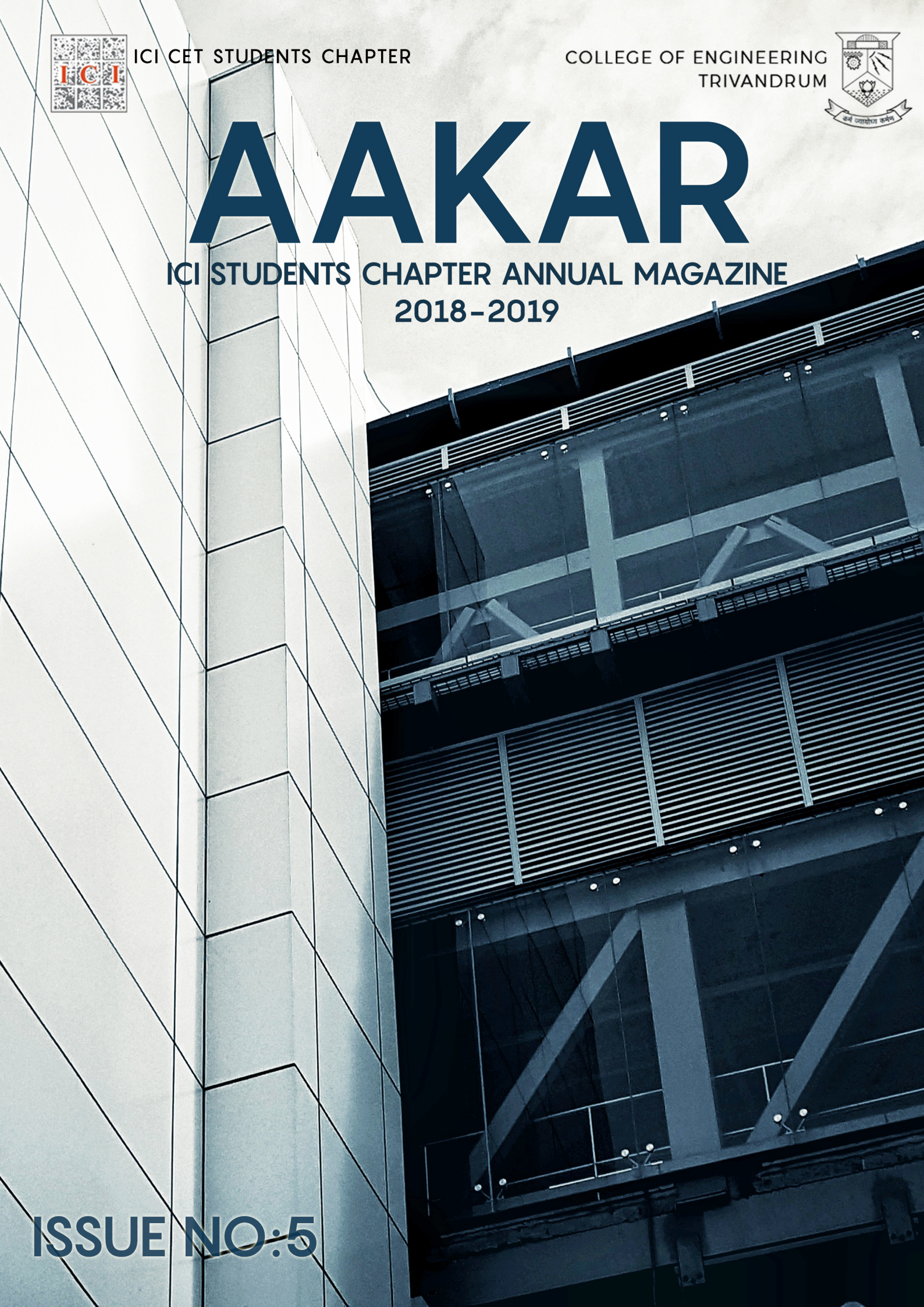
ICI CET STUDENTS CHAPTER

COLLEGE OF ENGINEERING
TRIVANDRUM

AAKAR

ICI STUDENTS CHAPTER ANNUAL MAGAZINE
2018-2019



ISSUE NO:5

"Make your life a Master piece Imagine no limitations on what you can be, Have or Do"

-Brian Tracy

FORWARD

Dr. Jiji C V

Principal

College of Engineering
Trivandrum

It gives me immense pleasure and satisfaction in expressing my appreciation to “AAKAR 2019”, the magazine published by ICI CET Student Chapter. I use this opportunity to congratulate all the people who have put in sincere efforts for the efficient functioning of the chapter, especially the Faculty co-ordinators, Executive Committee and the Student members. I sincerely hope that the Chapter keeps up the good work and wish them success in their future endeavours. Stay inspired and scale new heights.

Dr. Mini Soman

HOD
Department of Civil Engineering
College of Engineering Trivandrum

It is my pleasant privilege to pen down my thoughts on “AAKAR”, for a fourth time, this time as Head of the Department too. I have been the faculty co-ordinator since 2015 and was fortunate enough to receive the BEST EMERGING CHAPTER award in 2015 at Kolkata and the prestigious BEST CHAPTER award in 2018 at Bengaluru from among 200+ chapters across the country on behalf of CET.

The Chapter offers a great platform for the students to showcase, develop and enhance their technical skills through workshops, industrial visits and technical talks. The annual national fest “PANTHEON” and “DAKSHA”, the intra-departmental fest provide an opportunity to channelize their leadership qualities, managerial skills and also teamwork capabilities. Apart from this, participation of our students in endeavours like CAReKERALA and Sanitation awareness in railway coaches ensures their social commitment and ethical responsibility. I express my heartfelt appreciation for the chapter and wish it will be able to scale greater heights in future.

Prof. Biju V

ICI Staff Co-ordinator

Department of Civil Engineering

College of Engineering Trivandrum

ICI CET Chapter offers a great opportunity for budding Civil Engineers to develop, sharpen and nurture their technical skills. The annual publication of the chapter- “AAKAR”, is not just a means for the chapter to showcase its functioning, activities and achievements, but also an incredible platform for our students to exhibit their technical prowess, display their literary skills and pen down their creative thoughts.

Within such a short span, the chapter has been able to carve a niche of its own and has enabled the students to intricately know and explore the field of Civil Engineering through a wide variety of activities- “PANTHEON”, the reputed annual national technical fest, “DAKSHA”, the intra-departmental fest, Back to department talks, technical workshops- to name a few. It gives me a feeling of extreme joy and pride to be able to pen this forward for my dear chapter and its magazine- “AAKAR 2019”. I wish the chapter all success in the future and look forward to work with them in the years to come.

Aju Ani Justus

Secretary

"Coming together is a beginning. Keeping together is progress. Working together is Success".

I feel privileged and greatly honoured to pen down my thoughts as the Secretary of the ICI CET Chapter during the academic year 2018-2019, for its annual magazine- "AAKAR-2019". Turning back, I feel what the chapter has achieved since its inception in the year 2013 is exceptional. From the BEST ICI EMERGING CHAPTER IN INDIA in 2015 to the BEST ICI STUDENT CHAPTER IN INDIA in 2018, the journey has been amazing. The chapter gives ample opportunities for the students to think beyond the textbooks and the blackboard.

ICI is a platform for students to upbring their hidden talents. It was not an easy task being a secretary. Hardships were common, but with the support of teachers, and other panel members, together, we were able to solve any challenge put in front of us. I'm always grateful to my fellow companions for supporting me and helping me throughout the tenure and also for being a part of ICI family.

I use this opportunity to thank all student members who have cooperated with me during my tenure as the secretary of the chapter. I hope that the vigour and energy is carried forward and the chapter bring laurels to our department and institution.

Ankita S Varma

Magazine Editor

"We shape our buildings; thereafter they shape us."-Winston Churchill

ICI CET chapter is one of the most active students' activity group that is present in our college. Being a part of the chapter has been a wonderful experience for not only me but everyone who got involved. Being a national organisation, ICI CET chapter has allowed us to gain nation-wide recognition.

It gives me immense pleasure to be a part of the 5th edition of AAKAR. AAKAR is a collection of many articles that have been made by the student members of ICI CET chapter. It also includes the annual report of the academic year 2018-2019. The various activities that we have been a part of has been highlighted.

I hope everyone gets a glimpse of how much we got to explore and experience in this academic year through this magazine and that the students get inspired to get more active and continue to give their best.

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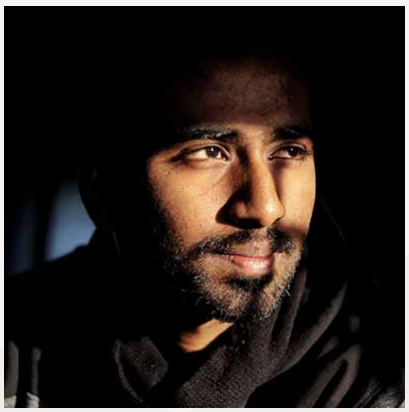

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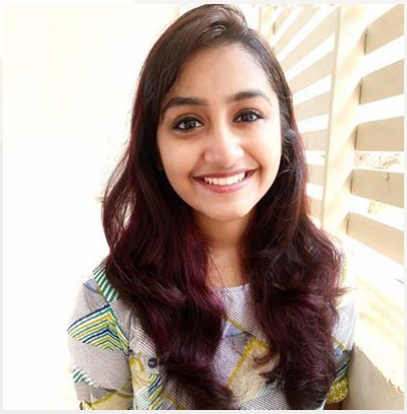

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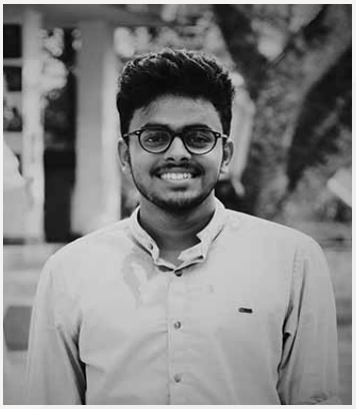

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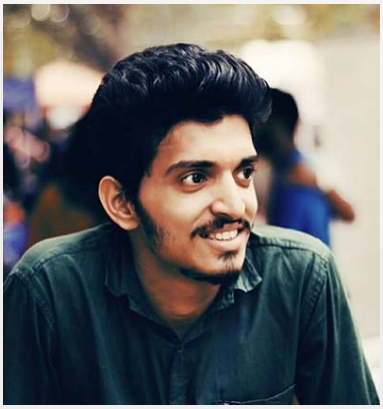

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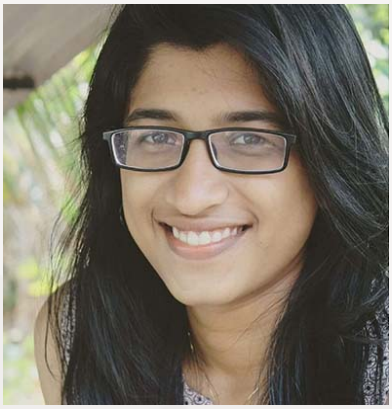

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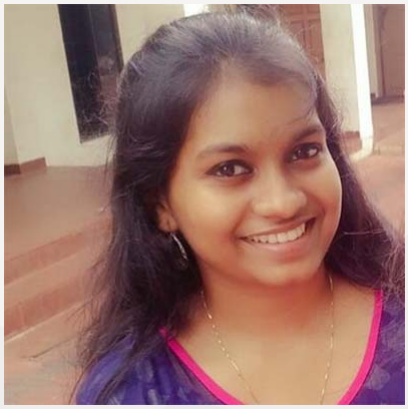

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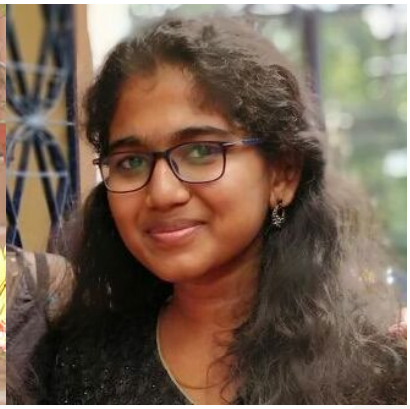

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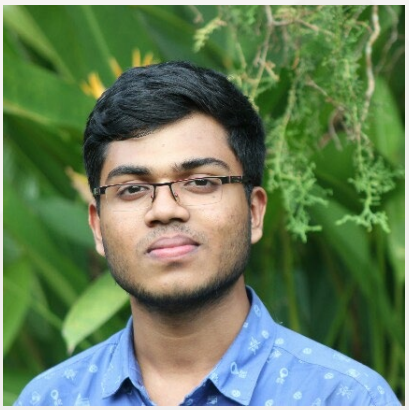

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REPORT OF ACTIVITIES

Pantheon, the national level technical fest of Civil Engineering Department, College of Engineering Trivandrum is hosted annually by ICI CET STUDENTS CHAPTER. It is one of the most highly sought after inter collegiate technical competitions exclusively for Civil Engineering students all over India, with a plethora of events, workshops and competitions that tests the engineering acumen of its participants and push them to the edge where the right blend of intellect and innovation reigns.

The workshops provide the students a hands-on training experience with the various softwares that are required in real-time and also cover other technical skills expected of a Civil Engineer-to-be, whereas the expo featured predominantly eminent exhibits from the field to inspire and ignite young minds. On October 26 and 27, 2018, the fifth edition of Pantheon was successfully completed by ICI CET. What we aimed to establish this season is the need of the hour - 'Engineers for sustainability'. We also ran the extra mile by working along with the Indian Railways with special emphasis to promote awareness for sanitation in the railways.

This was implemented by hosting an exhibition and an exclusive workshop on Indian railways, hosted on the day of Pantheon, at CET, which was supported by the People's Forum for Sustainable Development (PFSD). The last of the ideas was to advertise on the locos with posters inside compartments and banners in the front, on the same cause. All the strategies pitched here are intended for a widespread public coverage and outreach for a noble cause.

It's often said that it's only at a precipice that we change. We are a bunch of students who believe that in doing the right things at the right time can bring forth this change. These were our humble intentions. And this year, we strongly believe we raised the bars a little higher for any fest.

The grand expo was conducted on 26th and 27th of October as part of Pantheon' 18. The main attraction of the expo was the model exhibition by the first year students and the irrigation department, which included Mullaperiyar dam, Parambikulam dam, various Irrigation structures and a model of gravity dam, giving the spectators a knowledgeable visual treat. Stalls set up by Helping Hands Organization (H_2O), Natpac and Metcon added to the grandeur of the expo.

Enigma, the crime thriller event was held for the second time in a row as part of Pantheon '18. Enigma, as the name indicates was a mysterious event with the perfect combination of treasure hunt and crime solving.

Round 1 of Enigma was conducted on 26th October, the first day of Pantheon '18. In round 2, the selected 10 teams were given a set if 8 questions. The questions of aptitude and logical type. Third round consisted of crime solving through a treasure hunt.

For thousands of years, people have been creating models to translate and improve their ideas into 3 dimensional reality. Model making is a logical next step in the thinking process for many ideas.

The art of model making encompasses a wide variety of materials, techniques and end results. As the name indicates, 'Creatrix' is an event to bring out the creativity in Civil Engineering students. This event aims at building models with the given materials and conditions of acceptable strength within the given time constraints.

Event X was a 2-day event to test the logical and technical skills of students. First round consisted of aptitude test. Second round was a civil based question round. Round 3 was an estimation round. Round 4 was a tech charade round.

Day two kick started with a treasure hunt. Event X evaluated the various skills of the participants as various rounds were included and also judged the teamwork and coordination skills of the participants.

For every technical fest, Paper Presentation forms an ineluctable integral part. Same is the case with 'Eureka', Pantheon 18's Paper Presentation Competition. Eureka being a core event of the same, received an overwhelming response from students across the state.

The Eleventh Hour, a situation management event in Pantheon 5.0 evaluated the contestants' knowledge in all fields of civil engineering and logical reasoning.

Three problems related to three fields - geotechnical engineering, transportation, environment and building materials were given to the participants. Further, they were required to assess the problem and propose suitable solutions.

The various rounds were crafted such that they tested the ability of the contestants to manage time and solve problems encountered in an effective manner.

This event is based on the game SimCity where one plans and manages a city virtually in the allotted time. Each session had a duration of 2 hours.

Each team was given a city called Bamberg Basin where they had to establish their city along with facilities like residential, commercial, and industrial construction projects, electricity, fire stations, sewerage systems etc. In short, the event was a success with the enthusiasm and energy of the participants, co-coordinators and volunteers.

Pantheon'18 witnessed the introduction of never-before events and Coliseum was definitely a game changer in this. The event was hosted by the CET quiz club. Arjun of the CET quiz club was the quiz master for the event. The quiz was general in nature with a touch of sustainability.

Focus was the online photography contest conducted as part of Pantheon 2018. The event, which was rolled out on the 6 October 2018, witnessed immense response with about 300 participants mailing their entries.

The contest was conducted in association with CET Shutterbugs and the judging panel comprised of alumni and experts from the group and one of the theme was judged by famous photographer Vineet Vohra. Following were the theme winners.

ART WITH LIGHTS

STREET LIFE

EMOTIONS

WORKSHOPS

The workshop was all about cost effective construction techniques. The classes were taken on the first day by Mr. P B Sajan and on the second day by Mr. R D Padmakumar. The workshop began with an overview of present construction techniques and an introduction was given about costford. Lecture classes were also taken on Laurie Baker's construction techniques. The costford team demonstrated the construction of an arch.

REVIT WORKSHOP

The ICI student's chapter of CET conducted AUTODESK REVIT workshop. The main objective of this workshop was to enable participants to design a building structure and its components in 3D, annotate the model with 2D drafting elements, and access building information from the building model database. The workshop was handled by Rajesh T Vaidyan from CADD Connect.

SKETCH UP WORKSHOP

The main intention of the workshop was to familiarize the participants and the future Engineers with the concepts of the cutting edge technology and inculcate an understanding of its applications and uses. The workshop was handled by Smt. Treesa from InterCAD and venue was Sree Chithra Thirunal Computer Facility at College of Engineering Trivandrum. It included an introductory part regarding 3D modelling using Sketch Up App and also an interior designing and building designing session.

ICI INAUGURATION

The official inauguration of ICI CET Student Chapter was conducted on 01 October 2018. The chief guest of the event was Mr. Joseph Jacob, Director, POABS Group and Principal, Dr. Jiji C V. The event was also presided over by the UG Dean, Prof. Shaji T S. The function commenced with the welcome speech by Dr. Mini Soman, the faculty co-ordinator of ICI CET students' chapter, following which the Principal delivered the presidential address. The inauguration ceremony was symbolized by lighting a 'Diya'. Mr. Joseph Jacob, the chief guest, took to the podium to explain about the sand manufacturing processes undertaken by the company and the technological advancements in the recent years. He spoke about various aspects of the topic such as the efficiency and structural stability of manufactured sand. He also encouraged the students to ask their doubts regarding the topic. The session witnessed the unveiling of the 4th edition of our magazine "AAKAR" by the Principal. Lastly, the vote of thanks was delivered by the Secretary, Aju Ani Justus following which the programme came to an end.

Principal unveiling the AAKAR magazine

Principal addressing the gathering

Dr. Mini Soman addressing the gathering

Students attending the function

Principal handing over the memento to the Chief Guest

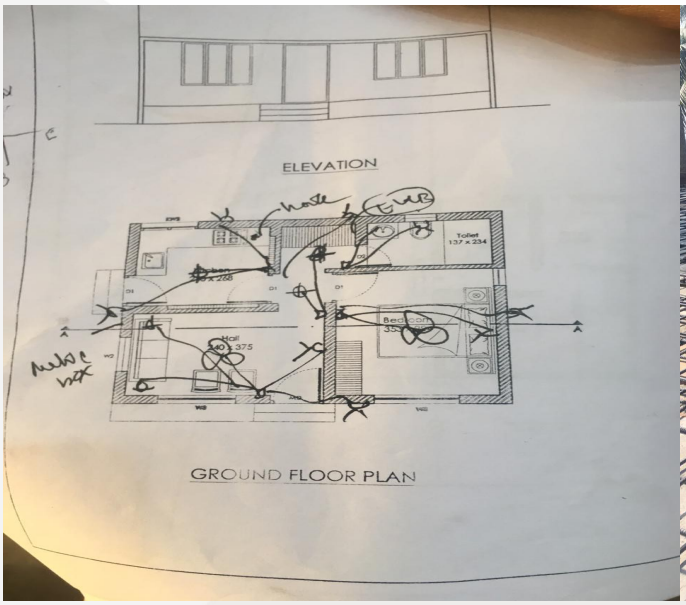
MOTIVATIONAL TALK SERIES

ICI CET Students Chapter organized a motivational talk series on 11 October, 2018. The session was conducted by Mr. Krish Dhanam, who is an entrepreneur and a motivational speaker. The event was presided over by Dr. Mini Soman and Dr. Sheela Evangeline. The event saw an enormous participation of students from all the years, eager to find solutions to the hurdles faced in career-decision making. Mr. Krish also suggested some tricks and exercises to improve the students' mental well-being. The session ended with students clearing their doubts and the vote of thanks was delivered by Mr. John Mathew.

Mr. Krish Dhanam holding an interactive session with the students

CAREKERALA- ICI CET HELPS IN REBUILDING KERALA

In the aftermath of the Kerala floods, many organizations came forward with the idea of 'Rebuilding Kerala'. Joining hands with this idea, the students of ICI CET Students Chapter assisted the CARe Kerala (Cooperative Alliance to Rebuild Kerala), an initiative by the Government of Kerala, in the rehabilitation works. College of Engineering Trivandrum serves as the technical advisory for this project. The first phase of rehabilitation works has been completed and inaugurated on March 15, near the lakeshore of Ashtamudi, East Kallada district. The students provided assistance to plumbing and wiring of these homes.



Plan and elevation of the proposed structure

Layout of the reinforcement used

Students engaged in various rehabilitation activities

Students assisting the electrical work

Students digging out a ridge to allow drainage flow

INDUSTRIAL VISIT- MUTTATHARA SEWAGE TREATMENT PLANT

A site visit was organized for final year students of Civil Engineering department, College of Engineering Trivandrum to the Sewage Treatment Plant at Muttathara, Trivandrum.

The State's first modern sewage treatment plant at Muttathara was commissioned on November 27 2016. The plant which can handle 107 million liters per day (MLD) currently handles only 32 MLD of sewage, as the sewerage network in the city is yet to be completed. The Sewage Plant is designed to meet city's sewage disposal requirements for the next 25 years. Trivandrum is the only city in the state to have a scientific sewage treatment facility. Sewage Plant at Muttathara is also India's largest and Kerala's first modern sewage treatment plant. The field visit gave an opportunity to the aspiring Civil Engineers to have an insight to real site working mechanisms and processes of sewage treatment including screening, grit removal, aeration, chlorination etc. A visit to quality control lab was also made. The effluent BOD is checked in the lab prior to disposing in the Parvathy Puthanar River. The Engineer in charge gave a knowledgeable demonstration of all the site processes. This site visit was very beneficial to the students as they got a chance to attain practical knowledge of the whole procedure and various environmental tests, ethical and societal problems and other aspects. This field visit covered the concepts and knowledge of core Civil Engineering subjects viz. - Water Supply Engineering, Environmental Engineering and Water Resource Engineering.

Industrial visit to Muttathara sewage treatment plant- April 4, 2019

WORKSHOP ON CONCRETE MIX DESIGN

A one day workshop on Concrete Mix Design was conducted on 19/06/18 powered by QCRETE. The workshop was from 9:00AM to 4:00PM and was held at Seminar Hall, Civil Engineering Department.

SURVEY ASSISTANCE AT VENGANUR

On 10 May 2019, four students of ICI CET, Ashwathy P, Rafeed P, Stephin J and Karthik G, visited the Government LP School at Venganur to conduct a total station survey for the plot of a proposed new building in the school premises. The initiative helped the LSGD Venganur Panchayat to cut the survey costs.

The surveying was done using total stations. After surveying the entire area, the students also prepared a site plan for future references. It was a great exposure to the students as it provided an opportunity to work in field conditions.

Students performing total station survey at the proposed construction site

STAAD FOUNDATION COURSE

A workshop was organized by ICI CET in association with InterCAD Systems Ltd. which provided STAAD complete foundation course. It included all features of two softwares such as STAAD PRO and STAAD foundation. The workshop was of 40 hour duration and began on 2nd April 2019. Twenty Eight students attended the workshop and upon successful completion of the course they were given original certification by Bentley Systems, the developers of the software. The total amount of fee was Rs. 3000 of which ICI paid Rs. 1000 for the students. The classes were conducted in the evening hours on weekdays and during the day in weekends. The training was done in students' laptops in to which the software was installed. The students were greatly satisfied with the workshop as this aided in their technical skill development.

WORKSHOP ON SELF COMPACTING CONCRETE

One day workshop on Self Compacting Concrete was conducted on 26/07/18 powered by BASF. The workshop was from 9:30AM to 4:00PM and was held at Seminar Hall, Civil Engineering department.

TALK ON 'REPAIR AND REHABILITATION OF RCC STRUCTURAL ELEMENTS' BY CERA-CHEM PRIVATE LTD.

The ICI CET Students Chapter conducted a talk on "Repair & Rehabilitation of RCC Structural Element" by Cera-Chem Private Limited, on 25th March 2019 in CE Seminar hall 2, CET, from 3pm to 5.30pm.

After the silent prayer, Dr. Sindhu G, HOD, Department of Civil Engineering, quoted the welcome address and invited Dr.Vijesh Lal, Manager, Projects & Specifications Cera-Chem Private Limited and Dr. Jayachandran, AGM (Marketing), CeraChem, to the session. The technical session was conducted by Dr.Vijesh Lal. He introduced us to the different methods of repair and rehabilitation of RCC structures, which can potentially increase the lifespan of RCC structures, reducing the tendency of public to opt for demolition and reconstruction of slightly damaged buildings. The different methods for repairing of RC structures included Cera-Micro concrete, Carbon fibre lamination, Epoxy resin injection, Polymer grouting,

Jacketing using Steel plate etc. Some case studies on different RCC structural damages and the remedies adopted by the company to resolve them were also discussed. It included remedial measures adopted for repairing beams, columns, footings, piers of bridges, cantilever structures etc., in different parts of Kerala. The sessional so gave an idea about the amount of money that can be saved by these methods through the case studies. About 40 students of final year and pre final year attended the lecture session. The students and staff alike were interactive throughout the session. After the technical session, Er. Jayachandran, AGM (Marketing), Cera Chem, shared his experiences in the construction field.

Finally the session concluded with the vote of thanks delivered by Prof .Biju V, Staff Coordinator, ICI CET.

Dr. Vijesh Lal, CERA, addressing the gathering

Dr. Vijesh Lal, CERA, delivering a lecture on steel plate bonding

Dr. Vijesh Lal, CERA, explaining the details regarding slab repairing

Er. Jayachandran, AGM (Marketing), Cera Chem

Students attending the lecture session

SHASTRA

TECHNICAL ARTICLES

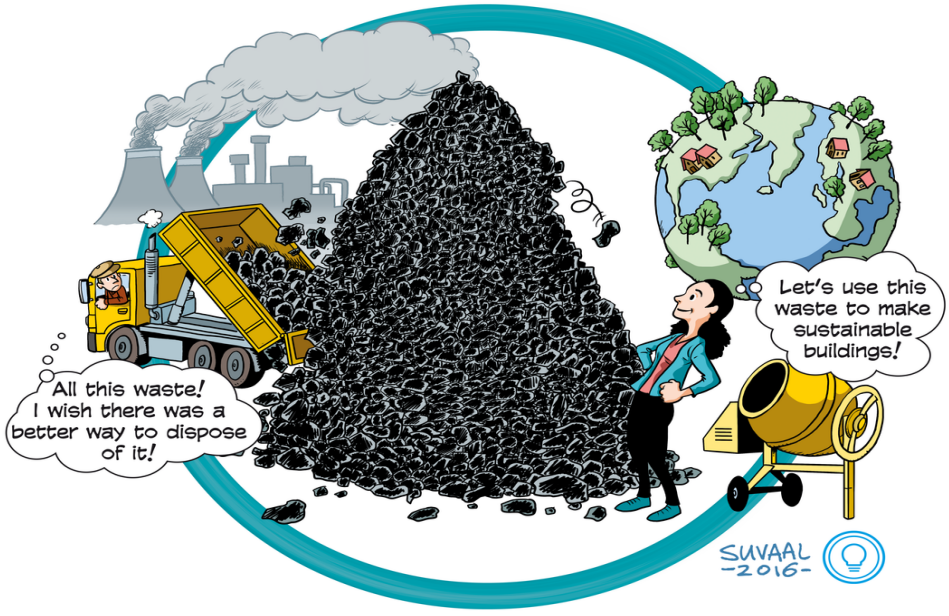
TWO PROBLEMS, ONE SOLUTION – GEO-POLYMER CONCRETE WITH WASTE MATERIALS AS AGGREGATES

ARUN GOVIND T, S8C2

A modern lifestyle, alongside the advancement of technology has led to an increase in the amount and type of waste generated, leading to a waste disposal crisis. The continuous depletion of the ozone layer and global warming issues have increased the awareness of the construction industries in using more ecofriendly construction materials. Geo-polymer concrete which uses by-products from industries is considered a potential material to replace ordinary Portland cement concrete. Geo-polymers are stable alumino-silicate materials formed by alkali activation. There exists a potential for copper slag and quarry dust to replace fine aggregates and of construction and demolition waste to replace coarse aggregate in geo-polymer concrete.

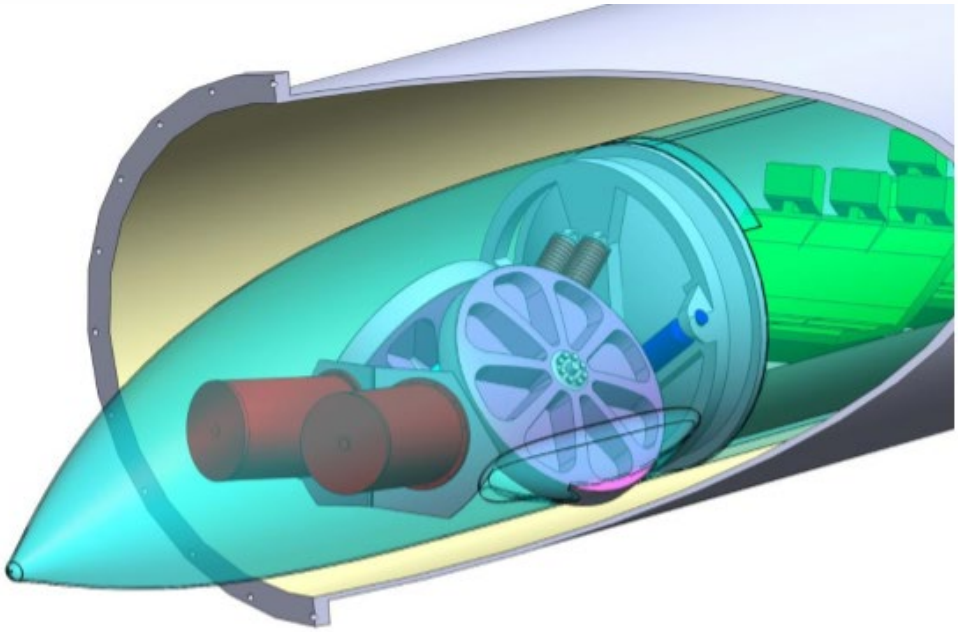
Concrete is the most widely used material in which cement is the main binder. Moreover, while producing one ton of cement, approximately one ton of carbon dioxide will be emitted to the atmosphere which contributes to about 3% of global total greenhouse emissions. Also, since lime stone is the main source material for an ordinary Portland cement, an acute shortage of lime stone will come after 25 to 50 years. Thus, an alternative to cement concrete is the geo-polymer concrete using alkaline activated aluminium silicate polymers in which cement is eliminated. World's natural resource reserves are getting depleted at a fast pace and the amount of waste being disposed of into landfill is increasing globally. Presently in India, about 290 million tons of

solid wastes are being generated annually as by-products of the industrial sector. Good performance of geo-polymer is obtained by the utilization of industrial wastes such as fly ash or steel slag. Countries with growing industrialization accumulate large quantities of industrial wastes and do not have a developed recycling pathway. The use of waste for GPC not only solves the waste disposal issue, but also reduces the consumption of primary raw materials. Quarry dust, a byproduct of crushing process, can be used as fine aggregates. This will reduce the cost of construction and construction material will be saved. It also showed improvement in mechanical properties and elastic moduli. Copper slag is a by-product of copper extraction by smelting. Its safe disposal is costly and causes environmental pollution. The construction industry is the only area where safe reuse of copper slag is possible. Thus, this reduces the environmental degradation threats and also the cost of concrete. So, effectively, the two problems, i.e., one, concerning the environmental impacts and cost of cement concrete and, two, the safe and efficient disposal of industrial wastes such as fly ash, GGBS, copper slag, quarry dust etc., are both solved by replacing these waste materials as binder and aggregates in geo-polymer concrete.



INDIA ON FAST TRACK TO MAKE VIRGIN HYPERLOOP ONE A REALITY

AMRUTHA KURUP, S4 C2



From a distance it looks like a gigantic white caterpillar snaking its way across the desolate desert. We are about 50 km from Las Vegas in an isolated stretch of the Mojave Desert in Nevada.

This is DevLoop, the full-scale test track of the fastest transportation system on land, set up by Richard Branson's Virgin Hyperloop One (VHO). A Virgin Hyperloop One (VHO). A pod can potentially fly across this vacuum tube at nearly 1000 km/hr - though the half km test track is too small to test these speeds. While 400 test runs have been successfully done, the pod has not carried a human passenger so far.

Yet, VHO talks confidently of transporting thousands between

Mumbai and Pune by the middle of next decade. If all goes as per plan, the first VHO world will be in India, and you could travel between the two cities in just 25 minutes.

Why India?

There have been reports about a hyperloop link between Dubai and Abu Dhabi taking off first. But VHO, which together with Roads and Transport Authority and port operator DP World, is in discussions with the UAE administration, clarifies that the India project is on a faster track. The Maharashtra government has already declared it an official infrastructure project. "It has taken three years to get to the stage we are, in India," says Harj Dhaliwal, Managing Director, India and Middle East, Virgin Hyperloop One.

According to VHO, the project is more viable in India. An estimated 80 to 199 million passengers travel between the two Indian cities annually. "VHO can meet this demand by sending pods several times per minute, supporting up to 16,000 passengers per hour per direction at peak capacity," says Dhaliwal. Incidentally in May 2016, when VHO kicked off a global challenge to find out the most promising hyperloop route, most entries came from India, and the Mumbai-Pune city pair was among the four shortlisted from 2,600 entries. Currently VHO is exploring a couple of routes in the US in addition to Mumbai-Pune and one in UAE Dubai-Abu Dhabi. Rival firm Hyperloop Transportation Technologies (HTT) has proposed two routes in India- one linking new Andhra Pradesh capital Amaravati to Vijayawada and another further afield.

But there is more movement on VHO's Mumbai-Pune corridor with the PMRDA (Pune Metropolitan Regional Development Authority) inviting stakeholder consultation meetings asking for suggestions and objections earlier this year. While VHO has been named the project proponent, others can put in bids too and a Swiss challenge method will be adopted to decide. Apart from VHO and HTT, Canadian company Transpod is working on ultra-high speed hyperloop technology.

VHO is confident that Phase One of the Mumbai-Pune project which involves building 11.8 km of a demonstration track with private investment of $500 million by 2023, can move ahead on the timelines promised as there should not be any complications with land acquisition. Phase 2 will see the rest of the stretch built with the track bifurcating into two in Mumbai — one headed to BKC, the other to Navi Mumbai, to facilitate cargo movement. The hyperloop corridor will be built either under the Mumbai-Pune Expressway or run parallel.

It's all about air dynamics

She reveals how around 200 engineers, from aerospace, automation, materials, power electronics, civil engineers, software and systems will collaborate on the project that uses Elon Musk's revolutionary technology with a few adaptations.

To explain it simply, air inside the tube is eliminated, so there is no friction when the pod travels, and an environment that is akin to flying 200,000 ft. above sea level is created. Inside the tube are tracks above which the pod floats through Magnetic Levitation. Thus the energy consumption is low. There are vents in the tunnel from where the atmospheric pressure is vacuumed out to eliminate air dynamic drag. A big tent nearby houses the air pressure management system.

Further away near the security gate is the control room in which around 20 computers and huge display screens monitor the test track.

Challenges remain

While the success achieved at Devloop is impressive, questions on safety remain as humans have not travelled on the pod yet.

VHO also talks of how the project can tap engineering talent from India and create an economic bonanza by boosting local manufacturing.

It's heady talk but until the first humans travel on the pod at speeds promised, we won't know whether the hyperloop is more hype than a realistic vision.

ENVIRONMENTAL INDICATORS

ANCIA CHERIAN, S6 C2

INTRODUCTION

Indicator is a value derived from parameters which points to provide information about, or describes the state of a phenomenon or environmental area with a significance extending beyond that directly associated parameter value.

It refers to single measurement of factors with the assumptions that their measurements are indicative of bio-physical or socio-economic system.

Environmental Indicators are useful tools for monitoring the state of environment in relation to sustainable development and environmental threat.

It is the detailed study of the environment and the area of the proposed project and reviewing the characteristics of the project.

Detailed studies of the environmental setting by selecting the environmental parameter are called environmental indicators.

The selection of environmental indicators is extremely important since the selections significantly define the level of details to be developed during environmental impact assessment (EIA).

USE OF INDICATORS

- Provide a snapshot of conditions at a given time
- Reveal trends over the historical trends and predict future trends
- Measure performance by gauging progress towards a BM/target
- Derived indices can also help prevent overwhelming the target audience with too much detailed/complex information
- Used to compare performance of organizations or countries

CRITERIA FOR DEVELOPING COUNTRIES

- Significant/salient
- Clear and easy to interpret
- Support policy decisions
- Scientifically credible
- Neutral/objective
- Comparable over various scales
- Cost effective
- Transparent

STEPS IN DEVELOPING INDICATORS

- Identify themes and issues related to the project
- Propose an initial set of candidate indicators
- Select an analytical framework that links projects to indicators
- Develop a list of criteria for indicator selection
- Evaluate indicators according to criteria
- Identify that sources and data gaps
- Gather data and populate the indicators. Standardize measurements whenever and wherever possible
- Compare indicator values to targets, thresholds and policy goals, as appropriate
- Disseminate results
- Assess strengths and weaknesses of indicator set
- Continue development of superior indicators

LIMITATIONS OF INDICATORS

- Scale/time issues
- Problems with aggregation
- Representative
- Changes in scientific understanding
- Cost of developing
- Politically driven
- Reflect regulatory structure that are developed in water/air quality

FUNICULAR SHELL ROOF

DEVIKA R S, S4 C1

Environmental degradation witnessed today is the result of unsustainable use of materials. Materials are being made to perform contrary to their natural qualities. Most materials behave best in compression, but for tensile structures we should rely on RCC. A conventional beam upon which the load acts, tends to bend at the center. The upper region of the beam is in compression, while the lower part is in tension.

To counter the tensile stresses, steel reinforcements are required in the lower portion. By inverting the structure, it can be converted into a compression structure with a considerable reduction in amount of steel and cement. In this case, a nominal ring beam is capable of taking the lateral thrust developed in the structure.

Traditionally, compression structures in the form of arches, vaults, domes, catenaries, and doubly curved structures, also called funicular shells, have been used extensively in temples and forts. These structures are the proofs of the durable performances of structures that have stood the test of time.

The funicular shell roof is a compression structure, which ensures conservation of natural resources by utilizing waste materials effectively and optimizing the use of expensive steel and cement. Further, the arch distributes the point load in all direction equally, thus is able to withstand impact loading at any point.

A funicular shell is constructed as a three dimensional catenary on a rectilinear base. The roofing system consists of doubly curved shells made with materials of good compressive strength such as waste stone pieces and brick tiles, supported on reinforced concrete edge beams. A series of these shells in variable geometric configurations is supported on a grid of concrete beams, providing an attractive roof for small to medium spans of 3' to 9' (bigger spans up to 40' also possible, subject to structural design). The rise to span ratio is 1:6.

The major advantage of funicular shell roof is that it eliminates the use of high-energy steel reinforcement used in conventional RCC roof, without compromising on strength. Here, reinforcement is needed only for the edge beams with 8mm bars. It also allows efficient use of waste materials and minimizes requirement of internal plasters, thus provides roofing at a lower cost.

They can take any shape- square, rectangle, trapezium or any other shape, depending of the casting of the mould. Design of the funicular roof can be very well adapted to seismic design requirements. For construction above intermediate floor, the funicular roof provides greater flexibility for locating walls, since the load distribution is uniform because of arch action of the shell.

GEO-SYNTHETICS IN ROAD CONSTRUCTION

MEENU PRASAD, S4 C1

Geo-synthetics are an established family of geo-materials used in a wide variety of civil engineering applications. Many polymers (plastics) common to everyday life are found in geo-synthetics. The most common are polyolefins and polyester; although rubber, fiberglass, and natural materials are sometimes used. Geo-synthetics may be used to function as a separator, filter, planar drain, reinforcement, cushion/protection, and/or as a liquid and gas barrier.

Eight main product categories included are: geo-textiles, geo-grids, geo-nets, geo-membranes, geo-synthetic clay liners, geo-foam, geo-cells and geo-composites.

The polymeric nature of the products makes them suitable for use in the ground where high levels of durability are required. They can also be used in exposed applications.

In the present world, Infrastructural projects are booming at a very fast pace. For the speedy and safer execution of projects like construction of roads and highways, vertical civil structures, etc. there is a huge demand of geo-synthetics. One of the most common uses, however, is in road construction, particularly temporary roads such as construction roads, access roads and forest paths.

The benefits of using geo-synthetics are:

Bearing capacity

For constructing both roads and parking lots, it's important that the subgrade is stable with sufficient bearing capacity.

By using geo-grids between the subsoil and base course, bearing capacity is increased. The interlocking of the cover soil with the geo-grid provides horizontal force transfer, which serves to increase bearing capacity and, in many cases, allow for base course thickness to be reduced. This method also makes expensive soil exchange unnecessary.

Rutting

One of the primary concerns when building unpaved roads on soft subsoil is rutting and inter-mixing of cover material into the subsoil.

By improving load distribution, geo-grids serve to minimize both rutting and soil intermixing. A specific project's requirements will dictate the specifications of the geo-grid needed.

Force-elongation

Low elongation characteristics of a geo-grid is needed for a successful reinforcement application. In many projects, force absorption at elongation requires a product with between 2-percent and 5-percent capacity. For more demanding applications, products with up to 8-percent elongation at break are available.

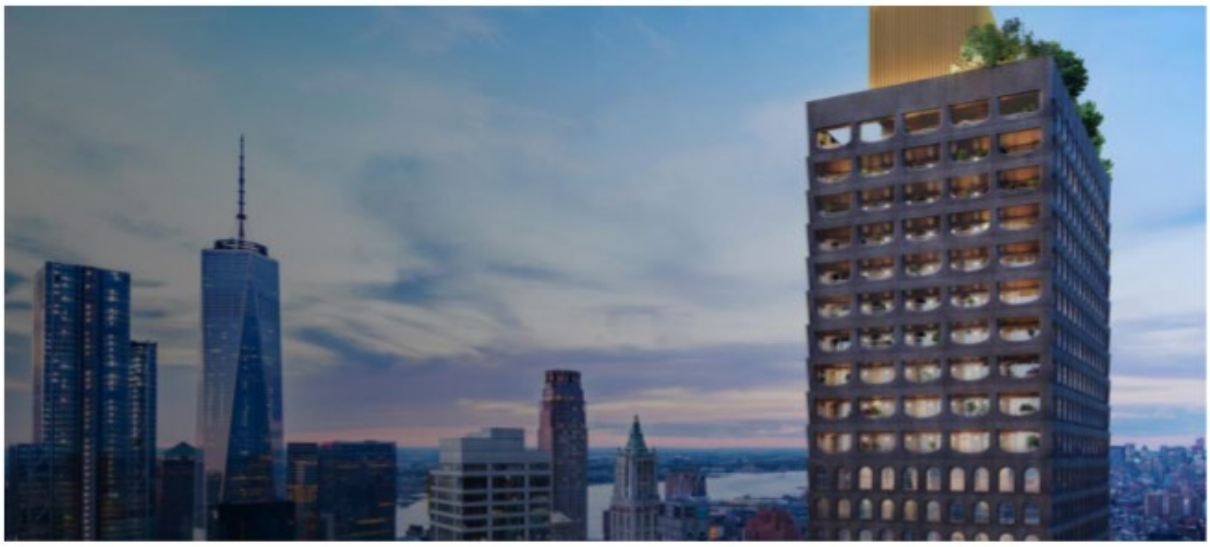
Installation robustness

Finally, it's important to consider a geo-grid's resistance to installation loads. High dynamic stresses can take their toll on reinforcement while installing and compacting cover soils and base course materials. To withstand this stress, a geo-grid should have thick, monolithic reinforcement bars.

Using geo-synthetics provides a more cost-effective and efficient method than many alternatives in a variety of applications.

SELF-ENERGIZING HIGH RISE TOWERS

NADIAH SHAJAHAN, S4 C1



In recognition of global warming and regional climate change, we are witnessing the remarkable speed of scientific, technological, and societal developments worldwide in reducing the rate of energy consumption per capita, increasing reliance on generating electricity from renewable natural resources in lieu of fossil fuels, attempting to reduce emissions of carbon dioxide (CO_2) and other greenhouse gases (GHG) globally, and accelerating the movement toward self-energizing high-rise towers.

A high-rise building is a tall building, as opposed to a low-rise building and is defined by its height differently in various jurisdictions. It is used as a residential, office building, or other functions including hotel, retail, or with multiple purposes combined. Residential high-rise buildings are also known as tower blocks and may be referred to as "MDUs", standing for "Multi-Dwelling Unit". A very tall high-rise building is referred to as a skyscraper.

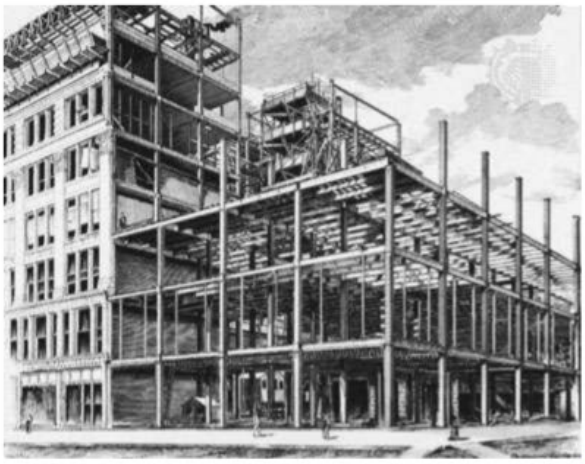
High-rise buildings became possible with the invention of the elevator (lift) and less expensive, more abundant building materials. The materials used for the structural system of high-rise buildings are reinforced concrete and steel. Most North American style skyscrapers have a steel frame, while residential blocks are usually constructed of concrete. There is no clear difference between a tower block and a skyscraper, although a building with fifty or more stories is generally considered a skyscraper.

It was, the refinement of the Bessemer process, first used in the United States in the 1860s, that allowed for the major advance in skyscraper construction. As steel is stronger and lighter in weight than iron, the use of a steel frame made possible the construction of truly tall buildings. William Le Baron Jenney's 10-story Home Insurance Company Building (1884–85) in Chicago was the first to use steel-girder construction. Jenney's skyscrapers also first employed the curtain wall, an outer covering of masonry or other material that bears only its own weight and is affixed to and supported by the steel skeleton.

Structurally, skyscrapers consist of a substructure of piers beneath the ground, a superstructure of columns and girders above the ground, and a curtain wall hung on the girders.

As the population density of urban areas has increased, so has the need for buildings that rise rather than spread. The skyscraper, which was originally a form of commercial architecture, has increasingly been used for residential purposes as well. Another factor influencing skyscraper design and construction in the late 20th and early 21st centuries was the need for energy conservation.

Earlier, sealed windows that made necessary continuous forced air circulation or cooling, for instance, gave way in mid-rise buildings to operable windows and glass walls that were tinted to reflect the sun's rays. Also, perhaps in reaction to the austerity of the International Style, the 1980s saw the beginnings of a return to more classical ornamentation, such as that of Philip Johnson's AT&T Building (1984) in New York City.



The world's current tallest skyscraper is the Burj Khalifa in Dubai. It is 828 meters tall, which is over two-and-a-half times as tall as any skyscraper in Australia.

However, there is a skyscraper being built in Jeddah, Saudi Arabia, that will be over 1,000 meters tall when it's finished. This will be the first building to ever rise over a kilometer high. It will also have 167 floors on top of each other.

We could probably build a tower over 2,000 meters tall, which would be like ten normal skyscrapers on top of each other.

This is probably not a very good idea though. Building such a mega-tall skyscraper would use a huge amount of concrete and steel.

Using lots of these materials when we don't need to can be bad for the environment. It's usually much better for the environment if we build smaller skyscrapers, maybe up to 300 meters tall. In fact, there are lots of challenges when you design and build a mega-tall skyscraper.

Stopping the Wind

The biggest difficulty is the wind. It blows on a skyscraper and tries to push it over, so you need to design a structure that keeps the building stable. The wind can also make a tower sway from side to side, so that people at the very top can even feel seasick. Architects and engineers have lots of technologies to help stop this. Some of the tallest skyscrapers in the world have a giant pendulum at the top, inside the building, called a "tuned mass damper".

Imagine a ball of steel, the size of a house hanging from ropes inside a skyscraper. When the wind blows, the pendulum swings back and forth, absorbing the energy of the wind, to stop the building swaying. Other buildings have pools of water at the top. When the wind blows it makes the water slosh around. Giant paddles in the pool absorb the water's movement, which stops the building from swaying.

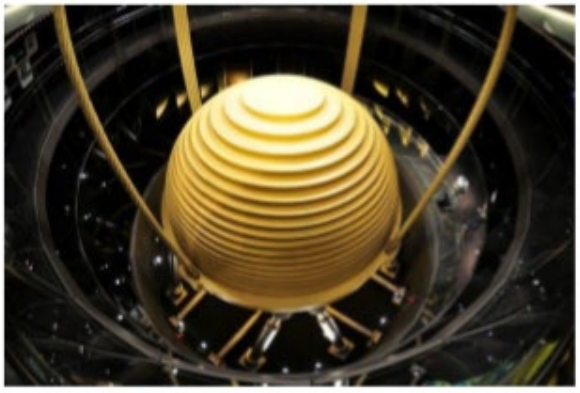
Another way to stop the wind is to use a clever skyscraper shape. When the wind blows on a skyscraper it creates swirls of air called vortices – like whirlpools in the sky. If these happen regularly, it can make the building sway back and forth. The Burj Khalifa building in Dubai is thin at the top and wide at the bottom, with giant steps down the side. The steps make the vortices happen at different heights to help stop the building from swaying in the wind.

Getting to the top

Another big challenge is how do you get to the top of a building that is one kilometer tall? Walking up the stairs isn't an option as there would be more than 3,000 steps.

Taking the lift would be a good idea, but you'd need a very fast lift. Otherwise it would take ages to get up or down the building. Some of these lifts can travel at 70km/h, the speed of cars on a highway. At that speed you would go past five floors every second and soon be at the top.

You would also need lots of lifts in a kilometer-high skyscraper. The Jeddah Tower will have 59 of them! They will have super-strong carbon fiber ropes to carry the lift, as normal ropes just aren't strong enough.



The Burj Khalifa building in Dubai is thin at the top and wide at the bottom, with giant steps down the side

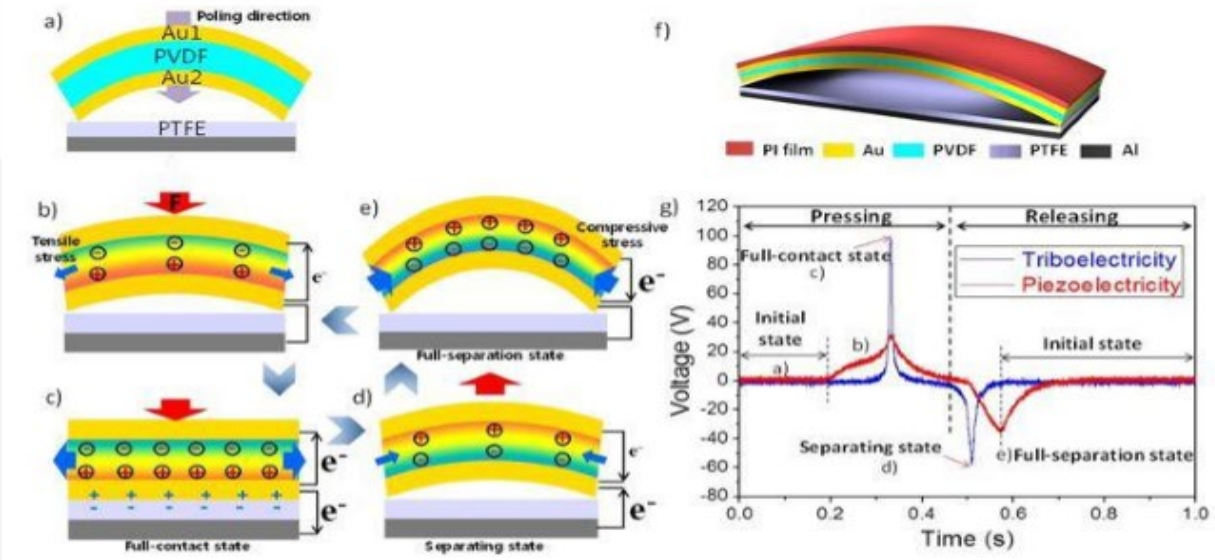
PIEZOELECTRIC ROADS

SYJITH RAJAN, S4 C2

Electricity has become a lifeline of present day civilization and thus its demand is enormous and is growing steadily. As the demand for fossil fuels are enormously increasing over time, the future of generating power using non-renewable energy will come to a halt. This overconsumption and risks associated is pressuring the environment and economy as well. In 2004, the global energy consumption level of non-renewable energy has risen to 80%, and will remain increasing in the next 20-30 years due to population growth as a main factor.

This consumption level results in a drastic amount of CO emissions and greenhouse gases being pumped into the air raising concerns on rising sea levels, increasing average temperature, and extreme weathering conditions. There seems no end to the different ways one can generate pollution free electricity. At one hand, rising concern about the gap between demand and supply of electricity for masses has highlighted the exploration of alternate sources of energy and its sustainable use. On the other hand, traffic on the road all over the world is increasing day by day thus; congestion on road is

becoming inevitable with the fancy of masses towards personal transportation system for their growing mobility. Energy demand and heavy traffic correlation motivate to dream about a road that would harvest energy from the vehicles driving over it. For this, a piezoelectric material embedded beneath the road, the piezo-smart road, can provide the magic of converting pressure exerted by the moving vehicles into electric current.



As stated in IISD report, the G7 countries, a group of finance ministers and central bank governors, agreed to phase out the usage of oil, gas and coal at the end of 2100. This form of agreement seeking for sustainable solutions made by leading countries offers a green light to great investment opportunities around the globe. Sustainability is simply a shortcut to a long term profit earnings and an incentive towards harnessing the "greenies" to expand and produce clean-energy products.

The roads which produce electricity by application of mechanical energy when vehicle moves over the road, those roads are called as piezoelectric roads. The energy consumed by the vehicle (sourced in the fuel combustion) is utilized for a variety of applications; one of them is to overcome rolling resistance. A typical asphalt road can be described as a visco-elastro-plastic material, with elasticity being its dominant material characteristic. When a vehicle passes over a road, the

road deflects vertically. This deflection is released as thermal energy. For a road with embedded piezoelectric generators, part of the energy the vehicle expands on roads deformation is transformed into electric energy (via direct piezoelectric effect) instead of being wasted as thermal energy (heat).

The various steps in the construction of piezo–electric roads are shown below

1. The first layer is laid with fine gravel and sand content.

2. Then a thin layer of asphalt is laid which acts like a strong base for the generators.

3. Piezoelectric generators are placed in quick drying concrete as per design and left for 30 min.

4. Then all the generators are wired in series to get collective output.

5. A bitumen sheet is used to cover all the generators to provide better adhesion of concrete to asphalt.

6. Finally a thick layer of asphalt is laid which finishes the construction.

(When applied on roads, the piezoelectric technology could produce up to 44 megawatts of electricity per year from one kilometer stretch of the road and meet the energy demand of about 30,800 households.)

The generators are embedded between the superstructure layers, and usually covered with an asphalt layer. When a car drives over the box, it takes the vertical force and compresses the piezoelectric material, thereby generating electricity. The energy- 80 kilowatt-hour per kilometer of road for car traffic can be stored in a nearby battery or super capacitor, depending on the application, or sent directly to streetlights and other roadside devices. The energy being converted into electricity through piezoelectric effect is coming from motion of vehicle which will otherwise be wasted by heat when the road deforms under the weight of the car. The layer of piezoelectric material is stiffer than the road material it replaces, so it even saves a tiny amount of energy.

At a time when governments are finding it hard to make land available for new power plants, extracting energy while using the vast spread of highways all over the world seems no less lucrative proposition. However, this idea has not yet gained enough ground among the policy makers even though researchers have shown that energy could be extracted from highways by fitting them with piezoelectric devices. The energy generating road designs could become a starting point for a self-sustaining future. We thus conclude that this thought will be a revolution in power production and curb down the energy costs thereby improving our country's economy. This energy is produced by consumers' participation without requiring any kind of input energy. In future, the work investigating the Energy Harvesting MEMS (Micro-Electro- Mechanical) devices will be continued that would result in the better production of electricity without any useful input. This kind of construction has been carried out in Israel, California and attempts are being made to implement this in India as soon as possible.

SAAHITYA

LITERARY ARTICLES

THORNS

ROSE PAUL, S6C2

Wilting away...
Picked up by the wandering evening breeze...
Scattered into a world of uncertainties...
That's throwing profanities...
Like a thorn bush in a field full of lilies...
I stood out...
But not as they wished...
Not to cover up their felonies...
I myself was an uncertainty...
Commitment... being my greatest weakness...
Pulled me with it to darkness...
Blinding me in the process...
Little did I know...
That I was becoming a joke...
They were feasting on...
My bad!!! I was different...
I was the thorn bush amidst the beauties...
They had to finally let me go...
Because of my thorns...
Cause they didn't want to be scarred in a world that reckons beauty...
A world which was a joke to me
And my thorns...
My flaws became my salvation...
My salvation causing my resurrection...
My thorns build me up...
They fought for me...
Laying in my bed...
I was in a tangled mess...
Floating in my own world...
My own field...
Where the thorn bushes ruled the uneven terrain...
Where the flaws were celebrated...

LIFE IS SO.....

SREESHA N P, S6 C2

You'll always be my best friend

I love you,

My friend and only mine...

Well, these words really have a space in my heart...

I never know when did she come into my life and I don't know how we became so close...

But she was a true friend and she was everything to me...

She was my friend and still she is ....in my memories

She has a beautiful smile...

I always tried to disturb her, make her angry ....I just thought she would never leave me...

She was something more than a true friend to me...

One day we just sat near the window of corridor...

Tears were rolling from my eyes, I was mad at her

She asked me a thousand times...

But I didn't tell her a word....I couldn't look at her...I felt that that my heart is being....I don't know

I don't know how she felt...and she left....

INCOMPLETE COMPLETENESS

ROSE PAUL, S6C2

You can be surrounded by people
and still feel lonely...
You can have everything
you might need but still feel
incomplete...
The feeling of an incomplete
completeness...
A forlorn soul battling through an
illusion we call world...
Once the alpha of the pack but
now a lonely soul...
My mind wanders, creating
illusions of completeness...
While my heart still feels
incomplete...
I feel trapped in this endless loop
of incompleteness...
But then he came...
Like a blazing fire...
Burning me with him...
Burning down the ropes that tied
me down to my lonely alleys...
Every touch was cosmic...
Every caress left me ignited...
Little did I know that it was just
a beginning... one where I would
be left craving more to fill my
incomplete completeness...

EKTARA

GREESHMA GAYATHRI C, S8 C2

In a very vulnerable moment,
when u choose to be torn, and you are fearlessly alive,
you realize,

you have no one to wait for,
but you and you alone – until the unmapped
in a embrace, leaves you breathless
in the fresh air of freedom.

When the heart is fingered to point blank resonance,
Only the sound remains,
the sound of silence.

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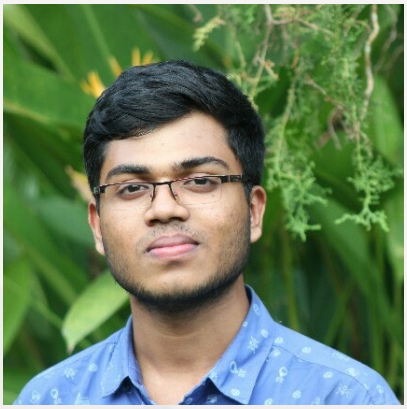
CATHERINE



SANDESH V H

The best Creator next to God are...

...Civil Engineers

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COLLEGE OF ENGINEERING TRIVANDRUM