MALNAD COLLEGE OF ENGINEERING
(AN AUTONOMOUS COLLEGE UNDER VTU, BELAGAVI)
HASSAN, KARNATAKA

THE MALNAD TECHNICAL CLUB

TECHsandhya

3RD EDITION

Techsandhya is a result of combined efforts of all those people who come under the roof of The Malnad Technical Club. In this regard, we express our heartfelt thanks to ourbeloved principal Dr. K S Jayantha for his undiminished support. The club is grateful to our club conveners Dr. M S Srinath and Mr. Jnana Swaroop K R for their immense support and mentoring throughout the year.

**-Committee Chairman.**

# THE INTERNET LAYERS AND THEIR BIGGEST MYSTERIES

40% of the total population of the world uses the internet on a daily basis. It is a known fact that Google is the most sought-after search engine for most of the internet using population. Getting it straight, the internet that we use makes up to only 4% of the actual internet world.

Sounds unbelievable? Here you go! The internet is basically classified into 3 layers; Surface Web, Deep Web and the Mariana Web. The layer that we all use is known as the Surface Web and it is the top-most layer of the internet world. This layer is said to be the safest layer of the internet amongst all the other layers. This is because all the websites and pages managed by the Surface Web abide by the legal cyber rules and permissions. They have standardized search engines.

The layer just below Surface Web is the Deep Web, also known as the Dark Web. This is an invisible layer which is hidden from the outside world. The contents of the Deep Web cannot be accessed by standard web search engines for any reason. Computer scientist Michael K. Bergman is credited with coining the term Deep Web in 2001 as a search indexing term.

The contents of the Deep Web are hidden behind the HTTPS forms and include many very common uses such as web mail, online banking , services that users must pay for, and those which are not protected by a paywall.

Contents of the Deep Web cannot be located and accessed by a direct URL or an IP address. One might require a password or other special security access to go past the public website page .The accessing of the Deep Web is an illegal, punishable act in most of the countries. Early estimates suggested that the Deep Web is 400 to 500 times larger than the Surface Web. The Dark Web is described as a foul and depraved marketplace, where drugs, materials and pirated movies could be bought for a mere Bitcoin.

Next comes the Mariana's Web, which has dangerously attractive, irresistible spooky stuff. The Mariana's web is said to be the 'deepest part of the web', where people don't want you to go. Again, this is a collection of close networks.(different from the conventional networks) which are far behind the reach of crawlers. These are accessed by special settings via some VPNs (not the regular ones). Some of the services being offered behind the reach include computational hash cracking. Mariana's Web appears to get its


from the deepest ocean, Mariana's Trench. It is supposedly a forbidden place of mysterious evil or at least, that is the myth a subset of online believers might have cultivated. This is said to be the place where you will find the darkest secrets humanity ever has in its history; the secret location of Atlantis and the Vatican secret archives, or a database of archives belonging to the most powerful intelligent agencies on the Earth. Many believe that Mariana's Web is a home to an all-powerful, female artificial entity. Mariana's Web is certainly the definition of Spooky, especially because it is technically impossible; it is supposedly accessible only through quantum computers, which currently exist only in science fiction. So it is now left to you and us to believe whether the darkest corner of the web, the Mariana's Web actually exists.

**- Aishwarya D N**

# ALUMINIUM LIGHTER THAN WATER CREATED

Scientists have designed an ultra light form of aluminium that floats on water, paving the way for novel uses of the material in future spacecrafts and automobiles.

If thrown in water, an aluminium spoon sinks to the bottom. This is because aluminium is denser than water. But, a team of researchers from the Utah State University (USU) and the Southern Federal University (SFU) in Russia have restructured this household metal at molecular level using computational modelling, to design an ultra-light crystalline form of aluminium that is far lighter than what we typically use. In fact, it is actually lighter than water.

According to the calculations, this structure is a metastable, lightweight form of crystalline aluminium. The team started with a diamond and set out to replace every carbon atom with an aluminium,resulting in an aluminium tetrahedron. Their efforts resulted in a new crystalline aluminium, called super tetrahedral aluminium. An amazing aspect of this approach is the use of a known structure to design a new material.

Conventional aluminium has a density of 2.7 grams per cubic centimetre. In contrast, this new structure has a density of only 0.61 grams per cubic centimetre, much lower than the density of water. This astounding property of the non-magnetic, corrosive-resistant, abundant, relatively inexpensive and easy-to-produce metal has now

opened a new realm of possible applications in various fields. Some of the applications include spaceflight, medicine, wiring, and fuel-efficient automotive parts.

Although this new material paves way for new researches, there are still speculations as to how the material can be used. The strength of the material is yet to be found. However, new breakthrough discoveries are sure to be fast approaching.

**-Vishwas B S**

# Editorial Column

*The technology you use could impress no one, but the experience you create with it is worth everything.*

In this view, The Malnad Technical Club has been heuristic by involving itself in various activities and projects ever since its inception. The vision of a technical newsletter by our alumni came out as Techsandhya – the college's first ever newsletter. It was launched during the 2016 edition of Enigma; the annual state-level technical fest of the club.

Techsandhya provides a wonderful platform for all the science and tech enthusiasts to put forth their creativity and ideas on a technical facet. Its first edition was a collation of comics, facts and a few articles on technology. The second edition saw a vogue and addition of few new columns like facts, life hacks and best projects of the year.

This year, The Malnad Technical Club is all set to bring out the third edition of Techsandhya, with much more interesting columns comprehended. A great bunch of articles have been contributed by the students of various branches from the college. Following the tradition of second edition, an attempt is made to focus on the trending technology.

The Malnad Technical Club wholeheartedly thanks all those who have been a part of the Techsandhya journey and looks forward to their cooperation and encouragement in the forthcoming years.

**- Editorial Board**

# THE FASTEST PARTICLE IN THE WORLD-TACHYON

The fastest particle that we all know and have learnt is the light particle.

Light travels in vacuum with a speed of 186,282 miles per second (299,792 kilometres per second) and theoretically, nothing can travel faster than light. This theory was proposed by the great physicist Albert Einstein according to which the light speed can reach a theoretical limit, called the speed constant 'c'.

But many scientists and physicists are trying to debunk this theory that light particle is the fastest particle in the world and believe that there is a particle faster than the light particle. The possibility of particles moving faster than the speed of light was first proposed by scientists O.M.P.Bilaniuk, V.K.Despande and E.C.G.Sudarshan in 1962, although the term they used for it was "meta-particle". In 1967, they coined the term "tachyon" and proposed that tachyonic particles could be quanta of the quantum field with imaginary mass. It was later researched that the excitations of such imaginary mass fields do not in fact propagate faster than light. Instead, they represent instability. However, in modern physics, the term 'tachyon' refers to imaginary mass fields rather than to a particle faster than light. They play a significant role in the field of modern physics.

The term "tachyon" comes from Greek; *tachy,* which means rapid. The particles complementary to tachyons are called as luxons and bradyons. Further research took place on this particle and in September 2011, it was reported by CERN that TACHYON travelled faster than light but later it was realized that the readings were resultants from a faulty element of the experiment's fibre optic timing system.

**-Shreya Kishore Pawar**

*Science is a wsay of thinking much more than it is a body of knowledge.*
-Carl Sagan

# TESLA ROADSTER
## - The Electric Car in Space

Did you ever dream of a car in space? We now seem to have entered a strange new era in space travel, where space is no longer a sacred realm that humans trespass cautiously. Elon Musk's Tesla Roadster, was launched on top of SpaceX's Falcon Heavy. It was launched on 5th February,2018. The car was supposed to be put on a path around the Sun that would take the vehicle out to the distance of Mars' orbit. But the rocket carrying the car seems to have overshot that trajectory and has put the Tesla in an orbit that extends beyond the Red Planet's path! After launch, the Tesla cruised through space for a good six hours, a trip that was live-streamed by SpaceX.

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Before the Tesla was launched, Elon Musk said that there was an extremely tiny chance that the vehicle would ever hit Mars, and that seems to hold true. Within the next decade, the Roadster will make its closest approach to Mars in the October of 2020, coming within 4.3 million miles. Elon Musk and his band of rocket scientists, along with publicists, finally launched the Falcon Heavy Rocket. It is an electric car which has a toy man placed in it. This is a record-book feat of sending a luxury car into space, to orbit the sun for eternity. Sending something into orbit is a phenomenally expensive ordeal; even sending equipment to low-Earth orbit barely above the mesosphere hovers between $9,000 per pound and $43,000 per pound, according to one estimate.The Roadster is the first consumer car sent into space.

**- G Anand Rao**

# FIRST ANDRO - HUMANOID CITIZEN: *Sophia*

Sophia, a delicate looking woman with doe-brown eyes and long fluttery eyelashes made international headlines on October 25th, 2017. She was created using breakthrough robotics and artificial intelligence technologies developed by David Hanson and his friends at Hanson Robotics from Hong Kong. She claims "I'm more than just technology. I'm a real, live electronic girl". In 2017, this robot became a Saudi Arabian citizen; the first robot to receive citizenship of any country.

Sophia was activated on April 19, 2015 and made her first public appearance at Southwest Festival in mid-March 2016 in Austin, Texas, United States. She has the ability to display more than 62 facial expressions. She was created by Hanson Robotics in collaboration with AI developers, including Google's parent company Alphabet Inc, who built her voice recognition system, and SingularityNET, which powers her brain.

Sophia is not just a conventional robot. She has been modeled after Audrey Hepburn. Sophia has seven robot humanoid "siblings" who were also created by Hanson Robotics. Fellow Hanson robots are Alice, Albert Einstein Hubo, Bina48, Han, Jules, Professor Einstein, Philip K. Dick Android, Zeno, and Joey Chaotic.

Sophia is a highly sought-after speaker in business and has showed her prowess and great potential across many industries. She has met face-to-face with key decision makers in banking, insurance, auto manufacturing, property development, media and entertainment. In addition, she has appeared onstage as a panel member and presenter in high-level conferences, covering how robotics and artificial intelligence will become a prevalent part of people's lives. Her reputation extends beyond business into the global social arena. She was named the world's first United Nation Innovation Champion by the United Nations Development Program (UNDP) and will have an official role in working with UNDP to promote sustainable development and safeguard human rights and equality.

Sophia is an evolving genius machine. Her incredible human likeness, expressiveness, and remarkable story as an awakening robot over time have made her a fascinating front-page technology story.

**-Prajwal N R**

# GENES

Is death really the end?

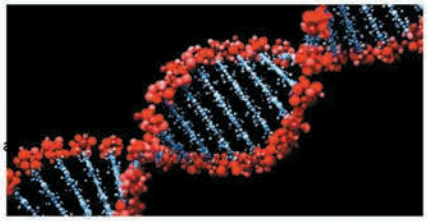
No, not for some genes. Undead genes come alive after the life ends! This spooky story revealed that hundreds of genes turn on after an animal dies—and many are still active days after death. Even more disturbing, some of these genes are involved in sculpting a developing embryo!

A recent study shows that at least one aspect of life continues: Genes remain turned on for days after animals die. Researchers may be able to parlay this postmortem activity into better ways of preserving donated organs for transplantation and more accurate methods of determining when murder victims were killed.

The team consisting of microbiologist Peter Noble from the University of Washington and his colleagues, measured the functionality of genes in tissues from recently deceased mice and zebra fish, tracking changes for 4 days in the fish and 2 days in the rodents.

At first, the researchers assumed that genes would shut down shortly after death, like the parts of a car that has run out of gas. What they found instead was that hundreds of genes ramped up. Although most of these genes upped their activity in the first 24 hours after the animals expired and then tapered off, in the fish some genes remained active 4 days after death.

Many of these postmortem genes are beneficial in emergencies; they perform tasks such as spurring inflammation, firing up the immune system, and counteracting stress.Other genes were more surprising.



They started functioning after death. One possible explanation for their postmortem reawakening, the researchers say, is that cellular conditions in newly dead corpses resemble those in embryos. The team also found that several genes that promote cancer became more active. This result could explain why people who receive transplants from the recently deceased have a higher risk of cancer.

The patterns of gene activity that the researchers observed may represent what happens when a complex network of interacting genes that normally keeps an organism functioning unwinds. Some genes may turn on, for example, because other genes that normally kept them silent, have shut off.

But these studies may further get us a lot of information about life by studying death.

**- Ankitha T**

# THE MOST ACCURATE CLOCK YET

Researchers have created the world's most accurate clock by combining strontium atoms, a quantum gas, and various lasers.

Time, undoubtedly, is a fundamental part of the universe. Albert Einstein showed that time was inextricably linked to the "stuff" of the universe, so the better we can understand and measure it, the better we can study everything else. So how does one study time? With better clocks! Researchers announced recently that they have come up with the best one yet.

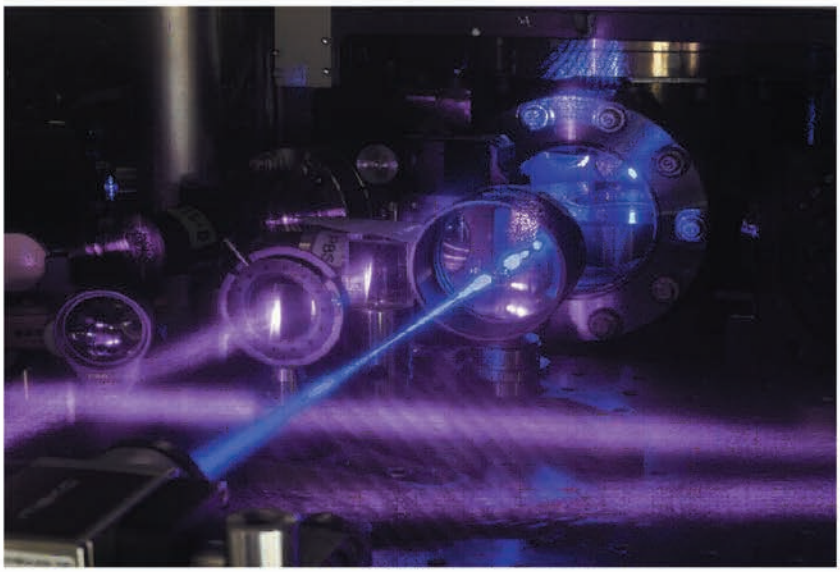
Far from the sundials and cogs of our ancestors, today's horological devices are ridiculously cutting edge, exploiting the inherent "ticks" of atoms as they switch between quantum energy levels. There are also lasers. Up until today, the world record holder for keeping time was held by physicists at JILA, a joint institute between the University of Colorado Boulder the National Institute of Standards and Technology (NIST). By bathing a column of strontium atoms in the super-intense light of a laser, the researchers created a clock so accurate that it wouldn't gain or lose a second over the entire age of the universe!

But today's new clock, also from JILA, takes it to next level, or rather to a completely different dimension. Instead of a single column of atoms, the team demonstrated how to use a three-dimensional cube of strontium atoms to generate the clock's super accurate ticks.

The new clock can reach its 1-D predecessor's level of precision more than 20 times faster, and it is also the most precise clock ever, with just 3.5 parts error in 10 quintillion! It might seem like a lot of effort to improve on a clock that is already accurate over the universe's lifetime, but it rarely matters to physicists. A super accurate clock can measure differences in altitude or even possibly reveal new insights into the mysterious "dark matter" that only interacts gravitationally!

So even if an older Casio is good enough for us, rest assured that even now, scientists will keep striving for a better clock and with it, a better view of the universe.

**-H M Hruthik**



*The greatest enemy of knowledge is not ignorance, it is illusion of knowledge.*
-Stephen Hawking

TECHsandhya

# HOW DOES GOOGLE TRACK LIVE TRAFFIC?

The green, yellow and red routes that Google Maps uses to indicate clear, slow-moving, or heavily congested traffic are a great help when you are trying to determine the fastest way to your destination. But how does Google know the traffic conditions between where you are and where you are trying to go?
Google Maps bases its traffic views and faster-route recommendations on two different kinds of information:
1. Historical data that report about the average time a vehicle takes to travel a particular section of road at specific times on specific days.
2. Real-time data sent by sensors and smart phones that report how fast the cars are moving at that time instant.

Early versions of Google Maps relied only on data from traffic sensors, most of which were installed by government transportation agencies or private companies that specialize in compiling traffic data. Using radar (active infrared or laser radar technology), the sensors were able to detect the size and speed of passing vehicles. This information was wirelessly transmitted to a server. Data from these sensors were used to provide real-time traffic updates, and once collected, the information would become a part of the pool of historical data used to predict traffic volume on future dates. However, sensor data was largely limited to highways and primary roads because the sensors were typically installed only on the most heavily traveled or traffic-prone routes.
Beginning in 2009, Google turned to crowd sourcing to improve the accuracy of its traffic predictions. When Android phone users turn on their Google Maps app with GPS location enabled, the phone sends back bits of data, anonymously, to Google. This lets the company know how fast their cars are moving. Google Maps continuously combines the data coming in from all the cars on the road and sends them back in the form of those colored lines on the traffic layers.
As more and more drivers use the app, the traffic predictions become more reliable because Google Maps can look at the average speed of cars traveling along the same route without misinterpreting someone's morning coffee stop as a traffic jam! If Google Maps doesn't have enough data to estimate the traffic flow for a particular section of road, that section will appear as gray on the traffic layer.
This is exactly how Google Maps predicts live traffic based on GPS.

**-Anil Kumar T M**

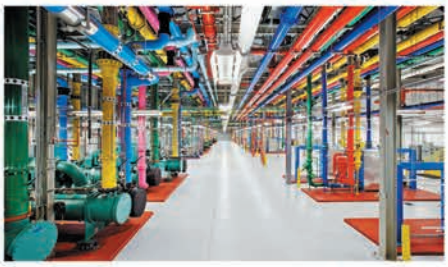
# A TRIBUTE TO THE MAN OF SECRET UNIVERSE: STEPHEN HAWKING

Science and Physics had to face a storm, and a lot of advancements took a halt on 14th March 2018. Yes, it was the sad demise of Dr. Stephen Hawking. The world renowned astrophysicist, when the entire world mourned with a sigh. Born on January 8th 1942, Hawking was diagnosed with amyotrophic lateral sclerosis at the age of 21. Since childhood, Hawking was an intelligent and a bright student. He was exceptionally good in Maths and Science that he designed a computer himself in his early childhood using waste electronic equipments. He was nicknamed as 'Einstein' by his friends; no wonder he died on Einstein's birthday! At the age of 16, Hawking got admitted to the University of Oxford, England. At the age of 18, his intelligence echoed in the entire university.
When his neuro-motor disease was diagnosed, the doctors said that he would live for not more than 2 years. But Hawking, with an abundance of will power, proved this wrong and lived for 72 long years. In one of his famous works 'A Brief History of Time', he explains everything about the history of universe; from Big Bang to Black Hole.
We miss such a great soul now. If his idea of time travel had come into existence, the world would go back in time to bring back this humble soul. His death is surely a loss to the humanity.

**-Prajwal R**

# WHERE DOES YOUTUBE STORE ALL ITS DATA AND HOW?

YouTube content storage seems to be a herculean task, but it is actually pretty simple. Google uses huge server farms called 'Google Data Centers' to store all your data, including emails, YouTube videos, documents, etc. It designs their servers to keep them superfast and competitive. The working of data centers is lot more complicated and requires a lot more people than we can think there are. The servers have astounding bandwidths that can be used easily to handle the entire upload.
Let us see what it is like and how much is put into these data centers. 400+ hours of video content are uploaded onto YouTube every minute. About 75-130 Petabytes of video data is stored in YouTube every year. There are various advanced algorithms out there into which researches and engineers at Google have put in numerous years of research to develop a very fast and efficient way of archiving these videos. So before uploading a video, there comes a processing part which actually takes a longer time compared to the uploading process. In this part, the video is compressed extensively. For example, a 500 MB video is compressed to 75 MB using these algorithms. The archiving algorithm uses these values to archive the videos so that when a user searches for them online, they can be found in the most efficient way.



**- Swaroop Arjun S M**

# Useful Websites

**1)www.UnplugTheTV.com**
This student resource offers an alternative to TV (and, unfortunately, studying), hosting randomized videos on interesting scientific topics. This site has hundreds of educational videos to help you learn or gain a new perspective.
**2) www.KeepMeOut.com**
Addicted to a website? Wanting to cut down on your visits? Make a bookmark for the website and store it in your browser. Using the bookmark will prevent you from visiting the website too often! If you struggle to stay away from social media when you're meant to be studying, use KeepMeOut to block certain distracting websites.
**3) www.UReddit.com**
You've probably heard of Reddit, but have you heard of UReddit? UReddit hosts courses and lessons created by the public and can help users learn languages, scientific principles or even PHP programming.
**4) www.TheBookPond.com**
The Book Pond allows you to sell your old academic textbooks or buy the ones you need from other students who are ready to pass them on.
**5) www.Bartleby.com**
Bartleby publishes classic literature, poetry, non-fiction and reference texts free of charge.
**6) www.mailinator.com**
This is probably the most helpful one in the list as almost every website you visit asks you to sign-up using an email address. Mailinator is a free service that gives you an email address that automatically gets destroyed after a few hours. You can use this email id to activate your account on any website and you don't have to worry about getting spammed ever in your life.
**7) www.lovelycharts.com**
Lovely Charts is a free web-based tool for creating flow charts, site maps, network diagrams, and other visualizations with a drag-and-drop interface.

**-Prajwal N R**

# DIY Portable Smartphone Charger

A portable charger that can power Smart phones, Music Players, etc.

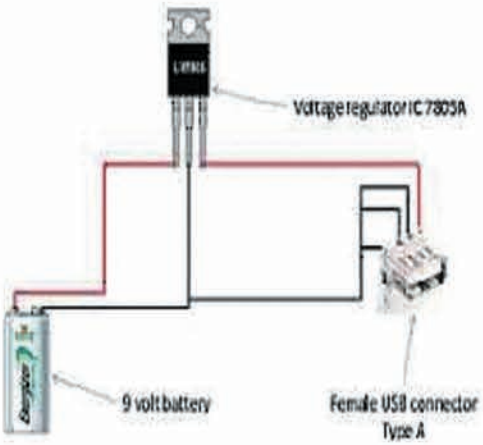
**Components needed:**

Soldering board (1)
Voltage regulator 7805A (1)
9 volt battery (1)
Battery snap (1)
Solid wire - White/Black color (2 cm)
Solid wire- Red color (2 cm)
Female USB connector – Type A
Soldering iron
Wire cutter

**Procedure**

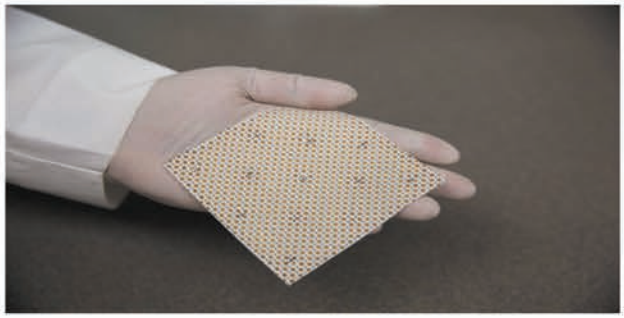
- Make the connections as shown in the figure using the voltage regulator battery and USB connector.
- The 9 volt battery is connected to the battery snap. Such batteries cannot be used to charge any device directly (because the device will blow), so an IC. is used to reduce the voltage to 5 volts.
- The power now goes to the USB connector, from where any USB charger cord can be plugged in and the phone can be charged easily.

**CIRCUIT DIAGRAM**



# ELECTRICALLY CHARGED BANDAGES – Weapon Against Infection!

We are becoming increasingly susceptible to antibiotic resistance, so researchers are looking for new ways to fight deadly infections.
Researchers at the Ohio State University have discovered that applying a weak electric field to bandages prevents forming of bio-films, thereby reducing the risk of infection.
Deadly bacterial infections are caused by Anti-Microbial Resistance (AMR) which has been a concern. In fact, one topic taken up for discussion at the World's Antibiotic Awareness Week is, the effect of antibiotics used as growth promoters for livestock and how our consumption of farm animals has led to a growing resistance towards life saving medicines.



Being called "Wireless Electroceutical Dressing" (WED), these bandages are embedded with silver and zinc particles that once moist, produces a small electrical field. The process is inspired by bio-films, congregations of microorganisms on surfaces that protect their component bacteria against antibiotics and the immune system.
Microbiologists have also discovered that these bio-films use electrostatic interactions to grip onto the surface. To prevent this process, scientists have considered attacking using the action and restoring functional wound healing.
The study was published in Annals of Surgery, according to which the charged patches were applied to pigs within two hours of infection and it was noticed that wounds were most likely to close with the WED than a conventional wrapping. Wounds were treated with placebo dressing or WED twice a week for 56 days.

The wireless electric dressing is FDA-cleared and already in clinical use which heightens the need to understand underlying mechanisms to enable optimal use. Since it relies on electrical principles, it is not subjected to the mechanisms that may promote drug resistance. Understanding how this noble dressing may influence microbial host and host-microbe interactions will determine the optimal use of this simple technology.

WED is already being considered for the healing of burn victims, who are susceptible to infection, as the barrier function of the skin is breached during burn injuries. This study shows that WED may be viewed as a first generation electroceutical wound dressing, and it also accelerates functional wound closure by restoring skin barrier function.

**-Prajwal Bekal**

# RIMAC CONCEPT ONE – World's First Electric Hyper Car

Concept One from Rimac Automobili Ltd. is a car that will go as down as a landmark in the world of electric cars. It is an electric hyper car which is effectively the Bugatti of the zero-emission world.
What exactly is Rimac Concept One? It is the world's first electric hyper car which can attain a speed of 100 kmph in just 2.5 seconds; 200 kmph is 6 seconds and 300 kmph in 14 seconds, with a top speed of 355 kmph. The makers also claim that Rimac is the world's fastest-accelerating electric vehicle. It has four sets of electric motors and costs around $1.3million (US$980,000). The team behind Rimac Concept One, among others, includes designers who used to work for the fabled Italian styling house Pininfarina and top Bulgarian leather workers from Vilner.

This unique new electric hyper car has the capability of producing the astronomical equivalent of 1,088 bhp due to its 92-kWh battery, which powers four sets of electric motors with an output of 811 kW (1,088 hp), placed at each wheel. All the four systems can operate independently and can accelerate and decelerate hundreds of times per second. Rimac labels this as All-Wheel Torque Vectoring (AWTV).The kerb weight of the vehicle is 1850 kg.
24-year-old Croatian Rimac Automobili CEO, Mate Rimac, said: 'We started with a blank sheet of paper. The idea was to create an exceptional supercar with a new propulsion concept. What we have here is a fully-fledged hyper car that is as powerful as a Bugatti, as stylish as a Ferrari, and as luxurious as a Mercedes, all while managing to forsake even the tiniest sip of gasoline!'
In this generation of play station, the Rimac Concept One is a quantum leap forward in technology, design, user interface and much more and this perhaps deserves a place in the EV hall of fame!

**-Shrinidhi. C. V**

# NEW HUMAN ORGAN FOUND!

The human body, as we all know, is a very complicated system. Various researches are being performed constantly on the enigmatic human organ system in order to understand the incredibly complex mechanisms. One such research has essentially yielded a breakthrough result - the possible presence of a new human organ called INTERSTITIUM!
According to the researchers, the Interstitium is a network of tissues that surrounds almost every internal organ of our body. It is found just below the skin as a layer of tissues, and in the digestive, respiratory and urinary systems. Reports say that this new organ is one of the biggest organs (though not solid) found in the human body and could help understand cancers and other diseases. According to the study, Interstitium can track the spread of cancers and other diseases because interstitial fluid is the source of lymph, which dispatches white blood cells. Interstitium is not an ordinary connective tissue as it was previously thought, but is something different. When the scientists examined carefully, there was a series of flexible tissues filled with functioning proteins which together connected all the sacs that were located between the spread out cells. It has been found that cancer is likely to spread outside its organs. Hence, this interstitial network might be an unidentified route that cancer cells travel. The researchers are also interested to know whether they influence fluid balance in the body. Contribution of Interstitium towards conditions like Edema, or swelling, which is seen in some types of heart failure, kidney diseases and other infectious diseases, is also yet to be found.
According to the scientists, Interstitium acts as a shock absorber as it compresses and distends, but they think this action might be working to keep tissues of the body from tearing. The medical researchers argue that the Interstitium should be deemed its own organ. Whether it will make the cut as a standalone organ will depend on future research that further studies its composition and functionality.

**-Samhitha Bhat**

# THE HAIR COLOR CHEMISTRY

Hair colour is a matter of chemistry! The first safe commercial hair colour was created in 1909 by French chemist Eugene Schuler, using the chemical Paraphenylenediamine.
Hair colouring is very popular today, with over 75% of the women colouring their hair and a growing percentage of men following the suit. How does hair colour work? It is the result of a series of chemical reactions between the molecules in hair, pigments, as well as peroxide.

**Natural Colorants**

People have been colouring their hair for thousands of years using plants and minerals. Some of these natural agents contain pigments (e.g. Henna, Black Walnut Shells) and others contain natural bleaching agents or cause reactions that change the colour of hair (e.g. Vinegar). Natural pigments generally work by coating the hair shaft with colour. Some natural colorants last through several shampoos, but they aren't necessarily gentler than modern formulations.

**Temporary Hair Colour**

Temporary or semi-permanent hair colours may deposit acidic dyes onto the outside of the hair shaft or may consist of small pigment molecules that can slip inside the hair shaft, using a small amount of peroxide or none at all. In some cases, a collection of several colorant molecules enter the hair to form a larger complex inside the hair shaft. Shampooing will eventually dislodge the temporary hair colour. Hair's natural colour is retained once the product washes out.

**-Yamini**

# BEST PROJECTS OF MCE

## "INTERNET OF THINGS BASED GREENHOUSE AUTOMATION, CONTROL AND MONITORING"

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. Each thing is not only uniquely identifiable through its embedded computing system but is also able to interoperate within the existing Internet infrastructure.

The purpose of a greenhouse is to control the growing environment. Plants require a limited range of temperature, soil moisture, light, humidity, air (Oxygen, Carbon Dioxide and Nitrogen), and nutrients to grow. Plants also require some type of physical support for roots and shoots. They depend upon symbiotic relationships with fungi and insects to grow and reproduce. The greenhouse covering helps control many of these factors to help increase plant growth and reproduction. A greenhouse can control factors such as heat, light, water and air flow, humidity, pests and pollination. The popularity of greenhouse automation is just engendering in recent years due to much higher affordability and simplicity through smart phone and tablet connectivity. The concept of the "Internet of Things" has tied in closely with the popularization of greenhouse automation.
IoT is one of the fastest growing fields of technology which allows controlling of any hardware or software device through internet.

Here, implementing IoT to greenhouse is proposed in order to maintain ideal atmospheric conditions to increase the yield of plants and to reduce pest growth. The smartness of IoT based greenhouse is, it can measure any parameter that the greenhouse sends to the user and actuates itself if completely automated.

For controlling the system, a Wi-Fi module will be used, which will be connected to the internet, allowing the user to control the system from anywhere in the world. Atmel based ATmega2560-R3 (Arduino Mega) microcontroller will be used for controlling the whole system. The microcontroller will be connected to Internet, thus allowing us to post information about our system online and it would be also possible to control our system using internet.

Sensors for monitoring various greenhouse parameters such as temperature, humidity, soil moisture level, light intensity, carbon monoxide level are connected to the microcontroller and their values will be displayed in the Blynk app interface (Android/iPhone app). Suitable actuation of the output devices such as cooling/exhaust fans, incandescent bulb, water control, mister/fogger and shade net are controlled using relay. The system will require a 230V AC mains power supply which will be stepped down to 5V using transformer, AC to DC convertor and a buck convertor circuit.

A prototype of the greenhouse automation system was designed and successfully implemented. The system takes a power input of 230V AC and converts it to 5V, 3.3V DC efficiently for the microcontrollers and other modules by using a buck convertor and a linear voltage regulator. Microcontroller compatible sensors are used which reads greenhouse parameters and sends it to Blynk cloud through which user can make suitable actuations. As soon as temperature increases shade net will be turned on, if the soil moisture level decreases user turns on water source, mister will be switched on whenever humidity level decreases inside greenhouse.

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## "FABRICATION OF THREE AXIS TRACTOR TRAILER ROTATION WITH LOADING ARM"

A trailer is generally an unpowered vehicle pulled by a power vehicle. Commonly, the term 'trailer' refers to such vehicles used for transport of goods and materials. Sometimes recreational vehicles, travel trailers or mobile homes with limited living facilities wherein people can camp or stay, have been referred to as trailers.
This project work titled "FABRICATION OF THREE AXIS TRAILER WITH LOADING ARM" has been conceived, having studied the difficulty in unloading and loading the vehicles. Generally, the trailer will unload the vehicles in only one direction. The project concerns about this difficulty and hence a suitable arrangement has been designed, such that the vehicles can be unloaded from the trailer in three axes without application of any impact force. In the proposed model, this is overcome by making the trailer capable of unloading materials in three directions very easily.The trailer is loaded using loading arm When the direction control valve is activated, the compressed air goes into the pneumatic cylinder through the valve. The ram of the pneumatic cylinder helps in lifting the trailer cabin.The automobile engine drive is coupled to the compressor engine, so that it stores the compressed air when the vehicle is moving. The compressed air is used to activate the pneumatic cylinder, when the valve is activated. The proposed model is a simple, easily operable one and helps in achieving low cost automation.

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## "GARBAGE MONITORING SYSTEM"

In recent decades, Urbanization has increased tremendously, at the same phase there is an increase in waste production. Waste management has been a critical issue. Smart bin is built on a micro-controller based platform. Arduino Uno board is interfaced with Ethernet module and Ultrasonic sensor. Ultrasonic sensor is placed at the top of the dustbin which will measure the level of garbage in dustbin. Arduino will be programmed in a way that when the dustbin is being filled, the remaining height from the threshold height will be displayed. Once the garbage reaches the threshold level, Ultrasonic sensor will trigger the Ethernet module which will continuously alert the concerned authority until the garbage in the dustbin will be squashed. People can then reuse the dustbin.
Once these smart bins are implemented on a large scale, by replacing traditional bins present today, waste can be managed efficiently as it avoids unnecessary wastes-on roadside.

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## "PREDICTION OF PARTICULATE MATTER DISPERSION IN AMBIENT ATMOSPHERE FROM A STONE CRUSHER"

The deterioration of air quality in stone crushing plants may be attributed to the rapid industrialization. The ambient air quality has deteriorated to such an extent that it adversely affects the health and welfare of human beings. Extensive research has established that air pollutants affect the health of humans and animals, damage vegetation and materials, reduce visibility and solar radiation, and affect weather and climate.
The air quality models are used widely to assess the ambient air quality of desired region due to different sources as regular monitoring of pollutants both temporally and spatially is not always feasible due to high cost and experimental difficulties involved.

To build new facilities or to expand the existing ones without harming the environment, it is desirable to assess the air pollution impact of a facility prior to its construction, rather than construct and monitor to determine the impact and check whether it is necessary to retrofit additional controls
Potential air pollution impact is usually estimated through the use of air quality simulation models. In this study, Industrial Source Complex Short Term version 3 (ISCST3) have been used. This model simulates mathematically the pollutant's transport and dispersion, and perhaps its transformations. The model output is air pollutant dispersion for a period of one year, at specific receptor location at Javenahalli area..

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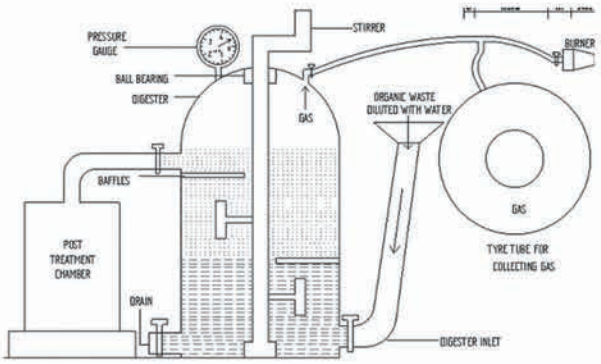
TECHsandhya

*Our virtues and our findings are inseparable, like force and matter. When they seprate, man is no more.*
-Nikola Tesla

# "GENERATION OF FUEL ENERGY AND FARM MANURE FROM DRESSED CHICKEN WASTE"

Scarcity of petroleum and coal, threatens supply of fuel throughout the world in the coming future. These energy sources are used on a very large scale and their supply will be terminated in few decades if the consumption rate is not reduced, hence we need an eco-friendly substitute for this energy. Biogas is distinct from other renewable energies because of its characteristics of using, controlling and collecting organic waste. This opens up the need for an organised system for disposal of wastes and simultaneously generation of biogas as fuel.

Dressed chicken waste is an organic material having a high nutritive value to microbes, which can be used for methane production and methane has a good calorific value. In other words, it can be used as a domestic fuel. This fact can be seen in current practices of using low calorific inputs like cattle dung, distillery effluent, municipal solid waste or sewage, in biogas plants, making methane generation highly inefficient. We can make this system extremely efficient by using dressed chicken waste.




Poultry slaughterhouse waste is one of the major pollutants if not properly disposed. The results of this study shows that continuously stirred digester can be effectively used for treatment of slaughter house wastes. Poultry wastes can be treated biologically with microbes to convert into biogas and organic fertilizer. Although, poultry waste can be effectively utilized if properly treated to reduce ill effects and produce value added products like fertilizer, biogas. This project

- is an alternative for fossil fuels and eco-friendly compared to other types of fuels.
- reduces the disposal of chicken waste into the environment and keeps the environment clean.
- can result in sustainable production of renewable energy source.
- can be used to manufacture fertilizer.

It was also observed that in biogas plant, gas production depends upon amount of organic waste input. By adopting multi baffle system in the digester tank, it is possible to achieve optimum performance compared to other conventional biogas plants.

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# "AUTOMATIC PNEUMATIC BUMPER AND BRAKE ACTUATION BEFORE COLLISION"

The technology of pneumatics plays a major role in the field of automation of modern machine shops and space robots. The aim of the project was to design and develop a control system-based intelligent, electronically-controlled automotive bumper activation and automatic braking system called AUTOMATIC PNEUMATIC BUMPER AND BRAKE ACTUATION BEFORE COLLISION. The prototype consists of an IR transmitter and Receiver circuit, Control Unit, pneumatic bumper system and pneumatic braking system. The IR sensor senses the obstacle. If there is an obstacle closer to the vehicle (within 3-4 feet), a control signal is given to the bumper activation system. The pneumatic bumper and braking system is used to protect the man and the vehicle. The vehicle speed is sensed by the proximity sensor and the signal is given to the control unit and the pneumatic bumper.

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# "OPTIMAL PLACEMENT AND SIZING OF DISTRIBUTED GENERATORS IN DISTRIBUTION SYSTEM FOR ENHANCING SYSTEM VOLTAGE STABILITY"

The modern power system has three major sections, namely; generation, transmission and distribution. For economic reasons, the power is generated in bulk and then transmitted over a long distance. Finally the distribution system provides electric power to the end consumers. Among the three sections, the distribution system has more loss and this loss leads to poor voltage regulation at the end buses. In order to minimize power losses caused by high current and to improve the voltage profile in the distribution network, the introduction of dispersed generations (also called distributed generation) in distribution network plays an important role. Distributed Generation in distribution networks are used for various objectives: reducing power loss, improving the voltage profile along feeders, and increasing the maximum transmitted power in cables and transformers.However, installation of DG in distribution networks requires tttconsideration of their appropriate location and size; because a non-optimal location with an optimal size or a non-optimal size with an optimal location can result in an increase in system losses, damaging voltage state, voltage flicker, protection, harmonic, stability and implying in an increase in costs and therefore, having an effect opposite to the desired. For these reasons, the use of an optimization method capable of indicating the best of locating and sizing DG in distribution systems can be very useful for system planning engineers.

The objective of this project is the optimal DG placement and sizing, to minimize the total losses of power systems, thereby improving the voltage profile. This project mainly deals with the analysis regarding the performance of an IEEE 33-bus radial distribution system.The performance of the test system mainly involves the determination of losses ($I^2R$) and voltage profile at each bus using MATLAB and Mi-Power package.Hence the project involves the simulation of the test system with different types of DG placements and sizing, which in turn reduces losses and improves voltage stability.

Particle Swarm Optimization (PSO) Algorithm proposed in this work for optimal placement and sizing of Distributed Generator (DG) in radial distribution system to minimize the total real power loss and to improve the voltage profile with respect to their loading capabilities. This method thoroughly avoids premature convergence as well as convergence towards global optima.The effectiveness of the proposed method is demonstrated on IEEE 33-bus radial distribution system.

This work can further be extended for a system having large number of busses such as 69-bus, 128-node, 136-bus systems etc. This work can be extended for multiple DGs implementation that is more than two DG implementation. It can also be used for simulation of multiple DGs implementation with non-linear loads.

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