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

THE MALNAD TECHNICAL CLUB

TECHSANDHYA
2ND EDITION

Wall that eats Smog

Besides serving the usual purpose of a wall, the walls of a building in Milan called the Palazzo Italia eat the smog. The Palazzo Italia was completed for the World Fair in the city of Milan in 2015. The entire outdoor surface and parts of the interior were constructed from panels of the bright white cement, known as i.active Biodynamic cement.

Italcementi, an Italian construction firm has developed the 'biodynamic' cement mortar that is able to remove pollutants from the air automatically. It uses a titanium catalyst that is activated by sunlight to drive the chemical reaction, which is like an artificial version of photosynthesis. The pollutants are trapped by the cement and turned into harmless salts. The salts are then washed off from the walls when it rains.

This cement mortar is made from 80% recycled aggregates which includes scraps from the cutting of Carrara marble – that provides superior brilliance compared to traditional white cements, absorb nitrogen oxide and sulphur pollutants and converts them into harmless salts. The Palazzo Italia is one of the first buildings in the world to use this cement.

It took more than 2,200 tons of cement to construct the building and the cement is able to withstand higher pressure than the standard cement and is also more flexible. The 9,000-square-meter façade was realized with 700 biodynamic concrete panels developed by Italcementi. Its TX Active technology captures air pollutants when the envelope material comes into contact with light, which it then transforms into inert salts, reducing smog levels in the environment.

The Palazzo Italia was designe by architects Nemesi and Patners. It took more than 12,500 hours of research to produce the new cement. It consumes 40 percent less energy than conventional buildings and has a glass roof that contains solar panels capable of producing 140 kilowatts of power. The cladding of the white sinuous building is both highly innovative and sustainable. Each exterior panel of Palazzo Italia, produced with Styl-Comp technology, is unique, and the building itself is net-zero energy. Because of the extensive use of photovoltaic glass and photocatalytic concrete cladding, the structure is capable of covering its energy needs autonomously.

Its properties can make huge difference to urban life. In a large city such as Milan, covering 15 per cent of visible urban surfaces with the smog cleaning cement could cut pollution by half. It makes 1000 m^2 of the surrounding area as effective as planting 80 evergreen trees.

The building is like a tree or a forest. The 700 panels act like leaves. Energetic, colorful and unforgettable, Palazzo Italia awakes one's wanderlust, evoking a desire to explore every single centimeter of this small yet culturally rich Mediterranean state. It is hoped that more buildings, and perhaps even pavements, could now be constructed using the i.active Biodynamic cement to reduce pollution in the environment.

Buildings in many city centers around the world bear the stains left by decades of heavy traffic and pollution, but this new type of cement could change this by actually cleaning the air around it.

- Janhavi B R

Editorial Coloumn

The Malnad Technical Club has been actively involving itself in various activities and projects ever since its inception. TechSandhya is one such venture, which was the vision of our alumni. TechSandhya is the college's first ever technical newsletter, which is one of a kind. It was launched during the 2016 edition of Enigma – an annual state level technical fest of MTC.

Techsandhya provides a wonderful platform for all the science and technology enthusiasts to put forth their creativity and ideas on a technical facet. It is a collation of comics, facts, mini projects & video links to projects, articles pertaining to new discoveries in the field of technology etc., thereby covering most of the technical aspects.

The journey of TechSandhya has been a very substantial one.

This year, The Malnad Technical Club is all set to present you the 2nd edition of TechSandhya during Enigma'17 with more interesting matters comprehended. Students from various branches, apart from the club members, have contributed their fair share of articles. This year, an attempt has been made to include the best projects of the college, DIYs and many more useful columns.

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 years to come.

- Editorial Board

DIY- Handmade Projector

Description: This project can be made easily at home. It helps you project your mobile phone screen on the walls.

Items Required:

1. Shoe Box
2. Magnifying Lens
3. Paper Clip
4. Mobile Phone
5. Cutter
6. Duct Tape

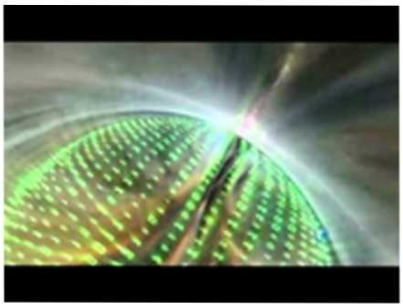
Procedure:

1. Trace the outer edge of your lens or magnifying glass onto one of the short sides of the box. Cut out the inside of the circle you just traced
2. Line up your lens with the hole and apply tape around the entire edge of your lens. Make sure your lens is held securely and there are no holes between the tape for light to escape.
3. Make a "U" shape of your Paper Clip, then bend the end such that you can make a phone stand on it.
4. Position your phone in its stand near the back of the box and walk forwards or backwards until your image starts to come into focus.
5. Now you can project your mobile sceen on the walls.

- Rohan Kumar

Universe Inside a Hologram

We all know that everything around us is three dimensional. We believe it just appears like that. But there is another fact in cosmology which says that everything around us, even space is a kind of HOLOGRAM. That is, everything we see and experience is just a projection on a two dimensional surface from a distant source. It may sound absurd but it could be another kind of reality we could ever imagine of. The idea of this two dimensional reality comes from one of the famous and abstract parts of cosmology, the black holes. Basically, a black hole is a star so massive that nothing, not even light, can escape from it because of its tremendous gravitational force. The periphery of black hole is called event horizon, inside which every physics law fails.



For instance, let us assume for some strange reason, your wallet fell into the black hole. Then, what you would see is a 3-dimensional wallet falling into the black hole! But, according to a recent research on black holes, the objects falling into the black hole are never lost, instead they are stored in terms of binary codes on the surface of the black hole. (This is analogous to a computer storing data in terms of 0's and 1's.)

Since objects falling into the black hole are never lost, we could use this information and theoretically reconstruct it. It implies that the information present inside a black hole is exactly same as the information present just at the outside of the two dimensional surface of a black hole.

By using this logic, one can say that everything around us - including you and me, the earth, the sun, the whole of solar system and the universe can be observed just as a projection in terms of binary information situated at a very distant region in space. This implies that we are inside a very big hologram!! The phenomenon appears to be a paradox, nevertheless, it is unavoidable. Physicists are still struggling to understand the nature of reality. It may happen today, tomorrow or perhaps thousand years later. If this happens, it is then undoubtedly the mankind's giant step towards complete understanding of the universe.

- Sudheendra G

OctoBot

What comes to your mind when you hear 'Robot'? Rajanikanth?? No! Robot is 'a machine capable of carrying out a complex-series of actions automatically, especially one programmable by a computer'. But, have you ever seen or heard of a robot working without electric power and control systems? Or without rigid circuit boards and metallic parts? If not, then this article will be definitely intriguing.

It has been a longstanding vision for the field of soft robotics to create robots that are entirely soft. But, replacing rigid components like batteries and electronic controls with analogous soft systems and then putting them all together is really a tough challenge.

Recently, a team of Harvard University researchers has demonstrated the 1st autonomous, untethered, entirely soft robot nicknamed the "octobot" which could pave the way for new generation of such machines. This eight-legged soft robot does not rely on external power sources as it is able to internally create all the power it needs to move. The research demonstrates that we can easily manufacture the key components of a simple, entirely soft robot, which lays the foundation for more complex designs.

Octopus has been a source of inspiration in soft robotics. This phenomenal creature can perform incredible feats of strength and dexterity with no internal skeleton. Harvard's octobot is pneumatic-based and so is powered by gas under pressure. A reaction inside the bot transforms a small amount of hydrogen peroxide (liquid fuel) into a large amount of gas which flows into the octobot's arms and inflates them like balloons.

A startling quality of hydrogen peroxide is that a simple reaction between the chemical and the catalyst (in this case platinum) allows us to replace rigid powers. To control the reaction, the team used a micro-fluidic logic circuit, a soft analog of a simple electronic oscillator which controls when hydrogen peroxide decomposes to gas in the octobot.

By simply incorporating three fabrication techniques - soft lithography, molding and 3-D printing, we can quickly manufacture these devices. The simplicity of the assembly process paves the way for the design of greater complexity. The same Harvard team is now working on an octobot that can crawl, swim and interact with its environment.

This research strengthens our hope on autonomous soft robots which inspires roboticists, material scientists and researchers.

- Veeksha Rai K

TECHSANDHYA

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

Hot Solar Cells

Everything in the world is powered by Energy. The ultimate source of energy is the Sun. Solar energy is the most promising and progressive sources of alternative energy. Due to the advancement in the field of electronics, we are able to convert the solar energy into electrical energy using photovoltaic cells. This photovoltaic cell which is made up of expensive and bulky silicon absorbs only a fraction of the sunlight is a shortcoming. Standard silicon solar cells mainly capture the visual light from violet to red. This means that they can never turn more than 32 percent of the energy of the sunlight into electricity. A promising breakthrough might provide us with a solar power device that could theoretically double the efficiency of conventional solar cells.

Scientists in MIT have created a photonic crystal that uses inventive engineering and advances in material science to capture far more of the sun's energy as heat energy that is lost in the conventional photo-voltaic cells. This heat is converted inside the crystal into wavelengths of light that a solar cell can process. The trick is to first turn sunlight into heat and then convert it back into light, but now focused within the spectrum such that the solar cells can use it. A solar power that is more efficient, reliable and in fact can continue to produce some electricity even when the sun goes down.

The key step in creating the device was the development of an absorber-emitter, which essentially acts as a light funnel above the solar cells. The absorbing layer is built from solid black carbon nano-tubes that captures all the energy of the sunlight and converts most of it into heat. As temperature reaches around 1,000 °C, the adjacent emitting layer radiates that energy back as light, narrowed to bands that the photovoltaic cells can absorb. The emitter is made from a photonic crystal, a structure that can be designed at the nano-scale to control which wavelengths of light flow through it. Another critical advancement was the addition of a highly specialized optical filter that transmits the tailored light while reflecting nearly all the unusable photons back. This "photon recycling" produces more heat, which generates more of the light that the solar cell can absorb, improving the efficiency of the system.

Black carbon nanotubes sit on top of the absorber-emitter layer, collecting energy across the solar spectrum and converting it to heat.

The MIT device is still a crude prototype, operating at just 6.8 percent efficiency—but with various enhancements it could be roughly twice as efficient as conventional photovoltaic. The new design could lead to inexpensive solar power that keeps working even after the sun sets.

- Y Samyuktha

Sky-Diver

How a skydiver jumped without a parachute and survived??

Skydiver Luke Aikins became the first person to jump from a plane without a parachute or wingsuit. Aikins jumped from a height of 25,000 feet which is roughly 8 km from the surface of the earth and it approximately took two minutes to fall into the net(30mx30m). You must be thinking how he managed to pull this dangerous stunt, right?As to know, without a parachute a skydiver would fall at a high speed of 120mph, a speed at which it would be fatal or he can have no chance of surviving if he hit the ground. This brave yet dangerous stunt took place in Simi Valley, California. Then, what was that which made him survive this huge fall? You might be thinking of movements such as flipping and tumbling to have decreased his speed? No! Not much, even if he did these kinds of movements he would still be falling at a speed of 100mph. Well to pull of this kind of stunt surely it includes several tactics, technology, procedures as well as strength and, above all, all he need to do is first find the net from that height.

Finding the net

Aikins helmet gave him GPS alert through the drive and the lights on the net were visible from such a great height. The lights turned red when he was out of track and turned white when he was on course. Still finding a net is not as easy as jumping out of the plane, right? The skydiver leaves the plane on a forward trajectory. So, does a falling skydiver steer his body? As Aikins falls from the plane he does something called as tracking.

Instead of falling like an X he brought his arms back along his body and we call that as tracking. So, it means what he did was glide forward and brought himself in the middle of the net. Now comes the landing part, the risky one.

Safe landing

Just before hitting the net, Aikins flipped over onto his back so that his body would bend in the direction, the back is flexible so as to not break his spine basically. The kinetic energy of Aikins was dissipated into the net which was made of polyethylene cord that is twice as strong as steel. The net absorbed his fall, dissipated his energy and allowed him to walk out of it. Though it was impressive stunt but was ridiculously dangerous and resulted in fatality.

- Varchas KI

Nano Batteries

While smartphones and smart wearable technology is growing more advanced, they are still limited by power. Why? The batteries haven't advanced in decades, but we're on the verge of a power revolution.

The answer for all these needs and expectations is raising the voice, as big technology companies and car companies are making electric vehicles, despite knowing the limitations of currently used lithium ion (Li-ion) batteries.

We have seen a plethora of battery discoveries coming out of universities all over the world. Tech companies and car manufacturers are pumping money into battery development with races like FORMULA-E.

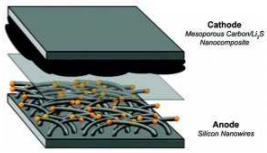
Here are some new inventions which are going to take birth with the demand of success.

LITHIUM-AIR BREATHING BATTERIES

Lithium-air refers to the use of oxygen as an oxidiser, rather than a material. The result is batteries that can be one fifth of the price and one fifth as light as lithium-ion, plus they could make phones and cars last five times longer.This battery was made to take shape at Dallas University and should help push developments in Lithium-air forward.

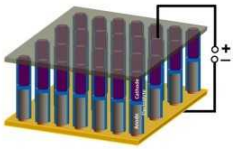
GOLD-NANO WIRE BATTERIES

Great minds at the University of California, Irvine have cracked nano wire batteries that can withstand plenty of recharging. The result could be nano batteries that don't die. Nano wires; thousand times thinner than human hair, possess a great possibility in future batteries. These batteries were tested by recharging over 200,000 times in three months and they showed no degeneration at all!



MAGNESIUM BATTERIES

Scientists have discovered a way to harness magnesium for batteries. This means smaller and more densely packed units and after all should mean cheaper batteries, smaller devices and less reliance on lithium ion. Just don't expect to see these appear soon, as they are still in the developmental stage.



GRAPHENE CAR BATTERIES

Graphene batteries are the future. One company has developed a new battery called CRABAT, that could offer electric cars a driving range of upto 500 miles on a charge. It can charge and discharge 33 times faster than lithium ion.

FOAM BATTERIES

3D is the future of all batteries. Pricto is the first company to crack this with its battery that uses a copper foam substrate. This means that these batteries will not only be safer, thanks to no flammable electrolyte, but they will also offer longer life, faster charging, five times higher density and be available at cheaper rates.

- G Anand Rao

Did you Know?

1) Did you know that Google's old logo was 14,000 bytes in size while the new logo is only 305 bytes?! How can a design change drastically decrease file size? The answer is here.

The old logo uses a complicated serif font which can only be created using Bezier curves. All together, it has 100 anchor points, resulting in 6kB (6380 bytes). When compressed, the size comes down to 2kB (2145 bytes).

A simplified version of the new logo, on the other hand, can be constructed almost entirely from circles and rectangles. The entire new logo consists of 10 circles, 5 rectangles and 1 shape made with 7 anchor points.

Google said, "The old logo with its intricate serifs and large file size, required that we serve a text based approximation of the logo for low bandwidth connections. The new logo's reduced file size avoids this workaround and the consistency has tremendous impact when you consider our goal of making Google more accessible and useful to users around the world, including the next billion."

2) Website to calculate savings made by turning off appliances

Conservation organization WWF India has made a website to mark Earth hour on march 25 that lets users calculate how much money they can save by turning off different home appliances for an hour. For example, switching off a fan can save Rs.95 and turning off an A/C can save close to Rs.1850

Food For Thought

1) The total amount of data humankind has ever collected up to 2003 is now collected every two days!

2) The red eyes in photos are caused by the flash on the camera reflecting on the blood vessels in the eye.

3) Footprints and tire tracks left behind by the astronauts on the moon will stay there forever as there is no wind to blow them away.

4) Brain waves can be used to power an electric train.

5) The Pitch Drop Experiment is one of the longest running scientific experiments which was started in 1927 to measure the flow of a piece of pitch over many years. At room temperature, Bitumen (tar) took 10 years to form a single droplet.

6) Average distance between asteroids in asteroid belt is almost one million kilometers i.e., three times the distance between earth and moon. Not so crowded as shown in pictures!

7) When an airplane wants to land on an aircraft carrier, the pilot is not supposed to apply the brakes, but is supposed to accelerate!

8) Mercury is the only planet smaller than a natural satellite of any planet.

9) BSA (Birmingham Small Arms) was not originally a cycle manufacturing company. Before the production of cycles, BSA was into the production of guns, which is evident from their logo.

11)There is a glacier called "Blood Falls" in Antarctica that regularly pours out red liquid, making it look like the ice is bleeding. (It's actually oxidized salty water.)

10) A tiny amount of liquor on a scorpion will make it instantly go mad and sting itself to death.

12) Your cornea is the only part of your body without the blood supply. It gets oxygen directly from the air.

13) Dogs' nose prints are as unique as human fingerprints and can be used to identify them.

Intelligence is the ability to adapt to change

-Stephen Hawking

TECHSANDHYA

An Interesting Story

Never underestimate your Clients' Complaint, no matter how funny it
might seem to be!!

This is a real story that happened between the customer of General
Motors and its Customer-Care Executive.

A complaint letter was received by the executive of General Motors:

"This is the second time I am writting to you, and I don't blame you for not answering me, because I sounded crazy, but it is a fact that we have a tradition in our family of having Ice-Cream for dessert after dinner, every night. But the kind of ice cream varies so, every night, after we have eaten, the whole family votes on which kind of ice cream we should have and I drive down to the store to get it. It is also a fact that I recently purchased a new car and since then my trips to the store have created a problem.....

You see, every time I buy a vanilla ice-cream, when I start back from the store my car won't start. If I get any other kind of ice cream, the car starts just fine. I want you to know I'm serious about this question, no matter how silly it sounds. What is there about a car that makes it not start when I get vanilla ice cream, and easy to start whenever I get any other kind?" The executive was understandably thinking about the letter, but sent an Engineer to check it out anyway.

The latter was surprised to be greeted by a successful, obviously well educated man in a fine neighbourhood. He had arranged to meet the man just after dinner time, so the two hopped into the car and drove to the ice cream store. It was vanilla ice cream that night and, sure enough, after they came back to the car, the car wasn't starting.

The Engineer returned for three more nights. The first night, they got chocolate, the car started. The second night, he got strawberry, the car started. The third night he ordered vanilla, and the car failed to start.

Now the engineer, being a logical man, refused to believe that this man's car was allergic to vanilla ice cream. He arranged, therefore, to continue his visits for as long as it took to solve this problem. And towards the end he began to take notes: he jotted down all sorts of data; time, type of gas used, time to drive back and forth etc.

In a short time, he had a clue: the man took less time to buy vanilla than any other flavour. Why? The answer was in the layout of the store. Vanilla, being the most popular flavour, was in a separate case at the front of the store for quick pickup. All the other flavours were kept in the back of the store at a different counter where it took considerably longer time to check out the flavour.

Now, the question for the Engineer was why the car wasn't starting even though it took less time. Eureka - Time was now the problem - not the Vanilla Ice Cream!!!!

The engineer quickly came up with the answer:

"Vapour Lock". Vapour lock is a problem that mostly affects gasoline fuelled internal combustion engines.

It occurs when the liquid fuel changes its state from liquid to gas while it is still in the fuel delivery system. This disrupts the operation of the fuel pump, causing loss of feed pressure to the carburetor of fuel injection system resulting in transient loss of power or complete stalling.

Restarting the engine from this state may be difficult. The fuel vaporizes when heated by the engine by the local climate or due to a lower boiling point at high altitude. In those regions where higher volatility fuels are used during winter to improve the starting of the engine, the use of winter fuels during summer can cause vapour lock to more readily. This was happening every night; but the extra time taken to get the other flavours allowed the engine to cool down sufficiently to start. When the man got vanilla, the engine was still too hot for the vapour lock to dissipate.

Remember, even crazy looking problems are sometimes real and all problems seem
to be simple only when we find the solution, with cool thinking!

- Vishwas B S

The Science Poem

Hey life is a boring story,
Come let's make it glory!
It's good to have lemon rice,
But awesome to know about lemon lights!
Nature kicked man out of apes,
Science gave him proper shapes!
Plants let him to have his food,
But science ensured it tasted good!
Earth gave him a sort of space,
Science flew him out to space!
Logs made him roll on wheels,
Science gave him hotwhells!
Science is not just fun but sure it makes us to learn!
If external force called problem act on you,
Just learn to conserve momentum called Peace!
When tornadoes called difficulties try to flew you out,
Believe in the force of gravity called confidence within!
Science is not just what we think,
It's deeper than we usually sink!
I want to hit u a fact that science is a state not just an act!!

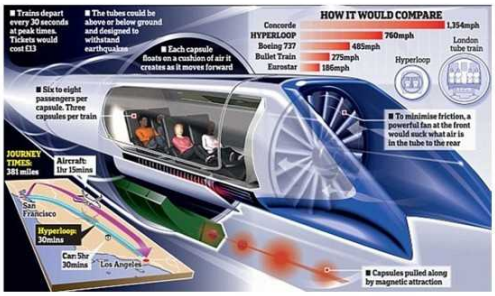
-SRINIVAS N V

HyperLoop

Have you ever imagined moving from one place to another at airline speeds for the price of a bus ticket? That's Hyperloop for you!!

Hyperloop is a concept proposed by Elon Musk, CEO of SpaceX. Hyperloop is a proposed mode of passenger and freight transportation that would propel a pod-like vehicle through a near vacuum tube at more than airline speed. It is energy efficient and safe.

Musk's Hyperloop consists of two massive tubes. Pods carrying passengers would travel through the tubes at the speed of around 700mph. The concept is operated by sending specially designed "capsules" or "pods" through a cotinous steel tube maintained at near vacuum. An electrically driven inlet fan and air compressor would be placed at the nose of the capsule to actively transfer high pressure air from the front to the rear of the vessel, keeing it aloft and preventing pressure building up due to air displacement. For propulsion, magnetic accelerators are planted along the length of the tube. Hyperloop system built by SpaceX at its headquarters in Hawthorne, California is approximately one mile in length with a six foot outer diameter. In the proposed con-



of hyperloop, the passenger-only pods should be 7 feet, 4 inches in diameter.

Conventional means of transport tend to be slow, expensive and energy inefficient. Hyperloop aims to make cost-effective, high speed transportation to use at moderate distances. Hyperloop tubes would have solar panels installed on the roof, allowing clean and self-powering system.

We live in an age where unbelievable advancements in technology take place almost every day. The changes have brought in a new age of "utopian technology". Hyperloop is one such exemplification, which could be otherwise termed as the fantasy of futuristic transportation!

- Aamodini S J

Vertical Launching Vertical Landing

In comic books and cartoons, we usually see rockets being launched and landed vertically on the planets, but in reality, achieving this feat is incredibly difficult. Considering this, agencies like NASA, Space-X, Blue origin, and the European Space Agency have developed rockets that are either ditched into the ocean for later recovery or purposefully burned in the atmosphere, which indeed is a huge loss of money and other resources. Now the notion in the fantasies concerning the vertical landing of rockets has come true, by means of which it could easily be reused, which would save an incredible amount of money.

Vertical Takeoff Vertical Landing (VTVL) is a form of takeoff and landing for rockets, not to be confused with aircrafts which take off and land vertically; which use the air for support and propulsion, such as helicopters and jump jets which are (Vertical Take-Off and Landing) VTOL aircraft.

VTVL is under intense development as a technology for reusable rockets, with two companies, Blue Origin and Space-X both having demonstrated recovery of launch vehicles after their return to the launch site operations. Blue Origin's New Shepard booster rocket made the first successful vertical landing following a test flight that reached outer space, and Space-X's Falcon 9 Flight 20 marking the first landing of a commercial orbital booster.

The technology required to successfully achieve VTVL has several parts. First, thrust must be greater than weight; second the

thrust is normally required to be vectored and requires some degree of throttling. Guidance must be capable of calculating the position and altitude of the vehicle, small deviations from the vertical can cause large deviations of the vehicles in the horizontal position. Reaction Control Systems (RCS) are usually required to keep the vehicle at the correct angle. Landing legs and deployment mechanisms add to the weight of the vehicle compared to expendable vehicles, which can reduce performance. Aerodynamics and mass distribution is also crucial; vehicles generally have to be nose heavy during ascent, but need to be stable during landing, usually on their tail, and after touchdown, where they are susceptible to winds.

Falcon 9 being the first completely developed rocket in the 21st century was designed from the ground up for maximum reliability. Its simple two stage configuration minimized the number of separation events and with nine first stage engines, it can safely complete its mission even in the event of an engine shutdown.

Although this technology is still the juvenile stage, we can expect the comic fantasies to hit the reality very soon.

- Sushmitha H S

The College Siren

Time is the most valuable thing a man can spend. As a great man once said "You may delay, but time will not". In today's world, where just about everything is convenient and accessible due to advances in technology, time is a luxury none can afford to lose. Now that we've technology bestowing aid for us, the things that were unimaginable a thousand years ago are existent now.

Automation is one such epitome. Automation or automatic control is the use of various control systems for operating equipment. The biggest benefit of automation is that it saves labor; however, it is also used to save energy and materials and to improve quality, accuracy and precision.

One such exemplification can be seen in our college, the college bell. The advantage of this design is that the bell rings at the start of each period without any human intervention to a great degree of accuracy and hence refrain the manual task of switching on/off the college bell after every hour which is fairly monotonous.

The main components are the microcontroller, the real time clock and the bell. The system is programmed. The bell that is used in our college is embedded based automatic bell. The software which controls the entire system is ingrained into the arrangement. All the bell timings and durations are predefined, programmed and set/burned in/into the microcontroller. The timings set by the user are stored in the microcontroller. A real time clock waits for the already set time to match the real time, when this transpires a signal is generated in the microcontroller and sent through the output port. The output circuitry waits for the signal from the microcontroller. The electronic circuit receives the signal and drives a corresponding relay. The relay is used as a switch to operate the bell. And there goes the siren. As soon as the duration is over, the signal is stopped and waiting for the next set time. There is a provision to enable the manual operation if needed.

The impact of technology in our lives, today, is immeasurable. It has become such an integral part of everything around us that sometimes we fail to notice its existence. This is one such instance.

- Hitha S

TECHSANDHYA

There is no law except the law that there is no law.
- John Archibald Wheeler

WITNESS THE FIRST SELF FILLING WATER BOTTLE!

When water is scarce, why not pull it out of thin air?? No need to wait for rain now, as one of the promising inventions is successful in converting humid air into water.
This gadget works on the principle of condensation. As we always have a certain percentage of humidity in the air, it does not matter where you are – even in the desert. The water we get is clean, unless air is really contaminated.
It is even available as a handy gadget which consists of a condensator (cooler) that is connected to series of hydrophobic surfaces that repel water. Basically it is taking in air in vapour state and converting it into liquid state.
It even consists of a filter to keep dust and bugs out of water. If fixed with a carbon filter then we can get pure water from polluted air. The advantage is that it costs 50% less than that of bottled water which is available now.
The rate at which water can be produced depends on relative humidity and ambient air temperature. It becomes more and more efficient as humidity and temperature increases.
Fontus, a water bottle family that are capable of filling themselves can be attached to a bike or a cycle where the cyclists can generate water during long distance rides easily. This device produces 0.5 liters of water in 1 hour under standard atmospheric conditions which is appreciable.
These water bottles are already in use in many countries which may become a boon for around 1.2 billion people in the world who are living in areas where water is scarce.

-Mownika

Life Hacks

#1 – Need to jot down something quickly? Open a temporary notepad in your browser by typing "data:text/html, <html contenteditable>" into the address bar.
Remember to bookmark and rename it as Notepad.

#2 – Test a battery easily by dropping it few inches from the ground. A fully charged battery bounces very little, whereas a dead battery bounces around.

#3 – If you can't send an Excel file because it is too big, save it with .xlsb extension. This will shrink the size.

#4 – www.HotelWifiTest.com ranks hotels' WiFi speed and shows hotels with free Wifi.

#5 – Did you know that you could text and walk at the same time? Download the app 'Type While Walk' on Android/ 'Type n Walk' on iOS and discover more!

#6 – To convert any YouTube video into Graphic Interchange Format (GIF), type gif in front of youtube in the URL.
For eg., www.gifyoutube.com/watch122

#7 – Delete one word at a time using <CTRL> + Backspace ←

#8 - Putting batteries in the refrigerator for a day before use can double their lifespan.

#9 How to remove permanent marker marks from everything

- Clothes – use hand sanitizer
- Walls – use toothpaste or hairspray
- Wood – use rubbing alcohol
- Carpet – use white vinegar
- Furniture – use milk
- White board – use dry eraser marker or pencil rubber eraser
- Ceramic or glass – use 1 part toothpaste with 1 part baking soda

#10 – To start a game of chess with a friend on Facebook, open up a conversation in Facebook Messenger and type @fbchess play

#11- You can predict the weather just by looking at your coffee. High air pressure is an indicator of sunny weather, which will push the bubbles to the edge of your cup. Rain is likely if the bubble go towards the centre.

#12- Putting a small amount of 7up in a flower vase will preserve them for much longer.

#13- Wrap a wet paper towel arround your beverage and out it in the freezer. In about 15 minutes it will be ice-cold.

ENCOADED BLING

Diamonds may decorate some of the most coveted pieces of bling. Being one amongst the nature's most beautiful and wonderful creation, they can be now used as a way to store vast amount of data using atom size flaws ordered in 3D arrays, according to a new study.
The researches experimented with diamonds whose crystals contained a number of holes where carbon atoms should be. These imperfections are called nitrogen valency centers because nitrogen atoms are located near the holes or vacancies. These defects hold electrons instead of carbon atoms, giving negative electrical charge. However, some researches could give these defects neutral charge by shining lasers on them. The findings suggest the diamonds could encode data in the form of negatively and neutrally charged defects, which lasers can read, write, erase and rewrite.
Diamond sheets fitted with holes could be the key to next generation of supercomputers. Each bit of data could be stored in a spot-on diamond only a few nanometers or billionths of meter. This is much smaller than any similar features used in data storage and could give rise to super dense computer memories.
A tiny diamond, half as long as grain of rice and thinner than sheet of paper can hold a hundred times more information than DVD.
One can enhance storage capacity by utilizing third dimension. Thus, flawed diamonds can now be a new way to store quantum data.

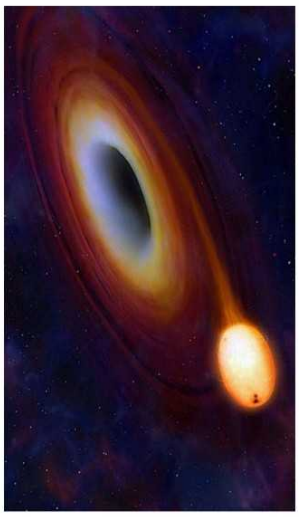
-Ankitha T

What Happens in the MCF?

We have all been using TV, radio and smart phones since so long. Also, everyone is aware of the fact that the whole process of communication takes place with the aid of satellites. A communication satellite relays and amplifies telecommunication signals via a transponder. But, have you ever given a thought on how the satellite communication actually takes place and who controls these satellites so meticulously without any data being lost? Well, the answer is simple – MCF.
Master Control Facility (MCF) located in Hassan, Karnataka is a constituent unit of the Indian Space Research Organization (ISRO) and the **prime control centre** for all the geosynchronous satellites launched by ISRO.
A question may now arise in every one of us: Why Hassan? Well, the facility was established in 1980-81 after various studies conducted on numerous scientific aspects such as low electromagnetic radiation noise, wide visibility of geosynchronous orbital arc, etc.
There is another master Control Facility located in Bhopal, Madhya Pradesh.
Presently, MCF is controlling 23 geo-stationary satellites that are already in the orbit. All these communication satellites are controlled and monitored. Various operations performed include ranging, telemetry, tracking and commanding.
The most important operation of MCF is to monitor and control the satellite after their deployment. MCF, Hassan houses two major facilities: Satellite Control Centre (SCC) and Machine Control Centre (MCC). While MCC carries out various tests on satellites such as their temperature stability, effect of electromagnetic radiation, pressure and acoustic tests, the SCC Controls the movement of satellites and put them into their predefined orbits along with monitoring various data obtained from the satellites that are already in the orbit.
One intriguing question is what would happen if MCF does not function for a day. We all are aware of the fact that communication is solely dependent on the proper functioning of the satellites. Communication takes place by transmitting and receiving packets of energy from the satellites. If MCF happens to not function for even a single day, communication would be at stake. All communication systems such as TV, radio, broadband would not operate!
Hence, control operations are carried out at MCF on a round-the-clock basis by a highly skilled manpower with uninterrupted power supply.

- Amodhini SJ
Jahnavi BR

AMAZING FACTS ABOUT BLACK HOLES



You can't directly see a black hole

Because a black hole is indeed "black" — no light can escape from it — it is impossible for us to sense the hole directly through our instruments, no matter what kind of electromagnetic radiation you use. The key is to look at the hole's effects on the nearby environment, points out NASA. Say a star happens to get too close to the black hole. The black hole naturally pulls on the star and rips it to shreds. When the matter from the star begins to bleed towards the black hole, it gets faster, hotter and glows brighter in X-rays.

Look out! Our Milky Way likely has a black hole

A natural next question is given how dangerous a black hole is? Is Earth in any imminent danger of getting swallowed? The answer is no, astronomers say, although there is probably a huge supermassive black hole lurking in the middle of our galaxy. Luckily, we are nowhere near this monster — we are about two-thirds of the way out from the center, relative to the rest of our galaxy — but we can certainly observe its effects from afar. For example: the European Space Agency says it's four million times more massive than our Sun, and that it is surrounded by surprisingly hot gas.

Dying stars create stellar black holes

Say you have a star that is about 20 times more massive than the Sun. Our Sun is going to end its life quietly; when its nuclear fuel burns out, it will slowly fade into a white dwarf. That is not the case for far more massive stars. When those monsters run out of fuel, gravity will overwhelm the natural pressure the star maintains to keep its shape stable. When the pressure from nuclear reactions collapses, according to the Space Telescope Science Institute, gravity violently overwhelms and collapses the core and other layers are flung into space. This is called a supernova. The remaining core collapses into a singularity — a spot of infinite density and anlack holes come in a range of sizes.

Black holes come in a range of sizes

There are at least three types of black holes, NASA says, ranging from relative squeakers to those that dominate a galaxy's center. Primordial black holes are the smallest kinds, and range in size from one atom's size to a mountain's mass. Stellar black holes, the most common type, are up to 20 times more massive than our own Sun and are likely sprinkled in the dozens within the Milky Way. And then there are the gargantuan ones in the centers of galaxies, called "super massive black holes". They are each more than one million times massive than the Sun. How these beasts formed is still being examined.

Weird time stuff happens around black holes

This is best illustrated by one person (call them Unlucky) falling into a black hole while another person (call them Lucky) watches. From Lucky's perspective, Unlucky's time clock appears to be ticking slower and slower. This is in accordance with Einstein's theory of general relativity, which (simply put) says that time is affected by how fast you go, when you're at extreme speeds close to light. The black hole warps time and space so much that Unlucky's time appears to be running slower. From Unlucky's perspective, however, their clock is running normally and Lucky's is running fast.

The first black hole wasn't discovered until X-ray astronomy was used

Cygnus X-1 was first found during balloon flights in the 1960s, but wasn't identified as a black hole for about another decade. According to NASA, the black hole is 10 times more massive to the Sun. Nearby is a blue supergiant star that is about 20 times more massive than the Sun, which is bleeding due to the black hole and creating X-ray emissions.

Black holes are dangerous only if you get too close

Like creatures behind a cage, it's okay to observe a black hole if you stay away from its event horizon — think of it like the gravitational field of a planet. This zone is the point of no return, when you're too close for any hope of rescue. But you can safely observe the black hole from outside of this arena. By extension, this means it is likely impossible for a black hole to swallow up everything in the universe.

CONCLUSION

Stephen Hawking proposed the four laws of black hole mechanics back in the 1960s, and calculated in 1974 that black holes should thermally create and emit sub-atomic particles, known today as Hawking radiation, until they eventually exhaust their energy and evaporate.
Neither wormholes or black holes have a ctually ever been seen directly, even with the sophisticated equipment in use today, both follow inevitably from Albert Einstein's General Theory of Relativity, and plenty of indirect evidence has been obtained .The ideas have certainly been more than readily accepted by the science fiction community, for whom they suggest intriguing possibilities.

-Swathi H G

Imagination is more Important than Knowlegde
-Albert Einstien

TECHSANDHYA

BEST PROJECTS OF MCE

OPTIMAL PLACEMENT OF DISTRIBUTION TRANSFORMERS CONNECTED TO A RADIAL DISTRIBUTION FEEDER FOR LOSS MINIMIZATION

Problem Statement

The global electricity industry is facing many challenges that require immediate attention towards growth, expansion and energy management. Most of the electricity supply companies are facing shortfall of availability of electrical energy. India's Transmission and Distribution losses are among the highest in the world. Electric utilities in India are facing the pressure of reducing the losses and improving the quality and reliability of supply. The utilities do not seem to follow any accurate mathematical or heuristic procedure in installing the Distribution Transformers. Moreover in many cases they are not placed in the required position due to socio-political and economical reasons which will result in more losses. Since the Distribution system forms a large part of the network, a small amount of loss at each transformer leads to a great variation in total. To address this problem care should be taken to minimize the power loss while placing a transformer. Therefore to make up for the shortfall of the electrical energy availability, reducing losses and hence saving energy becomes the first and foremost important step. The main objective of this work is to reduce losses in distribution system and hence to reduce the cost of the power supply.

Relocation of distribution transformers is a widely used strategy for reducing the energy losses in radial distribution systems. This method is important in the context of the distribution systems of developing countries. Generally, the distribution transformer locations are fixed based on some estimates of the temporal as well as spatial load growth in a given feed area. Many times these expectations may turn out to be incorrect at the end of the growth period, resulting in an improper location for the feed point. Hence, in such situations, wherein the load growth has stabilized or can be anticipated better, it is possible that the sum of the energy losses in all the feeders supplied by a transformer could be significantly reduced by relocating the transformers.

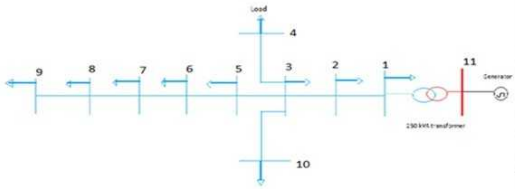


Fig.1 Single Line Diagram of HALLA TC

In 10 bus system with 250 kVA transformer, 413A11 , the original location of the DTC is at bus 1. Load flow analysis has been carried out and the optimal location was obtained at bus 5, thus it tends to relocate the DTC to bus 5 from bus1.

Apart from estimating the power loss, the Voltage Regulation is also considered for finding the Optimal Location of a Transformer. This methodology is implemented on an existing Distribution Transformer Centre (DTC) HALLA TC (TC code: 413A11 in HASSAN) and simulation is done for the same by drawing Single Line Diagram in MiPower Software Package. Further the same DTC is simulated by connecting it to its feeder (named SUVARNA) in order to find the effect of presence of other transformers in the feeder on the considered DTC. The results of MiPower package of the same has been verified theoretically by using node elimination technique.

Highlights of the project

1. This project is implemented by using the real time values (length, conductor resistance, load etc) obtained from CESC, Hassan.
2. Optimal location of the Distribution Transformer is obtained based on minimum losses and consistent Voltage Regulation.
3. Cost savings are found out if the Transformer is optimally placed.
4. Total cost savings per year per DTC= ₹224 * 365 days = ₹81,760
5. Approximate savings for SUVARNA feeder if all the DTCs are optimally placed (43 Transformers) = ₹ 82,000 *43 = Rs.35,26,000

* This project was awarded the best innovative project during Project innovation Challenge Infosys Mysore.

-Manasa R Deepa J
Guided by- Dr.Vishwanath Hegde
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TechBytes

1) Sweden is so good at recycling, it has run out of garbage and now must import garbage from norway to fuel its energy programs.

2) TYPEWRITER is the longest word that can be made using the letters only on one row of the keyboard.

3) In 64 bit apple mobiles, if you set the date to 1st jan 1971 and reset the system, the system will crash, and cannot be used again.

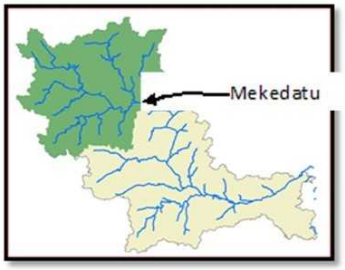
Feasibility work on Mekedatu Project

Why Dams and Reservoirs: Most of the rivers in India are flowing full in rainy season and flow is marginal (or no flow) in summer season. In rainy season more water is available in the river and demand for the water from downstream users is less. This excess water is stored in reservoirs by the construction of dams across the rivers and this stored water in the reservoirs is released to the downstream users according to their demands.

Mekedatu project: Mekedatu is a location along Cauvery River in Kanakapura Taluk and it is about 3.5 kilo meters downstream from Sangama, the place where Arkavati merges with Cauvery River. Tamil Nadu and Karnataka state boundary is at a distance of about 3 km downstream of Mekedatu. At Mekedatu, Cauvery River flows through a deep and narrow gorge which, geographically and topographically, is a suitable location for the construction of a dam.

As a part of student's project, the students took the task of investigation on "Feasibility work on Mekedatu Project". The findings of the investigation are as follows.

1) Analysis of forty year historical stream flow reveals that on an average 80 TMC of excess water is flowing to Tamil Nadu over and above their demand.
2) Seventy one Topographic sheets of 1:50,000 scale from survey of India are used in the project for the investigation of Mekedatu project catchment area.
3) Ten alternate dam sites are investigated for an economic section with minimum submerged area. It is found that Mekedatu is suitable for locating the dam with less bund length and minimum volume of dam material.
4) Shivanasamudra power project with bed level (RL) 422m above mean sea level, maximum water level in proposed Mekedatu dam must be below the existing power project.



Cauvery river Basin

Water spread area of proposed Mekedatu project

5) Elevation of bed level at Mekedatu is RL 340 m and fixing proposed dam height at RL 419 m, total 120 TMC water can be stored in the reservoir with total submerged area of 4.32 km2.
6) It is found that Gross Command Area (GCA) towards *downstream within Karnataka as measured on topographic sheet is about 14,312 Hectares.*

-Suma K Pavan Kumar N R
Gowthami H G . Mohammed Irfan
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Dept. Of Civil Engineering

Automated Wall Surface cleaning System for Exterior Painting Process

Wall Cleaning is an important process before painting the wall surface. Currently, wall cleaning is carried out by the man power. At present, there is a scarcity for man power, which necessities the automation. The problems associate with the manual cleaning process are the longer duration, results in health hazards for the workers, makes the process tedious and costlier.

The work is focused on the development of automated wall surface cleaning system. The system can be used to clean the dust and algae grown on the wall surface cleaning degree of safety and at affordable cost. The work closely revealed the parameters and features necessary for design of the system. the materials are selected based on the ISO standards. From the literature review, it has been observed that the pressure of the pump required to clean the wall surface is about 100 bar. In the present system, the pressure is about 120-130 bar is employed to clean the wall surface. The present system is developed to clean the wall up to 10 feet (vertically) and 4 feet (horizontally) during one cleaning stroke at its position with less human effort. With the automation system, the focus is to overcome the problems associated with manual system and to enhance the human safety.

-Abhishek S Ambarish
Kiran H.S. Manjunath M
Guided by- Dr. Amarendra H J
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A System to Filter Unwanted Messages from OSN User Walls

One fundamental issue in today's Online Social Networks (OSNs) is to give users the ability to control the messages posted on their own private space and avoid unwanted content to be displayed. The support provided by OSN until now, to fulfill this requirement is less. A system is proposed which allows OSN users to have direct control over the messages posted on the wall. This is achieved by using a flexible rule based system, which allows the users to customize the filtering criteria which could be applied on the text before posting it on one's private space. There is also Machine Level Learning based software classifier which automatically finds and labels text supporting the content based filtering.

-Manu K Nagalakshmi H
Sugandhini P S . Shilpa S Shastry
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TECHSANDHYA

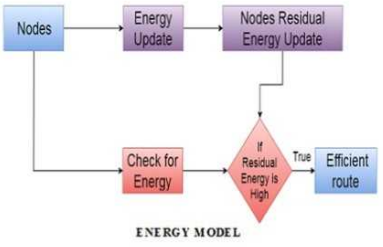
We often miss opportunity because it's dressed in overalls and looks like work
- Thomas A. Edison

Intensifying the battery life and reliability of mobile Devices using RMECR protocol and reducing power consumption

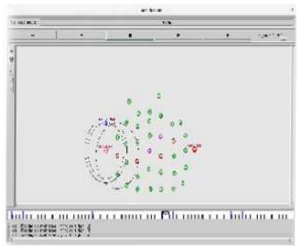
Abstract—Energy is one of the main network resources that is used in mobile devices. We proposed energy efficient routing techniques called reliable minimum energy cost routing (RMECR) and comparing with reliable minimum energy routing (RMER) which are used by the nodes in the most efficient manner. RMER and RMECR works on the basis of residual energy of the nodes so that the nodes with maximum energy can do the work and the nodes with less than certain threshold energy required to do certain amount of work will not do any work. There by, we try to increase the network lifetime and reliability of communication in a network of mobile devices. The proposed RMECR protocol is also used to reduce the cost of communication in wireless networking environment.

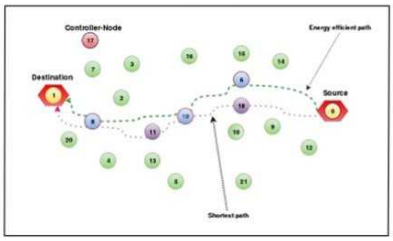
CONCLUSION AND FURTHER

- Energy is one of the most important network resources and has to be efficiently used in a network.
- Only nodes with sufficient energy are used with this routing so unnecessary use of nodes in the network is prevented.

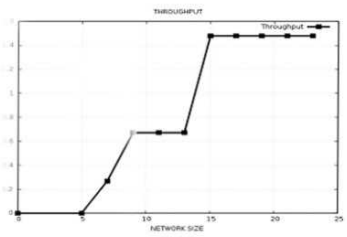


ENERGY MODEL





ENERGY BASED PATH



THROUGHPUT

- There is a lot of scope for improvements in this project. Our project can be further enhanced to form cluster based wireless networks.
- These networks are implemented in fire detection system and in tactical applications.

ACHIVEMENTS

- Our project has been sponsored by the Karnataka Government under the program Karnataka State Council for Science and Technology (KSCST).

Details: Project Proposal Reference Number: 39S_BE_1359, Serial Number: 249

- Accepted and presented a paper entitled "Enhancing the Network Life Using Reliable Energy Efficient Routing in Wireless Sensor Networks" for in IEEE ICACC 2016.

-Nithin H V Ravindra T R
Shivakirana H K Mohammed Arbaz
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Smart Helmet

An accident is an unexpected and unintended event. The avoidance of Traffic Rule and carelessness of the driver are the major factors of occurrence of vehicle accidents which cause harm to human being as well as the environment. Nowadays most of the countries are making it mandatory to wear helmet and avoid drunken driving. But still the rules are being violated. In order to overcome this problem, A smart –helmet can be introduced as an intelligent system, which checks whether the person is wearing the helmet and has a non alcoholic breathe before driving. If any of these conditions are not met, the bike does not start. A transmitter on smart helmet generates a signal on the basis of two above mentioned conditions with the help of a switch and an alcohol sensor and then sends it to the receiver on the bike through the RF transmitter. Now, the receiver decodes the signal and the microcontroller, according to decoded signal, takes the required action. In case alcohol is detected the relay gates actuated and cuts off the power to the spark plug.

The aim of this paper is to minimize the risk of accidents. This system follows some steps before the rider starts his journey. Initially the system inside the bike checks whether the rider placed helmet on his head or not, if he had placed helmet then the system checks for the presence of alcohol in the drivers exhaling air. If both conditions are met then only the bike will start.

-Preetham A D Srinidhi B R
Rakesh Kumar R Shamanth B D
Guided by- Mr. H S Lokesh
- Dept. of Automobile Engineering

INTERNET OF THINGS (IOT) BASED HOME AUTOMATION

Internet of Things (IoT) is a concept that envisions all objects around us as part of internet. IoT coverage is very wide and includes variety of objects like smart phones, tablets, digital cameras and sensors. Once all these devices are connected to each other, they enable more and more smart processes and services that support our basic needs, environment and health. Such enormous number of devices connected to internet provides many kinds of services. They also produce huge amount of data and information. Cloud computing is one such model for on-demand access to a shared pool of configurable resources (computer, networks, servers, storage, applications, services, and software) that can be provisioned as infrastructures, software and applications. The home automation system is capable of automating things that keeps our everyday household running – lights, ventilation, temperature etc. This kind of system could decrease the everyday power consumption of a household by utilizing our end objects (light bulb, TV etc.) more efficiently.

Internet Of Things(Iot) based Home Automation presents a low cost, energy efficient, flexible home control and monitoring system using an embedded system with internet accessibility for controlling devices and appliances remotely using a WiFi module,Android based Smart phone app and IR remote controller. The demonstration is done by the feasibility and effectiveness of this system. Devices such as real time clock, light switches, power plug, humidity sensor, temperature sensor and gas sensor have been integrated with the proposed home control system .The device can be controlled from anywhere in the world using internet, saves energy by turning off lighting devices, AC etc. when not needed and provides protection against LPG gas leakage by preventing it. It also provides instant notification once an intruder steps onto your property, activates lights as you approach your home. Elderly people can easily control the system.since it is user friendly, The system can be controlled by voice commands, which makes it very easy to use by physically challenged people.

-Amith M P
Hajira Saman Aishwarya KB
Lanuyangar longchar Anusha L
Guided by - Mrs. C L Triveni
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TechBytes

1) Computation can not be done without generating heat.

Rolf Landauer discovered in 1961 that every bit destroyed generates at least kTln2 joules of heat, where k is Boltszmann constant and T is absolute temperature.

2) The QWERTY keyboard Layout was designed to slow typist down.