Adaptive Cruise Control

Alert today, alive tomorrow! Speed control is necessary for a safe drive. Adaptive Cruise Control (ACC) helps to maintain a constant vehicle speed and to set a definite interval behind a vehicle that is detected ahead of it.

It is one the best safety systems that has been introduced in the automotive industry for control-based safety. ACC technology is widely regarded as a key component of any future generations of intelligent cars. They impact driver safety and convenience, as well as increase capacity of roads by maintaining optimal separation between vehicles and reducing driver errors. Vehicles with autonomous (adaptive) cruise control are considered as Level 1 autonomous car, as defined by SAE International.

Adaptive Cruise Control (ACC) is an automotive feature that allows a vehicle's cruise control system to adapt the vehicle speed to the traffic environment. A radar system attached to the front of the vehicle is used to detect whether slower moving vehicles are in the ACC vehicle path.

If a slower moving vehicle is detected, the ACC system will slow down the vehicle and control the clearance or time gap between the ACC vehicle and the forward vehicle. If the system detects that the forward vehicle is no longer in the ACC vehicle path, the ACC system will accelerate back to its set cruise control speed. This operation allows the ACC vehicle to autonomously slow down and speed up which is controlled by the engine throttle control and limited brake operation.

How does this system work? What are the infrastructure/systems used for the working of this system?

The radar headway sensor sends information to a digital signal processor, which in turn translates the speed and distance information for a longitudinal controller. If the lead vehicle slows down, or if another object is detected, the system sends a signal to the engine or braking system to decelerate. When the road is clear, the system will re-accelerate the vehicle back to the set speed.

Adaptive cruise control does not provide full autonomy: the system only provides some help to the driver, but does not drive the car by itself Some of the vehicle models supporting adaptive cruise control are Acura RLX, MDX, ZDX, Audi A8, A7, A6, Q7, A3 Prestige, Q5, A3, A4, A5, Q5, Q7 and Bentley Continental GT.

The three main categories of ACC are:
• Vehicles with Full Speed Range are able to bring the car to 0 mph (stop completely) and need to be re-activated to continue moving with something like a tap of the gas pedal.
• Vehicles with Traffic Jam Atttssist or Stop & Go auto resume from standstill to creep with stop and go traffic.
• Vehicles with partial cruise control cut off & turn off below a set minimum speed, requiring driver intervention.
• Vehicles with fully automated speed control can respond to traffic signals and non-vehicular on-road activity.
This is how an adaptive cruise control provides a safe, comfortable and a better journey.

-Aishwarya D. N., 2nd year Automobile Engg.

Tech Fact
• The first ever Internet Service Provider (ISP) was a company named CompuServe.

Editorial Column

The Malnad Technical Club was started with the perception of being on par with the burgeoning technology industry.

Way back in 2016, during its state-level technical fest, ENIGMA; Techsandhya- the annual newsletter was visualized precisely for the same reasons to make technology compulsive and addictive in our way of life. The earlier editions of Techsandhya were thought-provoking with interesting articles. The Techsandhya platform of today ignites the minds of tomorrow's innovators to make an interesting pitch with their piece of article as they see in the technology landscape. Every branch of Engineering is witnessing disruptive technologies being adopted to benefit the common man in many more ways than one and our fellow students are giving wings to their thoughts by being a part of this publication.

I take this opportunity to express my sincere thanks to students who have involved themselves in techical activities of the club. I immensely thank all the stakeholders for supporting us to publish this technical newsletter. Finally I wish them all the best for their future endeavours.

Mr. Manu K C, Club Convener.

Technical Club is a student driven and faculty guided initiative for increasing awareness in the field of Technology by updating the student's knowledge on recent trends and technologies. Each student in this club are rigorously tuned by their seniors to be able to create and sustain technical competencies. I'm really happy to be part of this club and I would like to thank MCE and our sponsors for their continuous support to Enigma - 2019 and 4th edition Techsandhya

Mr. Jnanaswaroop, Club Convener.

Calming Stone – A Device To Prevent Panic Attacks

Today, we observe that nearly 18% of total population suffers from anxiety control issue. This is not a minor issue. Detecting and treating it is a very critical matter. Since only 36% of the people suffering are treated, we have a device that helps calm anxiety and panic attacks. This device is rightly named as "CALMING-STONE".

Anxiety is a common feeling ranging from a debilitating illness for some to a temporary, yet agonizing feeling for others. This gadget is designed to help reduce the symptoms of anxiety and prevent panic attacks. Invented by New Zealand, anxiety sufferer Ramon Telfer, the handheld device can be used by people of any age to help alleviate symptoms of stress. Telfer designed the gadget based on a treatment he used to control his own anxiety in combination with a device from psychologists. "After years of struggling with my own anxiety problems, I developed multiple techniques to provide relief during anxiety or panic attacks. I decided to design a device that combines these techniques to deliver instant panic relief anywhere, anytime." says Telfer.

The object has a copper band running through it that picks up your heartbeat. Lights mimic the beat to help you visualize yourself calming down. Headphones supplied with the stone provide meditative aural sounds. Treating early signs of anxiety can help prevent panic attacks. "I discovered that breathing is one of the most important aspects of controlling emotion, whether it is anxiety, anger, or sadness," Telfer explained. "By controlling your breathing and focusing on fresh and cool air, many people have found that they can relieve stress. However, the depth of anxiety lies within the psyche. Anxiety can lead to irrational thinking and it is important to control these thoughts through guided meditation."

-Prajwal Bekal, 2nd year Mechanical Engg.

"The greatest tragedy of science - the slaying of a beautiful hypothesis by an ugly fact."

- Thomas Huxley

3D Organ Printing

Print your organs drop by drop!

This is an extremely surprising yet leading technology that builds your organs as per the requirements. This technology works on a constructive bio-printing in 3D printing technology.

Printing human organs has been a goal of biomedical engineers and researchers for decades. While it seems like an improbability, advancements in both 3D printing and chemical manufacturing have brought the world closer to replacing the parts of human body. A team of researchers from Osaka University have refined an enzyme-driven approach to build up new body parts.

The Osaka teams' research contributes to the process of bio-printing. More specifically, it can help perfect the gel structure for inkjet or 3D printing. Thus, far in 3D printing innovations, scientists have developed new skulls, created an ear, and partially rebuilt faces.

A couple of years ago, researchers even managed to recreate a network of blood vessels and capillary network.

Current methods use sodium alginateas the main agent for bio-printing. However, current methods use sodium alginate doesn't work well with certain types of cells. The team used *hydrogelation* through an enzyme; *horseradish peroxidase*.This builds up cross-links between phenyl groups. The *horseradish peroxidase* adds polymer in the presence of hydrogen peroxide. It is also found in the root of *horseradish*.

However, *hydrogen peroxide* can often damage cells. Thus, the researchers devised a way to limit the contact between hydrogen peroxide and the cells to make sure the cells stayed alive. With this method, more than 90% of the cells were viable.

Advances in induced pluripotent stem cell technologies have made it possible for us to induce stem cells to differentiate in many ways. Now we need new scaffolds so we can print and support these cells to move closer to achieving full 3D printing of functional tissues. Our new approach is highly versatile and should help all groups working to this goal.

While the study of printing organs themselves are still incredibly important to the ultimate goal of viable 3D printed organs, perfecting the ink could be a crucial step in that process. And the promises of bio-printing continue to be goals for biologist, engineers, and chemical engineers around the world.

-Pramath P H.,1st Year, Information Science Engg.

Blue Eyes Technology

Imagine, a beautiful world, where humans collaborate with computers! The computer can talk, listen or screech aloud! With the help of speech recognition and facial recognition, computer gathers information from the users and starts interacting with them according to their mood variations. Computer recognizes our emotional levels by a simple touch on the mouse and it can interact with us as an intimate partner. The machine feels our presence, verifies our identity and starts interacting with us and will also let us dial and call home at any urgent situation. This is all possible only with the help of "BLUE EYES" Technology.

The main objective of Blue Eyes Technology is to develop a computational machine having sensory and perceptual ability like humans. The Blue Eyes technology system is a combination of a set of hardware and software systems. The hardware consists of a central system unit (CSU) and data acquisition unit (DAU). Microcontroller-ATMEL 89C52 is the heart of the data acquisition unit. Bluetooth technology is provided for the coordination and communication between the two units. Using the Blue eyes Technology, it is able to record and monitor the user's physiological condition by a technical approach.

Blue eyes technology consists of three main components;
Mobile measuring device or Data Acquisition Unit (DAU)
Central System Unit (CSU).The Hardware, the DAU used in the Blue Eyes technology is the mobile component of the system. The main function of DAU is to gather the physiological information from sensors and forward to the CSU for processing and verification purposes. The Bluetooth module, which is integrated with the mobile device (DAU), provides a wireless interface between the Central System Unit (CSU) and the user having the sensors. PIN codes and ID cards are assigned to the entire operation for authentication purposes.

The CSU contains codec (PCM Codec commonly used for voice information transmission) and a wireless Bluetooth module. This section is integrated to a personal computer using USB, parallel and serial cable. The mini-jack socket is used for audio data accessing.

The program containing the operators' personal ID is amalgamating to the personal computer through the serial and power ports.

The operator's physiological condition is continually supervised by this Blue Eyes technology software.The software will respond in real time according to the operator's physiological condition. This software helps to transfer the data or information from managers to the data analyzers. Then it transfers the processed information from this data analyzers unit to the GUI controls and data analyzers. At last, the data visualization module supports a user supervisor interface section.Thus 'Blue Eyes' software enables the supervisor to know about the physiological condition of the operators.

Blue Eyes technology uses most modern cameras, microphones and advanced non-obtrusive sensing techniques to interact with humans and understand the emotions of human beings. The machine has the ability to grasp the eye movement of the user, the needs of the user and can also understand the emotional and physical states of a user in front of the machine. The process of making a computer having sensing and emotional capabilities is known as "Affective Computing".

The Blue Eyes Technology ensures a convenient way of simplifying life by providing more delicate and user-friendly facilities in computing devices. The day is not far when this technology will push its way into your household, making you lazier. The Blue Eyes Technology is meant to be a stress reliever, driven by the advanced technology of studying the facial expressions for judgment of the intensity of stress handled. These new possibilities can cover areas such as industry, transportation, military command centres or operation theatres. The Blue eyes technology serves as a model for today's biometric industry. Right now the unique Identification Authority of India is implementing facial recognition as an Aadhaar authentication factor.

-Prajwal N R, 2nd Year, ECE

E-Ball Technology
The 8th Wonder!

E-Ball is an amazing technology which shall soon be one's personal pocket computer! This technology imbibes a new concept that uses laser radiations for a computer. The E-Ball concept is a sphere shaped computer which has the smallest design among the currently available computer designs. It was designed by Apostolic Tnokovski, a 31-year old Macedonian product designer. It has all the features of a traditional computer such as keyboard, mouse and a large screen display. The diameter of the ball is 160mm and it can work on any Windows platform. The E-ball is generally placed on a stand and gets opened by pressing and holding the two buttons located on each side of the E-ball PC. Its unique feature is that, when closed, no one can guess that the whole computer is hidden in a ball. It projects the output to the paper, wall or to any output screen, since it does not have any external display unit of its own. It has a laser keyboard feature which can be activated with a key. This miniscule device comes with a HD-DVD recorder, 500GB HDD, 2GB of RAM, integrated graphic card and a sound card, 2× 50W speakers, wireless optical mouse, LAN and WAN card, modem web cam and an integrated LCD projector.

Invention and innovation are the new drivers in the development of technology. Thus, constant advancement is the only method to stay and survive in this emerging world of science and technology. E-ball PCs have made it possible to now have computers in our pockets!

-Harshitha, 2nd Year, Information Science Engg.

NUTALE– A tiny GPS tracker which keeps you from losing most precious belongings!

Technology is changing with each passing day; dozens of inventions take place while we breathe. Personal locating devices have become a part of everybody's life. As devices and technology shrink in size and come low in a price range, manufacturing such kind of devices is becoming easier.

Most of the tracking devices are targeted towards a specific and niche area such as keeping track of your children, monitoring the pets or locating personal belongings. "Nutale" is a new type of GPS tracking device that aims to stand out from the crowd by doing all of the above and much more.

Nutale is a powerful, user friendly and simple solution for real-time positioning, so you can keep track of your kids, pets, bikes, luggage or anything that moves. This is billed as one of the most compact and accurate trackers in the world. Originally slated for a 2017 release, an unexpected delay meant Nutale GPS to be released in the first quarter of 2018. The device is compatible with both Android and iOS, and works in conjunction with your phone to give real-time tracking updates. This device is app-operated and enables with geo-fence alert. One can set safety region on the app and enable the geo-fence alert for specific tracking.

The specifications of this device are:**Real-time GPS tracking**: Indoor and outdoor tracking is done with unlimited range. Nutale incorporates 4 layers of tracking technology for maximum accuracy. One will be receiving breach alerts, whenever your things or loved ones are out of safety zone.

Location records: With this GPS tracker, we can track and retrace 28 days of location footprint. We can view 24 hours of location history in the app at anytime. It also enables to keep track of the track record or check the Nutale GPS complete location records displaying the last 28 days in NutTag app.

30 Day long battery life: This ultra-long battery life is designed withvarious operating modes, making it more efficient and helpful to keep track in a better way.

Emergency SOS: Hold the button on your Nutale for 5 seconds to trigger an SOS alert. This will immediately send notifications to the connected accounts.

"Nutale" is a great technology which keeps one safe, especially during tourism. This device has passed the CQC test. Hence the product quality and safety is guaranteed. The Nut app will send the user alerts when the Nutale battery is low. It is also spill resistant i.e., resistant from raindrops or water droplets.This world class device is very exciting and pocket friendly. One is very unlikely to lose this tiny device anytime!

-Samhitha K. S., 2nd year IS&E

Tech Fact

- In 2004, the "at" symbol used in emails (@) became the first new character to be added to Morse code in several decades! The new character, known as the "Commat" consists of the signals for both A (dot-dash), and C (dash-dot-dash-dot) with no space or break in between.

How does your smart watch know your heart beat?
Optical Heart Rate Monitors

"Engineering or technology is all about using the power of science to make life better for people, to reduce cost, to improve comfort, to improve productivity, etc."-N. R. Narayana Murthy

The heart rate monitor is based on a difficult-to-pronounce technology called Photoplethysmography (PPG), but it basically comes down to using green LED lights paired with light- sensitive photodiodes to illuminate your skin and measures changes in light absorption.

This lets the device detect the amount of blood flowing through your wrist at any given moment. Because blood is red, it reflects red light and absorbs green light. "When your heart beats, the blood flow in your wrist — and the green light absorption — is greater. Between beats, it's less," reads the document.The sensors are designed to compensate for low signal levels by increasing both LED brightness and sampling rate. That is why the heart rate sensor on the back of the device flashes its LED lights hundreds of times per second, helping the device calculate heart rates precisely. But when it measures your heart rate every ten minutes, the watch switches to using infrared light. And if it fails to provide an adequate reading while using the infrared light, the device switches back to the green LEDs. In order for the sensor to work as advertised, the watch must be close to your skin. The company advises tightening the band in case the sensors aren't reading your heart rate accurately.

The device uses four primary technical components to measure the heart rate:

1. **Optical emitter** - generally made up of at least 2 LED's that send light waves into the skin. Because of the wide differences in skin tone, thickness, and morphology associated with a diversity of people wearing the devices, most state-of-the-art Optical Emitters in consumer wearables use multiple light wavelengths that interact differently with different levels of skin and tissue.

2. **Digital Signal Processor (DSP)** - the DSP captures the light refracted from the user of the device and translates those signals into ones and zeros that can be calculated into meaningful heart rate data.

3. **Accelerometer** - the accelerometer measures motion and is used in combination with the DSP signal as inputs into motion-tolerant PPG algorithms.

4. **Algorithms** - the algorithms process the signals from the DSP and the accelerometer into motion-tolerant heart rate data, but can also calculate additional biometrics such as VO2, calories burned, R-R interval, heart rate variability, blood metabolite concentrations, blood oxygen levels, and even blood pressure.

All in all, the heart rate sensor in the watch is a great feature, especially if you are something of a fitness buff. It checks your heart rate during workouts for an at-a-glance overview of both the intensity level and the heart rate change over time.

This is crucial, as having continuous readouts of one's heart beat in the Health app is indispensable when correlating your workouts and heart rates. In addition to your heart rate reading, the watch collects other data to provide estimate on calories burned. Aside from the heart rate sensor itself, it may tap into other sensors depending on your activity. In one example, running indoors prompts the watch to use its built-in accelerometer.

But go cycling outdoors and the watch starts using the GPS in your Phone, if available, to track your activity with great precision in order to provide as accurate estimate on calories burned as possible. The watch learns about your stride enough over time to start accurately track workouts without a phone.

-Abhyudaya Ram S.J., 1st year CS&E

Tech-Facts

- Although GPS is free for the world to use, it costs $2 million per day to operate. The money comes from American tax revenue.

- Ubuntu is one of the more popular distributions of Linux. The word Ubuntu comes from an African word meaning "I am because of you".

- Emoticons were reportedly first used on September 19, 1982, by Scott Fahlman, a computer scientist at Carnegie Mellon University. He created a happy face and a sad face with a colon, a hyphen and parentheses.

"Failure is simple the oppourtunity to begin again, this time more intelligently"

-Henry Ford

How is AI Developed?

"The development of full artificial intelligence could spell the end of the human race. Once humans develop artificial intelligence, it will take off on its own and redesign itself at an ever-increasing rate. Humans, who are limited by slow biological evolution, couldn't compete and would be superseded." — Stephen Hawking

Artificial Intelligence (AI) is a field that has a long history but is still constantly and actively growing and changing.

Artificial Intelligence technology is increasingly prevalent and nowadays used in a variety of industries from gaming to journalism to media and finance, as well as in the state of art research fields like robotics, medical diagnosis, and quantum science.

Like the term 'robot' itself, artificial intelligence is hard to define. Ultimate AI would be a recreation of the human thought process - a man-made machine with our intellectual abilities. This would include the ability to learn about anything, the ability to reason, the ability to use language and the ability to formulate original ideas. Roboticists are nowhere near achieving this level of artificial intelligence, but they have made a lot of progress with limited AI. Today's AI machines can replicate some specific elements of intellectual ability.

Computers can already solve problems in limited realms. The basic idea of AI problem-solving is very simple, though its execution is complicated.

First, the AI robot or computer gathers facts about a situation through sensors or human input.

The computer compares this information to stored data and decides what the information signifies.

The computer runs through various possible actions and predicts which action will be most successful based on the collected information. Of course, the computer can only solve problems if it is programmed to solve - it doesn't have any generalized analytical ability. Chess on computers are one example of this sort of machine.

Some modern robots also have the ability to learn in a limited capacity. Learning robots recognize if a certain action (moving its legs in a certain way, for instance) achieved a desired result (navigating an obstacle). The robot stores this information and attempts a successful action the next time it encounters the same situation. Again, modern computers can only do this in very limited situations. They can't absorb any sort of information like a human can. Some robots can learn by mimicking human actions. In Japan, roboticists have taught a robot to dance by demonstrating the moves themselves.

Some robots can interact socially. Kismet, a robot at M.I.T.'s Artificial Intelligence Lab, recognizes human body language and voice inflection and responds appropriately. Kismet's creators are interested in how humans and babies interact, based only on tone of speech and visual cue. This low-level interaction could be the foundation of a human-like learning system.

Kismet and other humanoid robots at the M.I.T. AI Lab operate using an unconventional control structure. Instead of directing every action using a central computer, the robots control lower-level actions with lower-level computers.

The program's director, Rodney Brooks, believes this is a more accurate model of human intelligence.

We do most things automatically; we don't decide to do them at the highest level of consciousness.

The real challenge of AI is to understand how natural intelligence works. Developing AI isn't like building an artificial heart - scientists don't have a simple, concrete model to work from. We do know that the brain contains billions and billions of neurons, and that we think and learn by establishing electrical connections between different neurons. But we don't know exactly how all of these connections add up to higher reasoning, or even low-level operations. The complex circuitry seems incomprehensible.

Because of this, AI research is largely theoretical. Scientists hypothesize on how and why we learn and think, and they experiment with their ideas using robots. Brooks and his team focus on humanoid robots because they feel that being able to experience the world like a human is essential to develop human-like intelligence. It also makes it easier for people to interact with the robots, which potentially makes it easier for the robots to learn.

Just as physical robotic design is a handy tool for understanding anim.al and human anatomy, AI research is useful for understanding how natural intelligence works.

For some roboticists, this insight is the ultimate goal of designing robots. Others envision a world where we live side by side with intelligent.machines and use a variety of robots for manual labour, health care and communication.

A number of robotics experts predict that robotic evolution will ultimately turn us into cyborgs - humans integrated with machines. Conceivably, people in the future could load their minds into a sturdy robot and live for thousands of years!

-S. K. Nithin Kowshik, 1st year ECE

BLACK BOX – The Air Crash Survivors!

Black box is an electronic recording device placed in an aircraft to facilitate the investigation of aviation accidents and incidents. The misnomer black box is also known as a flight recorder. Black boxes are generally bright orange in colour to aid in their recovery in case of accidents.

One of the earliest and proven attempts was made by Francois Hussenot and Paul Beandouin in 1939 at the Marigane Flight Test Center in France, with their type HB flight recorder. The first modern flight recorded, called Mata Hari was created in 1942 by Finnish aviation engineer VeijoHeibla. This black high-tech mechanical box was able to record all the important factors during test flights of fighter aircraft that the finish army repaired or built in its main aviation factory in Tampere, Finland.

A black box is made up of two separate pieces of equipment; the Flight Data Recorder (FDR), which preserves the recent history of dozens of parameters collected several times per second. Another one is the Cockpit Voice Recorder (CVR) that preserves the recent history of the sounds in the cockpit, including the

conversation of the pilots. They are compulsory on any commercial flight or corporate jet, and are usually kept in the tail of an aircraft, where they are more likely to survive a crash. FDRs record things like airspeed, altitude, vertical acceleration and fuel flow.

Black boxes are fitted with an underwater locator beacon that starts emitting a pulse if its sensor touches water. They work to a depth of just over four kilometres, and can "ping" once a second for 30 days before the battery runs out.

Digital recorders have enough storage for 25 hours of flight data but only two hours of cockpit voice recording, which is recorded over itself in a loop. The CVRs track the crew's interactions with each other and air traffic control, but also background noise that can give vital clues to investigators. Flight Data Recorders are usually double-wrapped in titanium or Stainless Steel, so as to withstand atrocious conditions. They are virtually indestructible. Researchers tried to crush it, destroy it in an hour of 1,100 degree Celsius fire, submerge it in a pressurised salt water tank, and immerse it in jet fuel; but all in vain!

It is currently not feasible to stream huge amount of data from a large aircraft; experts are working to make it possible. They are less powerful than our mobile phones. This device is called as black box because it is often charred black after a crash, or may be because

the very first boxes were painted black to prevent reflection. Another reason; 'Black Box' is a general name in science for devices with in- and output data having complex internal workings.

-Samanvitha T S

Did You Know

● In 1973, the very first mobile phone call was made by Martin Cooper, who was an employee of Motorola. The call was made from the streets of New York City

Best Projects of MCE

Production of Biodiesel from Dairy Waste Scum and Study on the Performance and Emission of Biodiesel in a Diesel Engine

Dairy waste scum is being increasingly considered as a valuable resource. However, these wastes may also contain contaminants that may adversely affect the land or water to which they are discharged. The study investigates using dairy waste scum as a feedstock for bio fuel production. The high cost of biodiesel can be reduced by using dairy waste scum as a raw material. Raw dairy waste scum has a high viscosity that makes them unsuitable as fuel for diesel engines. Acidesterification and transesterification are the well known process by which fats and oils are converted into biodiesel.

The present study consists of the production of biodiesel from Dairy waste scum through transesterification process with the use of sodium hydroxide as a catalyst. Experiments have been conducted to estimate the various properties such as viscosity, density, calorific values, and compared with the standard Diesel.

1 LITRE OF DAIRY SCUM OIL → 800ml of BIODIESEL

Experiments were conducted using the fuel blends of B10 B20 and B30 to evaluate the performance and exhaust emission.From the study, it is revealed that there is significant improvement of brake power specific fuel consumption operated with B10 blend (10% biodiesel +90% diesel). This operation does not require the engine modification.From emission analysis, it is known that carbon monoxide (CO) is decreased while the HC is increased for blend B30.

As the density and viscosity of the pure biodiesel is higher, there will be lower BTE and increase in NO2 emission because of problems in pumping spray characteristics of the bio fuel.

The bio-diesel thus produced, is noted to be more eco-friendly and provides better opportunities for sustainable development. Biodiesel being biodegradable, non-toxic and renewable fuel can be used as alternative fuel for diesel engines. This new way for using dairy waste scum, reduce the cost of production of bio diesel and the problem related to the disposal of dairy scum. It is evident from the experiment that additives will improve the thermal efficiency of the engine and it influences on emission characteristics.

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Guided by,
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Seed Sowing Machine and Green Card Technology for Indian Farming

Agriculture plays a vital role in the development of a country. In India about 70% of population depends upon farming and one third of the nations' capital comes from farming. Issues concerning agriculture have been always hindering the development of the country. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Agricultural tasks automation is significant in recent days to reduce the labor work and increase the yield of crop, efficiency and profit.

The project focuses on the design, development and fabrication of the agricultural system for sowing seeds. Various operations are performed in the agriculture field like seed sowing, weeding, plowing etc. Very basic operation is seed sowing. But the present method of seed sowing is problematic. The equipments used for seed sowing are expensive, very difficult and inconvenient to handle.

The proposed automated agriculture can be advanced for sowing seeds in farm with optimal distance, depth and overcome the probable obstacles. The project also presents an idea called green card, a unique identity for farmers hosted in a web application. Using this web application, farmers can access the latest updates on weather and market trends. In addition to this farmers can access information in the nearby soil testing centers, financial services like loan and insurance. The farmer can get the required information related to agriculture with the help of an expert through suitable means of communication. Farmers can also shop for agricultural products and equipments irrespective of time and place conveniently.
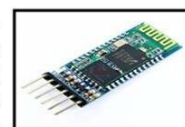

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Garbage Management Application

Waste management includes all the activities and actions required to manage waste from its inception to its final disposal. This involves collection, transportation, treatment and disposal of waste together with monitoring and regulation. Waste collection methods vary widely among different countries and regions. Domestic waste collection services are often provided by local government authorities. Nowadays, cities with developing economies experience exhausted waste collection services inadequately managed, uncontrolled dump sites and the problems are worsening. Waste collection method in such countries is an ongoing challenge and many struggle due to weak institutions and rapid urbanization.Proposed Garbage Management App is user friendly which provides people the information about waste management, segregation and proper disposal of waste.
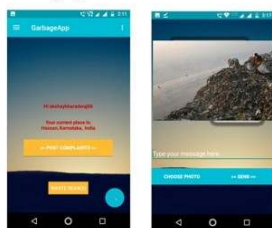
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Design and Development of Portable Automated Laser Engraving and Cutting Machine

Laser engraving is the practice of using lasers to engrave or mark an object. Laser engraving is the removal of material from the top surface down a specified depth. Laser engraving, which is different from laser making, is the practice of using lasers to engrave an object. Laser making on the other hand just discolours the surface, without cutting into the surface. The technique does not involve the use of inks, nor does it involve tool bits which contact the engraving surface and wear out. These properties distinguish laser engraving from alternative engraving or marking technologies where inks or bit heads have to be replaced regularly.

The project involves fabrication of portable automated laser engraving and cutting machine. The x and y axes movements of the bed is automated and controlled using micro-controller through stepper motors. The vertical movement of the laser holder can be manually operated. The bed movement is restricted is 100mm in both X and Y directions so, the maximum dimension of the PCB on which the holes can be drilled precisely is restricted to 80mm x 80mm.

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"If something is important enough,even if the odds are against you, you should still do it."

- Elon Musk

Accident Alert System for Tow-Wheeled Vehicles

The two-wheeler accidents generally result in toppling of the vehicle either due to impact or the loss of balance. The project uses a mechatronic device which senses the accident occurred in case of two-wheelers and sends an SMS alert and location to the concerned authority and also to the immediate members of the family.

The data processed by the microprocessor is sent to a GSM transmitter module. Global System for Mobile communication (GSM) is an architectural communication device used for mobile communication Also, the location coordinates of the place where the accident has taken place are sent in the SMS.

When the device is connected to the battery, the GPS sensor is activated and sends continuous location coordinates to the microprocessor. In current situation the critical angle is set to 100 degrees. In case of an accident, when the two-wheeler falls down, the Accelerometer detects the fall; the GPS sensor senses the location of the accident. Both the inputs are sent to the microprocessor which sends the signals to the GSM module via relay. Then the GSM module sends SMS to those numbers stored in the program. Also, a Buzzer is activated to alert the people in the vicinity of accident location. In the SMS, a help message and a Google Maps link is sent along with the location of the accident in case the internet connectivity is unavailable.

This system can avoid fatalities and the resulting casualties of an accident by providing a quicker alert and in turn by ensuring a quicker response by the Emergency Services. It also enables us to track or monitor the vehicle movement. Thus the resulting device is simple, useful, portable, efficient and cost effective.

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Smart Ambulance with Automatic Traffic Congestion Control

Today's world is developing at a very high speed. Every day, a new technology is discovered. However at the same time, everyone is facing problems in these smart cities. One major issue is traffic jams in big cities. Traffic congestion causes many adversary effects on country's transportation. Ambulance service is a service which gets widely affected because of these traffic jams. If there is a delay in reaching of ambulance to the hospital, a patient may lose his life. Also the vehicles on the road have to make way for the ambulance. But sometimes, the ambulance gets stuck in the traffic which in turn wastes a lot of time. Hence to overcome all these situations a solution is proposed in this model. The proposed method consists of a health monitoring system to measure health parameters of the patient in the ambulance and at the same time traffic lights are controlled to make the ambulance reach the hospital as early as possible. Health parameters such as pulse rate, body temperatures are calculated by sensors. Further by they are stored in SBC present in the ambulance. For traffic controlling purpose, RF and ZigBee communication is used. using serial communication, Traffic density is also considered while designing the algorithm to control the traffic lights.

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Fabrication of Portable Solar Water Purifier

Earth is the only known planet in this universe where life is possible only because of the availability of water and oxygen. Only 3% of the world's water is fresh water, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use. Scarcity of water and quality of water have long been a concern for many people in the world, according to an answer to the Lok Sabha on March 16, 2017. Arsenic, known to cause skin lesions and cancer, was found in drinking water source of 21% of such habitations. Hence there is a need for purification system to make water safe for drinking purpose. The goal of this project is to design a dependable way to purify water in locations that are off the grid and don't have constant sources of clean water. The design also needs to be able to build on a low budget considering that most of the places that don't provide potable water to lower communities.

There are many water purification techniques being used worldwide, some of the common techniques are Boiling, Ultra-violet purification, Ultra filtration and Reverse Osmosis.

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Design of Setup Weld Fixture for BG605 Rear Frame

This project was carried out at BEML, Mysore Complex. The purpose of fixture is to form a structure to assist in welding. This results in dimensional accuracy, quality and productivity.

The new product developed by Research and Development department of BEML to meet the market requirement has lead to introduction of articulation version of Motor Grader BG605A. The main frame structure of BG605A consists of aggregates called front frame and rear frame.

After successful trials and proven out proto equipment to meet production shop requirement and increase the production rate of fabrication of rearframe and front frame structure, has necessitated the design and development of new set up weld fixtures for front frame and rear frame structure of BG605A.

The objective of the project is to design and develop a fixture to set up the rear frame structure of MOTOR GRADER BG605A.

The scope of the project is to study the component design by gathering all required information, develop the tool concept using suitable 3D modelling software, finalize the feasible design on approval of tool engineering dept, to draft 2D drawings for manufacturing with bill of materials, cost economics and feasibility study and to further manufacture and prove out of the fixture.

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Mems Accelerometer Based Hand Gesture Recognition System

This work deals with a hand gesture recognition system, based on MEMS accelerometer.

In the process industry, human machine interaction plays a vital role in executing control action. In the present scenario, keyboard and mouse play a significant role in human-computer interaction. However, owing to the rapid development of hardware and software, new types of HCI methods have been required, specifically in remote manner. The use of hand gestures provides an attractive alternative to cumbersome interface devices for human-computer interaction (HCI). This situation leads to the design of a system to interpret the hand gestures.

A MEMS accelerometer ADXL 345 which senses the movement along X, Y and Z directions is used in this work to sense the hand gesture in various directions at various speeds. Arduino Uno is employed here to access the output 16 bit data of ADXL 345 and communicates the same to the user platform (PC) in remote mode. Remote communication is achieved in this work using Bluetooth HC-05. Further, python script is developed to read the response of ADXL 345, communicated to user platform. To demonstrate the execution of control action in remote manner, gesture is used in this work to execute the functions of upward and downward keys. The developed python script access the data of ADXL 345 corresponding to the hand gesture and executes the respective key functions.

It is observed from the results that the fabricated system senses the hand gesture and executes the functions of upward and is downward keys which are extended to move the PPT slides. The developed systemreliable and accurate.

"The advance of technology is based on making it fit in so that you don't really even notice it, so it's part of everyday life."
— **Bill Gates**

EmDrive

The Electromagnetic Drive, called the EmDrive, is an electromagnetic thruster (rocket) concept designed by aerospace engineer Roger Shawyer in 2001. It is a superfast engine that gives off no radiation and consumes no propellant, or fuel.

Hypothetically, it could get us from Earth to the moon in four hours!

EmDrive uses the hypothetical model of a radio frequency resonant cavity thruster, which is a magnetron, the same thing that makes the electromagnetic microwaves in our kitchen microwave ovens. The magnetron forces these waves into one end of a closed hollow cone, where they get caught in the cone's narrow end and bounce back and forth and so on to create acceleration. That acceleration, in turn, causes the thrust to push the vessel forward.

Test results indicate that the RF resonant cavity thruster design, which is unique as an electric propulsion device, is producing a force that is not attributable to any classical electromagnetic phenomenon and therefore is potentially demonstrating an interaction with the quantum vacuum virtual plasma.

Several prototypes of this concept have been constructed and tested, including by the Advanced Propulsion Physics Laboratory at NASA. In December 2002, Roger Shawyer described a working prototype with an alleged total thrust of about 0.02 newtons powered by an 850 W cavity *magnetron.*

The EmDrive proves to work as expected, it verges on the idea of a perpetual motion machine, being able to travel great distances without the same sort of solid fuel used in current rocket engines. NASA researchers even allege that the engine could turn trips to Mars from about 260 days to a blistering 70 days. Brace yourselves, the journey to Mars is not a dream anymore!

— Prathik U H, 1st Year CS&E

Laser Headlights

The Future of the Headlight Is a Laser – ten times brighter than LED, but won't blind oncoming traffic!

Laser light is an absolute innovation in automotive lighting and the next big step forward since the introduction of halogen, xenon, and LED headlight technologies. This lighting trend opens up completely new horizons in the design and performance of headlights. The brightness is already today almost four times that of an LED. This means that headlights can be made even smaller in the future, without compromising on light intensity.

The primary benefit for drivers is that these headlights will have the longest range provided by any current headlight technology! This offers the driver improved visibility, resulting in increased road traffic safety. Laser diodes are particularly impressive due to their small size: one laser diode generates an almost punctiform luminous flux on a few thousandths of a millimetre. In the future, headlights can be designed to be much smaller and more efficient with laser light.

BMW's new headlight technology is powered by lasers, but the important thing to note is that when you look into them, you're not looking at an actual laser.

What happens with each light is that three blue lasers positioned at the rear of the assembly fire onto a set of mirrors closer to the front. Those mirrors focus the laser energy into a lens filled with yellow phosphorus. The yellow phosphorus, when excited by the blue laser, emits intense white light. That white light shines backwards, onto a reflector. The reflector then bounces the more diffused white light forward, shining it out of the front of the headlight casing as a beam that is powerful, yet still able to be gazed upon. BMW says its laser-powered headlights actually save energy compared to other systems. Even though the actual lasers are 1,000 times brighter than LEDs, the system uses only about half the power, according to BMW.

Because laser-powered headlights can put out more brightness for their size, the headlamp units themselves can be much smaller. As a result, designers can have a lot more flexibility to make more aerodynamic shapes or fit more stuff into the engine compartment with the freed-up space. Audi is further extending its lead in automotive lighting technology.

Matrix Laser technology and its high resolution will make roadway illumination even more flexible and highly versatile in all situations. For the first time, bright lasers are making it possible to integrate projector technology in a compact and powerful headlight. They are also designed to automatically turn off for oncoming cars. It is obvious that progress is occurring and brands like BMW have pledged to continue offering the best possible headlights available under existing regulations. If anything, the future of this beneficial and fascinating technology appears to be bright!

—Savyasachi V. B., 1st year CS&E

Self Healing Paint: The Future Of Automobile Painting

It is the most painful feeling when you see a scratch on your brand new car, when you return to the spot where the car was parked. But the interesting fact is that, as the technology advances there is always a solution for every worse case. Researchers have recently come up with a polyurethane coating that heals its own scratches when exposed to sunlight!

The self-healing coating uses *chitosan* which is derived from chitin - the main component of exoskeleton of the crustaceans. The *chitosan* is chemically incorporated into traditional polymer materials, such as the ones used in outer coatings to protect the paint on cars. When a scratch occurs on the outer coating, the chemical structure is damaged and the *chitosan* responds to the UV component of sunlight. Chemical chains are then formed with other materials in the coating, eventually filling the scratch. Surprisingly, this process takes less than an hour and may eventually lead to scratch free vehicle or other products in the future!

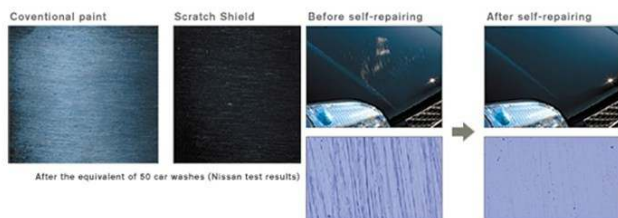This technology is great, but by whom was it developed and where? Biswajit Ghosh and Marek W. Urban from the School of Polymers and High Performance at The University of Southern Mississippi, Hattiesburg, advised that their new discovery will have a lot of practical applications and could coat anything that can be scratched including electronic gadgets, aircrafts, cars etc. The self-healing coatings could minimize upkeep and repair on a variety of products, saving consumers money and reducing waste of time

Recently, Kawasaki Ninja announced the updates for the 2019 Ninja H2. Kawasaki Ninja, has a highly-reflective mirror coated spark black paint, which makes it susceptible to scratches; even minor ones. It was observed that the self healing paint, when applied, healed Ninja's scratches efficiently.

Although this is a state-of-the-art technology, there are certain drawbacks;

1) In certain cases (like deep scratches), it takes more than one week for recovery.

2) The paint will not recover in the case of scratches caused by a coin, key, zip or fasteners.

It is very obvious that, we all look forward to the day when we can buy a product that is truly scratch-free.

This technology is very efficient in cost savings. Just imagine the drop in insurance premiums! This is surely a groundbreaking technology that is mostly to be implemented in the near future.

—Kashyap S., 2nd year ECE

Conventional paint | Scratch Shield | Before self-repairing | After self-repairing

After the equivalent of 50 car washes (Nissan test results)

Tech Fact
● A red panda is native to the Himalayas and South Western China. Translated, the English word for red panda is "Firefox," which is where the browser gets its name.

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

Stealth Technology

Sometimes whether you're trying to prank a friend or just avoid meeting people, you just wish to be invisible. For people working in the army, staying hidden is a matter of life or death. That is the reason why a lot of research is done on Stealth Technology.

Stealth technology makes the airplane, submarine, missiles or any other aircraft invisible to radar, infrared, sonar and other detection methods. The idea of stealth is to reduce the RADAR Cross Section (RCS) of an object, so that it can reduce as much reflection as possible. The strength of the radar signal getting reflected by an object depends on its edge configuration and not the size. This means if the aircraft is designed with specially designed edge, then despite its big size it will emit a very small radar signature. Stealth technology, also termed 'low–observable' technology, is a set of techniques that render military vehicles, mostly aircraft, hard to observe. Because RADAR—an acronym for RADIO Detection and Ranging is the primary detection technology for aircraft. Most stealth technologies are directed at suppressing RADAR returns from aircraft, but stealth technology also minimizes other 'observables' that is, energy emissions of any kind that might be observed by the opponent. Stealth technology is deployed today on several types of aircraft and a few surface ships. Counter–stealth technologies are also under continuous development. Another way to create invisibility is to cover object in specially designed material so that the radar does not get back to the source. The material should be such that it absorbs most of the radio signal and reflect back none. Behind the radar absorbent skin, there is specially designed structure called re-entrant triangles, which trap the radar signal and keep reflecting it

Radar antenna
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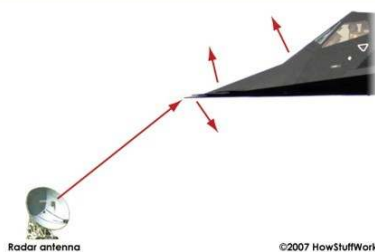
internally until it loses energy. Stealth Infrared radiation (i.e., electromagnetic waves in the 0.72–1,000 micron range of the spectrum) are emitted by all the matter above absolute zero; hot materials, such as engine exhaust gases or wing surfaces heated by friction with the air, emit more infrared radiation than cooler materials.

Heat–seeking missiles and other weapons zero in on the infrared glow of hot aircraft parts. Infrared stealth, therefore, requires that aircraft parts and emissions, particularly those associated with engines to be kept as cool as possible. Embedding jet engines inside the fuselage or wings is one basic design step toward infrared stealth. Other measures include extra shielding of hot parts, mixing of cool air with hot exhausts before emission; splitting of the exhaust stream by passing it through parallel baffles so that it mixes with cooler air more quickly; directing of hot exhausts upward, away from ground observers; and the application of special coatings to hot spots to absorb and diffuse heat over larger areas. Active countermeasures against infrared detection and tracking can be combined with passive stealth measures. These include infrared jamming (i.e., mounting of flickering infrared radiators near engine exhausts to confuse the tracking circuits of heat–seeking missiles) and the launching of infrared decoy flares. Combat helicopters, which travel at low altitudes and at low speeds, are particularly vulnerable to heat–seeking weapons and have been equipped with infrared jamming devices for several decades.
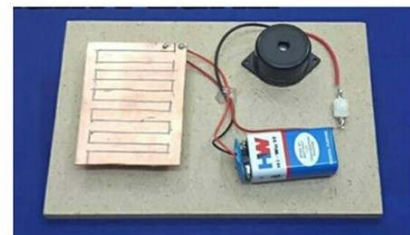
-Ashitha P.S., 1st year CS&E

DIY – Rain Detector

A system that will detect rain and alert the concerned.

Materials required:
- Copper string x 2
- LED x 2
- Plastic container x 1
- Buzzer x 1
- 9V battery with cap x 1
- Cello tape
- Connecting wires
- Cardboard base

Procedure:
Cut the connecting wire into three pieces. Remove its insulation and bare its ends. Get 2 inch thin copper strings and make small holes in the copper strips. Loop in the bare ends of connecting wire into the copper strips and lay them in the plastic container. Attach one of the connecting wires from the copper strips to the positive base of the buzzer. Connect third piece of connecting wire into the LED terminal (cathode). Connect the other terminal of LED to the red wire of battery cap. Now finish the circuit with connecting black battery cap wire to the other wire from the copper strip. Now put water into the container. As soon as the water makes contact with the 2 copper strips, the circuit gets completed and the buzzer and LED start signalling.

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