

REC, kannauj presents

# ABHIGYAAN

THE SOARING EXERCISE OF HUMAN IMAGINATION



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# Introduction

## *ABHIGYAAN*

The soaring exercise of human mind is *rec, kannauj* technical magazine. A revolutionary new concepts in the technical world and seeks to bring the glitz of new technologies of world to the pulsating heart of the college, in all its hedonistic glory.

Technical content is the main focus of the magazine which is topped with students' artistic mastery and calendar events of the college. *Abhigyaan* is centred on the edgy, glamorous aspects of gadgets and technology, and encapsulates the desires and aspirations of people indulged in making it possible.

# Director's Message



Rajkiya Engineering College, Kannauj is marking its presence as an emerging technical institute which is committed to inculcate the ideas of students and show them the right path for their implementation.

Being the director of this institute, my aim is to take institute to a level of achievements and focus on the never ending growth of institute.

REC-K is a place where young minds are fostered with sense of responsibility, confidence, self-discipline and integrity. We highly believe in providing a value based education to

the students.

We focus not only on the excellence in studies but their overall development to train them to become an ideal human being and serve their society and nation for good cause.

A highly standard education is provided under the umbrella of well qualified teachers who are also actively involved in the overall development of students. We look forward to become most preferred destination for the students to shape their ideas into existence. Our vision is to provide a breed of highly qualified, innovative and dynamic professionals to the sector of socio and economics importance.

I thank you all to become the part of REC-K family... And good luck to all for their gold and life ....

**Dr. Neelam Srivastava**  
Director - REC Kannauj

# **VISION AND MISSION**

## **CIVIL ENGINEERING**

All engineering fields flourishing in the modern era have their directives fixed on improving the way and walk of life in order to give something more spectacular to the world than the previous ones. In this mission the level of technology has raised its bar up to such an extent that it has completely lost its touch with the common global masses. The knowledge of common masses about the new inventions is restricted only to its usability standard continuously deviating away from the "how it is done" chronology. The only field of engineering which has kept its feet planted on the ground doing justice to the above agenda is the branch of "civil engineering". The beauty of this field lies in its simplicity and connectivity to every living standards of life.

Our vision here at the civil department of engineering is to impart abundant knowledge and excellence in civil engineering and technology with global perspectives to our students and to make them ethically strong engineers to build our nation. We believe that our excellence derives from high quality teaching faculty, a dedicated and capable support staff, a collegial and cooperative spirit well equipped and maintained experimental facilities to nurture brilliant breed of civil engineers.

The civil department is on a mission to serve as a reliable, highly capable resource for the society, the profession and the organizations involved in this field. The department bestows its attention towards performing forward-looking research both applied and theoretical that will positively impact the upcoming generations. The department of civil engineering is dedicated to providing a dynamic learning environment that emphasizes open-ended design, problem solving skills, team work, communication and leadership skills.

# **PROFLIGHT**

## **BEDDING ROCK LAYER TEST**

The bedding rock slope refers to the layered rock slope which is consistent with the trend of the whole rock mass and the slope formed by excavation. Such slopes are often at risk of instability due to the large-scale excavation of the original terrain during the formation and disturbance of the initial stress field. When there is a certain degree of strong weathered and weak interlayer in the slope, due to the water softening effect of the weak interlayer, the slope are more prone to instability damage at different degrees whenever the rainy season comes. In recent years, scholars at home and abroad have carried out some researches on the instability mechanism of bedding rock slope. For example, Li et al studied the dynamic evolution of rock-soil mechanics properties during the development of the landslide based on the typical case of landslide damage along the rocky slope of the Three Gorges reservoir. Shu et al studied the slope of the rock slope critical inclination and determined the functional relationship between the critical slope of the slip surface and the slope angle, the friction angle of the failure surface, cohesion, and the height of the sliding body. Bedoui et al aimed at the landslide mechanism of bedding rock slope, and the deep creep of slope landslide is divided into three stages: slope foot to the top of the initial slow deformation stage, slope foot to the middle of the slope surface of the accelerated deformation stage, and rapid deformation of the foot stage. Tiranti et al analyzed the stability of rock slopes in the near-horizontal layers and concluded that rainfall is the most important factor leading to the flat push-type landslides in such rock slopes. The above research results provided theoretical support for the analysis of the instability mechanism of bedding rock slope; however, there are still some problems to be perfected when the bedding rock slope contains the weak interlayer, what is the relationship between the instability of the slope and the weak intercalation? (2) Under the conditions of rainfall infiltration, what is the law of the seepage characteristics of this kind of slope and what kind of rainfall condition has the most influence on the rock slope with the weak interlayer. (3) Before and after rainfall, what happens to the mechanical properties of the rock slope and the weak interlayer, and how this change will affect the stability of the slope.

Therefore, this paper relied on the bedding rock slope with weak interlayer along the left side of the Beijing-Zhuhai Expressway (Changsha-Zhuzhou section). Based on the theory of similar materials and combined with the indoor rainfall-spraying technique, model tests on the instability process of bedding rock slope with weak interlayer under different rainfall conditions were carried out, and the change law of volumetric water content, sliding thrust, and settlement of this type of slope under rainfall infiltration was analyzed. According to the test results, the most unfavorable rainfall conditions affecting slope stability were discussed, and the failure modes of bedding rock slope with weak interlayer under rainfall infiltration were proposed, which provided theoretical guidance for engineering practice.

**MR. MUKUL SAXENA**  
(HOD CIVIL DEPARTMENT)

# **VISION AND MISSION**

## **COMPUTER SCIENCE ENGINEERING**

We believe "quest for quality" is a never ending process .... the more one attains quality parameters, more widens the demand for same. We aim to build strong technical base for each student and try to impart additional knowledge to students besides their regular curriculum which will surely help to develop broad technical outlook of the students to compete in professional field.

We crave to bear a torch with a vision to be bloomed as a research oriented institute to provide quality education not mere instill the sense that potential engineer must be worthy of indigenous exposition in every field and sphere of life. The Faculty will continue to be known for their passion for teaching these students and for their knowledge, expertise, and innovation in advancing the frontiers of knowledge in computer science and software engineering.

The central objective of our department is to contribute to society by advancing the fields of computer science and software engineering through innovations in teaching and research, thus enhancing student knowledge through interactive instruction and experimental learning.

Advance theoretical, experimental and applied computer through nationally and internationally recognized research by faculty and students

"I'm afraid that the following syllogism may be used by some in the future.

Turing believes machines think

Turing lies with men

Therefore, machines do not think

Yours in distress" ~Alan Turing

# **PROFLIGHT**

## **IOT APPLICATIONS IN ENERGY, ENVIRONMENT, FOOD & SUSTAINABLE AGRICULTURE**

The Internet of Things (IoT) has the capability to transform the world we live in, more-efficient industries, connected cars, Smart Energy, Smart grid, Environment monitoring ,food and water tracking and security, smarter cities are all domains of the IoT. However, the application of technology like IoT in agriculture could have the greatest impact. The global population is set to touch 9.6 billion by 2050. So, to feed this much population, the farming industry must embrace IoT. Against the challenges such as extreme weather conditions and rising climate change, and environmental impact resulting from intensive farming practices, the demand for more food has to be met. Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the farm vehicles have made. In IoT-based smart farming, systems can be built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. IoT-based smart farming is highly efficient when compared with the conventional approach. In terms of environmental issues, IoT-based smart farming can provide great benefits including more efficient water usage, or optimization of inputs and treatments. As IoT becomes ubiquitous, enterprise IT will experience a paradigm shift in terms of scale, scope, and cooperation. The smart-x applications of IoT encourage development of novel technologies needed to solve problems in the area of public health, aging population, environmental protection, climate change, conservation of energy, enhancements to safety and security etc.

**DR. B.D.K. PATRO**  
(HOD COMPUTER SCIENCE DEPARTMENT)

# **VISION AND MISSION**

## **ELECTRICAL ENGINEERING**

The Department of Electrical Engineering is the very first branch of Rajkiya Engineering College ,KANNAUJ and since it's inception in 2016 the department's vision is to become a fort-runner in bringing out competent electrical engineers ,innovators ,researchers ,entrepreneurs and thereby contribute value to knowledge –based economy and society.

The curriculum includes study of physics,engineering mathematics and in depth exposure of foundations,core and elective courses in the field of electrical ,power electronics, communications and signal processing , areas of communication and signal processing , control and computing ,software control and automation with an interdisciplinary approach.

The program has specialization tracks like –

- Energy Systems
- Smart Grid Technology
- Embedded Control and Systems

Four year full-time degree provides comprehensive theoretical ,practical and real life knowledge of Electrical Engineering as demanded by the industry today and for the future.

Here in Rajkiya Engineering College , Kannauj the B.Tech programme is based on following cardinal principles:

- Providing social context to education .
- Encouraging active learning .
- Opening a dialogue for work in global knowledge economy.
- To provide state of the art resources that contribute to achieve excellence in teaching –learning, research and development activities

# **PROFLIGHT**

## **HIGH EFFICIENCY PHOTOVOLTAIC CELLS**

Novel structures of photovoltaic cells (also called as solar cells) are provided. The cells are based on nanoparticles or nanometer-scaled wires, tubes, and/or rods, which are made of electronic materials covering semiconductors, insulators, and may be metallic in structure. These photovoltaic cells have large power generation capability per unit physical area over the conventional cells. These cells will have enormous applications such as in space, commercial, residential and industrial applications.

This patent specification relates to structures of photovoltaic cells (hereafter mentioned also as "solar cells"). More specifically, it relates to photovoltaic cells comprising structures that increase the junction area and absorb a broad solar spectral spectrum in order to increase power generation capability per unit area. This also relates to photovoltaic cells containing nano-scaled blocks. These photovoltaic cells can be used in commercial, residential, and also industrial applications for power generation.

Photovoltaic cells where light is converted into electric power to be fed to external loads, which are electrically connected to the photovoltaic cells, have been prevailing in a wide range of applications such as consumer electronics, industrial electronics, and space exploration. In consumer electronics, photovoltaic cells that consist of materials such as amorphous silicon are used for a variety of inexpensive and low power applications. Typical conversion efficiency, i.e. the solar cell conversion efficiency, of amorphous silicon based photovoltaic cells is in the range of ~10% [Yamamoto K, Yoshimi M, Suzuki T, Tawada Y, Okamoto T, Nakajima A. Thin film poly-Si solar cell on glass substrate fabricated at low temperature. Presented at MRS Spring Meeting, San Francisco, April 1998.]. Although the fabrication processes of amorphous silicon based photovoltaic cells are rather simple and inexpensive, one notable downside of this type of cell is its vulnerability to defect-induced degradation that decreases its conversion efficiency.

In contrast, for more demanding applications such as residential and industrial solar power generation systems, either poly-crystalline or single-crystalline silicon is typically used because there are more stringent requirements of better reliability and higher efficiency than those in consumer electronics. Photovoltaic cells consisting of poly-crystalline and single-crystalline silicon generally offer conversion efficiencies in the range of ~20% and ~25%. Novel 19.8% efficient 'honeycomb'-textured multicrystalline and 24.4% monocrystalline silicon solar cell. Applied Physics Letters 1998; 73: 1991-1993.] respectively. As many concerns associated with a steep increase in the amount of the worldwide energy consumption are raised, further development in industrial solar power generation systems has been recognized as a main focus for an alternative energy source. However, due to the high cost (\$3 to \$5/Watt) of today's Si-based solar cell, it is not yet widely accepted as an alternative energy source solution.

# VISION AND MISSION

The zeal for luxury in life is unending, even the time adds it's impulse to it. One can't be happy and satisfied with what it has, it is always chasing the undecidable and impossible.

As it is said, "Need is the mother of all inventions" and our Electronics Department lies at the centre of this thought. We at the Electronics Department try to develop, innovate and learn what is the future. The teachers and the students of the branch endeavor to respect the subject to utmost as well as develop a broad and unorthodox outlook about the branch. We imbibe the branch community with new ideas and a vision to technify our college with new contrivances and then from there take it to the next level of our ambitions.

Our obsession here at the Electronics Department is to feed the confidence among the community that they can create and innovate in the best way. Areas of Robotics and machine learning are the thriving topics of the current developments, as advancements in them are going to be a great boon for the society. The ultimate objective for any community is to give something back to the world in the best way possible, for us, through research and continuous advancements in one of the highly productive fields of Engineering.

"The new electronic independence recreates the world in the image of a global village"

~Marshall McLuhan

# **PROFLIGHT**

## **NEXT GENERATION LITHOGRAPHY**

Next-generation lithography or NGL is a term used in integrated circuit manufacturing to describe the lithography technologies slated to replace photolithography. As of 2016 the most advanced form of photolithography is immersion lithography, in which water is used as an immersion medium for the final lens. It is being applied to the 16 nm and 14 nm nodes, with the required use of multiple patterning. The increasing costs of multiple patterning have motivated the continued search for a next-generation technology that can flexibly achieve the required resolution in a single processing step.

Candidates for next-generation lithography include: extreme ultraviolet lithography (EUV-lithography), X-ray lithography, electron beam lithography, focused ion beam lithography, and nanoimprint lithography. Electron beam lithography was most popular during the 1970s, but was replaced in popularity by X-ray lithography during the 1980s and early 1990s, and then by EUV lithography from the mid-1990s to the mid-2000s. Focused ion beam lithography has carved a niche for itself in the area of defect repair. Nanoimprint's popularity is rising, and is positioned to succeed EUV as the most popular choice for next-generation lithography, due to its inherent simplicity and low cost of operation as well as its success in the LED, hard disk drive and microfluidics sectors.

The rise and fall in popularity of each NGL candidate largely hinged on its throughput capability and its cost of operation and implementation. Electron beam and nanoimprint lithography are limited mainly by the throughput, while EUV and X-ray lithography are limited by implementation and operation costs. The projection of charged particles (ions or electrons) through stencil masks was also popularly considered in the early 2000s but eventually fell victim to both low throughput and implementation difficulties.

The above-mentioned competition between NGL and the recurring extension of photolithography, where the latter consistently wins, may be more a strategic than a technical matter. If a highly scalable NGL technology were to become readily available, late adopters of leading-edge technology would immediately have the opportunity to leapfrog the current use of advanced but costly photolithography techniques, at the expense of the early adopters of leading-edge technology, who have been the key investors in NGL. While this would level the playing field, it is disruptive enough to the industry landscape that the leading semiconductor companies would probably not want to see it happen.

**DR. ARUN KUMAR SINGH**  
(HOD ELECTRONICS DEPARTMENT)

# Induction Program

With the dawn of new semester comes new opportunities and experiences. While we should reflect on previous successes and failures and use them to our benefits this semester, we should also take every new opportunity that comes our way. As the upcoming semester is the even one, we should also try to keep all the odds out.

**"The future is always beginning now"**

~Mark Strand

Pertaining to the above thoughts, The Rajkiya Engineering College Kannauj, conducted an induction program from 22 Jan to 29 Jan. The event was inaugurated by the honourable Director of the college Mrs. Neelam Srivastava. The start to the new semester brought a string of events which started with the Saraswati Pooja. The program started with the ode to the goddess Saraswati, the preacher of education and knowledge. The prayer was worth it as it was the occasion of Vasant Panchami. Different events were held in succession to the Saraswati Pooja.

## HOD's Discourse

The head of department of all the four branches along with the Hon'ble Director addressed the college community. The declaration to the college paved a pathway for a get together for all the faculties as they got comfortable with each others as well as with the college premises and surroundings. The 8 day program included yoga, lectures on value education , motivational speeches, soft skills, professional communication and personality development workshops.

## **Yoga: Enriching health and soul**

The next morning all the students and faculties breaking themselves from the shackles of biting cold turned up the heat as they embraced themselves into practicing yoga - :a spiritual and ascetic discipline widely helpful for health and relaxation. They greeted the retreating dawn with multiple exercise positions often called as 'asanas'. It was a great site to see the youth and the experience coming together on the green mat and practicing meditation. The foggy morning with it's lethargic air was defeated by the freshened spirits of the college community.

## **Value Education: Bettering individuals**

After a session of reverberating morning meditation the Director and the faculties conducted a lecture on value education. The faculties stressed on the need of moral values and social education, wanted students to instil those those along with academics .A great academic career looks tiny if one's moral order is crumbled. Students were told how values are helpful for them to make them a shining personality by keeping them determined in every walk of life. The humanities and value education faculty also presided over the lecture and inspired the students with fresh air of motivation. The motivational speech helped the students to make them feel significant and exuberant.

## **Ravidas Jayanti**

On 31st January, REC Kannauj community celebrated the birthday of Saint Ravidas, the founder of Ravidassa religion. He was a north Indian mystic poet, saint of the Bhakti movement during the 15th to 16th century. He is still called as guru in the region of Punjab and Uttar Pradesh. The event commenced in the packed conference room of the college with cheerful participation by students and faculties.

The event started with the prayer as a tribute to the 'Bhakti-Saint', followed by garland offering and candle lighting. The offering was led by Mr. Ashwini Upadhyay, faculty of Electronics Dept. After the prayer session, a series of lectures on spiritualism and Bhakti movement were delivered. Both faculties and students gave their articulations on Ravidas Jayanti. The atmosphere in the conference room was sterling and refining. The flow of spiritualism could be felt among the college community. Special lectures on spiritualism were also given by Mr. Arastu Gautam, faculty of Civil Dept. and students of different branches. The students discovered a lot about saint Ravidas and his teachings and took to them.

Rag

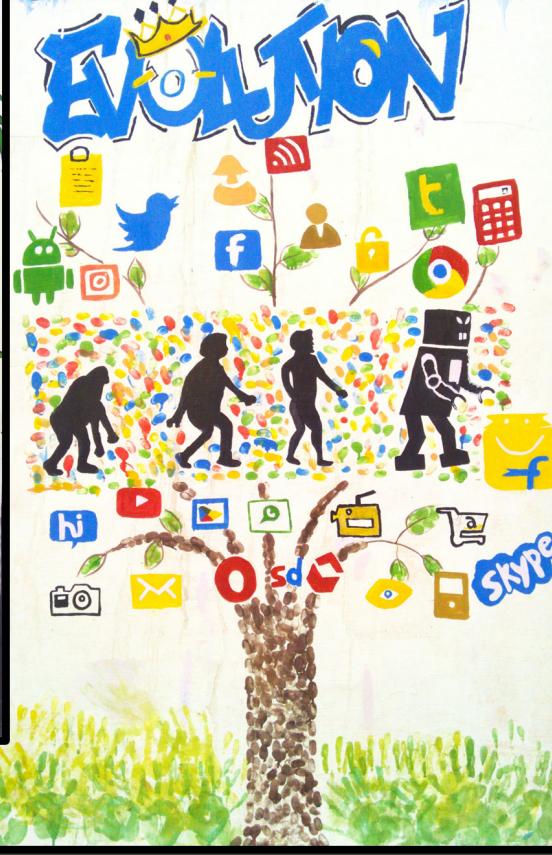


# Ragman 2k17



# Republic Day





## Wall Painting



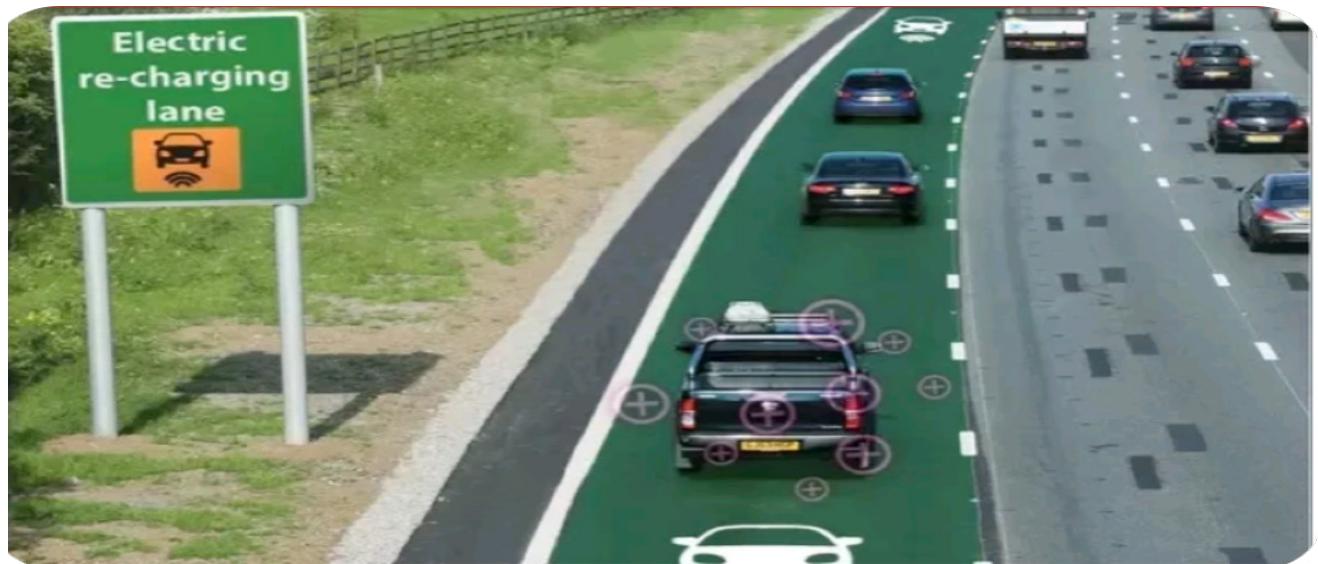


# 2k18 *UTKRIDA*



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# Wireless Power Technology



A great effort has been done by innovative scientists in this research area. A research team in MIT succeeded to wirelessly transfer power 60 watts for 2 meters with an efficiency of 40%.

Now, the transfer range and the efficiency levels are increasing on a startling pace, and hopefully soon(WPT) would be adapted in most of our home applications such as charging laptop & smart phones. moreover, scientists have achieved new technologies and techniques for transmitting power wirelessly from a stationary source to a mobile receiver.

This means the electric vehicles(EV)can be charged while driving, and it allows the EVs to run forever without a single stop.

# Graphene

Recent years have witnessed many breakthroughs in research on graphene (the first two-dimensional atomic crystal) as well as a significant advance in the mass production of this material. This one-atom-thick fabric of carbon uniquely combines extreme mechanical strength, exceptionally high electronic and thermal conductivities, impermeability to gases as well as many other supreme properties, all of which make it highly attractive for numerous applications.

Currently scientists are working on enhancing the capabilities of lithium ion batteries (by incorporating graphene as an anode) to offer much higher storage capacities with much better longevity and charge rate. Graphene based micro-super capacitors will likely be developed for use in low energy applications such as smart phones and portable computing devices and could potentially be commercially available within the next 5-10 years. Graphene enhanced lithium ion batteries could be used in much higher energy usage applications such as electrically powered vehicles, or they can be used as lithium ion batteries are now, in smartphones, laptops and tablet PCs but at significantly lower levels of size and weight.

## Spectre & Meltdown: Intel's nightmare

Well, if you are computing what do you basically want?

The normal answer which comes to our mind is speed, quickness, the smartness of a computer system, by saying system's and as we are Computer Science students, our community knows we are talking about processors and when we are saying processors our mind is blown up by one word INTEL, the leading producers of the fastest and the smartest processors in the world, but if I tell you this year in 2018 they have been under serious threat, then what?

Let us know why?

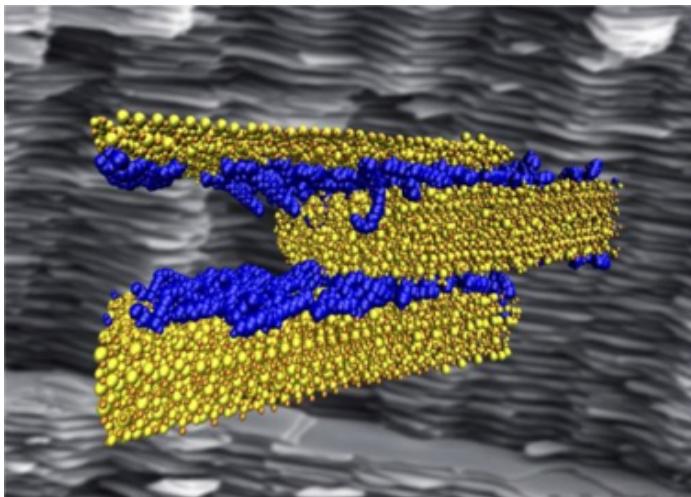
As we know processors involved in our systems these days are getting faster day by day and are being developed such as to predict the future. In order to make them faster, a technique called Speculative Execution has arrived which has increased the processing speed overall. It works in such a way that a program starts working out all the possibilities before it even decides which direction it has to go. Which speeds up the process. This technique combined with cache memory makes it more remarkable.

But here is the flaw, the more we try to interfere with the speed the more vulnerable our security becomes and the more Spectre & Meltdown come into the picture, these two variants try to bypass a privilege check which is required by a process to access data and it works it's way like you are knocking a box to see if it's hollow, as privilege check takes time and within that time cache can be breached by multiple knockings and just knowing the address where the data is, it can help you deduce what it is and this is called SideChannel Attacking. A Meltdown melts security boundaries normally enforced by hardware, doesn't require too much knowledge how hijacking takes place and has recently exploited some specific INTEL chips. While Spectre is one of a kind, it is so malicious as its attack can make a program induce its own data and that's what makes it a greater threat and will come to haunt us even after different OS's have launched their security patches against it.

# Weak hydrogen bonds key to strong, tough infrastructure

Rice University lab simulates polymer-cement composites to find strongest, toughest materials

**Summary :**Engineers study what it takes to make strong and tough infrastructures by probing the interfacial interactions of polymer and cement, which are key to composite properties.



Rice University scientists probing the interfacial interactions of polymer (blue) and cement (yellow) discovered the right mix of hydrogen bonds is critical to making strong, tough and ductile composite materials for infrastructure. Computer simulations like that in the illustration measured the strength of the bonds as hard cement slides past the soft polymer in a layered composite, which mimics the structure nacre, seen in the background.

**Credit:** Prophas Hundi/Multiscale Materials Laboratory

How polymers and cement molecules come together at the nanoscale and what drives their adhesion ? This structure can be approached by cement and polymer composites that may, for instance, make better earthquake-resistant concrete. The researchers showed that the proximity of oxygen and hydrogen atoms is the critical factor in forming a network of weak hydrogen bonds that connects soft and hard layers. Common polyacrylic acid (PAA) proved best at binding the overlapping layers of cement crystals with an optimal overlap of about 15 nanometers.

"This information is important to make the best synthetic composites," said Shahsavari, who ran the project with Rice graduate student Navid Sakhavand. "A modern engineering approach to these materials will have a large impact on society, especially as we build new and replace aging infrastructure."

The lab's results appear in Applied Physics Letters.

While engineers understand that adding polymers improves cement by blocking the damaging effects of "aggressive" ions that invade its pores, details about how the materials interact at the molecular scale have remained unknown, Shahsavari said. To find out, the researchers modeled composites with PAA as well as polyvinyl alcohol (PVA), both soft matrix materials that have been used to improve cement.

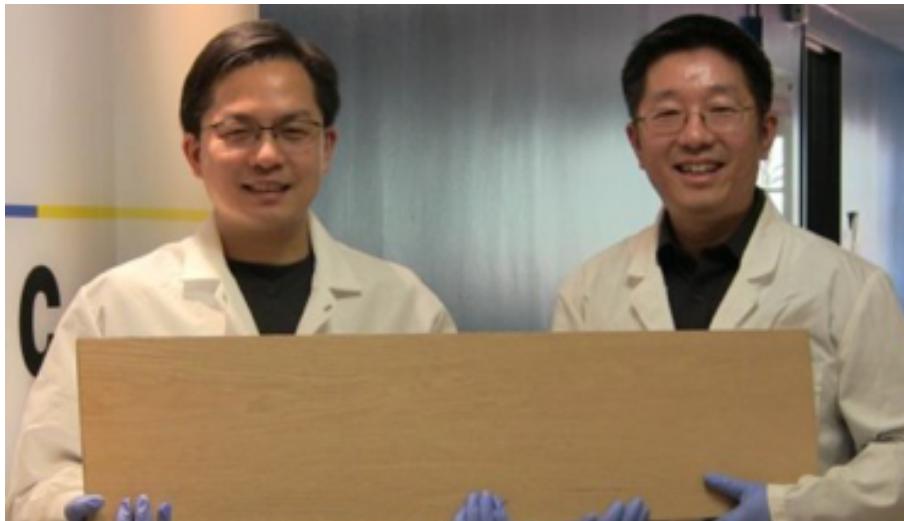
They discovered that the two different oxygen atoms in PAA (as opposed to one in PVA) allowed it to receive and donate ions as it bonded with hydrogen in the crystals of tobermorite cement. Oxygen in PAA had eight ways to bond with hydrogen (six for PVA) and could also participate in salt bridging between the polymer and cement, which makes the bonding network even more complex.

The researchers tested their simulated structures by sliding layers of polymer and cement against each other and found that complexity allowed the bonds between PAA and cement to break and reconnect more frequently as the material was stressed, which significantly increases its toughness, the ability to deform without fracturing. This allowed the researchers to determine the optimum overlap between cement crystals.

# Super wood could replace steel

New process could make wood as strong as titanium alloys but lighter and cheaper.

Summary: Engineers have found a way to make wood more than 10 times stronger and tougher than before, creating a natural substance that is stronger than many titanium alloys



"This new way to treat wood makes it 12 times stronger than natural wood and 10 times tougher," said Liangbing Hu of UMD's A. James Clark School of Engineering and the leader of the team that did the research, to be published on February 8, 2018 in the journal Nature. "This could be a competitor to steel or even titanium alloys, it is so strong and durable. It's also comparable to carbon fiber,

but much less expensive." Hu is an associate professor of materials science and engineering and a member of the Maryland Energy Innovation Institute.

"It is as strong as steel, but six times lighter. It takes 10 times more energy to fracture than natural wood. It can even be bent and molded at the beginning of the process"

"Soft woods like pine or balsa, which grow fast and are more environmentally friendly, could replace slower-growing but denser woods like teak in furniture or buildings," Hu said. "The paper provides a highly promising route to the design of lightweight, high performance structural materials, with tremendous potential for a broad range of applications where high strength, large toughness and superior ballistic resistance are desired," said Huajian Gao. This method is versatile for various species of wood and fairly easy to implement. This kind of wood could be used in cars, airplanes, buildings -- any application where steel is used.

"The most outstanding observation, is the existence of a limiting concentration of lignin, the glue between wood cells, to maximize the mechanical performance of the densified wood. Too little or too much removal lower the strength compared to a maximum value achieved at intermediate or partial lignin removal. This reveals the subtle balance between hydrogen bonding and the adhesion imparted by such polyphenolic compound. Moreover, of outstanding interest, is the fact that that wood densification leads to both, increased strength and toughness, two properties that usually offset each other," said Orlando J. Rojas, a professor at Aalto University in Finland.

Hu's research has explored the capacities of wood's natural nanotechnology. They previously made a range of emerging technologies out of nanocellulose related materials: (1) super clear paper for replacing plastic; (2) photonic paper for improving solar cell efficiency by 30%; (3) a battery and a supercapacitor out of wood; (4) a battery from a leaf; (5) transparent wood for energy efficient buildings; (6) solar water desalination for drinking and specifically filtering out toxic dyes. These wood-based emerging technologies are being commercialized through a UMD spinoff company, Inventwood LLC.

# Progress of hydrogen storage alloys for Ni-MH

Rechargeable power batteries in electric vehicles

With increasing energy demand, the consumption of fossil fuels, such as coal, oil and natural gas, has become a serious burden to the environment and energy resources. Therefore, it is essential to develop new green energies and energy saving technologies. Developing clean electric vehicles (EVs), fuel-efficient hybrid electric vehicles (HEVs) and distributed energy storage stations is an appropriate approach to ease these problems, and reliable batteries, as power conversion and storage devices, play a key role. Several types of rechargeable batteries, such as lead (Pb)-acid batteries, nickel-cadmium (Ni-Cd) batteries, nickel-metal hydride (Ni-MH) batteries and lithium (Li)-ion batteries, have been developed and practically applied. Among them and Li-ion batteries have relatively higher energy density, but as an energy carrier for electric vehicles, they are still a safety hazard. Ni-MH batteries have high power capability, tolerance to overcharge/discharge, environmental compatibility and safety, which make them appropriate for portable power tools and HEVs, although their energy density is relatively low compared to Li-ion batteries.

As clean energy materials, hydrogen storage alloys have been widely investigated and applied as negative electrodes for nickel-metal hydride (Ni-MH) rechargeable batteries due to their high energy densities and environment-friendliness. This review details the progress made in the last few decades on hydrogen storage alloys, such as  $AB_5$ -type alloys,  $AB_2$ -type alloys, Mg-based alloys, Ti-V-based alloys and RE-Mg-Ni (rare earth abbreviated as RE) alloys, for Ni-MH rechargeable batteries.

The principles of Ni-MH batteries and the relationship between electrochemical performance and hydrogen storage

properties have been narrated in detail. The achieved research results, existing problems and development direction are discussed systematically. The relationship between alloying compositions, crystal structures and electrochemical properties for each alloy type are also noted and analyzed with the emphasis on power batteries.

The Ni-MH battery industry has undergone rapid development since Japan began to produce Ni-MH batteries in large batches in 1990, and well-known battery manufacturers in several countries have also accelerated the industrial development of Ni-MH batteries. The gravimetric and volumetric energy densities of AA-size Ni-MH cells have been raised from 54 to 110 Wh/kg and 190 to 490 Wh/L, respectively. Their power has increased from under 200–1200 W/kg commercially, and up to 2000 W/kg at a development level. In 2000, the total output of small Ni-MH batteries was up to 1 billion in Japan. China was one of the few countries to participate in the early development of Ni-MH batteries. Since 1995, China has built a number of production bases for the large-scale production of Ni-MH batteries, such as the Tianjin Peace Bay Company, the Shenyang Sanpu Company, the Shenzhen BYD Company, the Shenzhen HPJ Company and the Shenzhen Great Power Company. Now, the production and export of Ni-MH batteries in China are more than in Japan, meaning that China is ranked first in the production of Ni-MH batteries in the world.

# Solitons divide and conquer

**An experimental technique allows packets of light called solitons to maintain their shape in all three dimensions as they travel through a material. Such wave packets could find applications in optical information processing.**

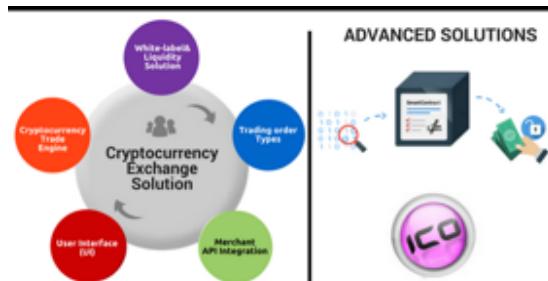
A 3D soliton, sometimes referred to as a light bullet, is the result of cancelling out diffraction and dispersion simultaneously. Although such objects exist in theory, they are notoriously unstable. The focusing of the beam by the material must perfectly balance diffraction, and it is extremely difficult to counteract diffraction and dispersion at the same time, because these actions require different beam intensities. Scientists have generated solitons that are stable in two dimensions (one along the direction of propagation and one perpendicular to this direction), and 3D solitons in a highly structured material (glass patterned with an array of optical devices called waveguides).

But it has not been possible to create 3D solitons in an unstructured material - which is desirable for studying these objects and for practical applications.

# Cryptocurrency

In the past 2 years, lots of computer geeks have been talking about Bitcoins and digital currency ,and lots of people are wondering about it ,some are mixing with e-wallets and banking transactions.let us explore why?

Cryptocurrency is basically ,a type of digital currency which uses cryptography to secure transaction discovered by Satoshi Nakamoto. Cryptography is the idea of encrypting the flow of information between any two people involved in any kind of transaction. Some of the most popular cryptocurrencies today are bitcoin and Ethereum. The currencies are transferred directly from peer to peer without any intervention of third party. It uses the hash function algorithm named as SHA-256. The next question is where this cryptocurrency is stored ? Answer is they are typically stored in digital wallet that exist on block-chain and prevent double spending of currency.



So, let's observe how transaction takes place . Bitcoin users go to online exchange to convert flat currency to bit coin and store them in the bitcoin wallet. Now to submit payment a request is sent to bitcoin network in order to make a purchase. To verify transaction bitcoin decentralised p-2-p network maintain a master ledger which is a block chain, it takes average of 10 minutes ,which also makes it Vulnerable for breaching .

After verification data is presented to all users and ledger is updated. This is how currency works in a Crypto-market.

# ହାତ୍ଯାକାନ୍ଧି

શાહીતુર્ગીરદિના

# Stephen Hawking

Exactly 40 years after famed theoretical physicist Stephen Hawking brought event horizons and black holes into the public eye, he is now claiming that black holes don't actually exist. Instead of all-consuming event horizons and black holes which nothing can escape from, Hawking now proposes that there are "apparent horizons" which suck in matter and energy — but only temporarily, before eventually releasing them again.

To be clear, Hawking isn't proposing that black holes don't exist — just that black holes, as we've understood them for the last 40 years or so (thanks to work done by Hawking and others), don't exist. The current understanding is that black holes are surrounded by an event horizon — a boundary in space time which only allow matter and energy to pass through one way, towards the black hole. It is, in other words, the point of no return. This is why black holes appear black — energy can't escape, and so they produce no light and no heat. In thermodynamics terms, a black hole is a perfect black body — an object that absorbs all energy and radiation.

The problem with this theory, though, is that it's based on general relativity. In recent years, as our understanding of quantum theory has improved, numerous conflicts have arisen, especially in places where both theories apply —such as black holes and event horizons. Basically, quantum mechanics has a big issue with the idea that event horizons completely and utterly destroy information — a big no-no in the world of quantum. Hawking's new proposal tries to ameliorate this conflict between the two theories.

In a short research paper called "Information Preservation and Weather Forecasting for Black Holes,"

Hawking proposes that black holes are instead enveloped by an apparent horizon. Basically, instead of an event horizon that blocks everything absolutely, an apparent horizon suspends matter and energy from trying to escape — and when it does escape, due to the wild fluctuations within a black hole and its apparent horizon, the energy would be released in a garbled form. Hawking likens these fluctuations to weather on Earth: "It will be like weather forecasting on Earth. That is unitary, but chaotic, so there is effective information loss. One can't predict the weather more than a few days in advance." (Unitarily is the part of quantum theory that strongly disapproves of event horizons being a point of no return.)

The research paper concludes: "The absence of event horizons means that there are no black holes — in the sense of regimes from which light can't escape to infinity. There are however apparent horizons which persist for a period of time."

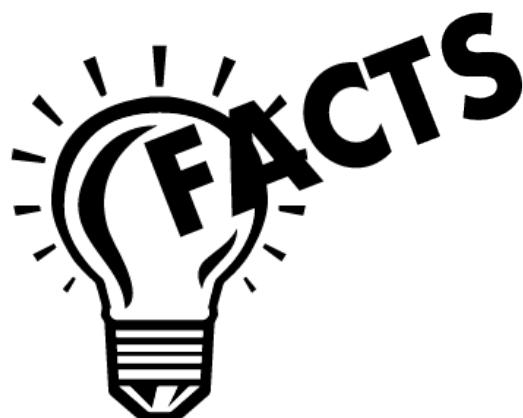
It's worth noting that Hawking's new paper is just two pages long, contains no calculations, and hasn't yet passed peer review. It does seem to do what it set out to achieve, though. Complex problems don't necessarily have complex solutions. Speaking to *Nature*, Hawking had a little more to say about the matter, too: "There is no escape from a black hole in classical theory," Hawking said. "[Quantum theory, however] enables energy and information to escape from a black hole." To fully explain the process, though, the theoretical physicist admits that we're still looking for a theory that ties up gravity with the other universal constants — a theory that, Hawking says, "remains a mystery."

# E-Possibilities

Digital India is a flagship programme of the government to empower India and Indians using technology. More significantly, it is a transformational initiative incorporating the spirit of "sabka saath" to create a new India by ensuring "sabka vikas". Digital India aims to bridge the gap between the digital haves and have-nots. Digital India BRIDGE(bringing revolution in digital governance and economy) channelizes initiatives like Aadhar, E-Sign, Digital lockers, Aadhar pay and BHIM(Bharat Interface for Money) to offer citizen-centric services at marginal costs or zero cost. The trinity of jandhan, Aadhar and mobile (jam) uses more than 116 crore smart phones, 110 crore bank accounts, including 29 crore Jandhan accounts to bring about inclusive development.

Digital India has been a driver of good

governance, epitomising the government's credo of "minimum government, maximum governance". Direct benefit transfer (DBT) is an example of that. The government believe in encouraging innovation and nurturing talent. With nearly 1000 start up deals, engaging around 50,000 youth and valued at 50,000 crore a year, India is the world's third largest start up hub. More than 80 new mobile manufacturing units have come up in the past two years and is expected to touch 50 crore units by 2020. Digital India is one of the biggest government programmes in the world to bring about sustainable and inclusive societal reforms using digital technologies. The process of making India into a trillion-dollar digital economy has begun and digital India is making this dream a reality, of creating a new ad better India.



- Average human body contains ten times more bacterial cells than human cells.
  - At over 2000 kilometre long, the great barrier reef is the largest living structure on earth.
  - There are 8 times as many atoms in teaspoonful of water as there are teaspoonful's of water in the Atlantic ocean.
  - Individual blood cell takes about 60 seconds to make a complete circuit of the body.
  - The known universe is made up of 50,000,000,000 galaxies, there are between 100,000,000,000 and 1,000,000,000,000 stars in a normal galaxy. In the milky way alone there might be as many 100 billion earth-like planets, may be we are not alone for sure.
- There is enough DNA in an average person's body to stretch from the sun to Pluto and back 17 times.
  - It can take an photon 40,000 years to travel from the core of the sun to it's surface, but only 8 minutes to travel the rest of the way to earth.

# मोबाइल

मोबाइल की वजह से सारा जमाना गड़बड़ा रहा  
कभी लगता है, आदमी अकेला बड़बड़ा रहा है।  
माना की इससे जीवन बड़ा आसान हो गया है,  
मगर इसी से जीवन में घमासान भी हो गया है।  
अधिक बतियाने वाला अक्सर दो भागों में बटा है,  
वो अपने आस पास के माहौल से कटा रहता है।  
कोई दाव लगा, कोई शेयर संग ऊचा नीचा जा रहा है,  
कभी लगता है आदमी अकेले में बड़बड़ा रहा है।  
पल दो पल की शांति के लिए आदमी मंदिर जाता है,  
फोन बजता है और दुनिया का पिटारा खुल जाता है।  
मोबाइल की रिंगटोन कम्बखंत कभी मानती नहीं है,  
हालांकि सूझव ऑफ़ - साइलेंट में मनाया जा सकता है।  
पर इसी बीच कोई अर्जेंट काल भी आ सकता है,  
सीरियल की तरह जीवन में भी ब्रेक्स आ गये हैं।  
मोबाइल के कारण रिश्तों में क्रैक्स आ गये हैं।  
सास जान गई की बुराई करने वाला कौन था।  
भाभी क्या जाने ननद के फोन का स्पीकर आँठ था।  
बाप बेटे पर तो बेटी मां पर खीजी है,  
क्या करे ..... जीवन का नेटवर्क ही बिजी है।  
“सिम - सिम खुल जा” जैसे दुकानें खुल रही हैं,  
कोई भी सिम तो बड़ी आसानी से मिल रही है।  
सिम का मिलना बड़ा तो बड़ा ही आसान हैं,  
मगर नम्बरों के जाल से आम आदमी परेशान हैं।  
डबल डबल नम्बरों से कस्टमर कन्फ्यूज हो रहा है,  
कहीं सिम तो कहीं नम्बरों का मिसयूज हो रहा है।  
इंसान सहजता छोड़ झूठे दिखावें में खो गया है,  
आज का इंसान भी शायद मोबाइल हो गया है।  
रातों की नींद और दिन का चैन खोता है  
सिफारिश से री-चार्ज, रिश्वत से चार्ज होता है।  
होता कहीं है और बताता कहीं है  
आज का आदमी भी क्या छुल सिम नहीं है?  
वक्त बेवक्त खन खन रहा है,  
मोबाइल की वजह से सारा जमाना गड़बड़ा रहा है।

# पता नहीं किस द्वंद में

पता नहीं किस द्वंद में  
फंसे हैं सब उस छंद में  
जिसका अर्थ भी विरक्त है  
उस ही के प्रसंग से

मैं ढूँढता नक्षत्र को  
उस सूर्य के आकाश में  
जहां धूमिल है हर वायुकण  
उस अग्निमय प्रकाश में

समय ने फिर सूर्य को गिरा दिया  
और चन्द्र की छाया ने धरा को फिर शीतल किया  
उस चन्द्र की आर्द्र छीट में चिर नींद मैं सो गया  
जब जागा तो मेरा पथ प्रशस्त्र खो गया

दो में से अब तो तुम चुन लो  
चीरोगे उस तेजमय प्रकाश को या फिर गिरोगे निशा  
की गोद में  
क्योंकि खोज का अंत अब इन्हीं दो स्रोत में  
निर्णय तुम्हारा है पछताना ना हो अंत मे  
नहीं तो फिर मिलेंगे फिर किसी द्वन्द में  
फसने किसी छंद में जिसका अर्थ भी विरक्त है उस ही  
के प्रसंग से

प्रांचल मिश्र “उन्नाद”  
कंप्यूटर साइंस इंजीनियरिंग  
(द्वितीय वर्ष)

# निश्छल दर्पण

पहचान नहीं पा रहा खुद को कौन हूँ मैं  
शायद इसलिए एक मूक की भाँति मौन हूँ मैं

इरादा तो रखता हूँ पूरी दुनिया में पहचान बनाने की  
पर आदत है मन ही मन खुद को झुठलाने की

डरता हूँ शायद प्रकाश में मेरा इश् उजागर ना हो जाये  
दूसरों को क्या मेरा प्रतिबिम्ब मेरे अपनों को ना भाए

पर यूँ डर डर के कब तक जीयूँगा मैं  
विष बन गए हैं जो अमृत के धूँट उन्हें कैसे पीयूँगा मैं

विष रुपी अमृत पीना पड़े तो पीता रहूँगा मैं  
खुद के लिए ना सही मेरे अपनों के लिए जीता रहूँगा मैं

फैसला जो अब अटल किया कि दृढ़ संकल्पित हो जाऊँ  
तो शायद उस निश्छल दर्पण में खुद को पहचान पाऊँ

लगा जब मैंने अपने प्रतिबिम्ब को पहचान लिया  
पता चला तब उस निश्छल दर्पण ने मुझे दूसरा जीवनदान दिया

संजीव यादव  
कंप्यूटर साइंस इंजीनियरिंग  
(द्वितीय वर्ष)

# पल

पल पल के फेर में घंटों हम सोचा करते हैं  
क्या पड़ी है हमें ??  
कहीं पल ही तो नहीं ज़रूरी हमें ????  
नतीजतन  
साथ पलों का भी केवल पल भर ही रहा

# मायने

प्रज्जवलित हुए दीप, सब अँधेरे छट गए  
अब बाहर सब जगमग, कहीं अन्दर तो नहीं डगमग?  
पाओ अगर हाँ इसको तुम, पर्व मायने सही निकल गए,  
पर क्या कर पाओगे तुम, एक दीप सौहार्द भी जलाओगे तुम ?  
फिर हाँ अगर खुद से आए, तो पर्व मायने सही निकल गए,  
तो हुए अब सब जगमग, जब अन्दर नहीं कोई डगमग

आकाश त्रिपाठी  
कंप्यूटर साइंस इंजीनियरिंग  
(द्वितीय वर्ष)

## **BEETEIN HUE PAL**

*Jab teri ankhein khuli toh sapne the,  
Aaj band hui toh bas apne the.  
Choti si yeh zindigi thi teri,  
Par in mein yadein kuch ankhein thi meri.  
Yaad hai tujhe voh hasta hua kal,  
Yadoon ki mutthi mein bandhe hue voh pal.  
Mutthi toh bandh ho gai bharke teri yaadein, Jane kahan tu chala gaya chod k kuch  
Mulakatein.*

**Nishita Singh**  
**I ET**

## **KHUSH HU**

*Aaraam nhi to kaam me khush hu!  
Din nhi to raat me khush hu!  
Bunk nhi to class me khush hu!  
Roti nhi to daal me khush hu!  
Call nhi to miss call me khush hu  
Mummy pass nhi to friends ke saath khush hu!  
School ka grup nhi to watsaapp group me khush hu!  
Jo beet gya uski yaad me khush hu!  
Jo aane vala nahi uske intezar me khush hu!  
Ye zindagi hai choti se yaaro mai har pal me khush hu!*

## **THINK LIKE A TREE**

*Soak up in the sun, Be graceful in the wind,  
Feel refreshed after it rains, Grow strong without notice  
Think like a tree.  
Be prepared for each season,  
Provide shelter to strangers ,  
Stay deeply rooted while reaching for the sky .  
Be still long enough to hear your own leaves Rustling,  
Once again think like a tree.*

**Alice**  
**I CSE**

# MARYAM

*"the beauty of mathematics only shows itself to more patient followers"*

I would like to use this opportunity and platform to talk about an exceptional personality, Mariam Mirzakhani.

Words fall short when it comes to define her brilliance and intelligence. She broke stereotypes and myths formed against women, throughout her life. By winning the Fields prize in mathematics, she gave uncountable women the sense of pride, butchering the myth and closing the argument once and for all; That women are less intelligent than their male counterpart.

She went against the wind and normal cultural norms when she took up mathematics as her core subject. Soul-breaking comments flooded, mocking her, insulting her, but amidst all she stood with her head held high. No remark ever was disheartening enough to lower her love for mathematics. She kept moving forward and forward. And then one day, her patience and hardwork was fruitful when she won the Nobel equivalent in maths.

Unfortunately for the world, we lost her at a very early age in 2017 to cancer. She was just 40. Even though she's not with us today, in her short span of living ,she achieved the unachievable. She lit a torch of hope for girls to receive increased.

Shrishti Bajpai  
II CSE

# WOMEN EDUCATION

**"women have as much knowledge and ability but men undertook to shape the destiny of women..."**

What does women mean? Have you ever wondered? Yes, women is representative of respect, work ship, courage, will-power, confidence and so on. She is the role figure of past, present and of course future too.in our past Rani Lakshmi Bai, Sarojini Naidu any many more women showered their ability to make our country developed and this was possible due to education. Education is the most effective and approachable weapon which bombards the awareness among society.

In the present scenario education of women has become a matter of concern because still at many places women do not get equal education and too in urban areas ,to tackle such situations government has launched many schemes which able the girls to receive free education.

We have example ray role models who proved themselves in every area whether home or outside like Vijay Laxmi Pandit in \_\_\_\_\_,Pratiba Patel as first female president, Malala Yusuf Zai fighting for education and many more. From scientists to doctors women proved to be no less than men. 50% of world's population is female so when the all the women are educated then it's undeniable that world would be a better place.

In a nutshell I would like to sum up this with a quote that perfectly defines the situation:  
"women should be given a chance to bloom, not to become a winter's moon....."

Shrishti Bajpai  
II CSE

# INSULT

## SHE SIMPLY REFUSES TO TAKE IT



She was on a phone call the other day and she noticed a word cloaked in a joke. “\_\_\_\_\_”

This mongrel of an insult , spilled in to put her in her place .and what place might that be ? The back seat of a slow moving train of your brain reserved for women who were too big to fit into your narrow mind or too tall to cover under your insecurities .

Genus : Selfish

Species : Ambitious

And if you think \_\_\_\_\_ offends her , She has a news for u.

\_\_\_\_\_ is a teacher who stands against a system . The \_\_\_\_\_ is a multi - tasker and that's why she has no time for your excuses. The \_\_\_\_\_ has a multi-million dollar business that was based on doubt and sheer determination . The \_\_\_\_\_ is pure ambition with hormones, yeah hormones. The \_\_\_\_\_ is a girl that said no and meant it and she left with her yes safely tucked in her hand bag . A \_\_\_\_\_ can't always be nice , but she may be the kindest . A \_\_\_\_\_ loses sleep for her kids , but dreams for herself . The \_\_\_\_\_ is your boss who gave you the raise . The \_\_\_\_\_ wears what she likes and is not afraid to have her heart broken . So the next time u look at her and want to send her flowers .

The next time you look at her face ,her eyes ,her clothes ,her skin ,her moods ,her shoes ,her voice, her vice, her sacrifice , her now , her then , her fight , her time , her love , her light , her heart, her mistakes , her “very being”

Please sign the big red roses to the ..... ”\_\_\_\_\_”

Where.....

\_\_\_\_\_ is a verbal eye-roll and the only insult you make to classify any woman who is not your cup of tea because she refuses to pour it.

Content Source: Shruti Hassan Unblushed

Edited By: Sonal Dwivedi

Computer Science and Engineering

2<sup>nd</sup> Year

# Just a few.....

- ❖ May be a topic of contradiction but for her holding faces is more like giving the world what they want while still being “SHE”.

So she simply loves to ..

“FAKE it with REALITY”

while following the lines-

“Like all ,Trust none...”

Feel for all , Fall for none...”



- ❖ How do you define the feeling of loving someone and not liking them ???

---she calls it being MANIPULATIVE

But trust her when she says-” the people around you deserve much better’, cause there’s much more to someone than we usually see.

- ❖ Living HELL when you dream a lot but it’s just one consistent dream which you can’t even mention as nightmare cause that’s the only place on this holy earth where we meet.

- ❖ last time I complained to you for being more like a gust of wind and taking everything from me,

This time you were slow and way more cruel,

You ripped my ego apart,

Made me beg before you to reduce the pain.

You presented yourself as life’s absolute reality.

And yes you finally won by tempting me to mention you as “dear death”

- ❖ Keep it fancy , maintain distance “HEAVEN”.

Go close, get betrayed ...

Here comes the “HELL”.

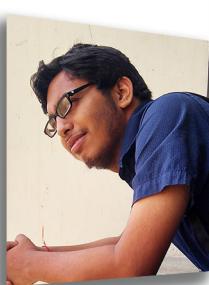
.....words

By: Sonal Dwivedi  
Computer Science and Engineering  
2<sup>nd</sup> Year

# Editor's Bench



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Content Editor/Writer



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Content Editor/Writer

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Content Editor/Writer



**Shrishti Bajpai**  
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Designer



**Abhishek Bajpai**  
Lead Design



**Naveen Tiwari**  
Lead Editing/Writing



## **ABOUT TECHNICAL CLUB - REC KANNAUJ**

Technical Club of Rajkiya Engineering College Kannauj is an appreciable initiative by the faculty and students to bring the institute on same platform with national as well as international institutions. This club, when fully functional, is to consist of 7 to 8 members all of whom were selected on the basis of critical assessment of their skill set. Under the precious guidance of the faculty members, this club is all set to and will create new horizons in the development of the college. The group will represent the college for various competitions held across the nation and will also look after for technical advancement of the institute in best possible way.

This will embark a new journey for this institute and provide the students with best possible opportunities that can be accumulated and bestow creative minds to work on innovative ideas. Members have immense dedication and devotion towards work, and toil very hard with a never say die spirit to achieve a singular goal of excellence in the field of technology with in suppressible zeal.

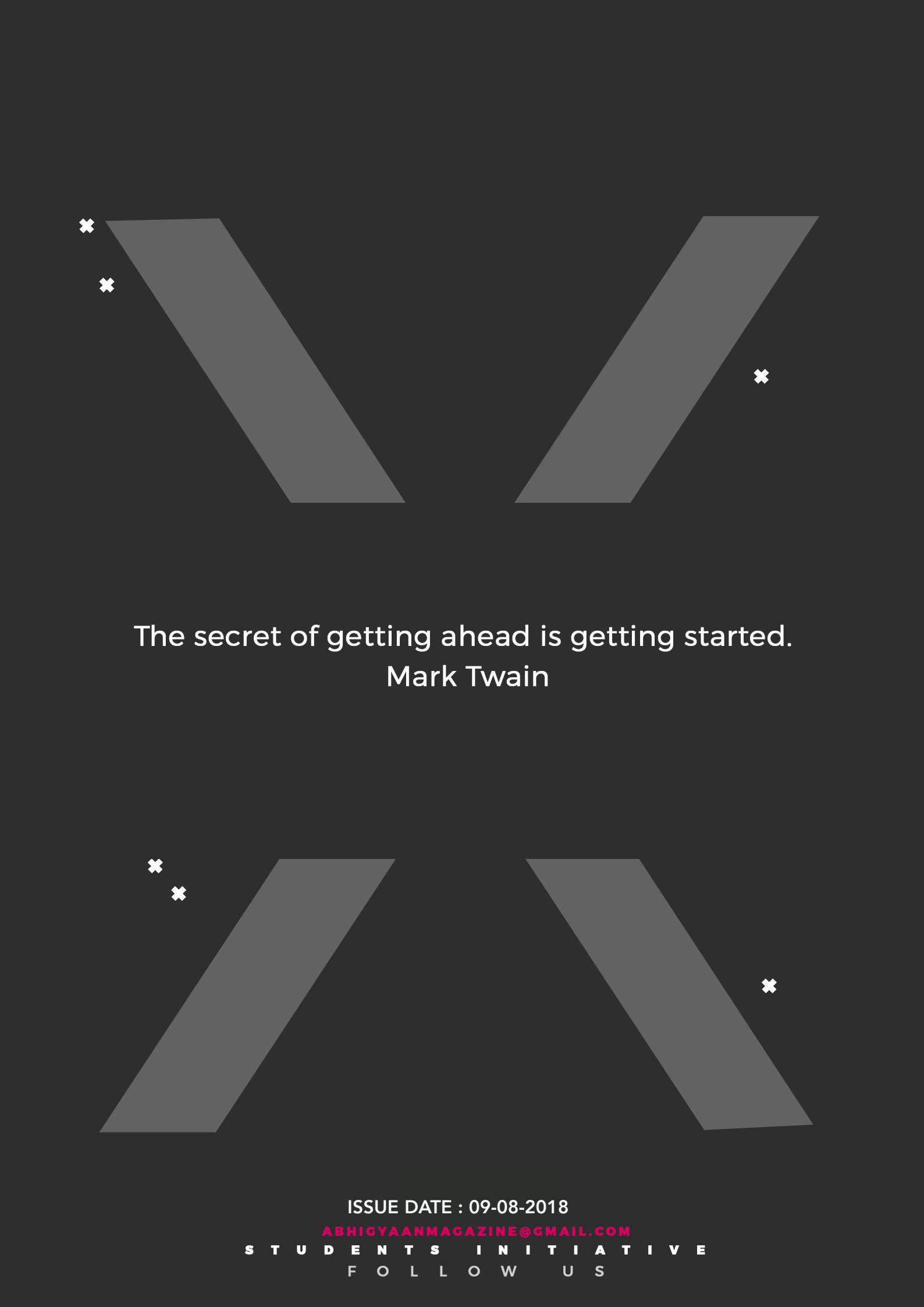
The main objective for this club are:

- To provide a platform where the neoteric ideas of students could be nurtured and prepare students in such a way that they can face any hurdles in the way of learning and can deal with the ever changing or dynamic technology.
- To enhance the students practical knowledge horizon by organizing the workshops, seminars and competitions on various technical level within the college.
- Provide a beneficial platform to the students to express their ideas freely and meaningful guidance in their field of interest.
- This club constitutes handful of students but represents the wishes of all the students and duty to steer the college towards a brighter and glorious future, all set to make a dent in the universe.

***"Journey of million miles begins with a single step"***

**Follow Us:**





The secret of getting ahead is getting started.  
Mark Twain

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[ABHIGYAANMAGAZINE@GMAIL.COM](mailto:ABHIGYAANMAGAZINE@GMAIL.COM)

S T U D E N T S I N I T I A T I V E  
F O L L O W U S