resource efficient. By implementing green construction, we can reduce 25-40%of energy usage,37%of CO2 emissions,40%of water usage, and 70% of solid waste.

By,
Vinayaka

INTERIOR DESIGNING

Interior design is the art and science of enhancing the interior of a building to achieve a healthier and more aesthetically pleasing environment for the people using the space. An interior designer is someone who plans, research, coordinates, and manages such enhancement projects. Interior design is a multifaceted profession that includes conceptual development, space planning, site inspections, programming, research, communicating with the stakeholders of a project, construction management, and execution of the design. Interior design is defined as the professional and comprehensive practice of creating an interior environment that addresses, protects and responds to human needs.

Interior designers

Designers craft spaces that anticipate our needs and appeal to our emotions while pulling from a broad set of skills and technical knowledge. Interior design has changed dramatically since the early 20th century when it was just beginning to emerge as a profession.

Interior designers are expected to have knowledge of:

- Textiles, materials, color, space planning, sustainability, and more
- Software applications for 2D & 3D computer-aided design (CAD) and building information modeling (BIM)
- Structural requirements, health and safety issues, and building codes.

Today, interior designers work with contractors, architects, engineers, craftsmen, furniture dealers, and businesses and homeowners. To become a successful interior designer, you need a well-rounded education and the skills to work within many disciplines (architecture; graphic design; decorative arts; and textile, furniture, and lighting design).

Specialties in Interior designing

Residential

Residential design is the design of the interior of private residences. As this type design is specific for individual situations, the needs and wants of the individual are paramount in this area

of interior design. The interior designer may work on the project from the initial planning stage or may work on the remodeling of an existing structure. It is often a process that takes months to fine-tune and create a space with the vision of the client.

Commercial

Commercial design encompasses a wide range of subspecialties.

- Retail: includes malls and shopping centers, department stores, specialty stores, visual merchandising, and showrooms.
- Visual and spatial branding: The use of space as a medium to express a corporate brand.
- Corporate: office design for any kind of business such as banks.
- Healthcare: the design of hospitals, assisted living facilities, medical offices, dentist offices, psychiatric facilities, laboratories, medical specialist facilities.
- Hospitality and recreation: include hotels, motels, resorts, cruise ships, cafes, bars, casinos, nightclubs, theaters, music and concert halls, opera houses, sports venues, restaurants, gyms, health clubs and spas, etc.
- Institutional: government offices, financial institutions (banks and credit unions), schools and universities, religious facilities, etc.
- Industrial facilities: manufacturing and training facilities as well as import and export facilities.[30]
- Exhibition: includes museums, gallery, exhibition hall, especially the design for showroom and exhibition gallery.
- Traffic building: includes bus station, subway station, airports, pier, etc.
- Sports: includes gyms, stadiums, swimming rooms, basketball halls, etc.
- Teaching in a private institute that offers classes of interior design.
- Self-employment.
- Employment in private sector firms.

Colors in Interior designing

Color is a powerful design tool in decoration, as well as in interior design, which is the art of composing and coordinating colors together to create a stylish scheme on the interior architecture of the space.

It can be important for interior designers to acquire a deep experience with colors, understand their psychological effects, and understand the meaning of each color in different locations and situations to create suitable combinations for each place.

Combining colors together could result in creating a state of mind as seen by the observer and could eventually result in positive or negative effects on them. Colors can make the room feel either more calm, cheerful, comfortable, stressful, or dramatic. Color combinations can make a tiny room seem larger or smaller. So, it is for the Interior designer to choose appropriate colors for a place towards achieving how clients would want to look at, and feel in, that space.

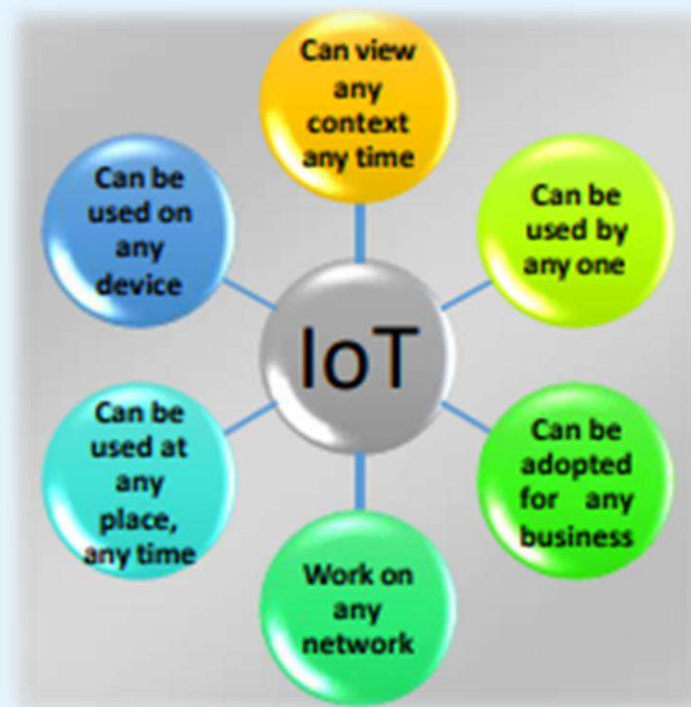
Design of interior spaces, closely related to architecture and sometimes including interior decoration. The designer's goal is to produce a coordinated and harmonious whole in which the architecture, site, function, and visual aspects of the interior are unified, pleasing to mind and body, and appropriate to the activities to be pursued there. Design criteria include harmony of color, texture, lighting, scale, and proportion. Furnishings must be in proportion to the space they occupy and to the needs and lifestyles of the residents. The design of such nonresidential spaces as offices, hospitals, stores, and schools' places clear organization of functions ahead of purely aesthetic concerns.

By,
Ankith Gowda

INTERNET OF THINGS (IOT) APPLICATIONS IN CIVIL ENGINEERING

In general, the construction industry lacks the change resistance due to which, there is no improvement in the innovative style of construction, control over the assets, and optimization of the construction process for better energy usage, resource allocation, and assets management. Digital transformation is an ongoing challenge in the construction industry. The future is the Internet of Things which will transform the real-world object into the virtual world object. The main aim is to identify different technologies in IoT to support Civil Engineering. Utilization of IoT applications to achieve smart design, Real-time control, Safety working environment.

INTERNET OF THINGS (IoT): The networking capability that allows information to be sent to and received from objects and devices using the Internet.



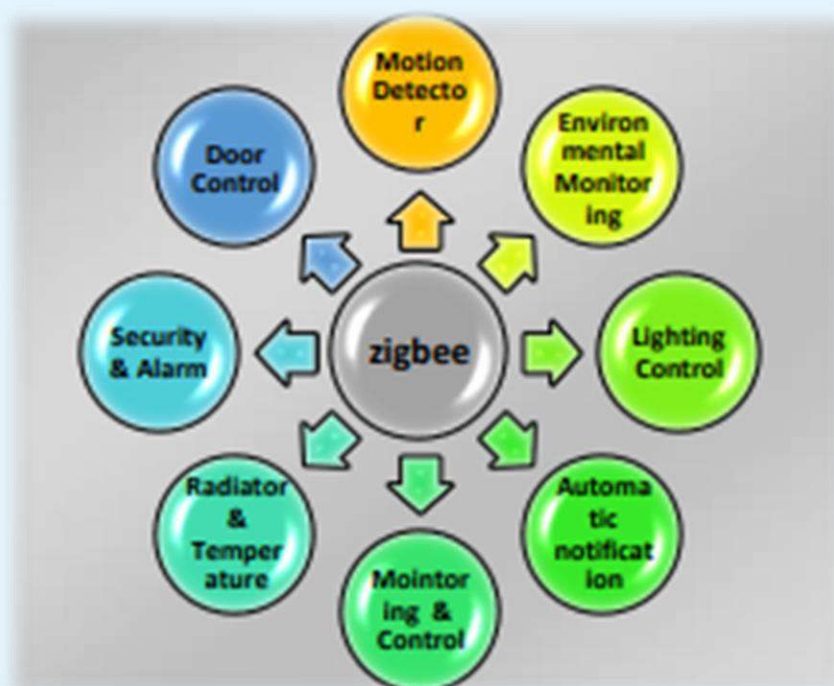
SMART CONSTRUCTION: Smart construction is building structure, design, construction, and task that make full utilization of computerized advancements and industrialized technical strategies to enhance profitability, reduce life cost, increase sustainability and expand client benefits.

A) Building Information Modelling: It can provide information of plan in 3D (width, height, and depth) and further dimensions such as 4D (time), 5D (cost), and even 6D (as-built operation).

B) Primavera: It is primarily project management software, which can exchange ideas among the project participants. It is easy to operate and use the information of scheduling and resource allocation in construction projects. It is mainly used for Planning, Monitoring, Controlling, and Reporting a project. It is used by project managers in the Construction field.

C) Global Positioning System (GPS): It is used in many aspects of the construction industry. It comprises satellites, ground control stations, and client collectors. It can give 3D arrangements including focuses, lines, and planes in a quick, precise, and productive route under every single climate situation, it has been broadly used in various fields, e.g., geodesy, photogrammetric, marine looking over, and mapping.

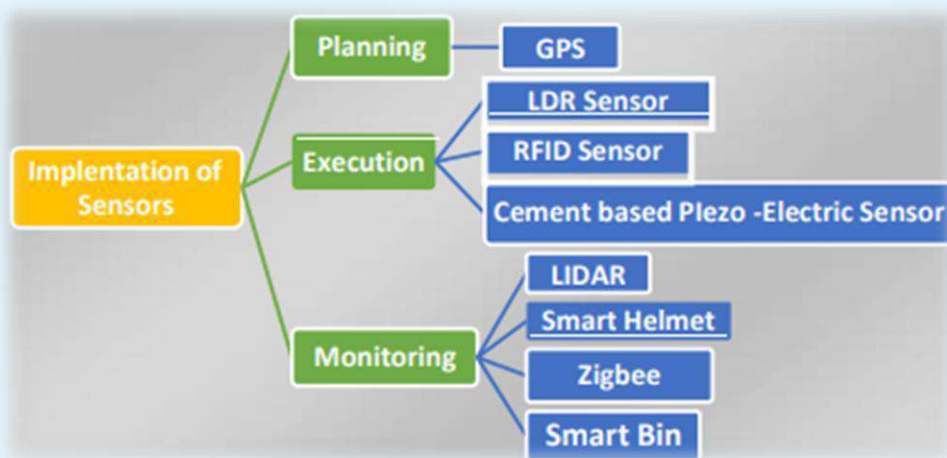
D) Wireless ZigBee module: ZigBee is a new two-way wireless network technique. ZigBee is particularly targeting low complexity, low power, low transition speed, low data rate, wireless sensor, and low costs. ZigBee wireless mesh technology was developed for self-configuring and self-healing networks that provide a simple, effective cost and battery life for an applications.



E) Cement-Based Piezo-electric Sensors: A new cement based piezoelectric composite sensor was introduced with the latest performance, particularly concentrating on AE signals. Such sensors were installed in the foundation of reinforced concrete frames during construction and used to monitor the damage of the concrete structures.

IMPLEMENTATION OF SENSORS IN DIFFERENT PHASES OF CONSTRUCTION:

IoT is the latest technology in which many things are connected through the internet. All these technologies tools and sensors are used in construction some of them are BIM, GPS, ZIGBEE, etc. The construction industry utilizes 60% of available materials of which 33% of wastage is generated and produces 45% of co2 emissions. So, by using available IoT technologies and sensors we can control the cons in the industry.



By,
Sagar Habalkar

LIGHT EMITTING CEMENT



Light-emitting cement is a green construction material designed to illuminate highways, roads, and bicycle lanes without using electricity. Light-emitting cement absorbs solar energy during the day and radiates light at night. This innovative cement was developed by Dr. Jose Carlos Rubio from the Michoacan University of Saint Nicholas of Hidalgo in Mexico. The research focused on modifying the microstructure of cement to absorb solar energy and emit light in darkness.

Light-emitting cement follows the principle of absorbing solar energy during the day and emitting lights at night. Light-emitting cement is a combination of sand, alkali, silica, industrial waste, and water.

Principle of light-emitting cement

Cement is an opaque material that does not allow light to pass through its interior. When water is added to cement, crystal flakes are formed because of hydration reaction. These crystals block the absorption of solar energy. The researcher's main objective was to modify this microstructure of cement to eliminate the crystals so that the incoming light can penetrate deep into the cement or concrete structure. The cement is also made phosphorescent so that the solar

energy is absorbed and released. The light-emitting cement, when combined with water, changes completely to gel form so that it absorbs solar energy and releases it in the form of light.

In the daytime, the light-emitting cement structure acts as a storage device. During this time, the whole mass is soaked in sunlight, and the electrons within the mass are in an excited state. During the night, these electrons return to their original state due to which light is emitted. This cement can provide light continuously for 12 hours without the use of electricity.

Most fluorescent materials made from plastic normally have a life of three years. They decay with the absorption of ultraviolet rays. But Dr. Rubio claims light-emitting cement is a sun-resistant cement that has a life of 100 years. When used on highways, the intensity of light emitted by the cement can be regulated to avoid unnecessary glare for the drivers and cyclists.



Composition of Light-emitting cement

Light-emitting cement is made from sand, silica, industrial waste, alkali, and water. To give it the light-emitting property, the materials go through a polycondensation process performed at room temperature.

The chemical reaction between these raw materials produces a strong mixture that looks like a gel. It also gives fewer amounts of unwanted crystal flakes. The only residue left after its production is steam. Hence, the product and its manufacturing are an eco-friendly process. The material is currently manufactured in green or blue. During the manufacturing, the scientists add certain additives to alter the optical properties of the material so that it converts to a

phosphorescent material. Hence, the microstructure changes to a non-crystalline structure that is like glass which allows the passage of light.



The light-emitting cement has garnered the attention of several countries, which shows the commercial demand for the material. Currently, the research is being carried out to move into a commercialization stage. The inclusion of light-emitting cement with plaster and other construction products is also under research and development. Adding certain additives during manufacturing, scientists modified the optical properties of the material to make it phosphorescent. However, it is manufactured like ordinary cement, but the change in the microscopic structure creates a nanocrystalline structure identical to the glass that allows passage of light inside. This helps to save on electricity costs. It can be used to light up the footpaths, swimming pools, interior rooms, roadways, etc., which are essential in this and future engineering.

By,
Praveen Nayak

OTHER ARTICLES

ಅಮ್ಮ

ಪ್ರೀತಿಯ ಕೈತುತ್ತು ಕೊಟ್ಟವಳು ಅಮ್ಮ
ತಾಯ್ನದ ಆಸೆ ಕಂಡವಳು ಅಮ್ಮ
ಮುದ್ದಿನ ಕೂಸೆನ್ನುವಳು ಅಮ್ಮ
ಕೊನೆಯಾಗದಿರೋ ಬಂಧವೇ ಅಮ್ಮ

ನಂಬಿಕೆ

ಖುಷಿಯೆಂಬುದು ಆಟಿಕೆಯಲ್ಲ
ಕಳೆದು ಹೋಗುವ ಸಮಯವಲ್ಲ
ಹುಡುಕಿ ತರುವ ವಸ್ತುವಲ್ಲ
ಒಮ್ಮೆ ಹೋದರೆ ಬಾರನೆಂಬುದೇನು ಇಲ್ಲ
ಆದರೆ ಮರೆತು ಹೋದರೆ ಬರುವೆ ಎಂಬ ನಂಬಿಕೆಯಿಲ್ಲ

ವಿಧಿ

ಕಾಣುವ ಕನಸಲ್ಲಾ ನನಸಾಗುವಂತಿದ್ದರೆ
ಭಗವಂತನ ಅಸ್ತಿತ್ವಕ್ಕೆ ಬೆಲೆಯೇನಿದೆ
ಮಾಡುವ ಕೆಲಸವಲ್ಲಾ ಕೈಗೊಳ್ಳುವಂತಿದ್ದರೆ
ವಿಧಿಯ ಹಣೆಬರಹಕ್ಕೇನು ಬೆಲೆಯಿದೆ
ಮನುಷ್ಯನ ಸ್ವಾರ್ಥವೆಲ್ಲಾ ಪೂರ್ಣವಾಗಿದ್ದರೆ
ಸಾವಿಗೇನು ಬೆಲೆಯಿದೆ

ನಗು

ನೋವಿನಲ್ಲಿ ನಗುವ ಕಲಿತವಳೇ
ನಗುವಿನಲ್ಲಿ ಮೌನವ ಕಂಡವಳೇ
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ಮರೆಯಲಾರದೇ ನೋವಲ್ಲೇ ನಗುವವಳೇ...

By,
Deepika C K

ಜೀವನ

ಎಲ್ಲರೂ ಬೆಳೆಯಬೇಕು

ಎಲ್ಲರನ್ನೂ ಬೆಳೆಸಬೇಕು

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ನಮ್ಮವರ ಕನಸುಗಳ ನನಸಾಗಿಸಲು ಸಹಕರಿಸಬೇಕು

ಜೀವನದ ಕಟು ಸತ್ಯ ಅರಿಯಬೇಕು

ನಮ್ಮವರಿಗೆ ಭಾರವೆನಿಸುವ ಮೊದಲೇ

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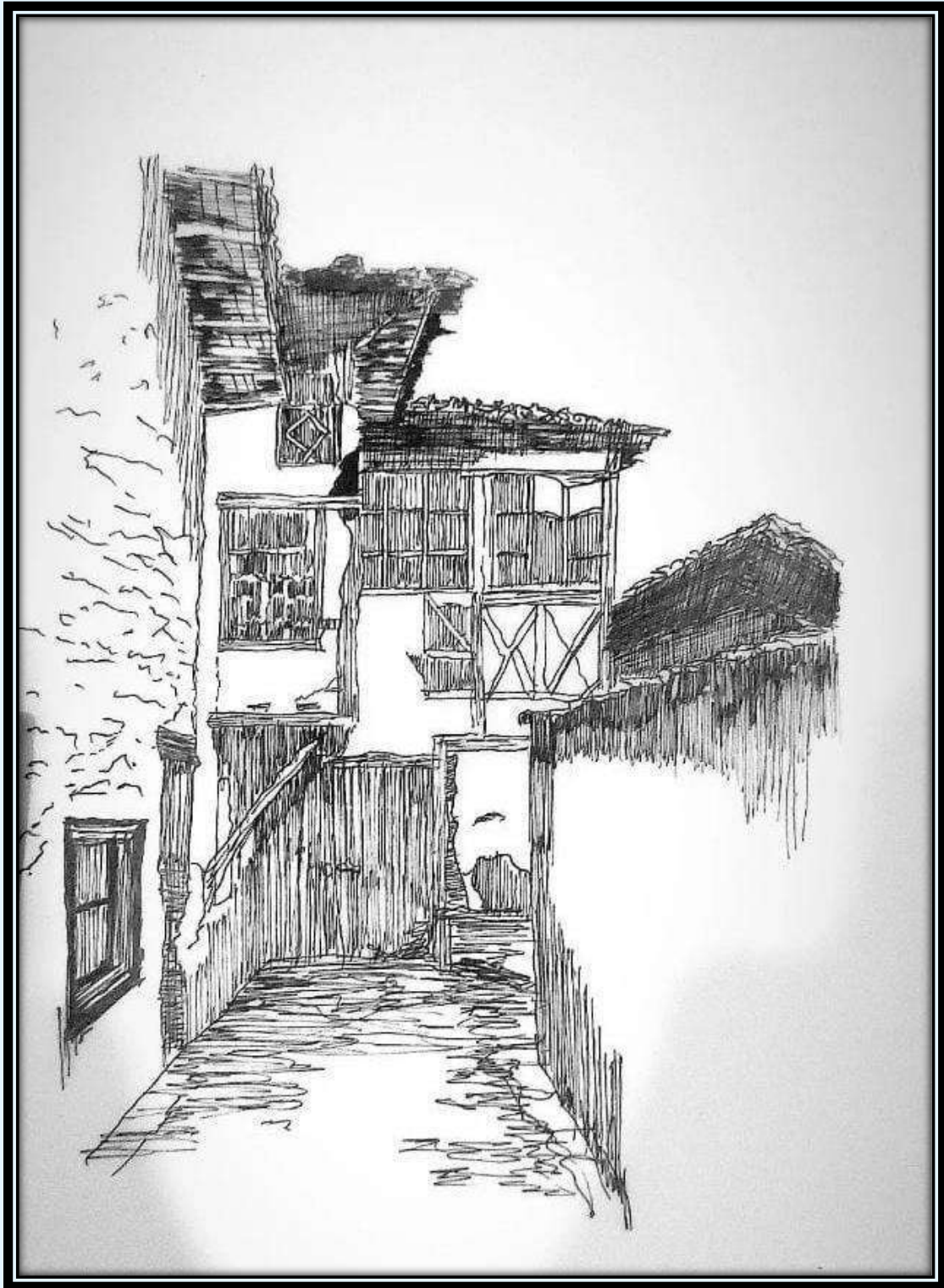
By,
Chandan P

OTHER ARTICLES

ಕನಸು ನನಸಿನ ಹಾದಿಯಲಿ
ನನ್ನಯ ಪಯಣವು ಸಾಗುತ್ತಲಿ
ಪ್ರೀತಿ ತುಂಬಿದ ಹೃದಯದಲಿ
ಕಣ್ಣಲ್ಲಿ ಪ್ರೀತಿಯ ತೋರುತಲಿ
ಮಾತು ಮೌನದ ನಡುವಿನಲಿ
ಪ್ರೀತಿಯ ಪಯಣವು ಸಾಗುತ್ತಲಿ
ನಿನ್ನಯ ಪ್ರೀತಿಯ ಮನದಲಿ
ಹೊಸ ಚೈತನ್ಯವ ತುಂಬಲಿ
ಮನದಲಿ ಮೂಡಿದ ಭಾವಗಳು
ಅಲೆಗಳ ರೀತಿ ನರ್ತಿಸುತ್ತಲಿ
ಪ್ರೀತಿಯ ನೆಲೆಯ ಹುಡುಕುತ್ತಲಿ
ತೆರೆತೆರೆಯಾಗಿ ಮನದ ದಡಕೆ ತಾಕುತ್ತಲಿ
ಸೋಲು ಗೆಲುವಿನ ಆಟದಲಿ
ಭರವಸೆಯಿಂದಲೆ ಮುಂದೆ ಸಾಗುತ್ತಲಿ
ಸೋಲಿನ ಕಹಿಯ ಮರೆಯುತ್ತಲಿ
ಗೆಲುವಿನ ಹವಣೆಯಲಿ ಬದುಕುತ್ತಲಿ
ಭಾವಯಾಣದಿ ನನ್ನ ಪಯಣ ಸಾಗುತ್ತಲಿ
ನೆನಪುಗಳು ಮರೆಯಾಗದೆ ಉಳಿಯುತ್ತಲಿ
ಮತ್ತೆ ಮತ್ತೆ ನೆನಪಾಗಿ ನನ್ನ ಕಾಡುತ್ತಲಿ
ಮನಸು ಯಾಕೋ ಕಳೆದು ಹೋದ ಕ್ಷಣಗಳ ಬೇಡುತ್ತಲಿ
ಸಾಗುತ್ತಲಿಹುದು ಪಯಣವು ಬಯಕೆಯ ಬದುಕು ನಗುವುದೆಂಬ ನಂಬಿಕೆಯಲಿ.

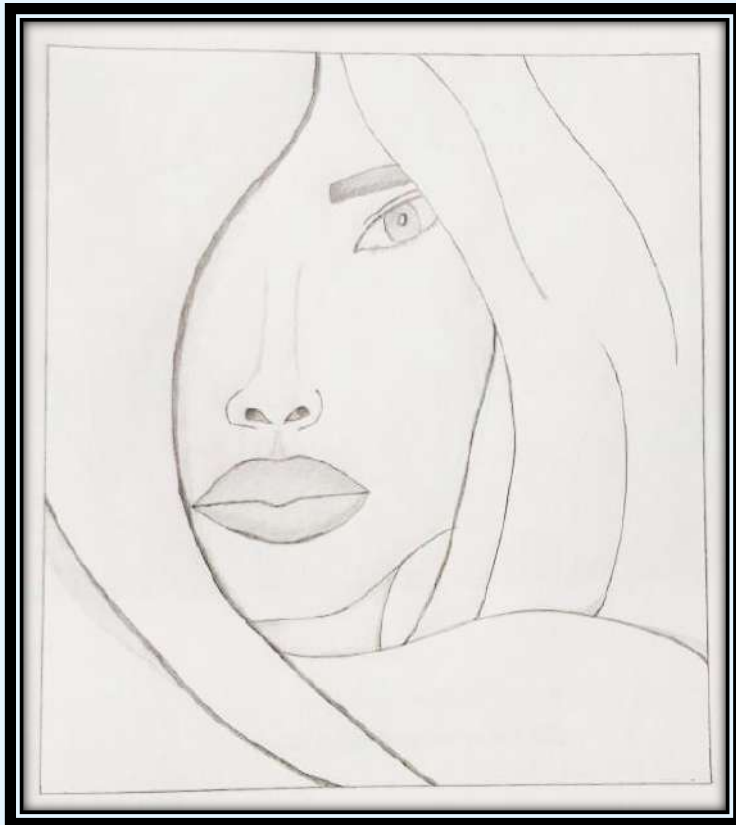
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INDIAN ORIGIN CEOs LEADING THE WORLD

ARVIND KRISHNA



Arvind Krishna is an Indian-American business executive serving as the Chairman and CEO of IBM. Krishna was born into a Telugu-speaking Hindu family in West Godavari District in the Coastal Andhra region of Andhra Pradesh, India. His father, Major General Vinod Krishna, was an army officer who served in the Indian Army and his mother, Aarathi Krishna, worked for the welfare of Army widows.

He did his schooling at Stanes Anglo Indian Higher Secondary School, Coonoor, Tamil-Nadu and at St Joseph's Academy, Dehradun. He received his B.Tech degree in electrical engineering from Indian Institute of Technology, Kanpur in 1985. Krishna earned his Ph.D. in electrical engineering from the University of Illinois at Urbana-Champaign. Krishna joined IBM in 1990, at

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IBM's Thomas J. Watson Research Center, and continued in Watson Research for 18 years till 2009. Later, he held General Manager Role in Information management software and systems and technology group of IBM. In 2015, he was promoted as senior vice president of IBM Research. He later became senior vice president of IBM's cloud, and cognitive software division.

He also led the building and expansion of new markets for IBM in artificial intelligence, cloud, quantum computing, and blockchain technology. He was a driving force behind IBM's \$34 billion acquisition of Red Hat, which closed in July 2019. He was appointed IBM's CEO in January 2020, effective April 6, 2020, succeeding Ginni Rometty, who had served as CEO since 2012. He joined Satya Nadella, Shantanu Narayen, and Sundar Pichai as an Indian-American CEO of a major United States technology company. In 2021, he was named by CRN as the year's "Most Influential Executive".

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PARAG AGARWAL



Parag Agarwal is an Indian-American software engineer and businessman who was the CEO of Twitter, Inc. from November 2021. Agrawal was born in Ajmer, Rajasthan.

In 2001, he completed his final year of higher secondary education at Atomic Energy Junior College, Mumbai. In the same year, he secured a gold medal in the International Physics Olympiad held in Antalya, Turkey. In 2005, Agrawal obtained his Bachelor of Technology degree in computer science and engineering

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from IIT Bombay. That year, he moved to the United States to pursue a PhD in computer science at Stanford University under the guidance of Jennifer Widom.

Agrawal held research internships at Microsoft Research and Yahoo! Research before joining Twitter as a software engineer in 2011. In October 2017, Twitter announced the appointment of Agrawal as chief technology officer. In December 2019, Twitter CEO Jack Dorsey announced that Agrawal would be in charge of Project Bluesky, an initiative to develop a decentralized social network protocol. On November 29, 2021, Dorsey announced that he was resigning as CEO of Twitter and that Agrawal was replacing him immediately.

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SATYA NADELLA



Satya Narayana Nadella (born on 19 August 1967) is an Indian-American business executive. Satya Nadella is Chairman and Chief Executive Officer of Microsoft. Before being named CEO in February 2014, Nadella held leadership roles in both enterprise and consumer businesses across the company. On 16th June 2021, Nadella has been further appointed as the Executive Chairman of Microsoft.

Joining Microsoft in 1992, he quickly became known as a leader who could span a breadth of technologies and businesses to transform some of Microsoft's biggest product offerings.

Most recently, Nadella was executive vice president of Microsoft's Cloud and Enterprise group. In this role he led the transformation to the cloud

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infrastructure and services business, which outperformed the market and took share from competition. Previously, Nadella led R&D for the Online Services Division and was vice president of the Microsoft Business Division. Before joining Microsoft, Nadella was a member of the technology staff at Sun Microsystems.

Originally from Hyderabad, India, Nadella earned a bachelor's degree in electrical engineering from Mangalore University, a masters degree in computer science from the University of Wisconsin — Milwaukee and a masters degree in business administration from the University of Chicago. Nadella serves on the board of trustees to his alma mater the University of Chicago, as well as the Starbucks board of directors.

AWARDS:

2018 - Time 100 honoree

2019-Named Financial Times Person of the Year and Fortune magazine Businessperson of the Year

2020 - Recognized as Global Indian Business Icon at CNBC-TV18's India Business Leader Awards in Mumbai.

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SHANTANU NARAYEN



Shantanu Narayen (born May 27, 1963) is an Indian-American business executive. He has been the chairman, president, and chief executive officer (CEO) of Adobe Inc. since December 2007. Before this, he was the company's president and chief operating officer since 2005.

He earned a bachelor's degree in electronics and communication engineering from University College of Engineering, Osmania University in Hyderabad. He moved to the United States to complete his education, and in 1986 received a master's degree in computer science from Bowling Green State University in Ohio. Later he received an MBA from the Haas School of Business, University of California, Berkeley.

In 1986 Narayen joined a Silicon Valley start-up called Measurex Automation Systems, which made computer control systems for automotive and electronics customers. He then moved to Apple, where he was in senior management positions

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from 1989 to 1995. After Apple, he served as director of desktop and collaboration products for Silicon Graphics. In 1996 co-founded Pictra Inc., a company that pioneered the concept of digital photo sharing over the Internet.

Narayan joined Adobe in 1998 as senior vice-president of worldwide product development, a position he held through 2001. From 2001 to 2005 he was executive vice-president of worldwide products. In 2005 he was appointed president and chief operating officer.

In November 2007, Adobe announced that Bruce Chizen would step down as CEO effective December 1, 2007, to be replaced by Narayan. As CEO, Narayan led the transformation of the company, moving its creative and digital document software franchises — which include flagship programs such as Photoshop, Premiere Pro, and Acrobat/PDF — from the desktop to the cloud. In addition, during his tenure as CEO, Adobe has entered the digital experiences category, an expansion which began with the company's acquisition of Omniture in 2009.

Honors and awards

In May 2011, Narayan received an honorary doctorate from his alma mater, Bowling Green State University.

In 2011, Barack Obama appointed him as a member of his Management Advisory Board.

Narayan is the lead independent director on the board of directors for Pfizer, and vice chairman of the US-India Strategic Partnership Forum.

In 2018, Narayan was ranked 12 on Fortune's "Businessperson of the Year" list and was deemed "Global Indian of the Year" in 2018 by The Economic Times of India.

In 2019, he was a recipient of India's Padma Shri award.

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SUNDAR PICHAI



Pichai Sundararajan (born June 10, 1972), better known as Sundar Pichai is an Indian-American business executive. He is the chief executive officer (CEO) of Alphabet Inc. and its subsidiary Google.

Pichai was born in Madurai, Tamil Nadu, India. Pichai completed schooling in Jawahar Vidyalaya Senior Secondary School in Ashok Nagar, Chennai and completed the Class XII from Vana Vani school at IIT Madras. He earned his degree from IIT Kharagpur in metallurgical engineering and is a distinguished alumnus from that institution. He holds an M.S. from Stanford University in materials science and engineering, and an MBA from the Wharton School of the University of Pennsylvania, where he was named a Siebel Scholar and a Palmer Scholar, respectively.

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Pichai began his career as a materials engineer. Following a short stint at the management consulting firm McKinsey & Co., Pichai joined Google in 2004, where he led the product management and innovation efforts for a suite of Google's client software products, including Google Chrome and Chrome OS, as well as being largely responsible for Google Drive. In addition, he went on to oversee the development of other applications such as Gmail and Google Maps. In 2010, Pichai also announced the open-sourcing of the new video codec VP8 by Google and introduced the new video format, WebM. The Chromebook was released in 2012. In 2013, Pichai added Android to the list of Google products that he oversaw.

Pichai was selected to become the next CEO of Google on August 10, 2015, after previously being appointed Product Chief by CEO Larry Page. On October 24, 2015, he stepped into the new position at the completion of the formation of Alphabet Inc., the new holding company for the Google company family. He was appointed to the Alphabet Board of Directors in 2017. Pichai was included in Time's annual list of the 100 most influential people in 2016 and 2020.

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ROSHNI NADAR



Roshni Nadar Malhotra is an Indian billionaire businesswoman and the chairperson of HCL Technologies. She is the first woman to lead a listed IT company in India. She is the daughter HCL founder and billionaire businessman Shiv Nadar. In 2019, she is ranked 54th on the Forbes World's 100 Most Powerful Women list. According to IIFL Wealth Hurun India Rich List (2019), she is the richest woman in India. In 2020, she is ranked 55th on the Forbes World's 100 Most Powerful Women. She is also the CEO of HCL Corporation, the holding company of all HCL Group entities.

Roshni Nadar grew up in Delhi, studied in Vasant Valley School and graduated from Northwestern University majoring in Communication with a focus on Radio/TV/Film. She earned an MBA from the Kellogg School of Management. She worked in various companies as a producer before joining HCL. Within a year of her joining HCL, she was elevated as executive director and CEO of HCL Corporation. She

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subsequently became the chairperson of HCL Technologies, after her father Shiv Nadar stepped down.

In 2014, she was recognized as NDTV young philanthropist of the year. She was conferred "The World's Most Innovative People Award" for Philanthropic Innovation by The World Summit on Innovation & Entrepreneurship (WSIE) in 2015. Also, she was recognized as Vogue India Philanthropist of the Year in 2017.

***ART WITHOUT ENGINEERING IS DREAMING
ENGINEERING WITHOUT ART IS CALCULATING***

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Ph: 0821 - 2972917