resonance

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CHRIST
COLLEGE OF ENGINEERING

ECTA
ELECTRONICS AND COMMUNICATION
TECHNOKRATS ASSOCIATION

Christ College Of Engineering, Irinjalakuda
RESONANCE - A Magazine by Department
of Electronics And Communication Engineering

about

Unleashing the symphony of Electronics and Communication Engineering....

Welcome to **Resonance**, a symphony of knowledge and innovation brought to you by the ingenious minds of electronics and communication engineering students of CCE. This magazine is a harmonious blend of technology, creativity, and the ever-evolving world of electronics that resonates with the passion of budding engineers of ECTA.

Resonance is an endeavor to celebrate the brilliance and boundless potential of electronics and communication engineering. Our magazine serves as a platform for students, educators, and industry experts to orchestrate their ideas, discoveries, and insights into the dynamic world of electronics. It delves into the latest trends, breakthroughs, and advancements in electronics. **Resonance** is an innovation overture which spotlights on groundbreaking projects and innovations created by students. Electronics impacts every aspect of our lives, beyond just the technical domain. This section sheds light on how electronics intertwine with our daily routines, from smart homes to wearable tech.

Are you ready to be immersed in the symphony of electronics? Tune in to **Resonance**, where the beats of innovation and the waves of communication come together in perfect harmony!!

Vision

The envisioned goal is to be a distinguished center for education, research, and innovation in Electronics and Communication Engineering. This establishment aims to nurture skilled engineers capable of addressing global challenges while remaining responsive to the ever-evolving needs of society.

Mission

• To elevate the teaching-learning experience by incorporating cutting-edge methodologies tailored for a demanding technological era.

• To foster inventive research in emerging domains, aiming to expand knowledge and devise sustainable solutions that benefit society.

• To cultivate ethics, values, and a commitment to constant growth, essential for nurturing professionals who can emerge as responsible leaders.

Message From
Executive Director

Our Electronics and Communication Engineering Department has grown leaps and bounds over the last couple of years - be it academics, be it placements or be it departmental level activities. And this definitely calls for a platform where all these can be placed on record. One such means is the departmental magazine and I am delighted to know that the ECE department is coming up with the third edition of their magazine - RESONANCE . I wish to share my happiness with the entire ECE department for all the wonderful initiatives and results that are coming out from this department. As I express my best wishes on the release of their magazine, I pray that this department may continue to grow and be a beacon for many aspiring engineers. As I always say, I say it once again here. May this magazine be able to showcase, among others, all that this department is about and all that it stands for. All the best!

Rev. Fr. John Paliakara CMI
Executive Director, Christ College of Engineering

Message From
Joint Director

It is indeed my pleasure to know that our Department of Electronics and Communication is coming out with their first-ever magazine 'Resonance' this year. Their persistence and determination in releasing this during the pandemic period itself is praiseworthy.

The ECE Department has come up with a host of initiatives over the past years. It is heartening to see the potential of the students unfolding at various stages through such initiatives and I commend them for their vibrancy and enthusiasm. This magazine is a milestone that marks the growth, gives wings to the imaginations and infuses life to the aspirations of both the students and staff of the ECE Department. I pray that this eloquent expression of the talents, progress and achievements of this department may be an inspiring and worthy read for all. I would like to applaud all the coordination and efforts behind this venture. My best wishes to the ECE department for this and all their future endeavours.

Rev. Fr. Joy Payyappily CMI
Joint Director, Christ College of Engineering

Message From
Principal

Over the past couple of years, the ECE department has been consolidating its position among the best performing departments at CCE. I am very much pleased to see its rapid growth and transformation over the past years. It is indeed heartening to see how young minds are being shaped in this department through the various co-curricular and extra-curricular activities on offer here. This annual magazine is also one of the fruits of their labour. May this magazine be a platform where talents are nurtured and where young minds get a spark in their engineering journey. I sincerely hope that this magazine will do justice in resonating the passion, zeal and dynamism that I see in this department through its pages. My best wishes for this magazine.

Prof. Dr. Sajeev John
Principal, Christ College of Engineering

Message From
Vice Principal

I am delighted to note that our Electronics and Communication Engineering Department is releasing their first-ever departmental magazine. I am sure that this magazine will further strengthen the credentials of the ECE department as that of being a very vibrant department. I liked the name being given to this magazine – RESONANCE - and I hope that true to its name, the contents of this magazine will resonate positively in the minds of all its readers. I wish them the very best for this, and all the array of activities that the ECE department has come up with, in their quest for excellence. May the ECE students reach such a level that their signature may one day be an autograph.

Prof. Dr. John V. D
Vice Principal, Christ College of Engineering

Message From
HOD

Department of Electronics and Communication Engineering, one of the major departments of the College, is widely acclaimed for being a nurturing ground for young engineers, adept in engineering knowledge, proficient in technical skills and routed in professional ethics. The Department was established in the year 2015 and the graduate programs offered by it continue to draw from a very strong application pool. Well planned laboratories simulate a near industry setting and provide the students with an inspiring environment to learn by doing. Department also maintains a well-stocked library with a good collection of books, journals, magazines and handbooks on Electronics and Communication Engineering and allied subjects. Besides providing an excellent learning environment, students are also encouraged towards innovation for the development of projects and products by applying the engineering skills acquired from the curriculum. Numerous awards and grants won by student projects testify the effectiveness of the collective efforts of the Department in this direction. We pride ourselves to help them grow and develop into sensitive and responsible citizens of the tomorrow.

With the objective of promoting the holistic development of students, the Department gives equal importance to foster the talents of students in arts and literature. The magazine, "Resonance- Volume 2", is one of such attempt to bring out the creativity in young engineering aspirants. It is a rich collection technical and non-technical essays and articles by the students of B.Tech Electronics and Communication Engineering during the year 2021-22. I am glad to see that the content of this volume is promising and worthy of good reading. I congratulate the Editorial Board, especially the Staff and Student Coordinators, for this wonderful initiative.

Dr. Caren Babu
Head, Department of Electronics and Communication
Christ College of Engineering

Message From
Chief Editor

As the chief editor, I must acknowledge the incredible challenges we encountered during this unprecedented period. Launching our magazine amidst these difficulties was undoubtedly a monumental task. Initially, gathering contributions from our juniors and faculties was not without its obstacles, but over time, we managed to curate a diverse collection of talented and relevant content.

Our magazine now stands as a platform that showcases the technical excellence of our students and faculties. I extend my heartfelt gratitude to our management and faculties for their unwavering support throughout this journey of 'Resonance'. The editorial team's dedication has been nothing short of remarkable. Countless discussions and relentless hard work went into successfully bringing everything together, and I sincerely appreciate their efforts.

This experience serves as a shining example of what a united team can achieve, regardless of the circumstances. With everyone's dedicated effort, I am proud to present our magazine. Let's work together to spread positive and uplifting vibes to all corners!

Alan Alphonse
S8 ECE, Christ College of Engineering

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SMART LED

L ED drivers are low voltage devices that convert the line voltage 227V power to the low voltage needed for the LED's and may also interpret control signals to dim the LED's. LED drivers come in either constant current or constant voltage. The cheapest and most basic way to drive LED's is to use a constant voltage power supply and a resistor in series with the LED to limit the current flowing through it.

Linear power supply (LPS) is an economical, simple, and reliable way of driving LED's. LPS's are based on either integrated circuit (IC) regulator or on bipolar junction or field effect transistors operating in the linear region. The selection of the most appropriate topology to drive LED's depends on the standard, specifications and application requirements like operation environment conditions, system input voltage, number of LED's and circuit array.

LED driver manufacturers are making big improvements to address size and cost constraints in smart lighting and automotive lighting requirements. LED drivers supply the constant electrical current at the right voltage so that LED lighting solutions operate efficiently. They also protect LED's from any voltage or current fluctuations. The rise of IoT connected lighting solutions and smart city initiative to improve energy efficiency is also contributing to growth in the LED driver market.

DRIVER'S

One of the big trends in market is the move towards constant current LED drivers, which are being used in high brightness and outdoor lighting applications. Other trends include primary side regulation (PSR), which eliminates secondary feedback circuitry, and power factor correction (PFC) circuitry for higher power quality. This is driven by shrinking system packages and lower cost requirements in the low-to mid- power range.

Thanks to their energy efficiency, reliability, and longer life, LED's are finding lot of homes in smart lighting and all kinds of indoor and outdoor lighting applications. For smart lighting solutions, size, weight, and cooling are big design challenges that has resulted in new drivers that deliver higher efficiency. The new LED drivers enable design that deliver up to 110W with 94% conversion efficiency using a flyback topology. The drivers also use lossless current sensing, which contribute to the higher efficiency.

-Aparna K
S4 ECE

EYE DIRECTIVE WHEEL CHAIR

Introduction

There are different types of disabled people around us. There are also different equipment which could help them to overcome their disorders or disabilities. A blind person can use the braille script a handicapped person can use a wheelchair and so on. Support of another person is also required while using a wheelchair. Here, eye directive wheelchair, is a well-equipped and flexible motorized wheelchair for paralytic and motor disabled patients to drive the wheelchair without straining any of their physical posture. The gaze movement is tracked autonomously, and the wheelchair is directed according to the eye position. It dissipates less power, can be fabricated using minimum resources, Eco- friendly and cost effective. Obstacle and ground clearance sensing is performed to ensure a person's safety-audible notifications for obstacles as well as joystick for wheelchair control is provided.

Design and Specifications

At first images are captured using a wireless camera and are sent to a base station (computer/laptop) for further processing. These processes can be categorized as Image Capturing Modules. In Microprocessor Interfacing, the generated electric digital output from the base station is used to direct the motors of the wheelchair. Microprocessors also take care of obstacles and their user inputs.

Wireless camera: Eye of the user is captured with a pinhole wireless camera which transmits the images to the base station wirelessly.

Computer Base station: The images received from the camera are processed using Open source Computer Vision library and the gaze movement is sent to the chair via XBee communication.

Microcontroller: They are used to maintain wireless communication protocols and on the receiver side, it also takes care of obstacles and manual user inputs.

Motor Driver: They provide the high current required to drive the motors.

Hardware Design

a) Image capturing device: - Images are captured using a wireless camera. It offers surveillance protection. It has operative range of 150 feet, providing full motion, real-time, color video with no delay.

b) Microcontroller: -Arduino is used as microcontroller. Arduino is a single-board microcontroller, intended to make interactive objects or environments more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. The system uses two microcontrollers - transmitting and receiving. The Transmiting Microcontroller is connected to the processing unit. This microcontroller converts the information received from the processing unit into signals and transmits them wirelessly over to the receiving microcontroller attached to the wheelchair. The Receiving Microcontroller receives signals from the transmitting microcontroller wirelessly and accordingly initiates the movement in the required direction. This microcontroller is mounted on the wheelchair and is connected to the motor driver. It is also connected to the object sensors; joystick control and the emergency stop button. This microcontroller can start the motion, change the direction, and even stop the system on receiving commands from the above-mentioned attachments.

c) X-Bee Communication: - The X-bee shield allows the Arduino board to communicate wirelessly using a wireless module. It is based on the X-bee modules from Digi but can use any module with the same footprint. The module can communicate up to 100 feet in-

d) Obstacle Sensors: -The wheelchair has been mounted with four ultrasonic sensors to avoid collision and damage to the user. Three sensors in three directions-forward, left and right is used. Ultrasonic sensors use electrical-mechanical energy transformation to measure distance from the sensor to the target object. The arduino rings the buzzer if any obstacle is detected within the range of 100-230 cm from the wheelchair, so that the obstacle can clear the way and ensures safe passage for the wheelchair. But if the obstacle still prevails within the 30cm range from the wheelchair, then the arduino sends stop command to the motor driver, ensuring the system comes to a halt. The fourth sensor is used for ground clearance. Ground clearance measures the height between the sensor and the flat surface (ground). The arduino will send stop command to the motor driver if there is a sudden step or slope.

e) Motor Driver: -Motor driver is required to run the motors since the motors require more current than the microcontroller pin can generate. Motor driver is basically a current amplifier which takes a low-current signal from the microcontroller and gives out a proportionally higher current signal which can control and drive a motor. In most cases, a transistor can act as a switch and perform this task which drives the motor in a single direction.

f) Battery: -The system uses lithium ion cells to supply power to the components mounted on the wheelchair. The battery contains 30 cells of Li-Ion having 3.7V 1.5AHr each. Battery is connected in 6x5 fashion i.e. 5 sets of batteries having 6 cells in series are connected in parallel. Hence battery gives overall 22.2V output with 7.5AHr capacity.

Mechanical Design

The original wheels having ball bearing are removed and a coupling of MS material is designed which can accommodate the motors shaft in it and which also fits into inner diameter of the wheel. The hole on the coupling is matched with the wheel and the shaft is also locked to avoid slipping.

a)DifferentialSteeringMechanism: -It is based on two separately driven wheels placed on either side of the chair. It can thus change its direction by varying the relative rate of rotation of its wheels and hence does not require an additional steering motion. If both the wheels are driven in
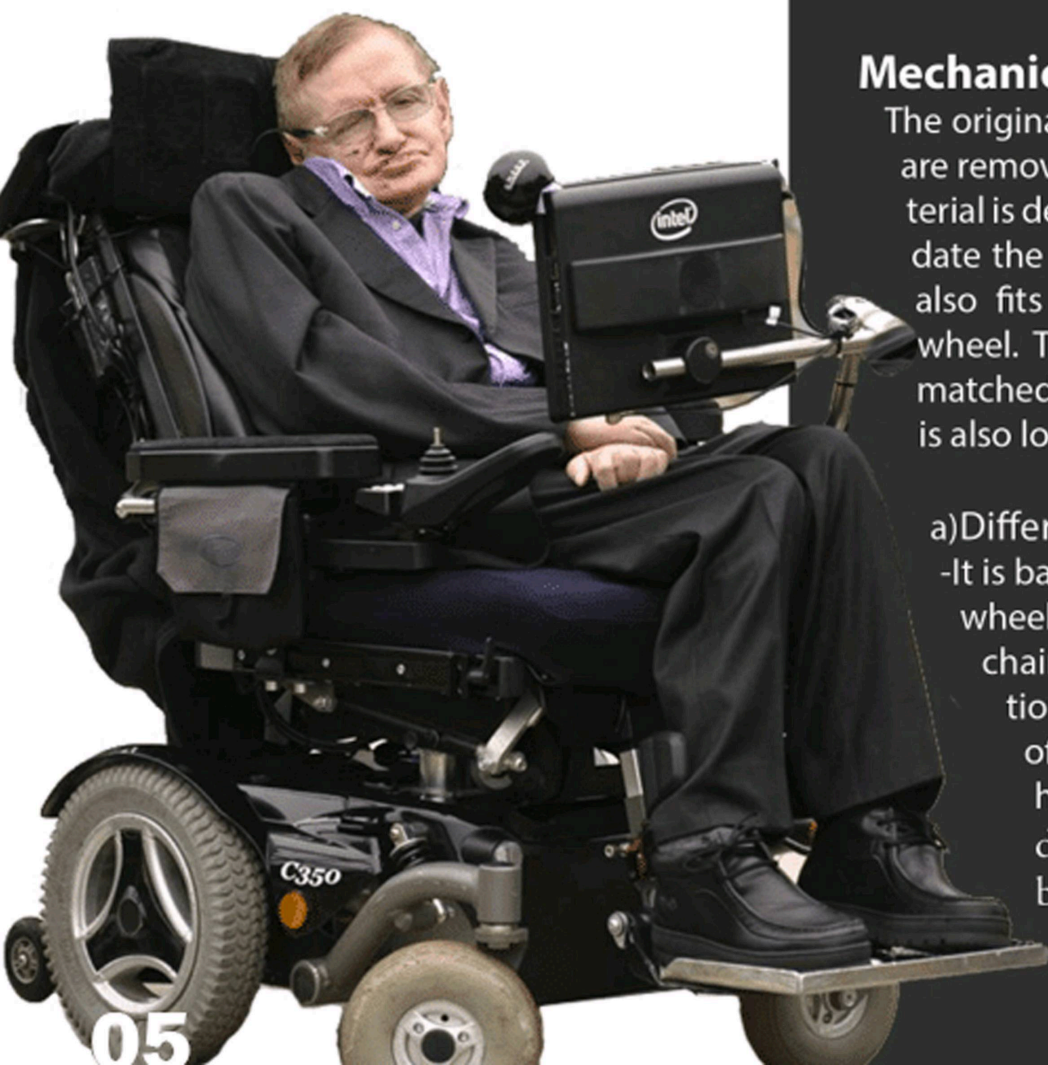
does not require an additional steering motion. If both the wheels are driven in the same direction and speed, the chair will go in a straight line. Otherwise, depending on the speed of rotation and its direction, the center of rotation may fall anywhere on the line joining the two wheels. The steering system used here is a skid steering or to be precise-differential steering, as parallel tracks are used on either side of vehicle. To generate a turn, the wheels on each side of the vehicle are driven at different velocities. The different velocities define the turning radius of the robot. By using a symmetrical design and driving the tracks on either side at equal velocities in opposing directions, the unit's turning center will coincide with its geometric center.

b) **Control Panel:** -The control panel made from acrylic material is provided for the user inputs at the convenient distance. Following things are accommodated in the panel and slots for them
are made using laser cutting.

c) **Joystick:** It can be used as an alternate directive and it also has a button which is used to switch between two operating modes.

d) **Push button:** This button rings the beeper to notify the user needs attention.

e) **Power switch:** This switch can turn on and off the entire wheelchair.

Working

User's eye movements are translated to screen position using the optical type eye tracking system, without any direct contact. When user looks at appropriate angle, then computer input system will send command to the software based on the angle of rotation of pupil i.e., when user moves his eyes balls left (move left), right (move right),

straight (move forward) in all other cases wheel chair will stop. Also, obstacle detection sensors are connected to the arduino to provide necessary feedback for proper operation of the wheelchair and to ensure the user's safety. The motors attached to the wheelchair support differential steering which avoids clumsy motion. The wheelchair has also been provided with a joystick control to ensure safe movement in case of tired vision and also with a safety stop button, which will enable the user to stop the wheelchair at his own ease.

Conclusion

It will be a useful device for persons with moderate/severe physical disabilities or chronic diseases as well as for the elderly. This is a good alternative as it uses optical-type eye tracking system to control the powered wheelchair. Direction in which pupil looks is decided by fixing range to the direction as user looks. Detection of pupil is done even on illumination, unless the illumination is covering whole eye, this is because when the light hits the pupil and illumination spreads on the pupil covering whole pupil, which ignores those pixels. So as we treat the illumination spots it will leave behind a maximum change edges that cannot be determined and the operator will consider another position to be a iris location. This process works even if image taken in little dark environment.

- Aleena John Gratious
S4 ECE

Govt invites bids for setting up of sub-assembly for making PCB, battery packs

The Ministry of Electronics and Information Technology (MeitY) has invited applications for the setting up of sub-assembly for manufacturing printed circuit boards, battery packs, power adapters, and switched mode power supply circuits from companies which are eligible for incentives under the production linked incentive (PLI) scheme for hardware.

As per the plan, if a company which is eligible to receive incentives under the PLI scheme sets up a printed circuit board (PCB) assembly itself, it will be eligible to receive incentives of up to 3 per cent from April 1, 2022, while it will come down to 2 per cent in the following financial year.

Similarly, if an eligible hardware company either sets up a domestic battery pack assembly unit itself or through one of its vendors, it will be eligible for an incentive of up to 2 per cent starting April 1, 2023. An incentive of 2 per cent, starting April 1, 2024, is also planned for eligible hardware companies which set up cabinet, chassis, or enclosure assembly units either themselves or through their vendors.

Like other PLI schemes, the incentives for companies in the telecom and networking equipment manufacturing space will flow following the achievement of a minimum threshold of cumulative incremental investment, and incremental sales of manufactured goods, net of taxes.

All these incentives will be provided to eligible hardware companies which apply for PLI under the Rs 7,325 crore scheme for manufacture of laptops, tablets, all-in-one-personal computers, and servers. The PLI scheme was announced in February, thereby completing troika of electronics manufacturing schemes — mobile phones and its allied components, core and peripheral telecom equipment, and now consumer electronics products.

Consumers in India currently buy laptops worth Rs 30,000 crore a year and tablets worth Rs 3,000 crore a year, of which about 80 per cent is imported. With the new PLI scheme, the government aims to attract the top five laptop and tablet manufacturing companies from across the globe to either set up or expand existing units in India.For the setting up of PCB assembly units, the government is in talks with several leading global chip makers, including Intel, senior government officials said, adding that the company was planning to set up a manufacturing unit in Karnataka. As of now, Intel's India unit only focuses on design and engineering aspect of PCB, while its manufacturing is done mostly in factories of China, Taiwan and the US.

-Albert Davis
S8 ECE

EMERGING TRENDS IN THE DESIGN OF IOTS

IoT is a term that almost all engineers would have stumbled upon in their academic years. Most of us know the basic concepts involved and almost all of us are using IoT devices in our daily lives with or without our knowledge. Almost all devices that we use in our daily lives that has the term "smart" in its title is usually an IoT device. From smartphones to smartwatches to smart appliances the list is endless.

IoT as a field of technology has faced exponential growth in recent years. The IoT market size stood at USD 190.0 billion in 2018. It is projected to reach USD 1,102.6 billion by 2026.

So, what are the emerging trends in IoT that will further increase its market share? Let's take a look.

COGNITIVE IOT

One of the key steps of taking IoT devices to the next level is to turn them into cognitive IoT devices. So, rather than just capturing the data, these devices should also have the ability to think, understand, and accordingly provide data to the user.IoT devices can be turned into cognitive IoT devices by applying cognitive computing to the huge amounts of sensor data being generated by IoT devices

Here are some of the popular platforms used for cognitive computing SparkPredict by SparkCognition provides sophisticated algorithms that can be applied to the vast amounts of sensor data generated by industrial IoT devices. These algorithms can be used to predict impending failures in systems long before they occur. This will result in immense cost savings for the industry and it will ensure that optimal efficiency is maintained across devices.

Microsoft Cognitive Services offers a set of APIs and SDKs that can enable developers to easily implement features such as emotion detection; face, speech and vision recognition and natural language processing into their applications.

IBM Watson probably the world's most famous supercomputer, offers it's immense processing capabilities based on hypothesis generation and evidence-based learning to developers via it's cloud based services. Its deep content analysis and evidence-based reasoning can improve predictions, reduce costs and optimize outcomes.

INTERNET OF BODIES

We've all heard of internet of things, now get ready for internet of bodies. Collecting our physical data via a range of devices that can be worn, implanted or in some cases even swallowed. The large amount of data generated could prove to be very useful in situations like the current COVID-19 pandemic. It could also improve human wellbeing around the globe. Now as futuristic as this may seem, a lot of people are already connected to it via their smartwatches and the number will only continue to increase.

DIGITAL TWINNING

A digital twin is a virtual model of a component or system. This model will constitute of the same sensor data that is present in its real-life counterpart. Such models will be immensely useful in industrial applications as it will allow specialists to experiment with processes on the digital twin and make informed predictions and create well planned changes.

Digital twinning is heavily reliant on IoT and the development of this field will further demand for smart industries with large-scale IoT implementations.

Digital Manufacturing

Digital manufacturing is the computerisation of the manufacturing process. It is the combination of cyber and physical systems. Both systems would interact with each other in real time and allow for predictive analysis well planned decision making

IoT bridges the gap between cyber and physical systems by acting as a method of communication and data transfer. Operational data feeds from sensors into the platform's AI-driven analytical engines, letting the platforms refine in real time how those complementary systems work. The results are levels of efficiency and productivity of which pre-IoT manufacturing could only dream.

The emergence of communication technologies like 5G, LoRaWAN and Zigbee will accelerate the implementation of digital manufacturing as it will allow for efficient integration of sensors into the manufacturing process. The improved connectivity will allow computer platforms to control a range of systems functioning at high levels of integration.

— **Krishnaprasad C**
S8 ECE

SIH EXPERIENCE

Smart India Hackathon (SIH) is a nationwide initiative to provide students with a platform to solve some of the pressing problems we face in our daily lives. Winning SIH has actually shaken our delusion that cracking national hackathons are next to impossible. It is said that "It always seems impossible until it is done".

Our journey of SIH began at our college. We got selected in the internal hackathon conducted in our college under software edition. We were actually a mixed team comprising both ECE and CSE department students which was a key secret to our success. We were lucky to have Rahul Manohar Sir as our mentor in our success journey. Our Team Lead, Krishnaprasad, kept on motivating us throughout, which I think was a real boost up for all of us. We were shortlisted for the finals which was supposed to be conducted at College of Engineering, Pune.

However, we missed our Pune trip since the software edition was planned to be conducted through online mode due to COVID 19 pandemic issues. That was the sad part of this success story. The words of Charles Darwin go like this **"It is not the strongest of species that survives, nor the most intelligent, but the one that is the most adaptable to change."**

Although the transition from offline mode to online mode was new to us, we somehow adapted to that and learned many things. Microsoft Teams and Slack were the two platforms that we used for communication and it was new knowledge for us. Our team's name was **'Byteenergizer'.** The hackathon lasted three days from August 1 to August 3, 2020. We had mentoring sessions in the morning and evaluation in the evening.

Our problem statement was theft detection in two wheelers. We proposed two solutions at first. Theftoff and Theftoff Lite. Theftoff is an OEM version and Theftoff Lite was our winning solution. We could not implement the OEM version due to non-availability of various components like Accelerometer, GPS, GSM module in this covid scenario. So, we discussed about various possibilities to make these features possible. The solution was actually right under our nose but it took time to find that until one of our team members suggested "Why not replace these features in a phone". That was a really brilliant thought and it actually paved our way to success and gave us a lot of hope. So, we replaced these features in an old phone which would be kept inside the vehicle. We used mainly two applications: Theftoff (App installed in user's phone) and Theftoff Companion (App installed in the phone kept inside vehicle). We exchanged our ideas, discussed with our mentor and divided our work through video calls during evening time.

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The best moment was when they made the announcement regarding the winners. That particular moment when they announced "UK151 Team Byteenegizer…" is still unforgettable. We were spellbound initially, then we were brimming with joy and our Team Lead, Krishnaprasad, spoke on our behalf. SIH was a wonderful, insightful and rewarding experience for all of us.

- Eleena Sajan
S8 ECE

Other Team Members:

Krishnaprasad C (S6 ECE) - Team Lead
Eleena Sajan (S6 ECE)
Albin Joseph C.R (S6 ECE)
Ann Treesa Benny (S8 ECE)
I.S. Sharath (S6 CSE)
Austin Anthony (S4 CSE)

RASPBERRY Pi FM TRANSMITTER

Building your own FM station with raspberry pi is very easy. FM transmitters comprise of two things - one is the transmitter part which creates a signal which is proper for transmission and the other one is the antenna which transmits the signal wirelessly. So here we use the raspberry pi of any version and any suitable wire of any length as the antenna.

One common question that people ask is how a raspberry pi can work as a transmitter and the answer to that question is every microprocessor will have a synchronous digital system with which it reduces electromagnetic interferences .the frequency of this clock signal is in the range 1Mhz to 200Mhz which is in the range of FM signals. All we need to do is modulate it to produce the FM signals through the GPIO pins available in the raspberry pi.

The next step would be choosing the frequency we want our FM station to work and one thing to keep in mind is not to interfere with the existing FM station.

Finally, just select the music of your choice and listen to it via any FM receiver like an FM radio or even your phone.
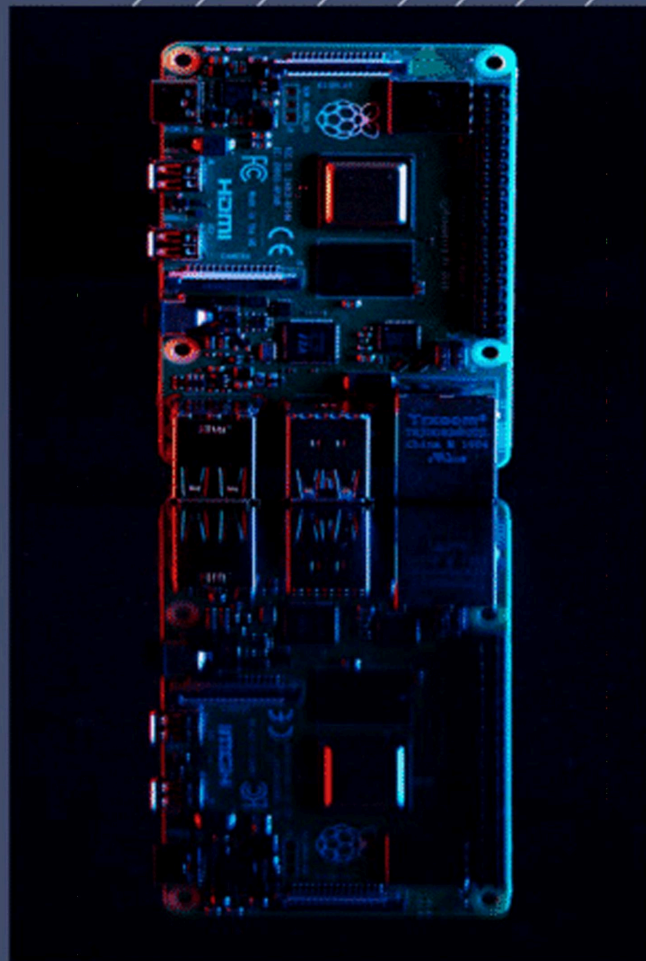
— **Srihari P S**
S8 ECE

EDM
ELECTRONIC DANCE MUSIC

Electronic dance music, also known as dance music, club music, or simply dance, is a broad range of percussive electronic music genres made largely for nightclubs, raves, and festivals. Rather than designating a single genre, electronic dance music encompasses styles ranging from Beatless Ambient music to 200-beats-per-minute Hardcore, with House music, Future House, Techno, Drum & Bass, Dubstep and Trance among the most notable examples.

The parent genres of EDM are electronic music, disco, synth-pop and hip hop. There are also some new genres derived from EDM and they're Future pop, RnBass, Hard trance, Russ music, Alternative R&B, Deconstructed Club, Electro Swing etc..........

Electronic music has become so popular that some people refer to this as "the new hip-hop ". EDM is made using electronic devices, so speaking frankly computers are described as the main instrument for creating EDM. A producer puts together different sounds using the Digital Audio Workstation (DAW), which is similar to arranging the pieces of a puzzle. Also, we've got EDM controller hardware to make the live shows handier.

EDM is addictive. You know the anticipation of the drop can increase your brain's dopamine levels, the chemical primarily responsible for making you feel good.

I would like to add the names of some popular EDM artists- Martin Garrix, Avicci, Marshmello, Tiësto, Calvin Harris, Alan Walker etc.....

Interestingly, EDM is popular in India and many EDM festivals are happening throughout the country namely Sunburn, Sula Fest, Bacardi NH7 Weekender etc...

So that's it about EDM so what are you waiting for, next time you open Spotify or your favourite music streaming platform try out EDM and be dumb and enjoy:)
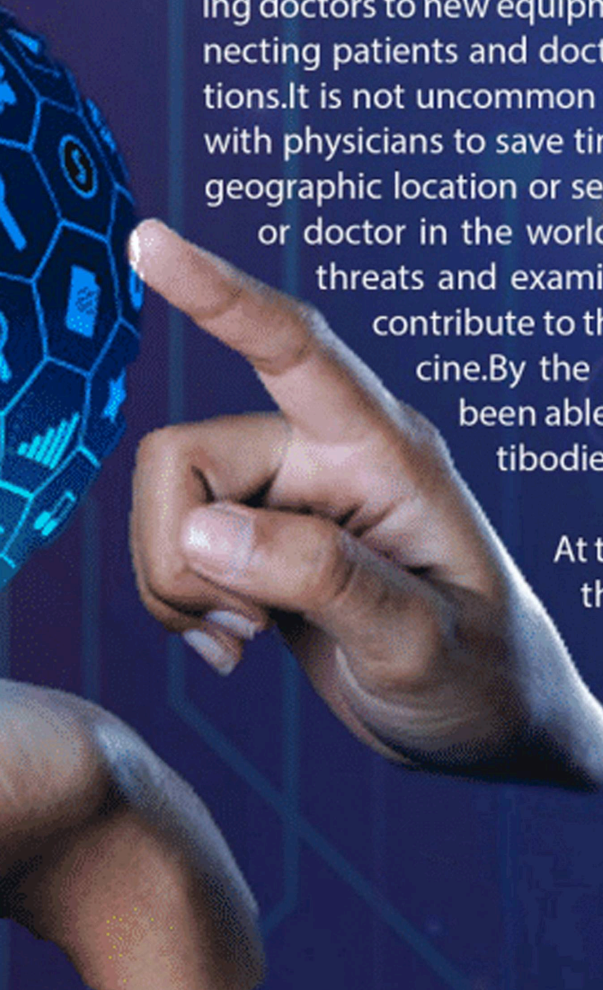
- Albert Paul
S8 ECE
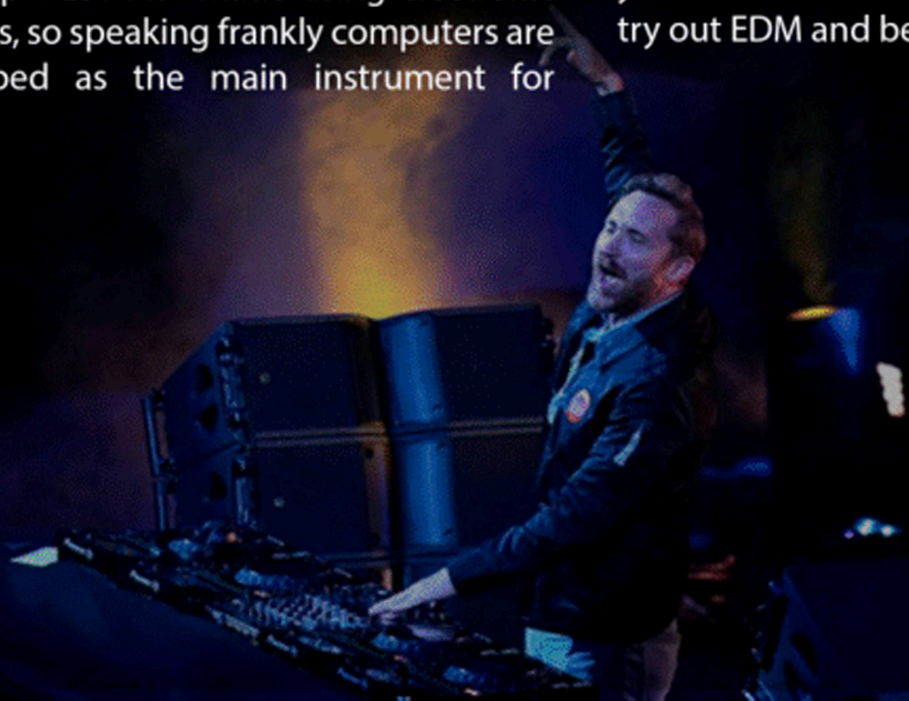
TECHNOLOGY | CAN'T LI

In today's world ,the technology plays an important role in every industry as well as in our personal lives.Out of all this the industries that technology plays a crucial role in healthcare is definitely one of the most important.The merger is responsible for improving and saving countless lives all round the world.

Technology in the 21st century has enabled humans to make strides only dream of .This means that the 21 st technology allows us to manage dreams as possible which the ancestors only have dreamt of.

Medical technology is a broad field where innovation plays a crucial role in sustaining health.Areas like biotech-nology,pharmaceuticals, the development of medical devic-es and equipment and more have all made significant contri-butions to improving the health of people all around the world.-From small innovation like adhesive bandages and ankle braces to larger more complex technologies like MRI machine ,artificial organs and robotic prosthetic limbs,technology has undoubtedly made an incredible impact on medicine.

IVE WITHOUT

With the increased use of electronic medical records(EMR),telehealth services and mobile technologies are bringing .Medical technology has evolved from introducing doctors to new equipment to use inside private practices and hospitals to connecting patients and doctors thousands of miles away through telecommunications.It is not uncommon in today's world for patients to held video conferences with physicians to save time and money normally spent on travelling to another geographic location or sent health information instantaneously to any specialist or doctor in the world.Applications that aid in identifying potentials health threats and examining digital information like X-rays and CT scans also contribute to the benefits that information technology brings to medicine.By the use of technology in medical research scientists have been able to examine diseases on a cellular level and produce antibodies against them.

At the end of the day technology has really made a ripple in the Medical field and one can only wonder what would the current medical professionals do if the current technology ceases to exist and keep an eye out on the horizon for what will the future of healthcare looks like

- Chaidhanya P
S4 ECE

LIDAR TECHNOLOGY

LIDAR stands for light imaging detection and ranging. It creates a 3D model of the surrounding of the vehicle. Self-driving vehicles have been great sign bearers of an indeterminate future that have soon become days of our past. They have already hit the roads of California, Texas, Arizona, Pennsylvania, and other US states and countries. Their mobility is restricted to specific test areas and driving conditions to improve its safety in all aspects and to reduce any sort of collateral damage, it is a remote sensing method that uses a laser to measure elevation like ground, forests, and buildings. It uses the ultraviolet, visible, near-infrared source to detect an object. Just like human-driven cars automotive vehicles too would have to face traffic congestion, potholes, trees, and many other obstacles on the road.

Light energy emitted by a LIDAR is called a pulse and the light reflected from the object is known as a return. LIDAR systems send the pulse of light and wait for the pulse to return. This measures how long it takes the emitted pulse to return to the sensor and gets a variable distance of the object. This is how LIDAR got its name, like sonar uses sound waves and radar uses radio waves, LIDAR uses a laser.

There are 2 of types airborne and terrestrial.

Terrestrial

In the automotive application of the LIDAR technology, most of the sensors are installed on the top of the vehicle, these rotate continuously and generate thousands of pulses per second, these high-speed laser beams are continuously emitted in the 360-degree surroundings of the vehicle and are reflected by the object in the way.

The resulting light reflections are then used to create a 3D point cloud on an onboard computer, it records each laser's reflection point and translates this rapidly updating point cloud into an animated 3D representation. The principle of LIDAR is similar to EDMI(electronic distance measuring instrument) where a laser pulse or a continuous wave is fired from a transmitter and the reflected energy is captured having the time of travel of the laser and the distance between the transmitter and the reflector is determined.

This system can work efficiently in bright daylight as well as night and its data can be collected quickly with high accuracy and precision. It also can see through walls and other obstacles. Still, it has some properties on which they are working on like its safety for the human eye and its poor working in unsuitable weather conditions.

Most companies working on automotive vehicles including FORD, GM, UBER, etc.. think LIDAR is an essential part of the sensor suite, but not everyone believes LIDAR to be a surefire solution. At TESLA their cars don't have LIDAR but they rely on radar, GPS maps, other cameras, and sensors for automation.

Airborne

Airborne LIDAR(also airborne laser scanning)is when a laser scanner attached to an aircraft during flight, creates a 3D point cloud model of the landscape. This is currently the most detailed and accurate method of creating digital elevation models, replacing photogrammetry.

It is a dynamic, polar, and active multi-sensor system comprising a navigation unit(GNSS, IMU) for continuous measurement of the sensor platforms position and

This provides the direction of the laser beam and the distance between the sensor and the reflecting targets. Airborne LIDAR is installed on a helicopter or drone for collecting data. As soon as its activated, it emits light towards the surface, which returns to the sensor immediately after hitting the object, giving an exact measurement of its distance.

They can be used for land surveying, power line inspection, forestry, mining, and many more.

A decade ago, LIDAR sensors were too big and too expensive to make them viable for a mass consumer application but at present, it is cheaper for promoting product production of

- **Gowri Parvathy**
S6 ECE

Technologies That Enhance and Impacts the Beautiful Game of Football

Today's technology is developing at an astounding pace to help us in almost every area of our lives. So, it was perhaps inevitable that technological developments would also quickly infiltrate the world of sports. Technology now plays a major role in all spheres of the global sport that is football, whether be it in a simple training or during a high magnitude fixture. Some of the significantly used technologies are: -

EPTS – Electronic Performance & Tracking System

Electronic tracking and performance systems for athletes help football teams and their coaches make conscious decisions to improve the performance of their athletes and in turn reducing the risk of injuries. These systems utilize cameras and micro-electromechanical devices (like accelerometers, gyroscopes, heart rate monitors etc.) worn by the players during training which gives out data that can be used improve both their individual performance and ultimately that of the entire team

Wireless communication system & Goal Line Technology (GLT) for referees

Quality communication is a principal part of proper referring and thanks to this wireless technology which can be worn by referees during the match now they can effortlessly communicate with the technical and field referees and make a quick decision about a situation. GLT is the method used to determine when the ball has completely crossed the goal line; the electronic devices scan between the goalposts and below the crossbar. It helps the referee to recognize a goal in the situation where it is unclear if the ball did indeed cross the line.

19

Video Assistant Referee (VAR)

The Video Assistant Referee constitutes an assistant referee who checks the decisions made by the main referee by means of video resources. The referees sitting in the VAR room have access to 33 television cameras – eight of them are slow-motion and a further four are ultra-slow-motion. In addition, the team uses two offside cameras . This team is utilized in only four situations

- **Penalties** : the system can be used to check whether a penalty should be granted or if a foul occurred in the penalty area

- **Red Cards** : If the referee decides that a foul has occurred, the VAR can be used to decide whether to give the player a red card

- **Errors** : VAR allows additional referees to intervene if the wrong player has been punished

- It can be used to check whether a player scored a goal without violating the rules of off-side or if a foul was committed before scoring that goal

With better and precise decisions accompanied by enormous data of players from training which is used to improve the individuals. These technologies are clearly playing a definitive role in helping players, coaches, referees and even the football enthusiasts by escalating the standard of this sport.

- **Suryajith R Menon**
S4 ECE

SOUND PRODUCTION

This idea of sound production can be expressed more efficiently by terms like sound design engineering, music production engineering. Defining on technical terms it is the art of practice of creating sound tracks for variety of purposes. It includes specifying or creating auditory elements using audio production techniques and tools. It is applied over fields including filmmaking, television production, video game development, theatre, sound art, post-production works, etc. Sound production involves creating sounds from scratch through synthesizers.

In late 80's to 90's the evolution of sound production which include MIDI and digital audio technology emerged during this decade. Digital Audio Workstation (DAW) came to the main role in music production. This transition to DAW helped the sound designers to work on complicated sound tracks with more ease as well as auditory effects which can be done more easily than the conventional technique. Also features of unlimited undo and sample-level editing allow fine control over the sound tracks. This technology also enhanced the theatre experience of movies with much clearer sound. This new evolution of sound design also improves the films to create a better impact of the screen play. Dolby is one of the best theatre experiences that we can have now and it is making the viewers elevate from their environment which makes the theatre experience the best.

Speaking more about DAW, there are lots of free as well as paid software for music production which include Logic pro, Pro tools, FL studio, Ableton live, Reaper, etc... which works on windows, iOS platform. A special mention to this is that there is a DAW for Linux operating system too. All these DAW require a standard system requirement for operation. All these software also have a standard mixing and mastering platform for all its final production works. Logic pro and Pro tools are the running industrial DAW platforms which are popular among music composers and producers.

DAW made the size of a recording room into the laptop we have now and also increased the quality of the sound with all instruments available virtually. This made a big bang of possibilities in the area of sound designing.

- Alwyn Wilson
S6 ECE
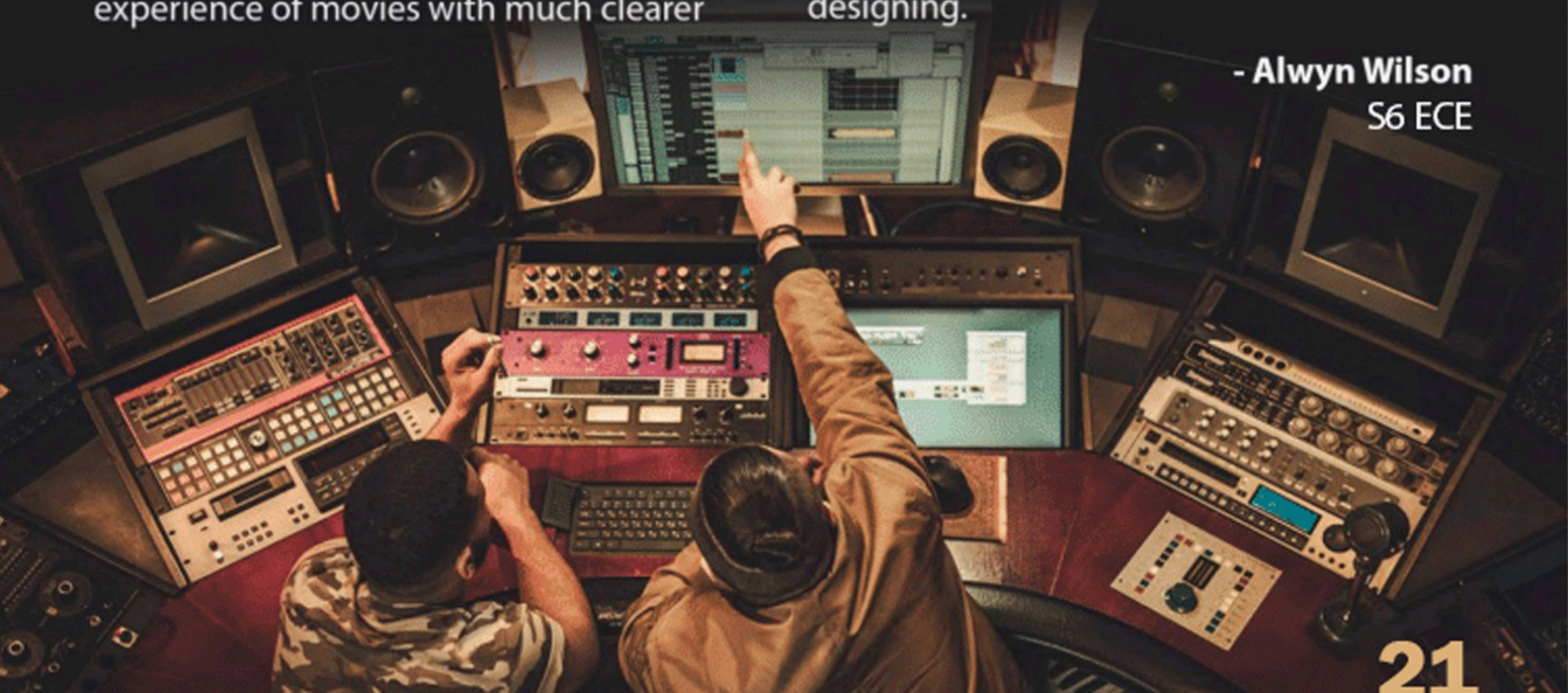
HEARING AID WITH ARTIFICIAL INTELLIGENCE

A hearing Aid is a small electronic device that is worn in your ears. It makes the sound clear for the people who have difficulty in hearing. The hearing aid helps them to listen, communicate and participate more happily in their daily activities. A hearing aid helps a person to hear in both quiet and noisy situations. A wide range of hearing aids are available nowadays. They are being updated and taking the concepts to next level. The hearing aid was invented by Starkey industries which was introduced during the covid-19 pandemic situation that utilizes built in AI.

LIVIO EDGE AI:

Starkey Industries analysed the key problems faced by the people who are using hearing aids for their whole life, and came up with the conclusion that main problems faced by disabled people are that they had to adjust the hearing aid manually which was troublesome. So, Starkey came up with a new solution that automatically adjusts the sound by itself according to the surrounding s and helps the people focus at what they are doing.

Benefits of this device:

•Bluetooth connectivity, tracking, body sensing. In this device it has an inbuilt Bluetooth that enables the patient to connect the Hearing Aid directly to their mobile phone or to any other device that can be connected via Bluetooth. It has a tracking device and body scanner which helps them to know where they are, and scan their body for the vital reports.
•Speech sounds are boosted to make it easier to hear people who are wearing mask.
•Hears speech comfortably even in busy situation while unwanted noise is suppressed. These features help the people using hearing aid to enjoy their life .

-Athul Tony
S4 ECE

SILENT SOUND TECHNOLOGY

Silent Sound Technology, one of the most amazing technologies which enables talking without talking. It helps the people who are unable to speak using their vocal cords. This technology was developed at the Karlsruhe Institute of Technology, Germany. It is expected in the next 5-10 years, When this technology is been implemented, it would have a drastic effect and will be widely used. This technology is processed in two ways they are:
•Electromyography
•Image processing

Electromyography is a technique used in silent sound technology that monitors tiny muscular movements that occur when we speak and converting them into electrical pulses that can then be turned into speech, without uttering a sound . Electromyography (EMG) is a technique for evaluating and recording the electrical activity produced by skeletal muscle. EMG is performed using instrument called Electromyograph, to produce a record called an Electromyogram. An electromyograph detects the electrical potential generated by the muscle cells when these cells are electrically or neurologically activated.

Most image processing techniques involves treating the image as a two-dimensional signal and applying standard signal – processing techniques to it. Analysis of remotely sensed data is done using various image processing techniques and methods that includes:

•Analog processing technique is applied to hard copy data such as photographs or printouts. It adopts certain elements of interpretation, such as primary element, spatial arrangement etc. With the combination of multi concept of examining remotely sensed data it allows us to make a verdict not only as to what an object is but also its importance. Apart from this it also includes optical photogrammetric techniques allowing for precise measurement of the height, width location, etc. of an object.

•Digital image processing involves a technique for the manipulation of digital images by computers. It contains some flaws. To overcome the flaws and deficiencies to get the originality of the data, it needs to undergo several steps of processing. Digital Image Processing undergoes three general step:

•Pre-processing Display
•Enhancement
•Information extraction.

The major advantages are for people who lost their voice and rendered mute due to accident. It helps in making phone calls in noisy public environments like market, bus, train, malls etc

It is also very useful in sharing confidential information like secret pin etc in public places, and is useful for astronauts.

One of the disadvantages is that it is slightly expensive. Nanotechnology will be the significant step towards making the device easier. Major prospects are without having electrodes and sensors hanging all around the face, these electrodes and sensors will be incorporated into cell phones. Features like lip reading based on image processing and recognition are incorporated in to cell phones rather than using computers (ultrasound SSI). Engineers claim that the device is working with 99% efficiency. It will be one of the most innovative technologies that in our mere future will be part of our day to day life.

-**Aishwarya Abi**
S4 ECE

TEAM CORE

I'm a member of the Team – Core, and I'm here to share my experience with my team on our journey to 'Yuva Mastermind'- Season 10, a contest for showcasing our ideas and concepts on dealing with different issues faced by society, an impressive initiative by Malayala Manorama, held at Rajiv Gandhi Indoor Stadium, Kadavathra, Kochi.

Core was formed as a part of 'Jumpstart', IEDC camp held at our college. We were assigned a task to go for a survey to the residences near our college and learn the problems faced by them in their daily lives. Most of them, mainly aged people and people who live busy schedules, came up with an issue of adjusting the height of the well motor pump according to the rise and fall of the water level. This need fuelled up our journey to Yuva Mastermind.

We promptly took over the idea of finding a solution for the same and worked in a group under the guidance of Mr.Rahul O. Manohar, Asst. Professor, ECE dept. and came up with our product FLAP- FLoating Aid for Pump which provided a floating base for all types of existing centrifugal pumps. Up to 2hp centrifugal pumps can be fixed accordingly. It's the maximum powered pump used for household purposes. Basically our product is providing a case for the existing pumps in their houses at a reasonable cost with more efficiency. We submitted our idea for the competition and got shortlisted from 1000+ entries from all over Kerala. We were asked to reach the venue a day before the competition and set up the stall for the exhibition. It was a great platform for presenting our ideas and tech innovations. We interacted with several people. We presented our product and explained the process to the panel and audience which was indeed a great exposure to the corporate world.

The product development took us through different phases of technology and engaged us in a deeper thought process on how to overcome the limitations faced throughout the process. We dealt with a number of issues, which steered us to research and practical thinking and induced in us the spirit of teamwork. Each member made a major contribution to the project and together we overcame the barriers in our path.

The project gave us a new outlook on problems and towards solving them. The contest exposure made us go through a lot of innovative ideas and approaches towards several issues faced by our society. We experienced a diverse culture and made new connections. It was definitely a great opportunity to learn new things, go

through different perspectives, experiment with ideas, tackle issues, teamwork and grow our network.

Sir Elbert Hubbard once quoted "The world is moving so fast these days that the man who says it can't be done is generally interrupted by someone doing it." Our generation is victim of global competency and hence rather than move with the times, move ahead of the times must be our trend and grab all possible opportunities for the same.

- Emil Benny
S8 ECE

Other Team Members:

Mila Rose Peter, S6 CE
Sara Maria John, S6 CSE
Steve Austin, S4 ME
Philips C George, S4 CSE