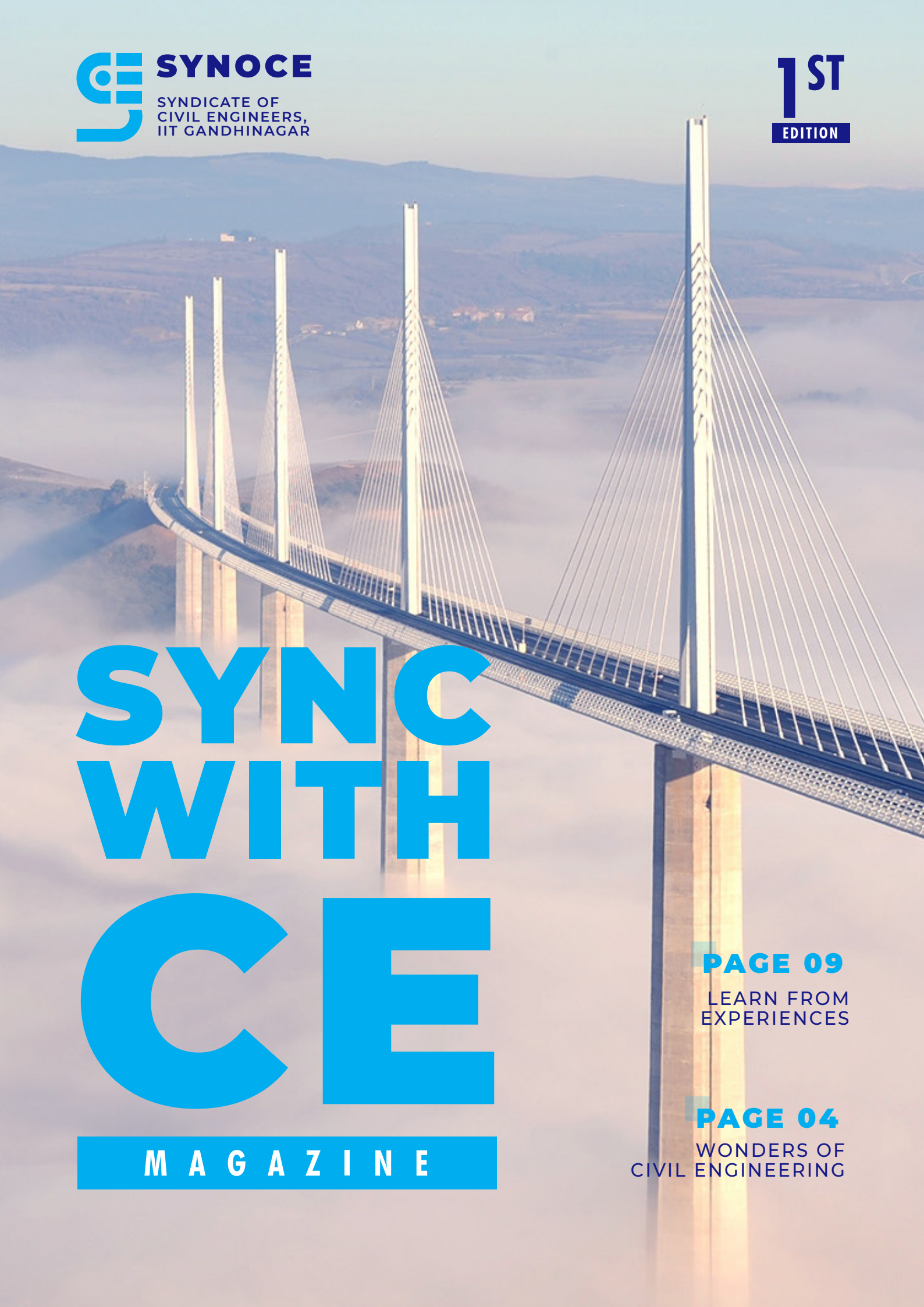


SYNOCE

SYNDICATE OF CIVIL ENGINEERS, IIT GANDHINAGAR

1ST EDITION

SYNC WITH CE

MAGAZINE

SYN OCE

Syndicate of Civil Engineers is a first of its kind, student-run society to encourage various academic and extracurricular activities that will help students develop Leadership qualities, Management skills and interpersonal skills. The foundation of this society was laid by a group of highly motivated civil engineers and faculty members of the discipline in January, 2020. At its core, SynOCE aims to provide guidance and support to all civil engineering students via workshops, Industrial visits, Career guidance and motivational talks, and peer-to-peer interaction outside the classroom.

For the first time, the syndicate has also come up with a magazine 'Sync with CE'. The aim of this magazine is to provide readers an idea of different civil engineering projects, various marvels, fun facts, and civil engineering start-ups at IIT Gandhinagar.

We hope that you all enjoy reading the first edition of Sync with CE.

Thanks and Regards
Team SynOCE

FROM THE PEN OF

FACULTY ADVISOR

"The journey of a Thousand Miles begins with one step"

– Lao Tzu

I feel exhilarated and proud to see that SynOCE, the Syndicate of Civil Engineers, brings out the first edition of our magazine, 'Sync with CE.' This magazine would be a perfect platform for the readers to learn about students' projects, Civil Engineering marvels, and interesting facts. I believe that the magazine can also become a source of inspiration for the readers to learn more about Civil Engineering.

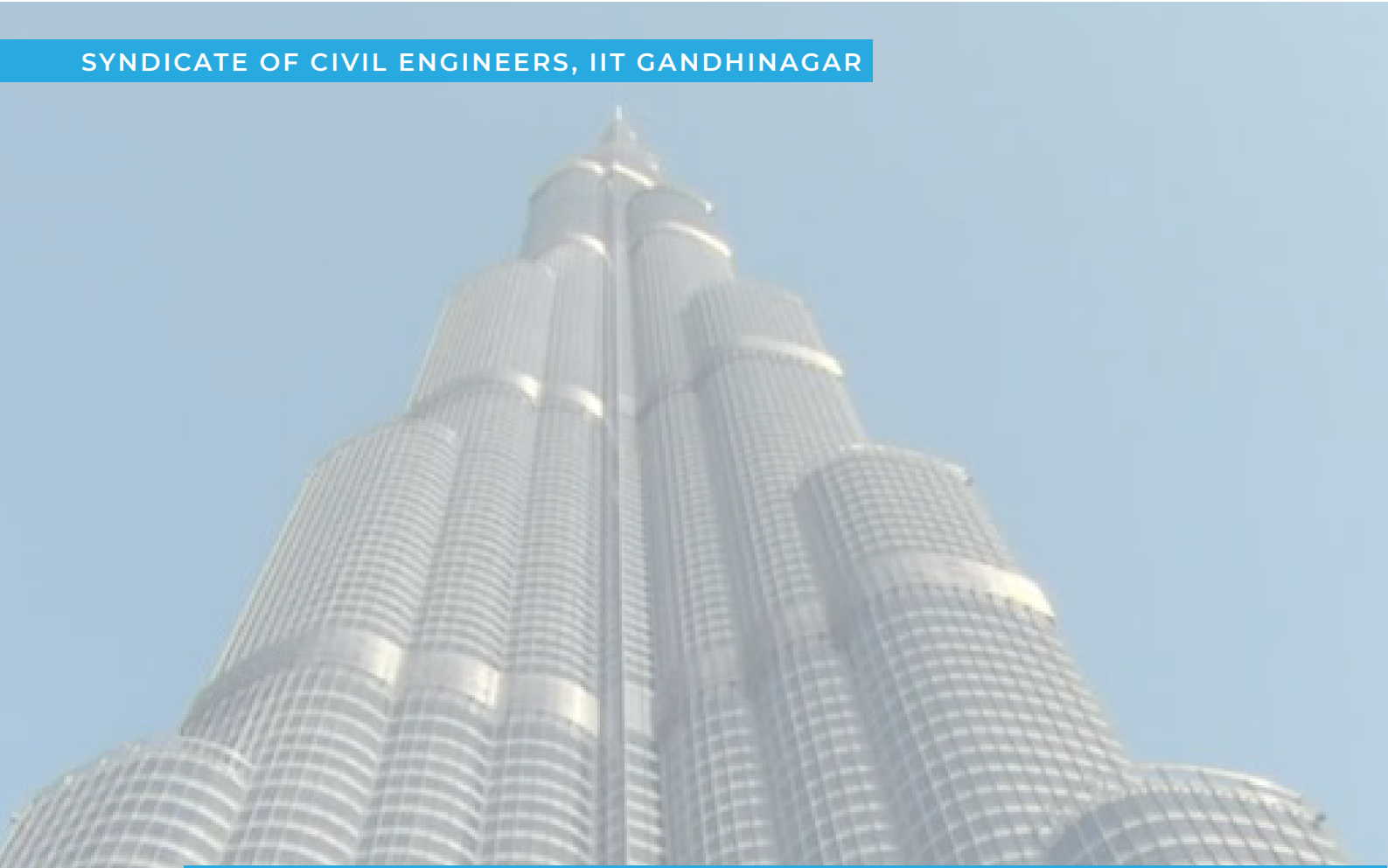
It is very inspiring to see students putting their efforts into achieving something. I would like to congratulate the entire team for their determined efforts to bring out the first magazine and set a standard for future teams.

I hope you all enjoy reading Sync with CE.

UDIT BHATIA

ASSISTANT PROFESSOR | CIVIL ENGINEERING
FACULTY ADVISOR | SYNOCE

CONTENT



WONDERS OF CIVIL ENGINEERING

01 MOSE

02 CHANNEL TUNNEL

MOSE

PROTECTING THE CITY OF VENICE

credits: https://e.rpp-noticias.io/normal/2019/11/13/420442_863342.jpg

Venice, an island city, is located at the northwestern end of the Adriatic sea in northeastern Italy. It is a part of the large group of small islands in the Venice Lagoon. This island city is famous for its characteristic waterways, its palaces, its mask carnivals, and gondola rides. The rising sea level around the city due to climate change and increasing industrial activities pose a grave danger to the city and its tourist attractions. As a result, frequent floods and high tides often impacted the city.

The government had planned to temporarily close the inlets which are mainly responsible for tide spread from the Adriatic sea into the lagoon. Thus, a line of sandbanks was used at the three main water inlets: Lido, Malamocco, and Chioggia. In 2003, with the aim of costal reinforcement, improvement of the lagoon, and raising of the quay-sides, the **MOSE** project was started.

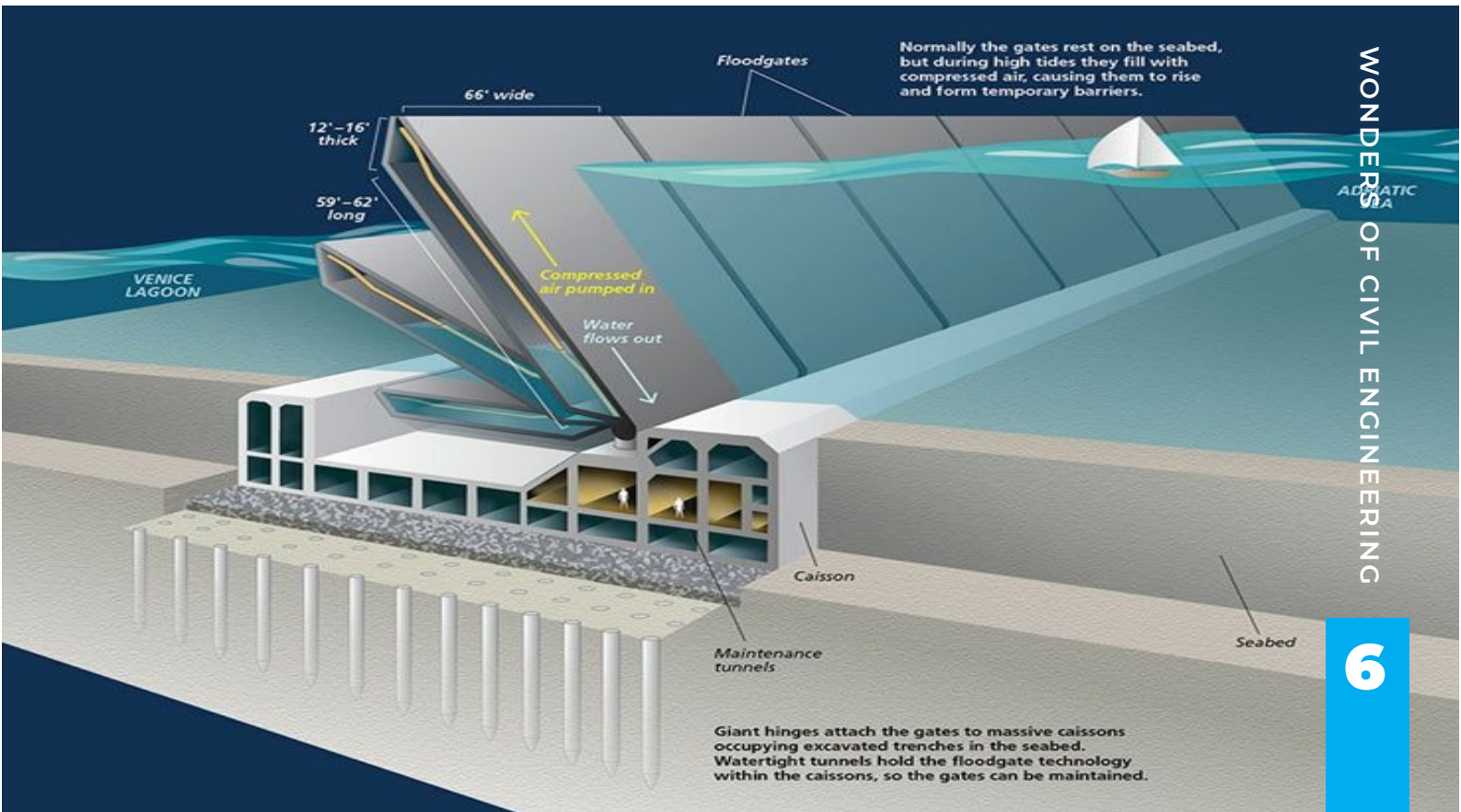
WHAT IS MOSE SYSTEM?

Modulo Sperimentale Elettromeccanico or Electromechanical Experimental Module is a series of artificial barriers consisting of mobile sluice flood gates located at the three main lagoon inlets. There are 4 defense barriers: 2 barriers comprising 21 and 20 sluice gates for the north and south channels respectively at the bay of Lido; 1 barrier composed of 19 sluice gates at the inlet of Malamocco and 1 barrier of 18 sluice gates at the inlet of Chioggia.

Each gate is bound by two hinges, 20 m wide. The gate rests on a tower, where the control system of the gate is present. It is laid on a foundation 20 m in length which has long steel and concrete piles of depth 38 m and a diameter of 0.5 meters.

The sluice gates are filled with water. To open these gates, compressed air is filled in the sluice gate, which replaces the water present inside it. As the water comes out, the gate rotates around the hinges and rises to block the flow of the incoming tide. Once the sea level decreases and reaches the same level as that of the lagoon water, the compressed air is from these gates. The average closing time of inlets, including maneuver time for opening and closing of gates, is approximately 80 minutes. When the weather forecast predicts a high tide, the invisible inactive gates rise to temporarily isolate the lagoon from the sea, shielding the city from high tides and floods. These defense barriers can protect Venice and the lagoon for the tide rise from an established level of 110 cm to a maximum of 3 m.

The MOSE system was initially proposed in 1966 but was turned down due to lack of funds and environmental issues. The construction work of the MOSE project was expected to complete in 2016. However, the project was always afflicted by corruption, cost overrun, and other unavoidable delays. As per the Italian newspaper “La Stampa”, the project is now expected to complete in 2022. All the 78 sluice gates have been constructed, and currently, engineers are working on the mechanism of rising them synchronously. Due to cost overruns, various scams, and continuous delays, the estimated cost of the project is now 6 billion euros which were initially 1.3 billion euros. Once ready, it will be the largest dam structure in the world with each barrier having an approximate area of 603 m^2.



CHANNEL TUNNEL

GOING BENEATH THE WATERS

credits: https://acivengstudent.com/wp-content/uploads/2019/09/The-Channel-Tunnel-Picture-1170x585.jpg

Beneath the waters of the English Channel, lies the world's largest underwater tunnel. The 50 km long Channel tunnel also called as the Euro Tunnel is a railway tunnel that connects the island of Great Britain with mainland France. The channel tunnel has made an enormous difference for the people of France and England as it has helped reduce the travel time between the UK and mainland Europe from 6-7 hrs to 2.5 hrs.

The Channel Tunnel consists of three tunnels running parallel to each other - two for the trains and a smaller tunnel for ventilation, manual access, and emergency. The two train tunnels are 7.6 m in diameter and are separated by 30 m. In between these two tunnels lies the smaller tunnel of diameter 4.8 m. The Channel Tunnel has been built at an average depth of 50 m below the seabed. The most amazing part is that the digging of the tunnel started simultaneously in England and the Fresh coast which met in the middle without any offsets. .

ENGINEERING CHALLENGES

An extensive amount of research work and geological surveys were conducted to get an idea of the rocks beneath the seabed and to select a suitable location for tunneling. Engineers found chalk and chalk marl at approximately 45 m below the seafloor. This geological formation is easy to bore through and is impermeable. The next step was to design a water-resistant tunnel boring machine (TBM) that could withstand the high pressure. A total of 11 TBM's were used for the digging purpose - six engaged from one side and the remaining from the other side.

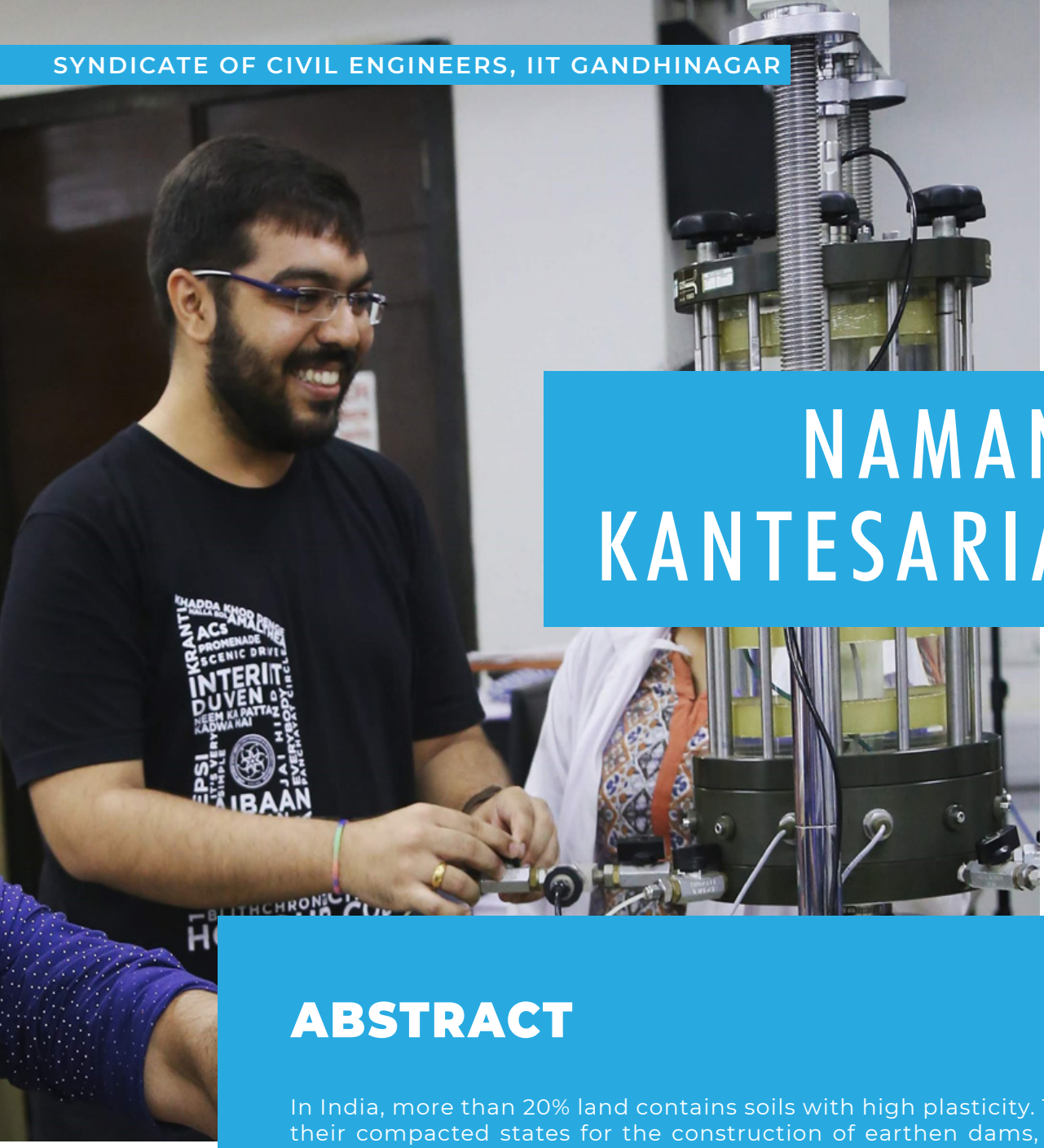
The TBMs excavated a huge amount of chalk. The ground conditions at the two ends were not the same. The ground was wetter on the French end as compared to the British end. Thus, on the French side, engineers decided to crush the chalk by mixing it with water and then pumping it out. All the chalk was put behind a specially built dam 37m high. On the British side, engineers build a landscaped platform at the foot of Shakespeare Cliffs near Dover using the same chalk.

The walls of the tunnel had to be covered with concrete which could withstand the pressure of approximately 45 m seabed as well as 45 m of water above it. Most important, it had to be waterproof. Thus, the tunnel was lined with nearly 1 million concrete sections which had strength more than the concrete used in nuclear reactors and had a minimum lifespan of 120 years. The walls were also supported by cast-iron segments that were bolted together.

After six years of construction, the tunnel was ready for the first test run on 10th Dec 1993. It was opened for the public on 6th May 1994. The total project cost was around $ 21 billion. This tunnel is widely regarded as one of the finest engineering feats of this century.

AMERICAN SOCIETY OF CIVIL ENGINEERS
CALLS IT ONE OF
"SEVEN WONDERS OF THE MODERN WORLD"

WORK OF STUDENTS



NAMAN KANTESARIA 01

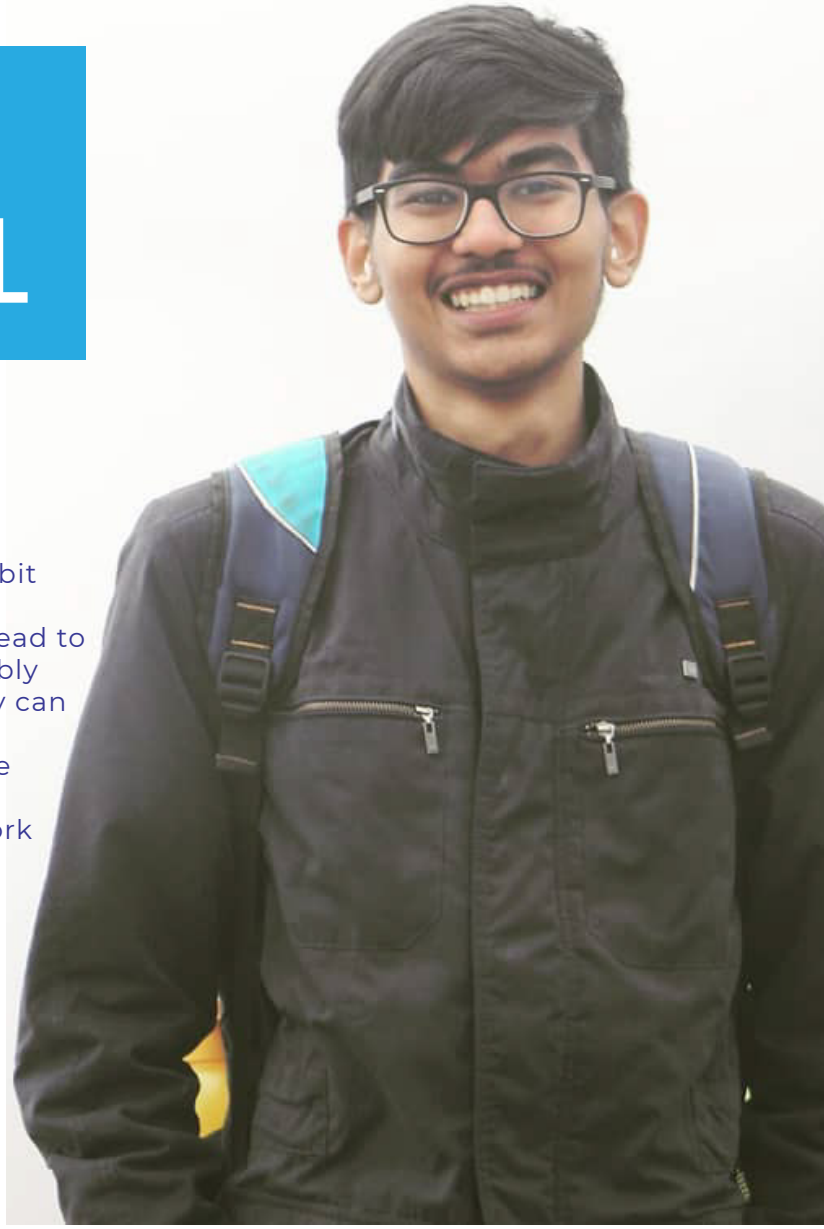
ABSTRACT

In India, more than 20% land contains soils with high plasticity. They are used in their compacted states for the construction of earthen dams, levees, artificial canals, etc. In many instances their use are also seen as the subgrade material in roadways and as a backfill material in retaining walls. The understanding of shear behaviour of this high plasticity soil in its compacted state is utmost importance for the design and analysis of these geotechnical structures. Hence, the aim of this research is to evaluate the shear behaviour of compacted CH soil at small and large strain under cyclic and static loading conditions. The loading in true field condition is not always isotropic in nature and many times it became anisotropic with stress ratio different than one. Hence to encounter this phenomena in static loading, a study was conducted to evaluate the effect of stress paths on undrained shear response of CH soil. Small strain shear modulus variation was also measured in this series of testing and an attempt was made to relate that with large strain deformation behaviour. Usually, clayey soils behaves better than granular soils under cyclic loading conditions. However, the strength loss sometimes became significant to damage the entire structure on it. Therefore, a study was performed in the current research to incorporate the effect of initial static shear under cyclic simple shear loading conditions. The results displayed significant effect of pre-shear condition on cyclic response of CH soil. Many regions of India are arid to semi-arid in nature and due to this, the soils of these regions remained unsaturated most time of a year. To incorporate this moisture variation, a series of experiments were performed on unsaturated CH soil. It was found that the soil-water characteristics curve (SWCC) governs all these responses and they can be explained through a fundamental parameter of matric suction.

I think many of you 'enjoyed' the ride of a roller coaster in theme parks. My experience at IIT Gandhinagar also similar to the ride of a roller-coaster: sometimes ups and sometimes down. However, I also eventually enjoyed and right now also enjoying this ride of IITGN. It all started in July of 2016, when I joined this institute as a Start-early PhD student. First few weeks of IIT Gn gave me a high magnitude of cultural shock. Some of you might be thinking that I am overreacting, but the education system and culture from my B.E. college were entirely different. But within few weeks, I made new friends and slowly I was enjoying the late-night classes, completion of weekly assignments of four to five subjects (that too without plagiarism!!!), hostel life, birthday bashes, late night tea, last-minute completion of course project and many more things. The busiest first year of course work was completed, and now the thesis work began. I joined my research group and met my wonderful and extremely helpful seniors. They made me feel like family and also inspired me to do the same with my juniors. Then another year went with thesis work, course work, the great 'qualifying exam', and proposal defence. Now the worst time came as my fellow batchmates (mostly in MTech program) graduated and left the college. But, this hard time also flew away, and the new junior students joined the lab research group. Within no time, I found new friends in them, and everything was again running smooth. Though sometimes the research work gave trouble but eventually it was getting resolved, and today I am thankfully doing my PhD at IITGN. TA work at IITGN sometimes become hectic, but I learn a lot from the experience of TA work and also get a chance to know the fantastic and curious B.Tech guys. In the end, I would like to thank my supervisor Dr Ajanta Sachan for her great support and understanding in every situation. IITGN changed me a lot and gave me high confidence in myself and also triggered the new way of thinking. Thank you IIT Gandhinagar.

NAMAN KANTESARIA

02 UTKARSH GANGWAL



ABSTRACT

A wide range of static (railways network) and dynamical networks (Ecological networks) exhibit critical thresholds or a tipping point. There is growing concern over tipping points as it can lead to abrupt loss of intended functionality and possibly non-recoverable states.This loss of functionality can be observed as networked systems experience failure and damage spread. In this research, we study the response of the systems to simultaneous disruptions using Indian Railways Network and United States Airspace Airport network (real-world networks, and random networks (synthetic networks), as prototype class of systems. For both classes of network, we observe the presence of critical thresholds, at which further perturbation can lead to instantaneous loss of intended functionality which is preceded by warning points. Further, we observe the statistically significant relationships between network robustness an size of simultaneous distribution which generalizes to the networks with disparate topological attributes. We show that our approach can determine entire robustness characteristics of networks of different architecture in the presence of random disturbances and targeted attacks of varying sizes. Our approach and the principle of tipping points can be extended to all real-world systems, and to other disciplines to address critical issues of risk management and resilience.

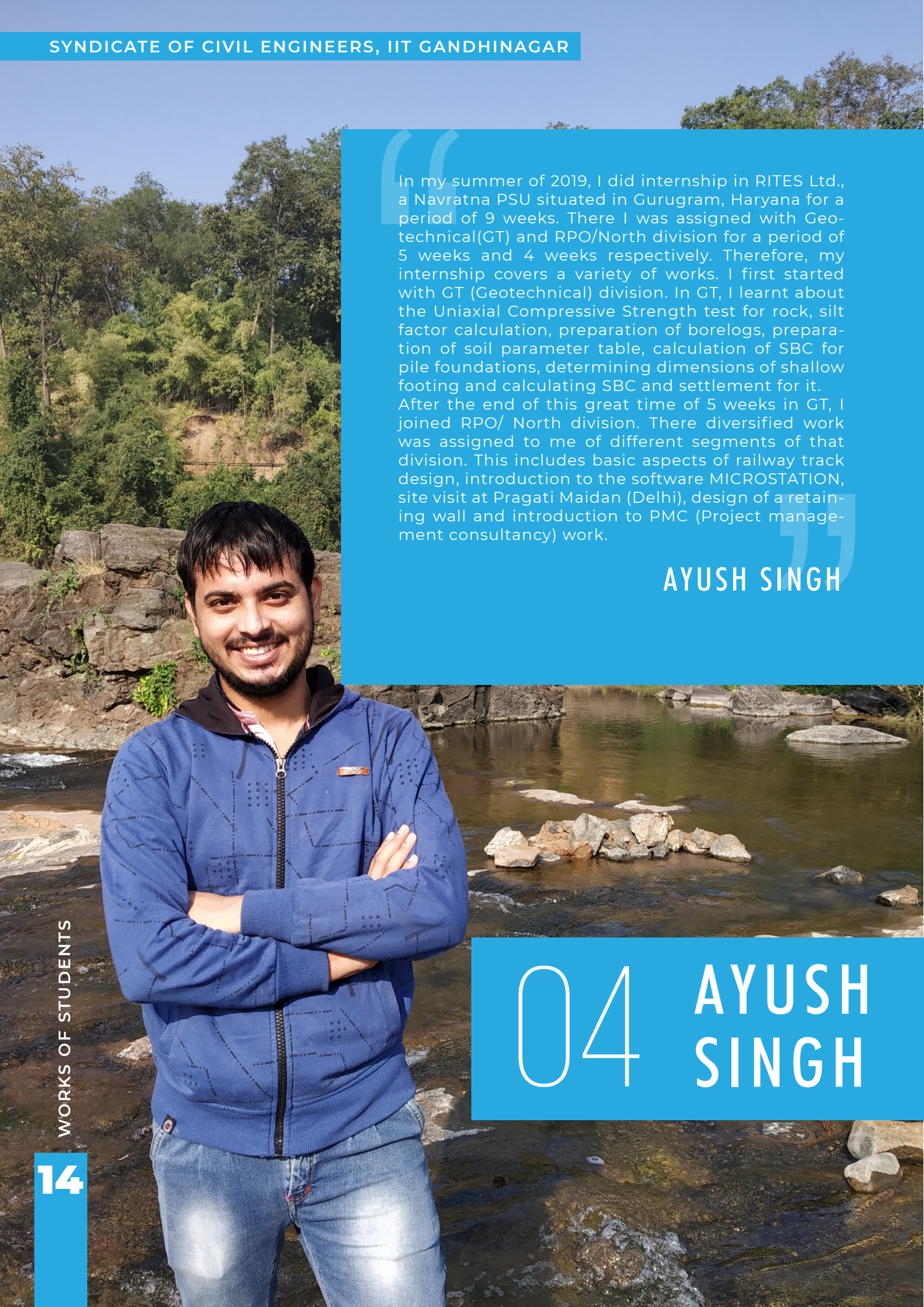
"It was through this research that I learned the efficient use of tools of computer science to solve civil engineering problems. I got to know a lot about network science, its application, and I even learned a programming language from scratch. Speaking of application, we were able to co-relate all our research work with the scenario of the Indian Railways being shut down due to the spread of COVID-19. We were also able to relate and understand the model of the spread of the pandemic, which in itself is a vast dynamical network.
Apart from all this, I got hold on my presentation skills and gained patience, which I believe is essential for self-possession. This project also served as a medium to interact with my advisor, to build trust, and to know more about him.
The best part of projects like these is that every time you sit and discuss something with your mentor, you have a takeaway message which might prove to be a life-lesson also."

UTKARSH GANGWAL

03 ANIMESH RASTOGI

I worked with Prof. Jose Andrade at Caltech. There, my goal was to study the mechanical behaviour of a load-bearing free-standing column made up of S-shaped granular particles. I used the Level Set Discrete Element Method (LSDEM), a variant of Discrete Element Method (DEM) that can simulate systems of arbitrarily shaped granular particles in 3D. I had an amazing and enriching time engaging myself in faculty-led research at Caltech. Along with learning about how to do simulations, I also acquired insights on how to perform research independently. Besides this, all the group meetings made me realize the importance of communicating one's work in the form of presentations. Moreover, this entire experience familiarised me with the process of performing numerical simulations using C++, all the way from mathematical modeling of a physical phenomenon to its visualization. Travelled to various places including San Francisco, San Diego, Santa Barbara- explored the cuisine and the culture in each city.

ANIMESH RASTOGI



"In my summer of 2019, I did internship in RITES Ltd., a Navratna PSU situated in Gurugram, Haryana for a period of 9 weeks. There I was assigned with Geo-technical(GT) and RPO/North division for a period of 5 weeks and 4 weeks respectively. Therefore, my internship covers a variety of works. I first started with GT (Geotechnical) division. In GT, I learnt about the Uniaxial Compressive Strength test for rock, silt factor calculation, preparation of borelogs, preparation of soil parameter table, calculation of SBC for pile foundations, determining dimensions of shallow footing and calculating SBC and settlement for it.
After the end of this great time of 5 weeks in GT, I joined RPO/ North division. There diversified work was assigned to me of different segments of that division. This includes basic aspects of railway track design, introduction to the software MICROSTATION, site visit at Pragati Maidan (Delhi), design of a retaining wall and introduction to PMC (Project management consultancy) work."

AYUSH SINGH

04 AYUSH SINGH

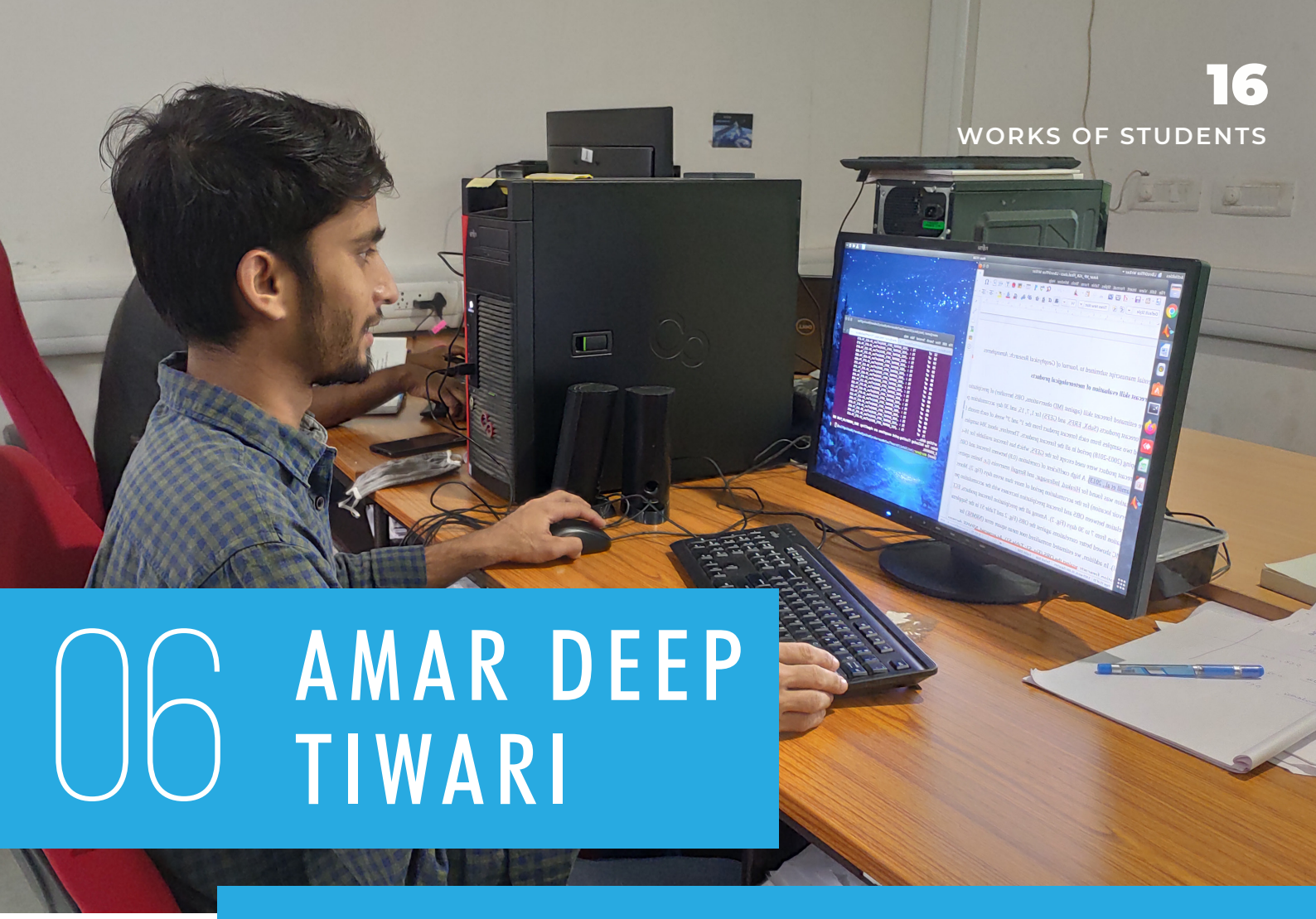
ABSTRACT

AWe have used GFRG Panels (Glass Fiber Reinforced Concrete) for construction of residential buildings, which results in significant increase in the construction speed, reduction in the labour requirement & construction cost and promotion of reuse of waste industrial by-product. Also, the ightweight property of GFRG panels makes it appropriate for using it in higher seismic zones. We designed GFRG panels from calcined gypsum, plaster, reinforced with glass fibres and fixed it's physical dimensions as thickness of 124mm under carefully controlled conditions to a length of 12m and height of 3m, contains cavities of 94 mm x 230 mm that may be unfilled, partially filled or fully filled with reinforced concrete as per structural requirement. The whole building, made out of concrete in filled GFRG panels, avoids the use of bricks (with multiple joints and weak locations) and reduces the use of concrete significantly and gives excellent surface finish which eliminates the need for plastering. Durability is also the same as conventional buildings. Housing using GFRG has great potential and is an ideal solution for mass housing which can be rapidly built which addresses sustainability and delivers quality houses.

05 RISHABH JAIN

"It was a surprise for me to see that even though UCWL is a technical industry, still it's employees and interns here celebrated environment day by making short videos, participating in debate, poetry recitation, doing yoga early in the morning on yoga day and also actively participating in campaigns like blood donation camp. Though I was able to learn and interact well with the civil department present at the UCWL plant I found that compared to civil, there were more learning opportunities for the students in chemical, mechanical, electrical and CSE discipline for technical aspects."

RISHABH JAIN



06 AMAR DEEP TIWARI

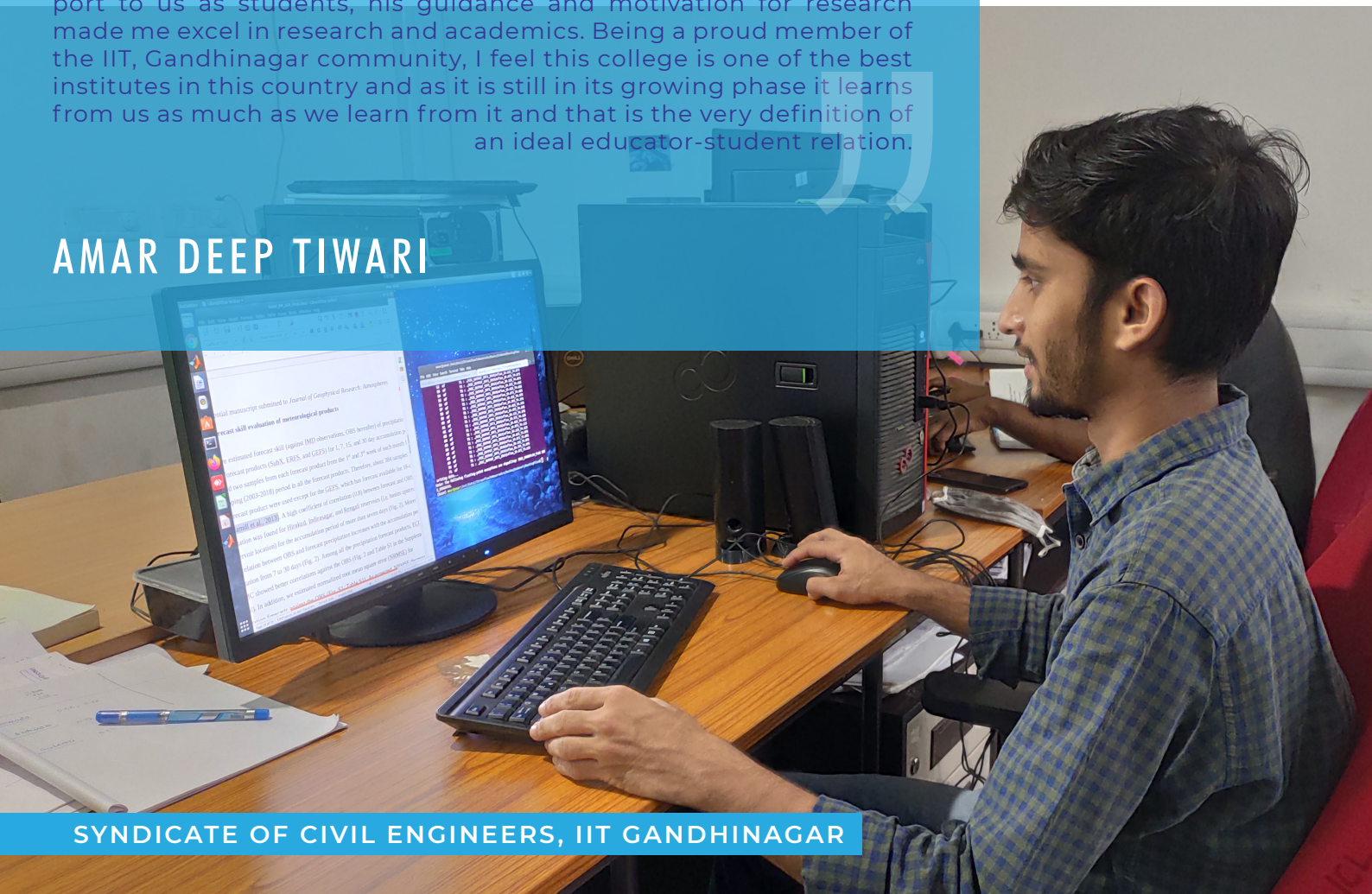
SYNDICATE OF CIVIL ENGINEERS, IIT GANDHINAGAR

ABSTRACT

Water is one of the most precious resources on earth, being essential for sustaining life, the development and research of water resources are of paramount importance. Reservoirs are instrumental in utilising water for activities such as irrigation and hydropower along with protection from extreme events like droughts and floods. Despite the large implications of reservoir storage for flood protection, irrigation and hydropower, India lacks a real-time reservoir monitoring system. Hence, the requirement to develop a system which can monitor reservoir storage and provide forecasts for floods (7-15 days) and droughts (1-3 months) emerged. Having a clear objective, we studied storage variability in major reservoirs and developed a satellite-based near real-time monitoring system for several large reservoirs in India. Monitoring the sluice gates of the reservoirs is extremely important for the smooth functioning of reservoir operations which require the forecasted streamflow to the reservoirs for short and long periods. Using the Variable Infiltration Capacity (VIC) model (excluding the influence of reservoirs in the model), we were able to forecast the inflow to reservoirs for up to 30 days with high efficiency in case of five major river basins in India. This project helped, especially, for flood protection, irrigation, domestic and industrial supplies, and hydropower generation. Further, we developed a model to forecast the hydrologic variables (runoff, soil moisture and streamflow) in the Narmada basin for 1-3 days, focusing majorly for flood events. Here, we incorporated the reservoirs in the VIC model as well. Apart from this, we have developed a model to forecast reservoir storage for 1-3 months in 91 major reservoirs of India in order to overcome the water stress in the dry period. As a collaborative project with the Indian Meteorological Department (IMD), we developed the Experimental Forecast Land Surface Hydrology portal. One of our novel projects is providing a forecast of precipitation, temperature, runoff, and soil moisture forecast data on a daily basis which has been developed for the very first time in India. Our work aims to aid the administration in establishing policies for the stakeholders and farmers.

The idea of a PhD sounds extremely academic and rigorous but a PhD at IIT, Gandhinagar is quite different. During my B.Tech from NIT Raipur, I didn't get much of a chance to explore a life beyond academics but after joining IIT Gandhinagar in July 2015, I developed as much as a human being as I did as a researcher. In this incredibly diverse and hospitable campus, it did not take me long to realise the opportunity I was bestowed upon. Being a PhD student, the first thing I learnt was that I needed to evolve in a holistic manner. The institute with its progressive and yet morally strong environment made me grow as a human being. The class representative elections in the very beginning took away my fear of interacting with people and enhanced my social skills. Badminton, another inseparable part of my life today, was introduced to me at this place and I feel honoured to have represented the institute at various competitions. The beautiful campus, approachable professors, deans and director make IIT Gandhinagar different than other colleges. The option to work flexible hours as the labs are kept open at all hours, the very carefully developed academic structure which focuses on the overall development of student rather than just imparting technical knowledge makes IIT, Gandhinagar an ideal educational institute. The aura of the college is such that it encourages an individual to interact with fellow students and bond with them. I came in contact with plenty of people and that made me motivated for research as well as extracurriculars such as sports, student leadership, cultural and technical activities on campus. The Discipline of Civil Engineering at IIT Gandhinagar is one of a kind group. The whole discipline works and stays together as a family and supports each other in times of need. The professors, fellow students and the administration have been immensely supportive, not just in my academic journey but also at times when I faced difficulties in my personal life. As a student who lives away from their family, I can say that the discipline of Civil Engineering has been nothing less than my family here at college. Prof. Ajanta Sachan has been very supportive since the beginning. Prof. Vimal Mishra has been extraordinary in their support to us as students, his guidance and motivation for research made me excel in research and academics. Being a proud member of the IIT, Gandhinagar community, I feel this college is one of the best institutes in this country and as it is still in its growing phase it learns from us as much as we learn from it and that is the very definition of an ideal educator-student relation.

AMAR DEEP TIWARI



SYNDICATE OF CIVIL ENGINEERS, IIT GANDHINAGAR

07 RENSI PIPALIA

SYNDICATE OF CIVIL ENGINEERS, IIT GANDHINAGAR

In the 2019 summer, I worked on a project with the guidance of Professor Vimal Mishra. I worked on a small part of a big Railway Project titled ' Risk and uncertainty assessment for critical railway infrastructure due to climate change impacts. During this project, I got introduced to the platforms like ArcGIS and MATLAB that I learned from scratch. I learned how to deal with a large dataset and produce results to help an organization form policies. Climate change is a burning issue, and the government needs to get an idea of how and to what extent it would impose a risk to railway infrastructure to save it from future hazards and build it more resilient.

This was the challenge on which Professor Mishra was working. My task included performing trend analysis of temperature and precipitation at railway stations and projecting them in the future under different Representative Concentration Pathway (RCP) conditions. It gave an idea of how much the temperature and precipitation are expected to increase/decrease in the future. Also, the frequency of the extreme events was determined to prepare the infrastructure for sustaining those events and minimize the economical loss. I learned an interesting way of quantifying the future energy demand in terms of cooling degree demand (CDD), the energy required to cool buildings. The plot of historic CDD and projected CDD helps us estimate the amount of energy needed in the future. It was an exciting project that helped me improve my programming skills and learn new concepts. It allowed me to work with the Water and Climate Lab that felt like a family, helping and supporting me whenever I got stuck. It was indeed an enriching experience.

ABSTRACT

Nowadays, India is experiencing abrupt climate change which is evident from various events over a period of time and the current management system is facing problems in coping up with it due to lack of enough resources (adaptability) which gives a huge contribution in increasing the vulnerability of the sensitive regions which are prone to the events happening due to climate change like extreme precipitation events (flooding). The research work on 'Socio-economic vulnerability assessment of climate change in India' basically focuses on providing information about the extent of relative vulnerability of rural regions in states of India which can help policy makers to produce a framework to take necessary adaptive and mitigation measures in the region based on data of vulnerability analysis. Vulnerability is basically a linear combination of three components namely exposure, sensitivity and adaptive capacity. In the research, we have separately analysed the data for all three components and then computed the vulnerability in the form of vulnerability index by combining indices computed for above three components. We analysed the data of precipitation from observed as well as simulated datasets and calculated return levels of precipitation for a region using the extreme value theorem to come up with an exposure index. To evaluate socio-economic index, we acquired the Census data about the education, health and economic status from various India government sites and determined Sensitivity and adaptive capacity index of each district. The basic understanding in this research is that the more the exposure and sensitivity of the region towards climate change, the more vulnerable it is. Unlike this, an increase in adaptive capacity makes the region less vulnerable. In such a way, policymakers could identify the type of actions needed to be taken in a specific region.

08 PRANJALI BORSE

"This research gave me an opportunity to explore a new field and a perspective to view the problem as a Civil engineer. I got introduced to the field of climate and realized how vast it is. It has improved my thinking ability and my perspective. Working on this project improved my programming skills and my efficiency. Having faced so many difficulties in starting the project from scratch, I had never imagined that I would be able to come this long and get satisfactory results. Now, we have contributed this work to Gujarat state Disaster Management authority to help in producing climate change policy. While having discussions on this project, I could get to think about totally different perspectives of my advisor and from him, I learned to handle the difficult problems with simplicity. I believed in myself and my capabilities which is what has made all this possible."

PRANJALI BORSE

DID YOU KNOW?

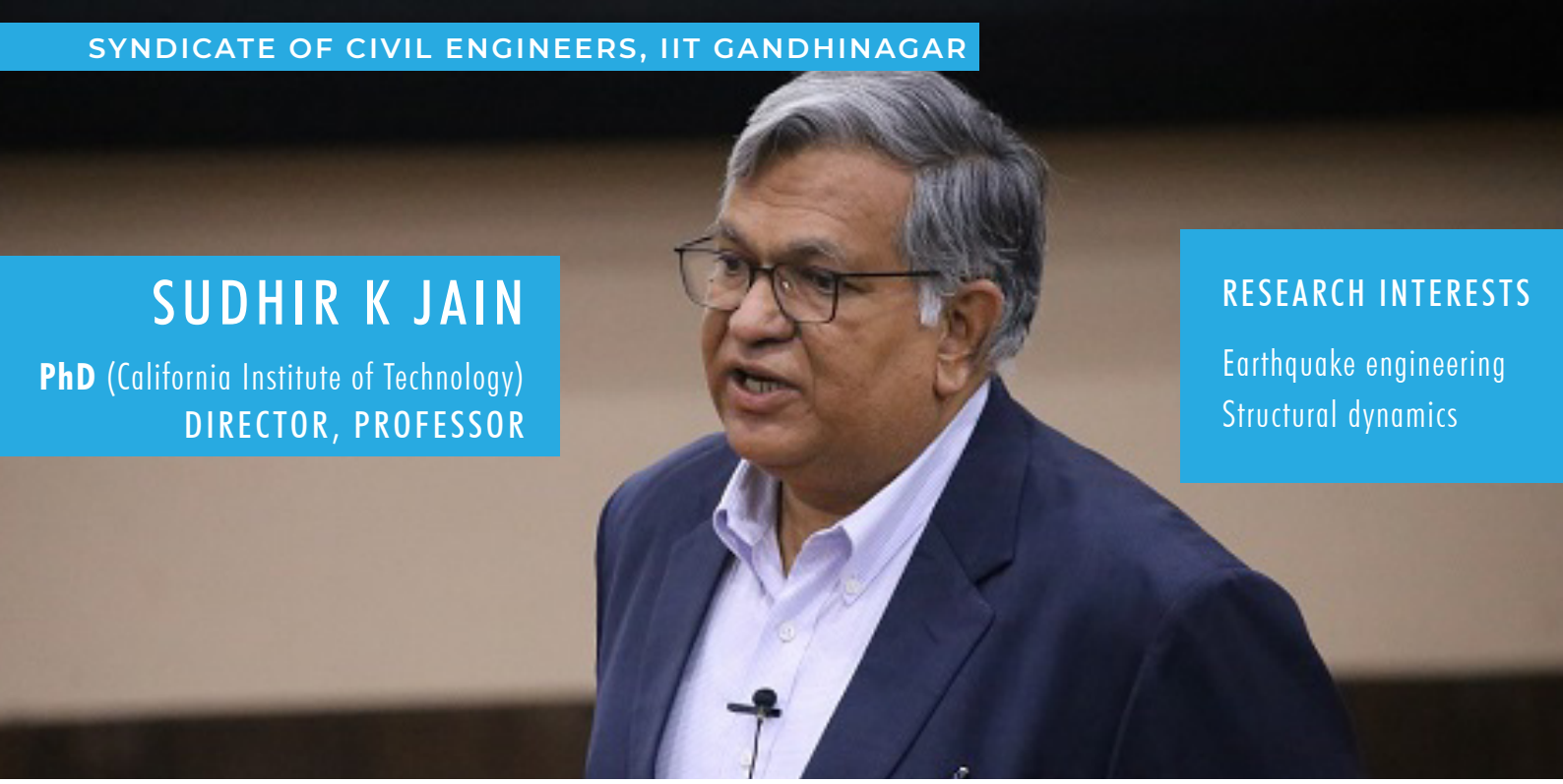
Burj Khalifa has been built using *110,000 tons* of concrete which is equivalent to the weight of *100,000 elephants*. Almost *12,000 workers* worked on the building per day which at the end was equal to a total of *22 million man-hours*.

Wembley Stadium, world's largest football stadium, was constructed in four years. On the contrary, it took only six years to build **Palm Jumeirah** which is *5.72 sq. km*. large and has an area equal to *600 football fields*. Also, it is said that the sand and rock used in the Palm Jumeirah development can form a 2m wide wall that can circle the earth three times.

The world's largest floating 600 MW solar energy project at **Omkareshwar dam** on Narmada river in Khandwa district of Madhya Pradesh will begin power generation by year 2022-23. The estimated investment in this project stands at *Rs 3,000 crore*.

We leave this fact to you. Guess the first and second most consumed material by humans on this planet.

FACULTY RESEARCH AREA



SUDHIR K JAIN

PhD (California Institute of Technology)
DIRECTOR, PROFESSOR

RESEARCH INTERESTS

Earthquake engineering
Structural dynamics

AJANTA SACHAN

PhD (University of Tennessee at Knoxville)
ASSOCIATE PROFESSOR

RESEARCH INTERESTS

Liquefaction & cyclic instability
Dynamic behavior of soils
Unsaturated cohesive soils
Special soils: micaceous, soft, laterite, expansive
Experimental studies on strain localization

AMIT PRASHANT

PhD (University of Tennessee at Knoxville)
PROFESSOR

RESEARCH INTERESTS

Constitutive modeling for granular materials
Numerical modeling of geotechnical structures
Earthquake geotechnical engineering
Applications of geosynthetics

ASHWINI KUMAR

PhD (University of Waterloo)
VISITING PROFESSOR

RESEARCH INTERESTS

Stability and large deformation of structures
Theoretical stress analysis
Post-buckling and non-linear response of laminated plates

C N PANDEY

PhD (North Gujarat University)
VISITING PROFESSOR

RESEARCH INTERESTS

Carbon sequestration of coral reefs of Gujarat
Status of grasslands of Saurashtra and Central Gujarat
Potential area mapping for mangrove restoration in South Gujarat, Kachchh and Saurashtra

DHIMAN BASU

PhD (University at Buffalo)
ASSOCIATE PROFESSOR

RESEARCH INTERESTS

Ground motion characterization and seismic hazard
Performance based earthquake engineering
Complex structures
Structural health monitoring

G V RAO

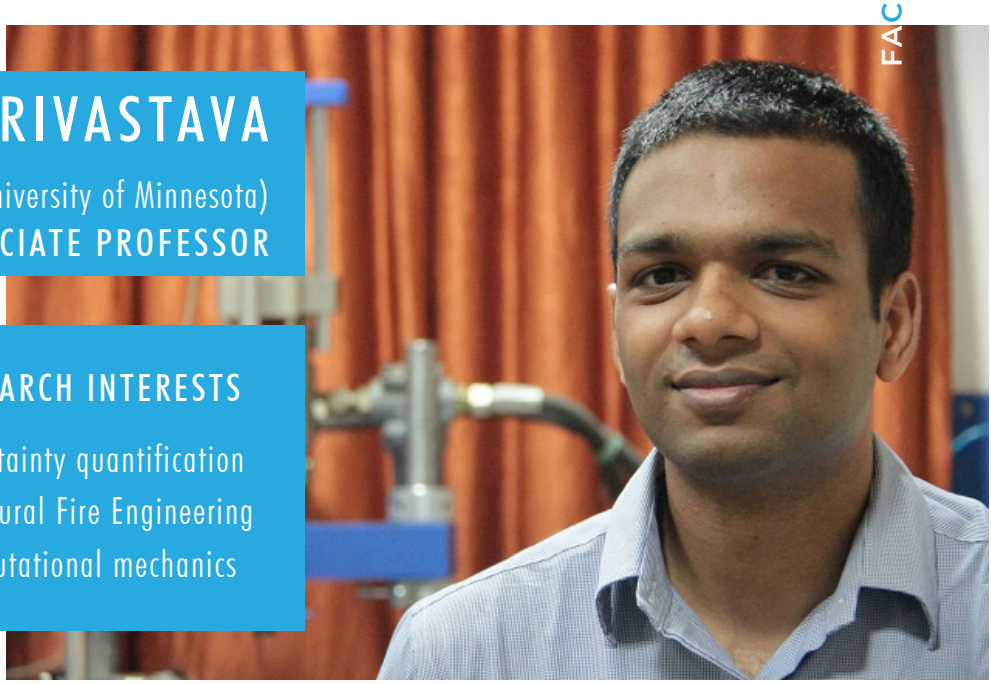
PhD (IISc Bangalore)
VISITING PROFESSOR

RESEARCH INTERESTS

Geotechnical testing and evaluation
Design of pavements and quality control check

GAURAV SRIVASTAVA

PhD (University of Minnesota)
ASSOCIATE PROFESSOR



RESEARCH INTERESTS

Uncertainty quantification
Structural Fire Engineering
Computational mechanics

MANISH KUMAR

PhD (University at Buffalo - SUNY)
ASSISTANT PROFESSOR

RESEARCH INTERESTS

Performance-based earthquake engineering
Passive structural control
Seismic isolation
Characterization of earthquake shaking
Seismic risk assessment
Concrete and masonry structures
Blast-resistant design
Concrete printing

PRANAB MOHAPATRA

PhD (IIT Kanpur)
PROFESSOR

RESEARCH INTERESTS

Hydraulics and water resources engineering
Transients in pipe flow
Transients in open channel flow
Frequency domain analysis in pipe flow

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RESEARCH INTERESTS

Critical infrastructure resilience
Network science
Ecological dynamics
Machine learning
Climate variability and change

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RESEARCH INTERESTS

Surface water hydrology
Climate variability and climate change
Global food and water security

SAMEER PATEL

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ASSISTANT PROFESSOR

RESEARCH INTERESTS

Aerosol and air quality
Air pollution control
Low-cost air quality monitors
Environmental policies and regulations

CIVIL ENGINEERING STARTUPS AT IITGN

01 MiCoB Pvt Ltd

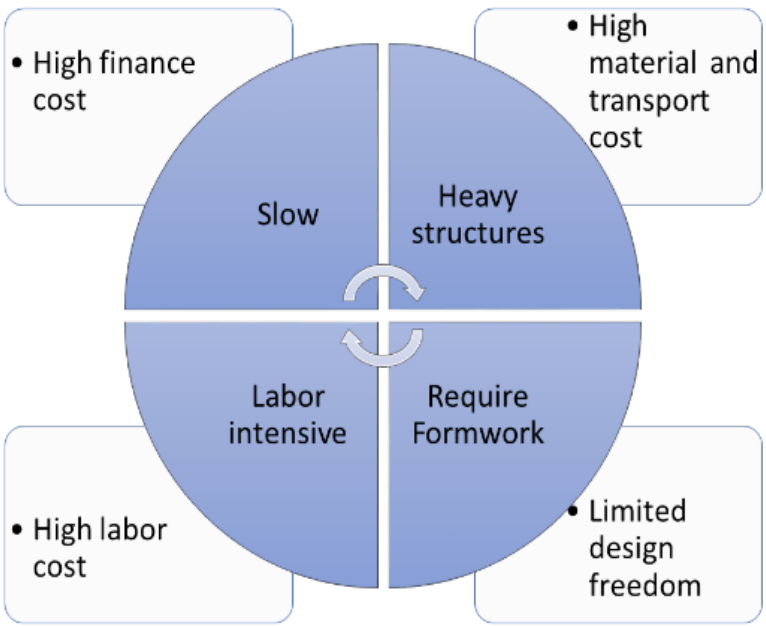
02 GeoCarte Radar Technology Pvt Ltd

MiCoB

LET'S PRINT THE FUTURE!

MiCoB is an entrepreneurial venture initiated by four research students at IIT Gandhinagar. With the motto to merge art, automation and construction, MiCoB strives to change the face of construction industry, and how it is perceived in general. The company focusses on bringing man-machine integration in the construction segment, using its state of the art 3D concrete printing technology. 3D concrete printing is a novel method which uses fully automated concrete extrusion assembly to perform layer-wise construction of large scale segments.

The process results in quality-compliant end products with better control over the rheology and finish of the material. Further, 3D concrete printing is more sustainable and eco-friendly as it produces 40% less carbon foot print compared to the conventional methods. Besides, the major commercial challenges associated with conventional construction such as cost and time are also effectively addressed using this technology.



We expect that with that the 3D printing technology developed at MiCoB, construction of mass housing could be made faster, safer, more economic, less labour intensive and environment friendly. The company also look forward to cater the need of customised, flexible and rapid construction of various infrastructural elements that could contribute in the projects such as metro rails, flyovers and smart city development.

3D concrete printing facility developed by MiCoB at IITGN

3D concrete printing facility developed by MiCoB at IITGN

Another exciting market segment that MiCoB is successfully targeting is that of concrete furniture. With its exceptional features, unique designs and high ease of customisation, MiCoB's concrete furniture is an excellent choice for the modern décor. Long term durability, near-zero maintenance and the unique look of our concrete furniture has the potential to change the face of modern furniture and home décors in coming times. Other salient features of our furniture include its low maintenance, no swelling, and resistance to heat, extreme weather conditions, microbial attacks and termites.

Besides, the modest and minimalistic look of concrete furniture gives an edge to the modern décors. The company has been successful in delivering its first furniture range (called Legacy) to various independent clients as well as an educational institute (IITGN).

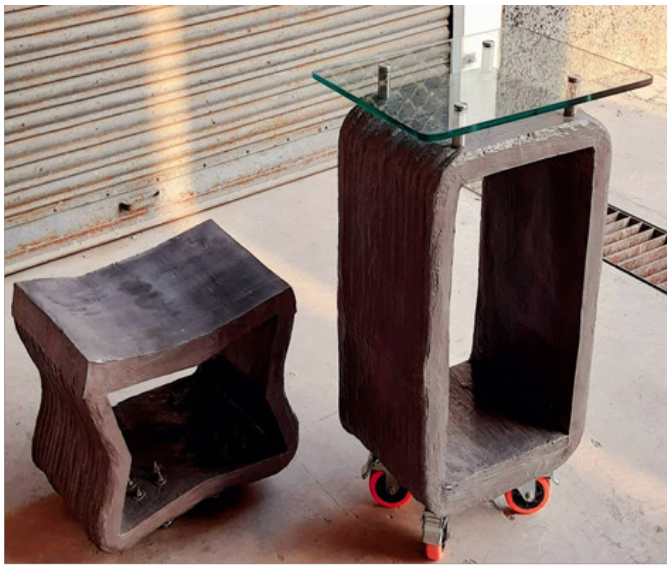
Carbon-fibre and glass fibre reinforced wall panels and parametric facades, for housing

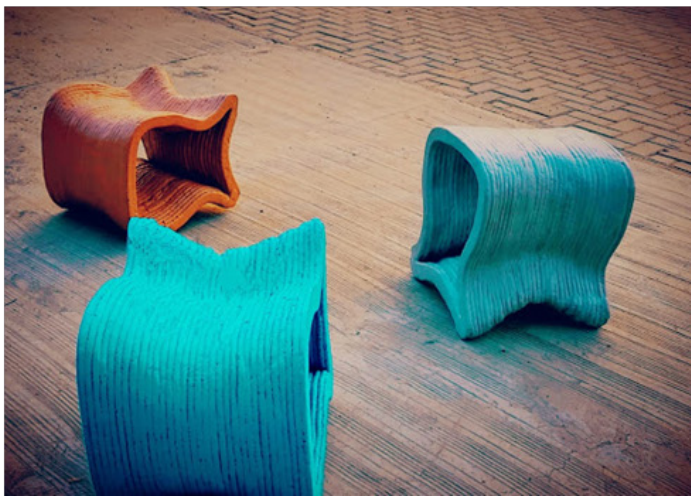
Carbon-fibre and glass fibre reinforced wall panels and parametric facades, for housing

With the vision to improve the current scenario of architecture, infrastructure and real estate , MiCoB looks forward to offer design freedom, streamlined construction processes, economic habitats to all and sustainable infrastructure; while also making the due contribution in safeguarding the environment. In a nutshell, we at MiCoB aims to be a part of the society that thrives to create a better world for the upcoming generation.

TOGETHER, LET US CREATE A BETTER TOMORROW!

LET'S PRINT THE FUTURE!





MiCoB's 3D printed furniture

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GeoCarte

GeoCarte Radar Technology Pvt Ltd

Our journey started way back in 2015, when a research oriented team at IITGN perceive the scope of GPR technology. With the intent to cater the fast growing Indian Infrastructure industry GeoCarte Radar Technology Pvt. Ltd. was born. GeoCarte is Redefining the way Sub surface investigation is done.

GeoCarte provides comprehensive professional high-end Geo-Exploratory services using advanced Ground penetrating radar (GPR) technology to map underground infrastructure without digging. GPR Technology uses electromagnetic waves of high frequency that goes deep inside the earth and get reflected when it encounters any anomaly, sub surface utilities i.e. change in material.

This Technology is used as precautionary measure to existing assets during installation or construction of new infrastructure. It can be used in following fields, Underground utility mapping, Underground leakage detection, Rock profiling & boulder mapping, Structural Scanning, Highway and railway inspection, Ground water table mapping, mineral exploration, Railway ballast investigation.

We leverage our expertise for all kind of sub surface explorations ranging from utility mapping to archaeological investigations, assessing the concrete structure condition and leakage detection.

GeoCarte is capable of providing satisfactory output results even in challenging site conditions where conventional GPR analysis tool fails. Analysis and interpretation of GPR weak signal data has been GeoCarte forte to ensure accurate mapping of underground structure from its inception.

The complexity of GPR projects undertaken by GeoCarte has varied widely from utility mapping on roads to industrial areas to scanning for artefacts at archaeological sites. The company's efficiency in handling the complex projects in this domain has won appreciation from its esteemed clients.

GeoCarte has proved its competency in the field of Ground penetrating radar through its numerous completed and on-going projects. At GeoCarte, GPR services along with in-house developed advance analysis tool make it effective to be implemented even in difficult site scenarios viz, high clay content, high moisture content, etc.

THE TRUE VALUE OF ANY BUSINESS IS MEASURED BY ITS PERFORMANCE. WE DELIVER AN EXPERIENCE TO OUR CUSTOMERS WHICH DRIVE THEM TO RECOMMEND US.

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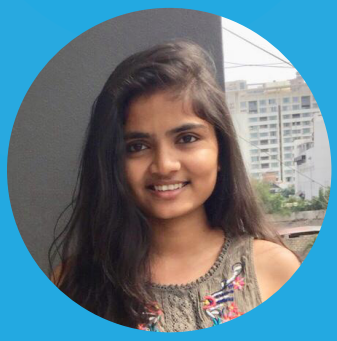

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