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SSN COLLEGE OF ENGINEERING

NEWSLETTER OF
THE DEPARTMENT OF CIVIL ENGINEERING

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JANUARY 2018
Volume 2 Issue 2

THE HALF YEARLY NEWSLETTER OF THE
DEPARTMENT OF CIVIL ENGINEERING
SSN COLLEGE OF ENGINEERING

"Scientists study the world as it is; engineers create the world that has never been."

-Theodore Von Karman

INDEX

FROM THE HOD'S DESK

New Year Greetings to Staff and Students,

It gives me immense pleasure to present the second edition of our department newsletter for this academic year. The department has recorded consistent improvement in its academic and research performance. The department maintains active research groups and the faculty have published good number of papers in indexed journals. During last semester, various curricular and co-curricular activities were conducted successfully by the department. Through seminars, symposia, workshops, industrial visits and in-plant training, the students were equipped with technical knowledge, skills and creativity to excel in their engineering profession.

My hearty congratulations to Ms.Elakiya, III year student who won third prize in the Swachh Bharat Hackathon, a national level competition conducted by Govt. of India to find innovative solutions for sanitation related problems. It is also interesting to note that one fourth of our student strength have underwent internship/in-plant training during the winter vacation.

I believe that in the years to come, our department will continue to be the trend-setter in offering an array of curricular and co-curricular activities in order to achieve academic excellence.

Dr.S.Ramana Gopal

- **Vijayalakshmi R, Ramanagopal S**, Sathia R and Arvindh Raj V* (*2012-16 B.E. Civil Engg.), " Case Study on the Repair and Rehabilitation of G+3 Residential Apartment Located on Sea Shore, Tamilnadu, India", *Indian Journal of Science and Technology*, Vol. 10 (26), Jul 2017, pp 1-7.

- **Sabapathy Y K**, Balasubramanian V B*, Shiva Shankari N*, Yeshwant Kumar A* (*2011-15 B.E. Civil Engg.) and Ravichandar D, "Experimental Investigation of Suface Modified EOF Steel Slag as Coarse Aggregate in Concrete", *Journal of King Saud University - Engineering Sciences*, Vol. 29 (4), Oct 2017, pp 388-393.

- **Sabapathy Y K**, Rekha J* and Ramya Sajeevan* (*2013-17 B.E. Civil Engg.), "Experimental Investigation on the Strength of Sisal Fiber Reinforced Concrete", *International Journal of Science, Technology and Engineering*, Vol. 4(4), Oct 2017, pp 21-25.

- **Rajkumar R**, Aravindh R*, Gokula Krishnan B* and Mukul Anand B* (*2015-19 B.E. Civil Engg.), "Study on Behaviour of Plate Girder with Plane Web and Corrugated Web", *Advances in Computational Science and Technology*, Vol. 10 (9), Aug 2017, pp 2745-2764.

- Powrna B, **Rajkumar R**, Aravindh R* and Gokula Krishnan B* (*2015-19 B.E. Civil Engg.), "Seismic Performance on Non-Structural Elements – An Experimental Investigation and Numerical Analyses", *International Journal of Civil Engineering and Technology*, Vol. 8 (11), Nov 2017, pp 1005-1017.

- Naveen Kumar P* (*2011-15 B.E. Civil Engg.) and **Sangeetha P**, "Analysis of Non-Composite and Composite Space Frame for Varying Support Condition", *International Journal of Science, Technology and Engineering*, Vol. 4 (1), Jul 2017, pp 21-31.

- **Sangeetha P**, "Parametric Study on the Stiffness and Energy Absorption Capacity of Composite Space Truss", *International Journal of Advanced and Applied Sciences*, Vol. 4 (9), Sep 17, pp 1-5.

- **Suryakanta Biswal** and Ramaswamy A, "Uncertainty based Model Averaging for Prediction of Long Time Prestress Losses in Concrete Structures", *Construction and Building Materials*, Vol. 153, Oct 2017, pp 469-480.

FACULTY UPDATES

CONFERENCE PUBLICATIONS

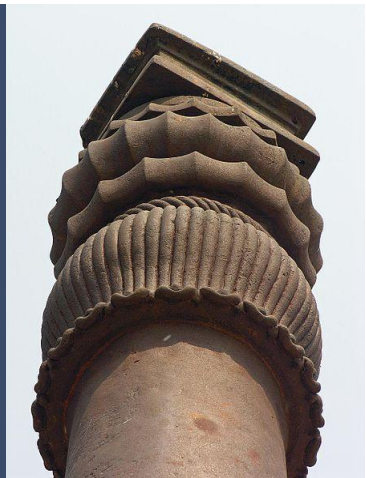
- **Muthulingam S** presented the paper, "Gaussian Trend in Corrosion Morphologies of Reinforcing Bar in Concrete under Marine Environment", in the 71st RILEM Annual Week and ICACMS 2017 - International Conference on Advances in Construction Materials and Systems, IIT Madras, Sep 2017, Chennai.
- **Sangeetha P**, Ashwin Muthuraman R M* (*2014-18 B.E. Civil Engg.), Dachina G**, Dhivya M**, Janani S** and Belluri Sai Madumathi** (**2013-17 B.E. Civil Engg.), presented the paper, "Behaviour of Concrete Filled Steel Tubes", in the National Conference of Fluid Mechanics, SSN College of Engg., Oct 2017, Chennai.

EXTERNAL RECOGNITION

- **Dr. Ramana Gopal S** attended the first Doctoral Committee meeting in respect of Mr. Senthilkumar S P, Ph.D. scholar, Anna University on 12 July 2017 at Jerusalem College of Engineering, Chennai.
- **Dr. Sivapriya S V** has reviewed a paper for Springer Journal "*Iranian Journal of Science and Technology, Transactions of Civil Engineering*".
- **Dr. Sivapriya S V** has taken up work as adaptor of the book "*Geotechnical Engineering: Principles & Practices: International Edition, 2/E*" by Pearson Publication.
- **Dr. Sivapriya S V** attended the Monitoring Committee meeting in respect of Ms. Priyadarshini A, M.S. scholar, on 27 Dec 2017 at the Division of Soil Mechanics and Foundation Engineering, Dept of Civil Engg., CEG, Chennai.
- **Dr. Muthulingam S** has reviewed two papers for Elsevier Journal "*Corrosion Science*".

The Iron Pillar of Delhi inside the Qutb complex was originally erected by emperor Chandragupta II. It is a 7 m tall victory column made of iron and stands testimony to the skill of ancient Indian iron smiths for its high resistance to corrosion.

Scientists found that the iron used in the 6000 kg pillar was processed to withstand the effects of extreme Delhi climate without rusting. This was achieved by using high phosphorus content iron resulting from an even layer of crystalline iron hydrogen phosphate hydrate.



FACULTY UPDATES

EVENTS ATTENDED

- **Dr. Ramana Gopal S** participated in the NBA Orientation Workshop – Movement for Quality Education organized by Zeal Education Society held at Pune on 30th and 31st Oct. 2017.
- **Dr. Muthulingam S** attended the AICTE sponsored Short Term Course "Stability Design of Steel Buildings" organized by the Department of Civil Engineering, IIT Madras from 6th to 11th Nov. 2017.
- **Dr. Muthulingam S** participated in the Workshop on Textile Reinforced Concrete Systems held at IIT Madras on 4th Sep. 2017.
- **Dr. Muthulingam S** participated in the Carmen Andrade Workshop on Corrosion Control in Concrete Structures held at IIT Madras on 8th Sep. 2017.
- **Dr. Suryakanta Biswal** attended the AICTE sponsored Training Programme under Emeritus Professor Fellowship Scheme on Civil and Structural Engineering organized by the Department of Civil Engineering, RMK Engineering College from 21st to 23rd Dec. 2017.

FACULTY FUNDED PROJECTS

- **Dr. Sreehari P and Dr. Mahalingam B**, "A Study on Permeation Properties of Self Compacting Concrete using Class C Fly Ash" (Rs.5,00,000; 30 months).
- **Dr. Rajkumar R**, "Laboratory Model Studies and Parametric Analyses" (Rs.2,30,000; 24 months).
- Dr. Shanmuga Priya M (Dept. of Mathematics) and **Dr. Sangeetha P**, "Effect of Thermal Radiation and MHD Flow of Water based Nanofluid over a Stretching Sheet" (Rs.50,000; 12 months).

Did you know that concrete is used more than any other man made material in the world?

EVENT UPDATES

FACULTY DEVELOPMENT TRAINING PROGRAMME

The Department of Civil Engineering organized a seven days FDTP on **CE6601-Design of Reinforced Concrete and Brick Masonry Structures** approved by Anna University from **4th to 10th Dec. 2017**. The programme was coordinated by Dr. Rajkumar R and Dr. Mahalingam B.

Fourteen external faculty members from various engineering colleges from all over Tamilnadu participated in the programme. Sessions were handled by eminent Professors from IIT Madras, CEG Anna University and Annamalai University. The participants also visited a pile driving site at Pallavaram, Chennai.

EVENT UPDATES

WORKSHOP

One day workshop on **Recent Advances in Water and Waste Water Treatment** was conducted on **22nd Aug. 2017** coordinated by Dr. Ramana Gopal S and Dr. Srinath R. Thirty seven participants from both academic and industrial background benefitted from the programme.

Lectures were delivered by Dr. Indumathi M. Nambi, Associate Professor, IIT Madras, Mr. A. Pandian, Resident Engineer & Plant Manager, VA Tech Wabag Ltd., India, and Dr. R. Sivacoumar, Senior Principal Scientist, National Environmental Engineering Research Institute-Chennai Zonal Lab.

Dr. Indumathi M. Nambi presented two case studies – one pertaining to North Chennai's oil pipelines and the ground water table, and the other pertaining to South Chennai's IT Park at Siruseri and the hydrological system. Mr. A. Pandian explained in detail the various elements and operation of a modern waste water treatment plant. Dr. R. Sivacoumar showed how water and waste water treatment can be done at micro level in our residences.

EVENT UPDATES

INAUGURATION OF ASSOCIATION OF CIVIL ENGINEERS

The inauguration of the Association of Civil Engineering was held on 7th Jul. 2017 with Dr. S. Velmurugan, Senior Principal Scientist at CSIR-Central Road Research Institute (CRRI) presiding as the chief guest. The association was formally inaugurated for the academic year by the chief guest, head of the department and the association in-charge. Following this, the office bearers for the academic year were introduced.

Dr. S. Velmurugan delivered a guest lecture on “Global Road Safety Issues and Road Safety in India”. The lecture presented the crash statistics and Dr. S. Velmurugan elucidated where India stands with respect to global road safety statistics and standards and why our crash numbers are very high. He also explained how accidents can be analysed and audited with a case study.

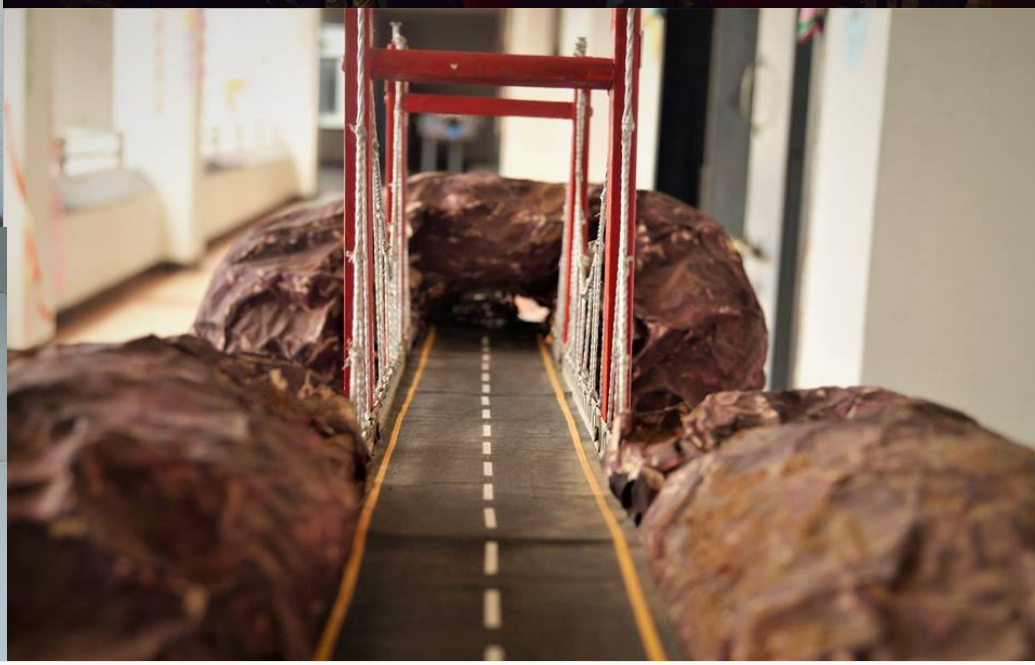
Invente has made its mark as one of the best technical symposiums out there for engineering students in Chennai. It serves as a platform to learn and showcase one's skills by the students and for the students.

Following the grand success of the first edition of Invente in 2016, the 2nd version this year garnered high expectations and stood tall to fulfil them all and even more.

The Department of Civil Engineering conducted 10 events and a workshop attracting more than 600 enthusiastic participants. Some of the star events were paper presentation, poster presentation, potential professor, tech hunt, bridge it, concrete challenge and technical quiz. The events were well planned, efficiently executed and managed to gather maximum response. The scheduling of the events was also strategically structured in such a way that the participants were able to take part in maximum number of events. The workshop was conducted on Total Station – an all-in-one electronic surveying instrument that every field engineer should be familiar with.

The two day fest was a success with impressive and encouraging reviews from participants. This would not have been possible without the cooperation and encouragement of the students, faculty coordinators and the management. Let's hope the next edition is even bigger.


WORKSHOP

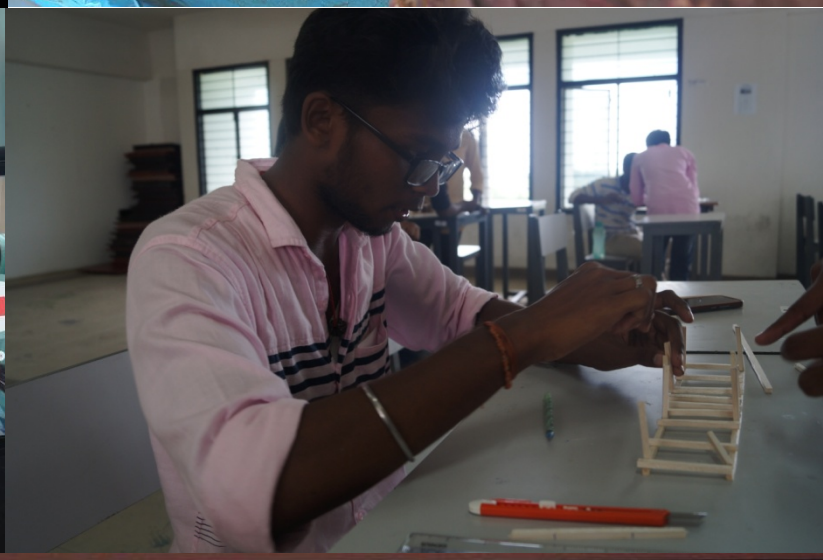



BRIDGE IT


BATTLE OF DESIGNS
COMPUTER LAB
RC34


CIVIL


31:52




NATIONAL LEVEL TECHNICAL SYMPOSIUM
invente 2.0
IMAGINATION UNLIMITED
SEPTEMBER 8th & 9th, 2k17
SSN

POONDI RESERVOIR

The IV year B.E. Civil Engg. students visited the **Institute of Hydraulics and Hydrology at the Poondi Reservoir**, Thiruvallur, Chennai on 23 Aug. 2017.

The Institute of Hydraulics and Hydrology, Poondi was established as an Irrigation Research Station in 1944 at Poondi, a small village in Tiruvallur District, 60 km from Chennai, adjoining Poondi reservoir constructed across Kosasthalaiyar River for providing drinking water supply to Chennai city. This is an esteemed research station where models of all the dams across Southern India have been built to conduct precise and accurate hydrological studies.

The students were accompanied by Dr. Sreehari P and Ms. Sumetha R. The Assistant Engineer at the Institute explained the various components of the reservoir using the fully working scaled model of the same. The students also learnt about watershed management.

INDUSTRIAL VISITS

L&T MULTISTORIED BUILDING CONSTRUCTION SITE

The III year B.E. Civil Engg. students visited the **Emami Tejomaya apartment complex construction site by L&T Constructions Ltd.**, Navalur, Chennai on 2 Aug. 2017. The students were accompanied by Dr. Mahalingam B and Dr. Sivapriya S V.

The site has three towers under construction with 27 floors each and a fourth tower with 11 floors. The load bearing walls in the structure are concrete walls. One of the unique features in this construction site is the use of aluminium formwork. 'Aluminium Formwork' is used for its ability to aid mass construction activity and faster completion of the construction work with lesser labour thus, saving both time and expenses. It has lesser number of joints and ensures smooth finishing with minimum maintenance.

HENNING HOLCK-LARSEN CENTRE, LARSEN & TOUBRO LTD.

The II year B.E. Civil Engg. students visited the **HENNING HOLCK_LARSEN CENTRE**, a museum and diamond jubilee landmark of the L&T Constructions Ltd. in Manapakkam, Chennai on 20 Jul. 2017.

This architecturally unique structure is dedicated to the memory of L&T's founding father and Chairman Emeritus, Henning Holck-Larsen. It is a two storied elliptical structure with a built-up area of 1115 sq.m. The HHL centre showcases the Indian Infrastructure Development and L&T's contribution towards building this nation.

The students were accompanied by Dr. Mahalingam B and Dr. Sangeetha P. The centre was a one-stop-shop to spread the knowledge of L&T's core business activities to the community at large. The students were exposed to

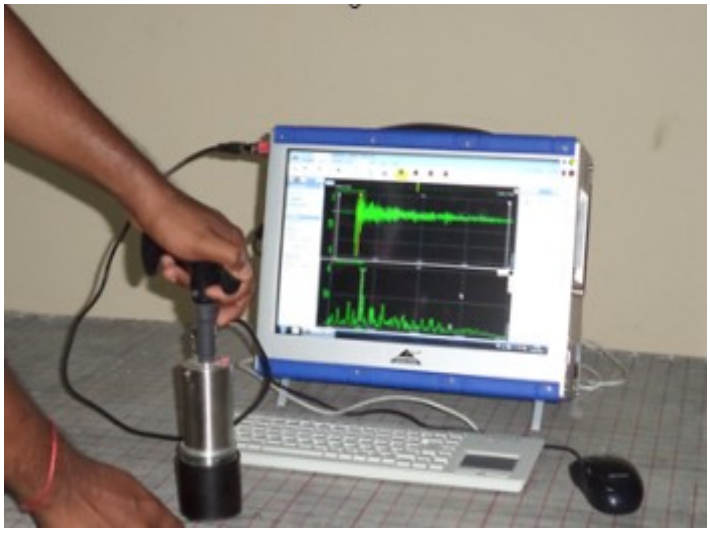
- L&T's origin, it's cultural & traditional heritage and professionalism.
- L&T's technological strengths and leadership in the industry.
- The wide variety of projects executed by L&T in the core areas of industrial and infrastructure development.
- Various recognition/awards L&T has received from different National & International organizations, associations, institutes etc.

CSIR-SERC (STRUCTURAL ENGINEERING RESEARCH CENTRE)

The III year B.E. Civil Engg. students visited **CSIR-SERC**, Taramani, Chennai on 26 Sep. 2017.

SERC is one of the 39 constituent laboratories of the Council of Scientific and Industrial Research in India. CSIR-SERC is involved in various activities with the Central and State governments as well as with public and private sector undertakings.

The visit was coordinated by Dr. Sabapathy Y K and the students were accompanied by Dr. Suryakanta Biswal. The students had a chance to explore advanced laboratories at the facility and had a glimpse at some of the R&D projects undertaken at the centre.



EVENT UPDATES

I YEAR ORIENTATION

The orientation programme for I year students admitted this year was held from 9th to 11th Aug. 2017. Unlike previous years, this academic year, the orientation programme was scheduled to include activities in the respective departments. On the first day of orientation, the students along with their parents were briefed about the campus and various opportunities provided by the college for holistic development of the graduates. This was followed by guest speakers from different walks of life on the next two days of orientation.

On 28th and 29th Aug., the orientation was held in the department. The students visited the laboratories and glimpsed some of the research activities undertaken. Faculty from each stream of civil engineering interacted with the students.

True or False?

"A 10 storey building was constructed in 48 hours in India." - True.

In 2012, a team of over 200 people worked round the clock to construct a precast 10 storey building INSTACON in Mohali to enter into record books as the fastest completed such building in India.
The structure can withhold for 600 years. It is a precast/prefabricated tube-in-tube structure. Concrete has been used only in the foundations and three inch deck floorings in the nut and bolt structure.
In addition to being cost effective to manufacture and assemble compared to conventional RCC framed structures, it is a "smart building" where quality of air that people breathe in will be more pure as the structure detects if carbon dioxide levels are high and makes adjustments accordingly.

ALUMNI INTERACTION

Uma Maheswaran K, Sr. Engineer at L&T (2011-15 B.E. Civil Engg.) briefing the III and IV year students regarding tunnelling.

The interaction was facilitated by Dr. Sabapathy Y K.

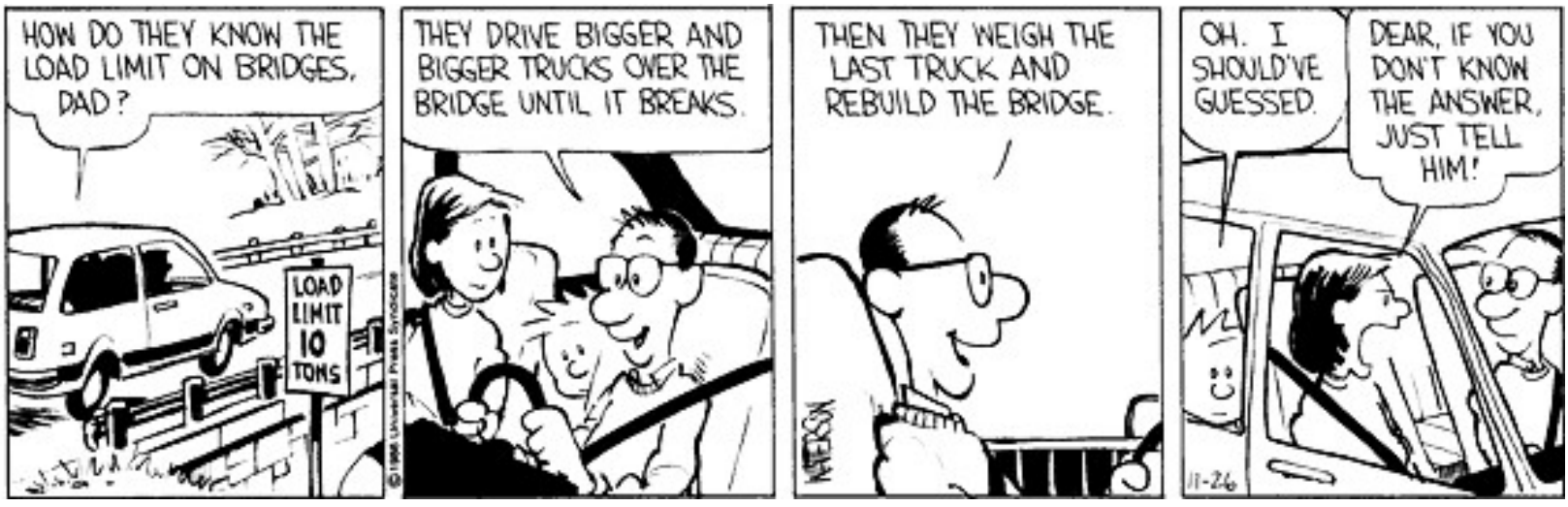
Arjun SA, GET at CBRE Holdings (2013-17 B.E. Civil Engg.) interacting with IV year students.

III YEAR, B.E. CIVIL ENGG.	
C M Elakiya	3 days IPT at SM Builders, Hosur
Shrinidhi A	2 weeks IPT at PWD, Madurai
G Vishnu Aravind	2 weeks IPT at RMD Kwikform India Pvt. Ltd., Chennai
P Dinesh Kumar	10 days IPT at Kanya Homes Pvt. Ltd., Chennai
	10 days IPT at Aadhuthya Associates, Sivakasi
Jawahar V **Balamurukan R** **Jai Vigneshwar A** **Saranya S** **Vaishnavi K**	1 week IPT at L&T Construction Apollo Proton Therapy Hospital Project Site, Taramani
Yogesh Kumar K **Prasanth A** **Karthik Raja R**	2 weeks IPT at L&T Construction Saint Gobain Project Site, Sriperumbudhur
Gokula Krishnan B	1 month internship at IIT Madras under Prof. Bhoominathan's project in soil structure interaction
Prathibha Devi N **V Arumugam** **K Dharmasekaran**	1 week IPT at Department of Atomic Energy, Kalpakkam
Alex Kirubhakaran **K P Priyadharshini**	1 week software training in Revit at Uniq Technologies, Chennai
A Harikrishnan	3 months Marketing Internship at SPI Cinemas, Chennai
Srilekha V	10 days IPT in the analysis of marine structures at BMT Consultants India Pvt. Ltd., Chennai
S Sadhana **C Roshini** **Chitralekha R** **Shobana P**	2 days training at Kilpauk Water Treatment Plant, Chennai
Kannan Meena	3 weeks internship at Five Holdings LLC, Dubai

II YEAR, B.E. CIVIL ENGG.	
Ramasamy S M **Santhosh S**	10 days IPT at Shreeram Gateway, Chennai
U Amrutha **K Sooraj** **BalasSubramanian A** **Aaditya Jagadeesh** **K Deveshwar** **G S Akilan**	12 days training at Chennai Metro Rail Limited (CMRL), Chennai
Mohammed Duraid Falih N	10 days IPT at Viveks and Associates, Chennai
Hemanth V **Krishna Khumaar A** **Vishnu Vardhan**	5 days IPT at Indian Railways-Rail Vikas Nigam Ltd., Chennai
K Sai Likitha Krishna	16 days Internship at Fujita Corporation, Qatar
V Madhumitha **Deepak Prem J**	2 weeks training in GIS at Greater Chennai Corporation, Chennai
Vishvaa R S **Kavya L**	5 days IPT at Hiranandini-Vijay Nirman Pvt. Ltd., Chennai
Ahalya S **Aparna P Vijay** **Deepika A** **Dhivya D** **Swarna Varshini**	10 days IPT at Venkat Homes, Chennai

CONFERENCES & WORKSHOPS

- **Ashwin Muthuraman RM and D Baranidharan**, IV yr., won the **best paper award** for their paper, "Ultrasound Pretreatment for Enhanced Biogas Production from Confectionary Waste Water Co-digested with Suitable Organic Substrate" at the **National Conference on New Frontiers in Chemical, Biological, Energy and Environmental Engineering** organized by the Department of Chemical Engineering, at SSN College of Engineering.
- **K Vaishnavi and A Srinithi**, III yr., presented a paper, "Environmental Impact on High Rise Buildings in Coastal Region" in the **IEEE Students' Conference cum Paper Contest 2017** at Sri Eshwar College of Engineering, Coimbatore.
- **Gokula Krishnan B**, III yr., participated in the **Indian Geotechnical Conference 2017-GeoNEst** at IIT Guwahati.
- **Gokula Krishnan B**, III yr., attended the 3rd Indo-Japan **Workshop on Geotechnics for Natural Disaster Mitigation and Management** organised by the Indian Geotechnical Society and Japanese Geotechnical Society at IIT Guwahati.
- **Chitralekha R, Shobana P, Saranya S and Roshini C**, III yr., attended the **Workshop on Architecture and Civil Engineering: Scope and Professional Practice** at Sri Venkateswara College of Engineering.



TECHNICAL SYMPOSIUMS

- Chitralekha R and Shobana P, III yr., won second place in Paper Presentation in the National Level Symposium at Sri Venkateswara College of Engineering.
- A Jai Vigneshwar, Kannan Meena, K Dharmasekaran and N Prathibha Devi presented a paper on Solar Roads in the National Level TechFest at VIT Chennai.
- Saranya S and Roshini C, III yr., won first prize in Vermassang, a surveying based event at Sri Venkateswara College of Engineering.
- Saranya S and Roshini C, III yr., won first prize in Spectre, an AUTOCAD event at Sri Venkateswara College of Engineering.
- Saranya S and Roshini C, III yr., participated in scaffold wing model making in the National Level Symposium at Sri Venkateswara College of Engineering.
- Chitralekha R and Shobana P, III yr., participated in Poster Presentation in the National Level Symposium at Sri Venkateswara College of Engineering.
- Chitralekha R and Shobana P, III yr., presented a paper in the National Level Symposium at Dhanalakshmi College of Engineering.

NPTEL ONLINE CERTIFICATION COURSES

- 10 B.E. Civil Engineering students have successfully completed NPTEL online certification courses offered during Jul-Sep 2017.
- **Adithyan M.P.**, IV yr., has scored 92% and placed in the top 5% in the NPTEL online certification course on ‘Project Planning and Control’ offered during Jul-Sep 2017.

- Kannan Meena, III yr., represented USA at the Model United Nations conducted at SSN College of Engineering on 15th to 17th September 2017.
- Manjula R, II yr., was a member of the Chess Team representing Anna University in the All India Inter University Chess Championship held at Jagrab Lake City University, Bhopal from 10th to 14th November 2017 and placed fourth in the team event.
- Amrutha U and Manjula R, IIyr., was a member of the winning Chess (Women) team in the Anna University Zonal Tournament for the year 2017-18 held at Anand Institute of Higher Technology on 5th September 2017.
- Manjula R, IIyr., was a member of the winning Chess (Women) team in the Anna University Zonal Tournament for the year 2017-18 held at TRP Engineering College on 26th and 27th September 2017.
- Amrutha U, IIyr., was a member of the winning Women's Team Chess in SSN Trophy, held at SSN College of Engg, from 18th to 21st August 2017.
- Manjula R, IIyr., placed fourth in the Women's Team Chess in SSN Trophy, held at SSN College of Engg, from 18th to 21st August 2017.
- Chandramouleeshwar and Dharmasekaran K, III yr., won II place in Badminton in the Anna University Zonal Tournament for the year 2017-18.
- Dharmasekaran K, III yr., won I place in singles and doubles Badminton in the Virudhunagar District Level Badminton Tournament.
- Sai Pradeep, IV yr., was a member of the winning Basketball team in the All India Inter Engineering Sports Fest at MIT Pune and was also named the best player of the tournament.

SWACHHATHON 1.0

SS Ahluwalia giving away the third prize to Elakiya

C.M. Elakiya, III yr., B.E. Civil Engineering, under the guidance of Dr. R. Srinath, Associate Professor, won III prize in the Swachh Bharat Hackathon for "**Technological Solutions for Safe Disposal of Menstrual Waste**" conducted by the Ministry of Drinking Water & Sanitation and AICTE, Govt. of India on 8th September 2017 at New Delhi.

Swachhathon 1.0- A Swachhata Hackathon was organized by the Ministry of Drinking Water and Sanitation to crowd source innovative ideas to solve the sanitation related problems (including hygiene) being faced by the country and also to incubate the ideas to develop sustainable solutions. The initiative saw massive participation; over 3000 entries (including international entries) were received under 6 categories that included 'Operation and Maintenance of School Toilets', 'Behavior Change Communication', and issues of 'MHM'.

Technological solution for safe disposal of menstrual waste received very interesting innovations. Aishwarya from Kerala came up with treating the used sanitary pads with a chemical solution and residue of which could be used for fertilizers and making grow bags. **Elakiya from Tamil Nadu gave a solution to reuse the treated used sanitary pads for making paver bricks.** Mr. Subhankar Bhattacharya from West Bengal made a zero emission incinerator.

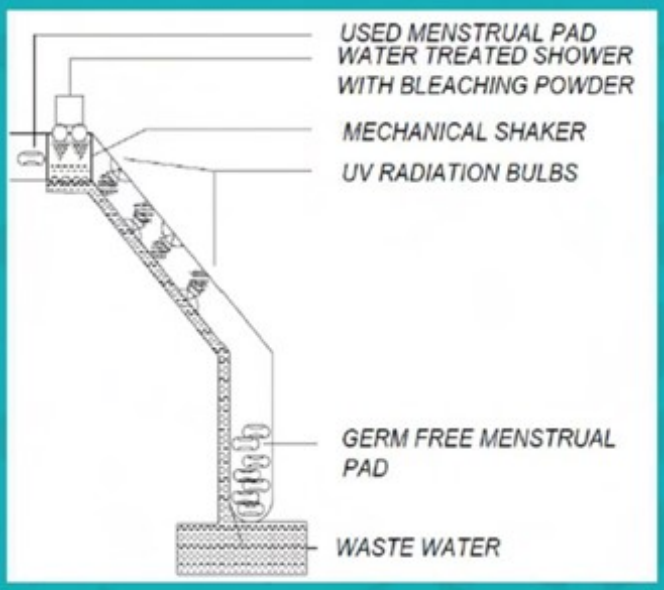
Elakiya's idea was to make use of treated sanitary pads to make paver blocks. The menstrual cotton pad waste is uniformly spread within cement mixer. The compressive strength, flexural strength and unit weight test have been conducted and it is observed that as high as 30% waste sanitary pad and 70% cement mixer can be used in paver blocks without compromising on the strength of the block.

SWACHH BHARAT MISSION - GRAMIN
MINISTRY OF DRINKING WATER AND SANITATION

THE SWACHH BHARAT HACKATHON

MANAGEMENT OF MENSTRUAL WASTE FINAL SELECTION

Chemical treatment of cotton pad, waste used for paver block



-Key features:
-Waste to energy technology (useful by product is raw material for paver blocks)
-Aids instant disposal
-Chemical treatment and UV treatment of menstrual waste

C.M. Elakiya
Tamil Nadu

STUDENT UPDATES

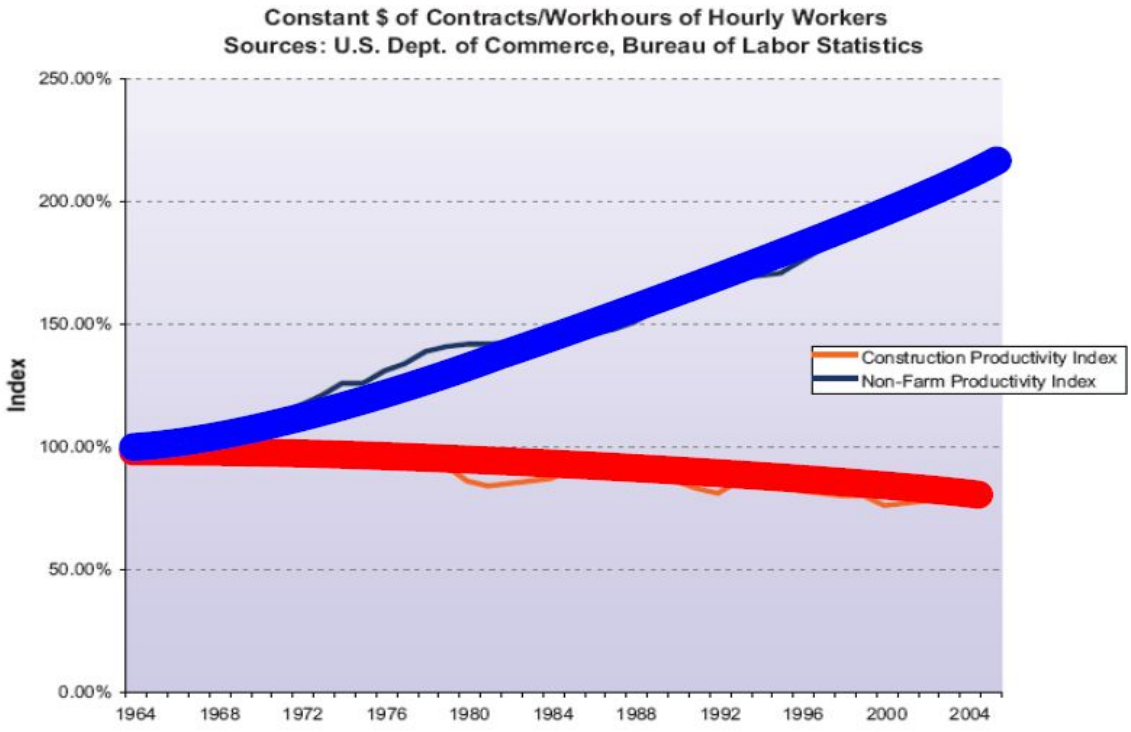
STUDENTS INTERNALLY FUNDED PROJECTS

S. No.	Students	Project Guide(s)	Project Title
1	U. Amrutha G. Arun V. Madhumitha (II year)	Dr. P. Sangeetha Dr. S. Ramanagopal	Study on behaviour of the headed stud connectors in composite structure
2	Aadhitya Jagadeesh S. Ahalya K. Deveshwar D. Swarna Varshini (II year)	Dr. P. Sangeetha Dr. R. Vijayalakshmi	Behaviour of channel connector by push out test
3	Sooraj K K. Sai Likitha Krishna V. Hemanth P. Sasitharan (II year)	Dr. Y. K. Sabapathy	Flexural strength of concrete beams reinforced with alkaline treated palm fibres
4	B. Sruthi Reddy T. Hema Naga Sri Pushpa Swetha (II year)	Mrs. R. Sumetha	Experimental study on properties of pervious concrete as pavement material
5	R. Balamurukan V. Jawahar (III year) V. Dayanidhi (IV year)	Dr. Y. K Sabapathy	Experimental approach to develop cellular light weight building blocks
6	C. Roshini S. Sadhana S. Saranya (III year)	Mrs. R. Sumetha	Subgrade stabilization using geotextiles
7	N. Md. Duraid Falih K. Karthigeyan Anupriya Natesan (II year)	Dr. Y. K. Sabapathy	Punching shear on column footing using FRP MAT/Grating
8	R. Chitra Lekha A. Duraimurugan P. Shobana (III year)	Dr. Srinath Rajagopalan	Efficient removal of indigo dye from effluents of denim dyeing units
9	C.M. Elakiya (III Year)	Dr. Srinath Rajagopalan	Experimental study of partial replacement of fine aggregate with menstrual cotton pads in paver blocks
10	Ajay Nair K. Harish Kumar (III Year ECE) P. Dinesh Kumar Inakota Sai Sahith (III Year Civil)	Dr. R. Hemalatha (ECE) Dr. P. Sangeetha (Civil)	Detection and estimation of defects in concrete using infrared thermography

Every middle class Indian knows the importance of avoiding waste. In fact, almost every Indian mother makes sure that her children understand the practice of reducing wastes, be it with food or clothes and even with the very paper we use to write.

Every Indian would have heard the term '*Jugaad*' in his/her life at least once, if you have, then you know what it means. For those who haven't, *Jugaad* means a **hack -** an innovative fix or a simple workaround. Its principles are deeply rooted in frugality and ingenuity inherent to our culture. You would have practised it without even knowing the term *Jugaad:* for example, old and unusable clothes become waste cloths to be used for wiping surfaces; old newspapers would be used as wrapping paper, etc. Lean similarly invokes the underlying principles of *Jugaad,* but it is only better.

Inefficiency in the Indian construction sector has been on the rise. This decrease of efficiency continues to be a global pandemic. In the US, studies show productivity index in the construction sector being consistently below 100% since the 1960s and still reducing, compared to other sectors. Principles of Lean Construction are being increasingly adopted by many companies in the US with drastic improvements in productivity and deliverables, but the companies adopting Lean is still but a small percentage of the entire industry. Lean is one of many management principles which would prove to be a much needed panacea for the Indian construction industry.



Reference: Paul Teicholz, Ph.D., Professor (Research) Emeritus, Dept. of Civil and Environmental Engineering, Stanford University

What is Lean?

Lean construction is a comprehensive management system formed by integrating project deliverables and the diverse trades employed in a project through principles of collaboration, adaptability and waste reduction. Lean, at its core, aims to maximize customer value while minimizing waste and hence improves efficiency and productivity, consequently increasing profits.

Lean was inspired by Total Quality management principles adopted by Toyota between 1948 and 1975 which was known at that time as **Toyota Production System** (TPS). Toyota was immensely successful in improving productivity without compromising on quality which increased its profit by several folds and Toyota became the world's largest manufacturing organization. It was only in the 1990s that Glenn Ballard and Greg Howell developed the **Theory of Lean** by drawing heavily from the principles adopted by TPS. They are also the cofounders of Lean **Concrete Institute** (LCI).

What are its principles?

Its main objectives are to design out overburden (**Mura**) and inconsistency (**Muri**) and eliminate waste (**Muda**). Together these 3Ms (**Mura**, **Muri** and **Muda**) are termed as direct obstacles of flow and produce inefficiency.

Flow is defined as anything which builds a measurable addition of value, step by step, one step leading to another. **Waste** is defined as any step which doesn't add value but adds to the cost of the project. The eight wastes targeted by Lean are:

1. Defects: Any activity that is not done correctly and requires rework.
2. Overproduction: Any task which is completed before the subsequent task can be started. It's producing more than is needed, faster than needed or before it is needed.
3. Waiting: Waiting refers to periods of inactivity. A scenario where labour is ready but necessary materials required for starting the task has not been delivered yet is the most common one.
4. Transport: This is unnecessary motion or movement of products or materials that do not directly support immediate production. It occurs when materials, equipment, or workers are moved to a job site before they are needed. It can also denote unnecessary transmission of information.

5. Inventory: This refers to supply (materials or goods) that are not immediately needed. Excess inventory can tie up budget and resources as they require additional handling and storage and often degrade when not used.
6. Motion: Any movement that is not necessary, like the distance between workers and tools or materials. Motion takes time and adds no value to the product or service.
7. Over Processing: It refers to unnecessary steps in operations, such as reprocessing, double-handling, added communication and double-checking which adds no value to the product or service, occurs while trying to eliminate the other types of waste.
8. Improper Utilization of Talent: Each labourer has a specific set of skills and experience. When the right person is not matched to the right job, their talent, skills, and knowledge go to waste.

What are the steps involved?

1. **Identify Value** from the customer's point of view, i.e. recognize what the customer needs than what is included in plans and specifications.
2. **Define/Map the Value Stream** while eliminating wherever possible, steps which don't create value.
3. **Create Flow** - make the value-creating steps occur in tight sequence to facilitate flow.
4. **Establish Pull** - participants communicate and collaborate with each other to determine the schedule of tasks.
5. **Seek Perfection** - Repeat the entire sequence of events until a state of perfection is reached and perfect value is created with no waste.

It is similar to the **PDCA** (Plan, Do, Check, Act) cycle commonly used in construction management the only difference is *Act* becomes *Adjust* in the PDCA cycle.

When implemented properly Lean Construction has a number of operational and administrative benefits in addition to saving time and money without compromising on quality.
It is estimated that India needs an investment of USD 4.5 trillion in infrastructure till 2040 and the construction industry is riddled with cost and time overruns which causes projects to run over budget. By adopting Lean Construction principles some of the overruns could potentially be offset and in turn, contribute to better economic development.

Organizations such as the Institute for Lean Construction Excellence (ILCE), est. 2008, has been instrumental in propagating Lean Construction and companies such as Vedzen - a management consultant which offers a wide range of services relating to Lean - shows hopeful prospects for our construction industry. So it is evident that the industry needs to adapt to the country's rapidly growing infrastructural needs.

This leads us to the question:

Is our industry ready for such a fundamental changeover?

AJAY SURESH
IV YEAR, B.E. CIVIL ENGINEERING

We live in a world where in only structures offering sophistication to people qualify to be an infrastructure. Civil engineers take a keen interest in developing new infrastructures like highways, airports, bridges, skyscrapers etc but they turn a blind eye to infrastructures which carry and remove the waste generated by people. Won't dumping waste generated from residential areas pose serious health issues to people?

We are under the misconception that a civil engineer's job revolves around developing new infrastructures which would increase a nation's economy and enhance tourism but none of us have really thought about developing an infrastructure for waste management. Isn't it the responsibility of a civil engineer to develop such infrastructures?

A study has reflected that the number of fatalities due to unmanaged waste disposal is more than that of natural calamities like floods, earthquakes etc. New York's Love Canal tragedy and Valley of drums, Kentucky, prove that landfill collapse has not only led to adverse effects on people living during a particular period but has also been affecting people generations after generations. Only after these hazards, the US government realised the importance of waste management and enforced stringent laws and regulations.

Once upon a time, India was known for its prosperity, historical monuments and cultural behaviour but today, it is the house to mount-like landfills which causes fire, explosion, and communicable diseases. Our capital Delhi, dumps waste in an unmanaged way and has the distinction of being the leading city in waste production. Delhi is a home to four huge landfills which would reach the height of Qutb Minar if the trend of dumping waste continues.

Mumbai is notorious for its Deonar landfill which caught fire in the year 2016 covering the city in smog for over a week.

The reason behind all these tragedies is the unplanned and non-engineered way of landfill management. Designing, constructing and maintaining landfills properly will help us to face the impending threat posed by landfills.

SHOBANA P

III YEAR, B.E. CIVIL ENGINEERING

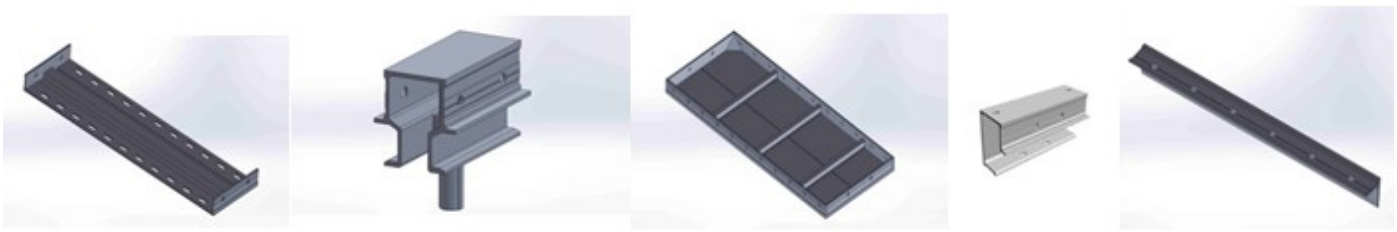
The construction industry is rapidly changing and with changing times, new processes and the materials are being used. A lot of research and development is carried out in the construction industry throughout the globe.

When concrete is placed, it is in plastic state. It requires to be supported by temporary supports and casings of the desired shape till it becomes sufficiently strong to support its own weight. This temporary casing is known as formwork or shuttering.

Aluminium formwork system is unique as all the components in a building, including slabs, floors, walls, columns, beams, staircases, balconies and window hood are concrete and there is no need for block works or brick works. As all the periphery of resulting component is concrete and the quality of concrete can be controlled, the durability of the structure increases. It gives form finish, eliminates the need for external and internal plaster and the walls can be directly painted with a minimal skim coat thereby saving cost.

Aluminium formwork system is highly suited for load bearing wall construction whereas traditional formwork consisting of plywood and timber is not suitable to the high pressures of fresh concrete on the wall. Use of this formwork in load bearing design gives an average of 15% cost saving in the structure of the building and increased usable floor space of 8% over RCC design.

This is one of the systems identified to be very much suitable for Indian conditions for mass construction, where quality and speed can be achieved at high level. It is more effective for repetition of building layouts and in addition, it enables unskilled labour to work with formwork thereby reducing the burden on skilled labour. All panels are clearly labelled to ensure that they are easily identifiable on site and can be smoothly fitted together using the formwork modulation drawings.



The panels are held in position by a simple pin and wedge system that passes through holes in the outside rib of each panel. The panels fit precisely, simply and securely and require no bracing. As the erection process is manual, tower cranes are freed up and can concentrate on other handling operations. The result is a typical 4 to 5 day cycle for floor to floor construction.

The concrete surface finish produced with the aluminium forms allows achievement of a high quality wall finish without the need for extensive plastering.

Versatility

- Architect is not required to change the building layout to suit the technology.
- It is capable of forming any type of structural design.
- The system is unique in that it forms all of the concrete in a building including; walls, columns, beams, floor slabs, staircases, balconies, window hoods, storage lofts.
- No need for bricks, blocks or plastering.
- All the equipments are comprised of standard size pieces of formwork, as a result, as high as 70% of the standard size formwork components are reused for one building layout.

Speed

- Multi-Storey Housing - structures are completed at the rate of four days per floor regardless of floor size.
- Thousands of tenements can be completed annually.

Quality

- Precision in fabricating the formwork results in accurate and consistent forming of the concrete.
- The quality of the concrete finish is the same regardless of whether the system is used for low cost housing or luxury housing.

Durability

Two issues related to durability are

- Durability of the housing units,
- Durability of the aluminium formwork.

Durability of the housing units

All concrete (walls, slabs, staircases etc.) are poured monolithically, therefore, there are no construction joints and no problems of leaking joints.Smooth concrete finish means that no plastering is required. The tendency of plastering to break away is well known.All four walls in a room, as well as the floor and ceiling, are cast-in-place reinforced concrete.The result is a rigid reinforced “box” structure, which has no joints and is very durable.

Durability of the aluminium formwork

Formwork is made up of aluminium alloy which is of light weight but has high tensile strength. Further, it does not rust like steel and can therefore be re-used hundreds of times.

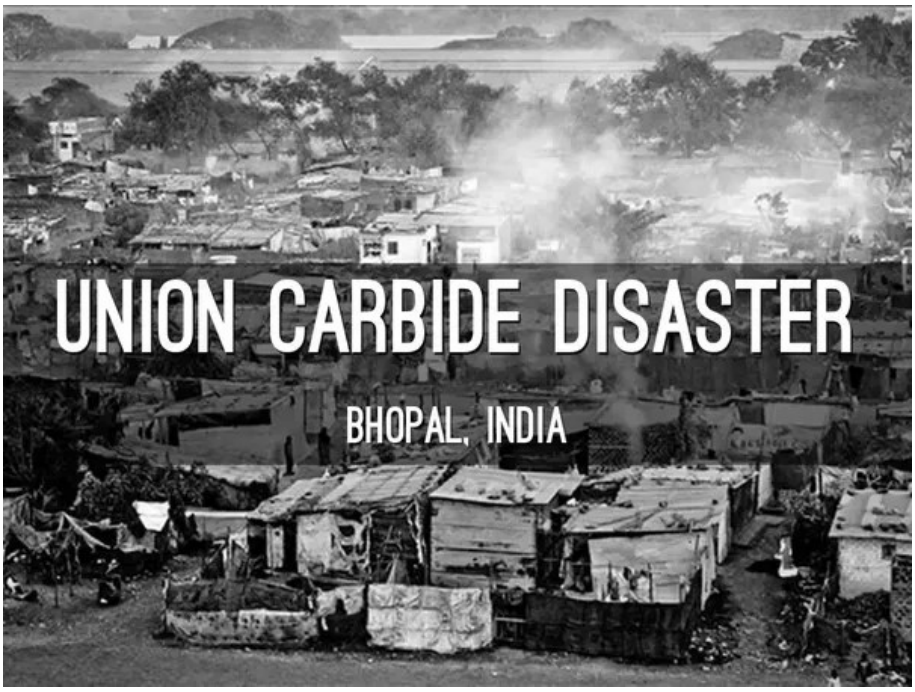
KAVYA L

II YEAR, B.E. CIVIL ENGINEERING

The Bhopal gas tragedy shook the entire world and it continues to claim lives even now. The Union Carbide in Bhopal produced sevin, a pesticide and during the process of production, methyl Isocyanate is the intermediate formed. The chemical properties of MIC gas, lower boiling point, exothermic reaction with water and safety failure induced a series of chemical reactions that led to the disaster. Now let us get into the bigger picture!!!

Dec 3rd 1984 12:05 am

It crept in slowly amidst the undoubting inhabitants of shanty houses. They were all sleeping peacefully not knowing that their dooms day has started.



Four years before…

Many people in Bhopal were happy as the new carbide plant provided them jobs; one among them was Kum Kum Saxena who was proud to work as a medical officer at the American based company. To the locals it was a “Medicine to plants” producing factory- an easy form of ‘pesticide’. But some of them called it “liquid dynamite” who knew what was stored inside the protective concrete walls.

First sign of what awaited them in the future was death of Asraf Khan, a maintenance worker, who inhaled the gas and died. Saxena was stunned when she saw his scan report, his lungs collapsed and he drowned in his own body fluid. She warned her senior manager of the disaster if the gas leaked but her voice was subjugated.

The year 1984 saw drought thereby decreasing the pesticide demand and impacting the company. To cut down cost, workers were fired and safety checks were done less frequently.

On Dec 2nd 1984

At night, a maintenance officer cleans the pipes to MIC storage using water and he forgets to use a slip blind (a device that stops water entering into MIC tanks) (**1st safety failure**). As water enters MIC tank, an exothermic reaction starts and MIC reaches its boiling point 39^0C as a result of refrigeration failure (**2nd safety failure)**and the gas escapes the vent gas scrubbers (which would reduce it to caustic soda and was not in use) (**3rd safety failure)** and it passes the gas flare tower at high pressure into the atmosphere (**4th safety failure).**

The MIC gas being heavier than air remained close to ground and thousands suffocated and vomited lung fluid, thousands ran realizing the gas was toxic. Saxena received a call from carbide notifying of the mass leakage. She covered the windows of her house with wet blankets that prevented air from entering inside.

Aftermath of the disaster

After a day, nearly 3000 people lost their life but the worst was yet to come. The gas was a first class carcinogen and genotoxic and it claimed 25000 lives and has affected 500000 till now. People suffered from blindness, respiratory illness, pulmonary oedema, nervous disorders and women had miscarriages and menstrual problems. But all that the government did was let Anderson (chairman of Union Carbide Corporation) get away without any punishment. Though the government gave compensation it was not enough to sustain them through the impairments that followed their offspring. In simple words, the disaster took their 50 years of development back.

How it could have been averted?

Employing a better safety system: The disaster could have been averted in the beginning itself if the refrigeration system had worked properly. The proper working of scrubbers and flare towers would have at least prevented the gas from escaping into the atmosphere.

A gas as toxic as MIC shouldn't be stored in large quantities.

Use of such toxic reagents should be avoided as much as possible while designing a chemical process itself. They could have adopted different reaction pathways without the generation and storage of MIC.

It is human nature to learn from mistakes… So, we should learn to not repeat it and foresee the failures of the safety systems.

CHITRA LEKHA R

III YEAR, B.E. CIVIL ENGINEERING

A NUMBING SOUL

Oh my dream, where are you?
And why you left without a clue.
Life is cursing me with its hex,
Finding you is not simplex.
Wandering across deserted lanes,
Looking out for you in every broken pane,
All things I desire,
Are set on fire.
Drowned in the flood of tears,
Awaiting for blooming years.
Stranded in a never ending queue,
With fading hopes of getting to you.
I hate succumbing to despair in this way,
But all I have is a soul waiting to decay.
Give me something to hope,
Because I am at the end of my rope.
Oh my dream, save this lifeless soul,
On which life has taken an ugly toll.

SARANYA S

III YEAR, B.E. CIVIL ENGINEERING

WHY IT IS NECESSARY FOR THE HUMAN KIND TO BECOME A MULTIPLANETARY SPECIES

Are you suicidal? Maybe you are and you just haven't realised. All of us are on a suicidal mission that we did not sign up for. I am not here to trick you into becoming suicidal like the creator of the Blue Whale Challenge. I wish to share with you my insights on the human kind becoming a multi-planetary species.

Can you imagine a day when your successors would refer to you as extra-terrestrials? This day is not a distant dream. Elon Musk's vision of colonising Mars is planned to occur within the next few decades. Mars is just the beginning.

Why do we need to colonise a new planet? Isn't our planet, our earth fit enough to sustain humanity? Have we out grown the planet that our predecessors, the homohabilis, and the Neanderthals passed on to us? We have over exploited our planet's resources. Our life is too short to experience all of nature's wonders but long enough for us to over use the resources our planet has, to offer. In the pretext of tapping into earth's inert potential we have sapped it of all the non-renewable resources.

LIT FIELD

Very soon our planet would have lost all the vital resources that our species requires to thrive. How sure are you that we belong to this blue planet? The biological clocks of astronauts get set to 24.3 hours which is the same time as one Martian day. The theory of panspermia might have just been true. Intriguing isn't it!

How do we become a multi planetary species? What does it take for us to find a new home planet? Where is this new prospective home planet? And how long is it going to take before we shift to our new planet? So many questions waiting for answers...

Finding a suitable home planet is not going to be easy. Reaching there is going to take a lot more effort than finding it. There are at least two trillion galaxies in the universe; our galaxy is just one of them. Our Milkyway galaxy has about hundred billion stars of which forty billion stars have planetary systems. The sun is in the goldilocks' zone of our Milky Way galaxy, and it is not the only star in this zone, the number of stars in the goldilocks' zone of Milky way run to a few billion. Putting all these numbers and figures in context, the probability of finding a planet that can sustain human life, our new home within our galaxy is high. If not, there are still two trillion galaxies and a gazillion star systems that we have not explored yet.

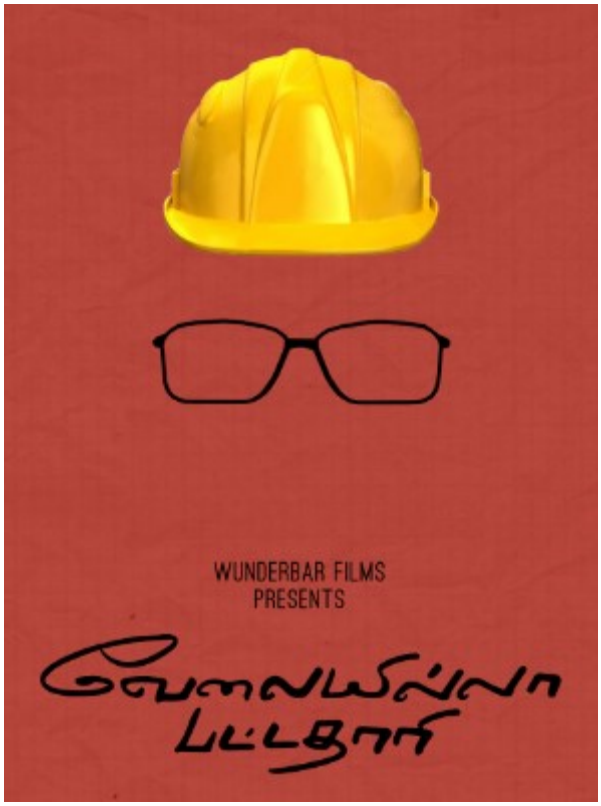
Scientists have discovered an earth like planet called Giza that seems to be suitable for sustaining life. Further research will help us figure out if this planet could be our new home. Giza is seventy-five lightyears away from our solar system. It would take us seventy-two years to reach this planet if we travel at the speed of light. Our fastest space shuttles are a thousand times slower. Science is evolving every day. Very soon we will be able to build faster spacecrafts.

Our quest to find a new home planet will ensure that our species thrives for millenniums to come. Until evolution changes us into better species of course.

SADHANA S

III YEAR, B.E. CIVIL ENGINEERING

SWAG BEHIND MOTIVATION



The funniest thing about a regional *civil-engineering* dedicated flick *Velaii-illa Patadhari* (Unemployed graduate, but VIP is the swag- so I'll call it that way) is the way logic contradicts itself almost throughout the second half. The whole treatment goes innately realistic and justified at first, when things actually go pathetically wrong for the protagonist, and ultimately when things actually go right for him in the film, logic goes awry and laughable. He (Raghuvaran) then disturbs the wrongdoers, plays the corporate bait, threatens goons and what not, but still finds himself successful, leave alone stable in the field (he gets another project in its sequel, lol). Doesn't it sound cool to play your profession with punch-dialogues and appease the whole system like a *swag* VIP Raghuvaran, engineers?

But it's the reality check that reminds us that it's not the VIP's Raghuvaran, but the Raghuvaran in Mani Ratnam's free-spirited *Anjali*, the life even really eminent civil engineers are probably leading - unsung, quiet yet disciplined and reputed. In fact, all the director in *Anjali* minded about was his personal conflicts and his professional life was seldom interfered (the dramatic sequence in the site later on seemed totally irrelevant). So people, ***where's this swag in realism?***

Perhaps, a more in-depth take into their professional lives might change your mind. Because it's not the villains they are bashing that turn them into *swag*, but several of the battles, often fought inside them, with ethics laying the cornerstone, that destine their professionalism. Without doubts, these conflicts are less dramatic, yet far more layered, and deeply disturbing.

Insight into disturbances:

The trick behind these ethical conflicts is in the way Engineer struggles to treat it as a proper black or white scenario. With survival in the field treated as predominance, the approach and the extent to which he/she adheres to limits is intriguing. Be it the client or employee, the PWD or labour unions, and don't forget the Ethical code of conducts and the Environmental limitations - Life isn't that easy, when a person has to sound louder than all these voices circling him in consequent demands. Here are some interesting ethical paradoxes, in lieu to arbitrary and obligatory clauses, which could trick even a far-sighted, working Civil Engineer.

Inflating time-sheet hours:

More than once throughout that career spanning schedules and months of pre-planning, this dilemma will arise- Should I give myself the extra hour on the worksheet or use my paid-time-off hours?

Intersecting the working hours of several departments, the project pursued stipulates the definite unison for the conceived stretch. Often, when the unpredictable parameters wreck spoilsport, the civil engineer finds it difficult to know whom to turn to. While it might seem like a harmless decision, what if you were instructed to inflate hours to overcharge a client?

Monetary is definitely the deciding factor for the employee, quality being for the client- and with overtime down-sliding efficiencies in the site, workers pressing demands, coupled with the constant urge to comply to unique design and a hopeful product, ethics and concern probably might be the last thing running in the head. But they can't be eliminated still, can they?

Coping with the corrupt:

Ethics isn't about just avoiding bad decisions, it's also about choosing good ones. Let's face it, the green patches of duty-mindedness appear to be stubbles, in the industry that are sought after to bill billions, often without traces. The civil servant there is expecting a little brown envelope in his hands. The contractor has had a protracted bidding process to win tenders. With clients ready to cross the line, third parties are now threatening your position.

What are your possible stands?

It isn't merely about retaining your loyalty now. It's about safeguarding respect which comes with power, and perishes the next day your name is in papers for the wrong reasons. At this juncture, when you try hard to read between lines like advocates do, the rule clearly states 'to uphold the dignity of your position' and 'to act with zero tolerances to bribery, fraud and corruption'. A few clauses above, the cannon describes that 'acting professionally and avoiding conflict of interests are something that all engineers should pursue'. You scratch your head, and everyone except you appreciates the underlying dark humor.

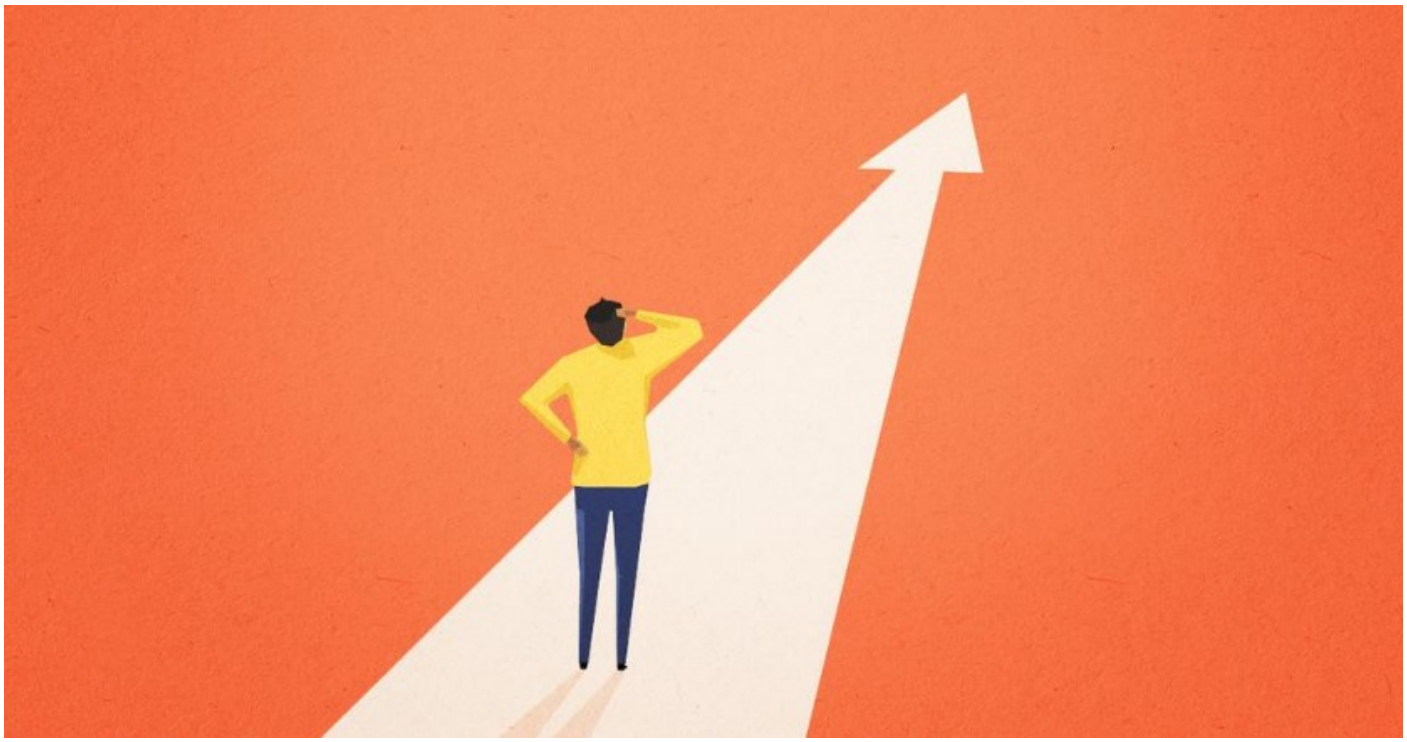
A note to remember:

Ensuing questionable business strategies and cutting corners to look at things uncomplicated, might make you think you are peace, but you are never. The USPs (*call it swag, please*) of any civil engineer is not in obeying orders, but executing them at will. You can always seem like going far with your money. Possibly till you're caught red-handed, and when ethics appear to be not arbitrary disciplines, but clearly listed rules in placards, hammered with nails and hanged in the entrance of your firm.

GOKUL KRISHNA J

II YEAR, B.E. CIVIL ENGINEERING

It was a dusty evening and I was lying down on my sofa sifting uncomfortably through different postures to find my *Goldilocks'* position as I scrolled endlessly through social media. If I had to describe my personality with one of the seven deadly sins I would be a glutton, so most of the accounts I follow on various social media would be something related to food, I simply love food. After I spent a solid hour gawking at delicious recipes and cringing at flagrant fusion dishes I realized that I'm wasting precious time even when I had tons of work to do, but I was still too lazy to even lift a finger. As I gazed upon the ceiling and pondered my existence, the true meaning of life, and all other abstract concepts that a bored mind can conjure up; a feeling of guilt and shame crept up my psyche. I was ashamed of myself for being so unproductive. I neither had the drive nor desire to do anything; what I lacked was **motivation**.



I decided to lift my spirits by doing the one thing which could incite some spark in me; I decided to watch a motivational movie, in this case: "**The Pursuit of Happyness**". I wasted another two and half hours watching the movie for the millionth time (no offence though, I love that movie). I cried during the climax and wished I had Chris Gardener's indomitable spirit. My motivation was all pumped up and I ended up tidying my room, I completed my Coursera assignments, I watched a TED talk and I even wrote an answer on Quora and I felt pretty much satisfied for the day. I rewarded myself by staying up late and spent my night watching a Netflix Original, ecstatic that I've overcome my laziness. The next morning I woke up around noon and I was back to '*ground zero*' it was as if yesterday hadn't happened at all.

If you've been through a similar situation or if you're perpetually caught between feeling guilty due to inactivity and feeling lethargic or undetermined, you're stuck in the vicious cycle of procrastination. I am not an expert at breaking that cycle, but I'd like to share some knowledge that I've encountered on the internet which I have observed to be effective.

"Amateurs wait until they feel inspired to do creative work. Professionals do it on a strict schedule." ***- James Clear***

"Yes, I wait until I'm inspired to do my work. It just so happens that my inspiration comes at 8.00 a.m. every single day." ***- A friend of James Clear***

1. Early to Bed and Early to Rise…

The importance of waking up early cannot be stressed enough. Everyone has 24 hours a day so you cannot create more time but you can make more time by managing your sleep cycle. When you wake up early you get a head start and you feel less stressed because you don't have to rush through. To wake up early you need to go to bed early, this will also improve your quality of sleep. Although how early you want to wake up is entirely up to you. For me, it's usually around 6:00 a.m.

2. **Diet – Workout – Meditation**

   If you take care of your body it'll take care of your mind. Following a certain diet and workout regimen will make you more body positive, more confident and you'll feel more energized. Also, it can help you in keeping depression and other negative emotions at bay. Meditation helps you to focus and control your thoughts which mean better attention span and more concentration.

3. **Keep a To-Do List**

   Writing and maintaining a To-Do list will help you stay organized and remind you of the impending tasks to be completed. Putting it on paper will hold you more accountable than making a mental note although using your phone brings about the same effect. Remember the 80-20 rule 80% of results come from only 20% of the efforts. So your goal must be to finish those few tasks which produce the most significant results.

4. **Eat the frog**

   No, I am not asking you to include frog in your diet. It means 'Do the most difficult task first'. When you have a flurry of tasks to carry out always start with the most difficult one because after you finish that everything else would be easier. If you feel you'd get stuck doing it all day, then start with a moderate task which you know you'll be able to finish and then go on to the more difficult ones. Never ever start with the easy ones because you'll end up feeling satisfied too quickly and reward yourself for essentially doing nothing.

5. **Regulate Distractions**

   Avoid the urge to constantly reply to messages or check your newsfeed. It may provide you with instant gratification but it also eats up a lot of your time. It doesn't reduce stress but aides you in avoiding your work and you end up feeling like you've spent a lot of time working while you've wasted most of your time. Next time you feel like checking WhatsApp or when you phase out, write down what's distracting you. When you write it down you take away its power to distract you and you can also keep track of your distractions so that you can be well prepared in the future.

6. **Avoid Multitasking**

   No matter what anyone tells you, humans can't multitask effectively. When you multitask it tremendously increases your cognitive load. Cognitive load is the total amount of mental effort being used in the working memory. Switching between tasks also increases your cognitive load. So at the end of the day you'll feel exhausted even though you didn't complete any task.

7. **Hack your Reward System**

   Use positive reinforcement to make yourself adapt any desired behaviour. Like how a dog trainer gives the dog a treat every time the dog sits, you can also train your brain to perform any task through positive reinforcement. You can also pinch yourself every time you're distracted till your brain is conditioned to associate that physical pain with the distraction and this will discourage it from getting distracted frequently. This is a form of punishment. Use of punishment together with positive or negative reinforcements to enforce or modify behaviour is called Operant Conditioning in psychology.

8. **Find your Anchor**

   When you work on something you love you don't need much motivation to start off with. In fact, studies have shown that working on tasks you're genuinely interested in can motivate you and increase your confidence. I love writing and reading even though I don't practice them regularly. I genuinely want to improve my writing skills so writing about motivation is merely an attempt to motivate myself to write more.

9. **Have Some Fun**

   As much as it's important to be more productive it's equally important to have fun. By scheduling high-density fun (like going out with your friends or reading a book) after you finish your work or during the weekends instead of indulging in low-density fun (like watching videos of puppies on YouTube or laughing at memes on 9gag) you're actually activating your reward system in the brain while also relieving stress.

10. Never Lie to Yourself

When you say “I’ll start working on it tomorrow, there’s lots of time” or “I don’t feel like doing it now” even though you’re not exhausted, that’s lying to yourself. You’re allowing yourself to become lazy. When your behaviour isn’t consistent with whom you want to be or claim to be, you’re indulging in self-deception. Self-deception has the most insidious effect on your productivity so try to be completely honest with yourself.

“The only thing standing between you and your goal is the nonsense* story you keep telling yourself as to why you can't achieve it.” - Jordan Belfort

In the end mix and match to find what suits you best. Also, remember that it’s ok to be imperfect. We can’t stay motivated all the time, so it’s best to stay in tune with our emotions and go with the flow sometimes. Choose your battles wisely. Hope this helps. ☺

AJAY SURESH

IV YEAR, B.E. CIVIL ENGINEERING