



MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

Autonomous Institution – UGC, Govt. of India

Accredited by NBA & NAAC with 'A' Grade

NIRF Indian Ranking, Accepted by MHRD, Govt. of India | Rank Band – 6th to 25th, National Ranking by ARIIA
Maisammaguda, Dhulapally, Secunderabad – 500 010, Telangana

A.Y : 2020-21

VOL.2

Under
Student Chapter IEEE, IETE & Technical Association Electro Spikes

TECHNITRONIX

HALF YEARLY TECHNICAL MAGAZINE

**DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING**

ECE

DEPARTMENT VISION

- Our vision is to develop the department in to a full fledged Centre of learning in various fields of Electronics and Communication Engineering keeping in view the latest developments and to invoke enthusiasm among the Students to continually renew their education in rapidly developing technological scenario.

Vision**DEPARTMENT MISSION**

- Our mission is to inculcate a spirit of scientific temper and analytical thinking & train the students in contemporary technological trends in electronics and communication to meet the challenging needs of the industry by providing versatile sound knowledge in the field of engineering and technology

Mission**ABOUT THE DEPARTMENT**

The Department of Electronics and Communication Engineering is accredited by NBA, with an intake of 240 in B.Tech Programme and also offers M.Tech Programme in Embedded Systems. The department has state of the art laboratories with latest softwares like MENTOR GRAPHICS, CADENCE, MATLAB, XILINX, CCSTUDIO, KEIL, RTOS, RT Linux, OSCAD, PSPICE and MULTISIM. The department consists of well equipped Robotics- Centre of Excellence to train the students in specific modules to design and develop innovative projects that extend the state of the art in Robotics. It has well qualified and experienced faculty members. The highly competent and professional faculties, many of them drawn from premise institutions and industry have extensive experience and contribute to the holistic development of academics, research and career building of students. The department established IEEE, IETE & ISTE student chapters under which it organizes Technical Symposiums and various co-curricular activities every Academic Year. The department organized National Conference on Signal Processing Communications and System Design (SPCOMSD) in 2014 and is organizing International Conference on Signal Processing Communications and System Design (ICSPCOMSD) every year, from past 5 years. The department also organized Faculty Development Programmes on Analog & Digital Design using CADENCE Tools, Embedded System using 32 bit processor, Programmable System on Chip Mixed Signal Microcontroller, Refresher Courses on Analog and Digital Communications, Digital Signal Processing, VLSI Design using CADENCE Tools and One Week Refresher Course on "VLSI & Embedded Systems". The department organized AICTE Sponsored Two Week Faculty Development Programme on "Speech, Image & Video Processing Techniques, Analysis & Applications". The department also publishes the Registered Journal "International Journal of Research in Signal Processing, Computing and Communication-System Design (IJRSCSD)" with an ISSN: 2395-3187.

PO'S

PO1	Engineering knowledge	An ability to apply knowledge of mathematics (including probability, statistics and discrete mathematics), science, and engineering for solving Engineering problems and modeling
PO2	Problem analysis	An ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components
PO3	Design / development of solutions	An ability to design a complex electronic system or process to meet desired specifications and needs
PO4	Conduct investigations of complex problems	An ability to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions.
PO5	Modern tool usage	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
PO6	The engineer and society	An understanding of professional, health, safety, legal, cultural and social responsibilities
PO7	Environment and sustainability	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.
PO8	Ethics	Apply ethical principles, responsibility and norms of the engineering practice
PO9	Individual and team work	An ability to function on multi-disciplinary teams.
PO10	Communication	An ability to communicate and present effectively
PO11	Project management and finance	An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments
PO12	Life-long learning	A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning

PSO'S

The graduates of the department will attain:

PSO1: The ability to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.

PSO2: The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning

PSO3: Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

PEO'S

PEO1-PROFESSIONAL DEVELOPMENT

To develop in the students the ability to acquire knowledge of Mathematics, Science & Engineering and apply it professionally within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability with due ethical responsibility.

PEO2-CORE PROFICIENCY

To provide ability to identify, formulate and solve engineering problems with hands on experience in various technologies using modern tools necessary for engineering practice to satisfy the needs of society and the industry.

PEO3- TECHNICAL ACCOMPLISHMENTS

To equip the students with the ability to design, experiment, analyze and interpret in their core applications through multi disciplinary concepts and contemporary learning to build them into industry ready graduates.

PEO4- PROFESSIONALISM

To provide training, exposure and awareness on importance of soft skills for better career and holistic personality development as well as professional attitude towards ethical issues, team work, multidisciplinary approach and capability to relate engineering issues to broader social context.

PEO5- LEARNING ENVIRONMENT

To provide students with an academic environment and make them aware of excellence, leadership, written ethical codes and guidelines and the life-long learning to become a successful professional in Electronics and Communication Engineering

MESSAGES

Founder Chairman's Message

**Ch. Malla Reddy**

Founder Chairman, MRGI
Hon'ble Minister, Govt. of Telangana State

MRECW has made tremendous progress in all areas and now crossing several milestones within a very short span of time and now I feel very happy to know that the students and faculty of the ECE department of MRECW are bringing out the Volume-2 of the Technical magazine Technitronix in A.Y 2020-21. As I understand this magazine is intended to bring out the inherent literary talents in the students and the teachers and also to inculcate leadership skills among them. I am confident that this issue will send a positive signal to the staff, students and the persons who are interested in the educational and literary activities

Principal's Message

I congratulate the department of ECE, MRECW for bringing out the prestigious half yearly department technical Magazine Technitronix under A.Y: 2020-21, I am sure that the magazine will provide a platform to the students and faculty members to expand their technical knowledge and sharpen their hidden literary talent and will also strengthen the all round development of the students. I am hopeful that this small piece of literary work shall not only develop the taste for reading among students but also develop a sense of belonging to the institution as well. My congratulations to the editorial board who took the responsibility for the arduous task most effectively. I extend best wishes for the success of this endeavor.

**Dr. Y. Madhatee Latha**

Principal

HOD'S MESSAGE

It is an occasion of great pride and satisfaction for the department of ECE, MRECW to bring out the half yearly of the Technical magazine Technitronix under A.Y:2020-21, it gives me immense pleasure to note that the response to the magazine has been over whelming. The wide spectrum of articles gives us a sense of pride that our students and faculties possess creative potential and original thinking in ample measures. Each article is entertaining interesting and absorbing. I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them.

**Dr. N. Sreekanth**

HOD

SCIENTIST OF THE HALF YEAR

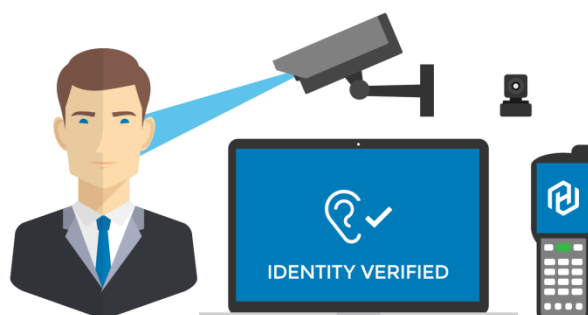
**GUGLIELMO GIOVANNI MARIA MARCONI**

Guglielmo Giovanni Maria Marconi, 1st Marquis of Marconi FRSA (25 April 1874 – 20 July 1937) was an Italian inventor and electrical engineer, known for his creation of a practical radio wave-based wireless telegraph system. This led to Marconi being credited as the inventor of radio, and he shared the 1909 Nobel Prize in Physics with Karl Ferdinand Braun "in recognition of their contributions to the development of wireless telegraphy".

Marconi was also an entrepreneur, businessman, and founder of The Wireless Telegraph & Signal Company in the United Kingdom in 1897 (which became the Marconi Company). In 1929, Marconi was ennobled as a Marchese (marquis) by King Victor Emmanuel III of Italy, and, in 1931, he set up Vatican Radio for Pope Pius XI

FACULTY ARTICLES

EAR BIOMETRICS - FUTURE



Like other biometric using face, iris, and finger, the ear as a biometric contains a large amount of specific and unique features that allow for human identification. The ear morphology changes slightly after the age of 10 years and medical studies have shown that significant changes in the shape of the ear happen only before the age of 8 years and after the age of 70 years. It does grow symmetrically in size and begins to bulge downwards as the person ages, but that is a measurable effect. Studies suggest that ear changes only **1.22 mm** per year. Also, the color distribution of ear, unlike face, is almost uniform. The position of the ear is almost in the middle of the profile face. Ear data can be captured even without the awareness of the subject from a distance. Ear biometrics can stand as an excellent example for passive biometrics and does not need much cooperation from the subject, which meets the demand of the secrecy of the authentication system present in the environment.

A digital camera takes the profile face images of the subjects in the environment from different angles, from which the section of the ear is segmented, preprocessed. The feature vectors are then analyzed in different test cases which consist of the rotation of the face in the same plane, different plane, different light conditions, etc. will be given to the machine learning model as input which would be trained to recognize a person in the environment. The process, though complicated, would develop a system which would provide an authenticated ear-based biometric identification system.

Mr. S. Srikanth
Department of ECE



EXTENDED REALITY



Extended reality (XR) is a term referring to all real-and-virtual combined environments and human-machine interactions generated by computer technology and wearables.[1][circular reference] E.g. It includes representative forms such as augmented reality (AR), mixed reality (MR) and virtual reality (VR) and the areas interpolated among them. The levels of virtuality range from partially sensory inputs to immersive virtuality, also called VR.

XR is a superset which includes the entire spectrum from "the complete real" to "the complete virtual" in the concept of reality–virtuality continuum introduced by Paul Milgram. Still, its connotation lies in the extension of human experiences especially relating to the senses of existence (represented by VR) and the acquisition of cognition (represented by AR). With the continuous development in human–computer interactions, this connotation is still evolving.

XR is a rapid growing field being applied in a wide range of ways, such as entertainment, marketing, real-estate, training and remote work

Mrs. K. Raghavendra
Department of ECE



STUDENT ARTICLES

DRONES IN MODERN WARFARE

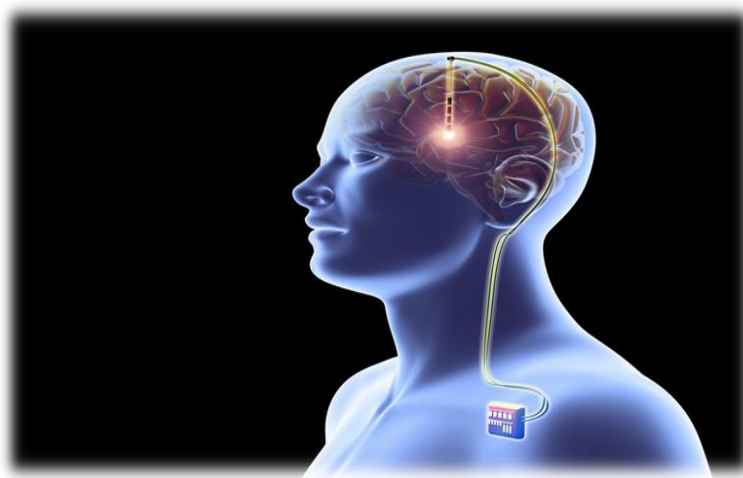
Drones are unmanned aerial vehicles that are remotely controlled. Drones have been in use by the modern militaries mainly the united states in its conventional war since the beginning of the 21st century. The first military drones were used by the bush administration where 51 attacks were recorded. Drones strikes can be used in areas whereby deploying soldiers on the ground would be too risky. Drones use can also be justifiable when an enemy is in possession of dangerous weapons that could risk the lives of the soldiers and the neighboring population. Using soldiers to capture enemies cannot be possible for it could put lives of soldiers and many innocent lives at risk. Instead, using a drone which is quiet, quick and efficient might be the better option in such instances.

Using drones in modern warfare puts an army at an advantage and increases its chances of succeeding against its foes. When an army archives early success in a conflict, it limits the loss of life, prevents human suffering and saves the country significant amount of money. Drones are a cheaper way of combat as compared to the use of fighter jets or deployment of foot soldiers. Drones are an evolutionsal invention that is here to stay. The challenges that surround the use of drones has been enormous.

Triveni
18RH1A0405
III ECE A



MEMORY BOOSTING BRAIN IMPLANT



Deep brain stimulation involves the implantation of electrodes in the cerebral lobes of the brain. The momentum behind today's brain-implant breakthroughs has been building at least since 1961, when Dr. William House invented the cochlear implant as a tool for restoring hearing in people with profound deafness. At the time, many of House's considered the idea of hacking into the auditory nerve absurd. But it worked, and more than 300,000 patients around the world now use such implants.

The big story here is decoding: We've finally been able to harness the big data of the human brain," says Dr. Michael Kahana, a professor of psychology at the University of Pennsylvania and the leader of the other team that recently reported memory-boosting success. "There's a lot of hype in this field, but that's not hype. That's real."

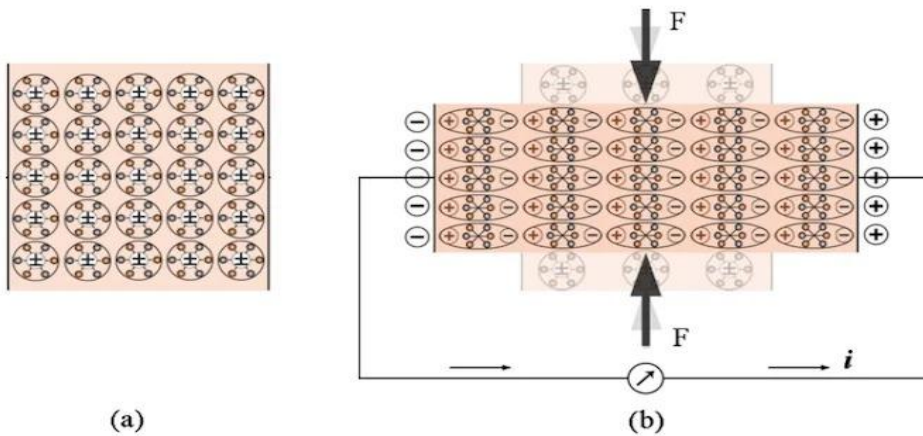
R. Akhila

18RH1A04J4

III ECE D



PIEZOELECTRIC SENSORS: THE PIEZOELECTRIC EFFECT



The first key aspect of piezoelectric accelerometers is the piezoelectric effect. In general, a piezoelectric material can produce electricity when subjected to mechanical stress. Conversely, applying an electric field to a piezoelectric material can make it deform and generate a small mechanical force. Although most EEs are familiar with the piezoelectric effect, the details of this interesting phenomenon sometimes aren't fully understood. A deeper insight into this effect can help us better understand the working of piezoelectric sensors. Figure 1 shows the effect of an external mechanical force on a piezoelectric material.

Figure 1. Piezoelectric materials without mechanical stress (a) and with stress (b). Image (adapted) used courtesy of Felix Levinzon. As shown in Figure 1(a), with no mechanical stress, the center of the negative and positive charges of the molecules coincide, which means that the molecules are electrically neutral. Applying a mechanical force, as depicted in Figure 1(b), deforms the structure and separates the center of the positive and negative charges of the molecules, creating many small dipoles in the material. As you can see, some fixed charges appear on the surface of the piezoelectric material. The amount of the produced electric charge is proportional to the applied force.

Y. Harika

18RH1A04P6

III ECE D



PAPER BATTERY



A paper battery is basically a device which can act both as a capacitor and as a battery. It is a flexible, light weight device made up of carbon nano tubes emboldened on paper (cellulose). It is basically formed by combination of cellulose with carbon nanotubes. It consists of infusion of carbon nanotubes with paper consisting of an ionic liquid as an electrolyte.

Given below are two ways to create paper batteries:

1. The first method involves fabricating zinc and manganese dioxide based cathode and anode. The batteries are printed onto paper using standard silkscreen printing press.
2. The second method is a bit complex and involves growing nanotubes on a silicon substrate. The gaps in the matrix are then filled with cellulose and once the matrix is dried, the combination of cellulose and nanotubes is peeled off. Thus sheets of paper consisting of layers of carbon nanotubes are created. Two such sheets are combined together to form a super capacitor with a ionic liquid like human blood, sweat or urine being used an electrolyte.

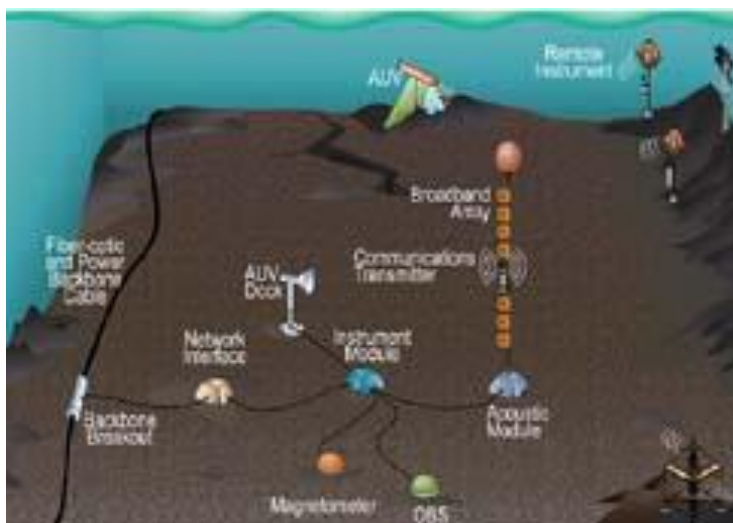
S. Malavika

18RH1A04L6

III ECE D



AQUA COMMUNICATION USING MODEM



Today wireless communication the biggest part in our life, the idea of wireless under water communications may still seem far-fetched. However, research has been active for over a decade on designing the methods for wireless information transmission underwater. To bring the concept of long lived, dense sensor networks to the underwater environment, there is a need to develop low cost and low-power acoustic modems for short-distance communications. Aqua Communication using modem and presents designing and developing such a modem. An underwater communication is a technique of sending and receiving signal below water. A modem is typically used to send digital data over a phone line. The sending modem modulates the data into a signal that is compatible with the phone line, and the receiving modem demodulates the signal back into digital data. Wireless modems convert digital data into radio signals and back. We therefore explore a complementary path that emphasizes simple but numerous devices that benefit from dense sensing (e.g. Telephone System) and shorter-range communication.

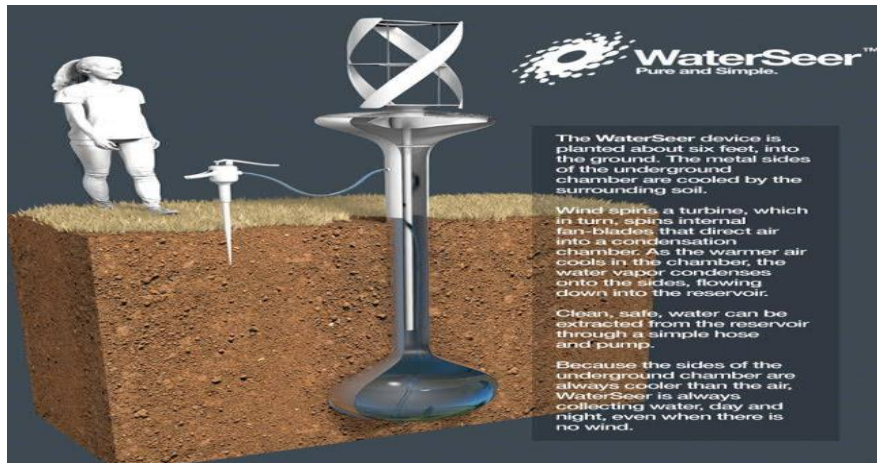
E Devi Harshini

18RH1A0458

III ECE A



WATER SEER



In many parts of the world, the lack of an adequate supply of clean water is a serious problem. As per UNICEF estimates, worldwide, about 2,000 children under the age of five die every day from diarrhoeal diseases and of these some 1,800 deaths are linked to water, sanitation, and hygiene. In a big breakthrough, VICI-Labs in collaboration with UC Berkeley and the National Peace Corps Association have developed a device with a goal to provide a sustainable source of clean, safe water.

This device is known as “Water Seer.” It relies on simple condensation processes to collect clean water from the atmosphere. It works without using any power source, without generating any sort of pollution or environmental impact, without the need for costly chemicals or maintenance.

The Water Seer device has a vertical wind turbine on its top, and it functions by utilizing wind power. It is planted six or more feet into the ground, and then the soil is packed around its metal neck. When the wind spins its internal fan blades, it draws air into the subterranean chamber. Since it is cooler underground, the air condenses into water in the reservoir to create a sort of an artificial well. This clean drinking water can be delivered to the surface by using a simple pump and hose. It works well even in areas with a very harsh climate. It can yield up to 37 liters of pure water a day, and the best part is it is priced at just \$134.

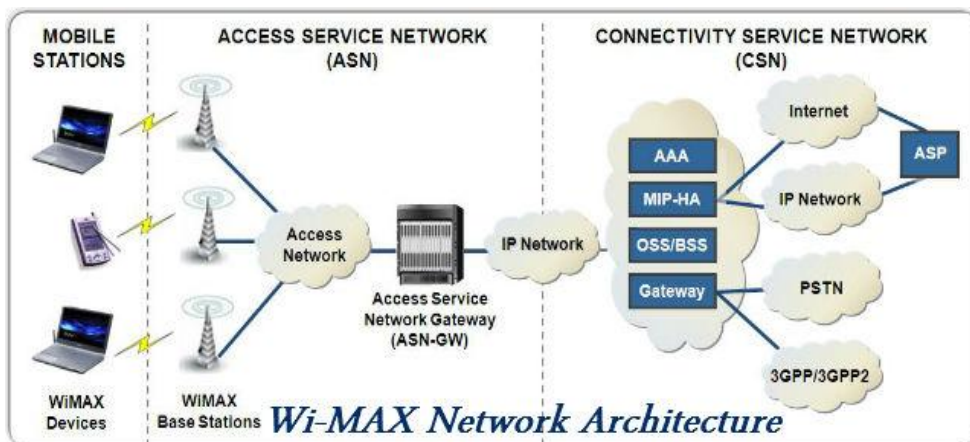
B. Sowmitha

18RH1A0419

III ECE A



WiMAX TECHNOLOGY



WiMAX is a wireless broadband access technology based on an internet protocol and its performance is equivalent to Wi-Fi networks/802.11 by the coverage & quality of service of cellular networks. **WiMAX full form** is "Worldwide Interoperability for Microwave Access". A wireless digital communication system like WiMAX is also called IEEE 802.16 that is designed for wireless MANs (metropolitan area networks).

WiMAX communication system provides BWA (broadband wireless access) up to 50 kilometers for fixed stations and also for technology that provides broadband access services for enterprise & residential customers in a reasonable method mobile stations from 5 to 15 km. WiMAX is a broadband wireless.

The operation of WiMax is similar to WiFi, however at high speeds above larger distances for several users. This wireless broadband has the capacity to provide service even in difficult areas to reach & the capability to defeat the physical boundaries of usually wired infrastructure

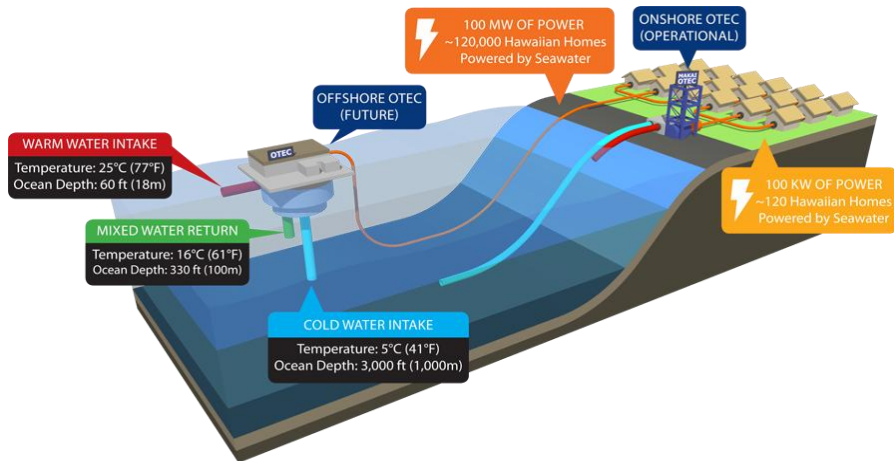
E. Keerthi

18RH1A0459

III ECE A



OCEAN THERMAL ENERGY



Ocean thermal energy conversion (OTEC) is a technology that converts solar radiation into electrical energy. The OTEC system also generates fresh water as a primary product and generates only enough electricity, as a secondary product, to operate the OTEC system itself. The oceans, being a vast renewable resource, it has the potential to produce billions of watts of electric power.

According to some experts this potential is estimated to be about 10^{10} KW power generation. The significance of discussing this topic lies in the production of significant amount of power with a little impact on the surrounding environment. Considering the economics of OTEC, it is appropriate to determine multiple product systems e.g., electricity, desalinated water, Mari culture, and air conditioning systems. The present paper also covers the basic types of an OTEC power plants cycle that are to be utilized.

Y. Dikshitha

18RH1A04P9
III ECE D



NFTS: THE NEW DIGITAL ASSET



A token that is not fungible is referred to as a "non-fungible token." An NFT is a digital asset that displays real-world components such as art, music, in-game items. They're bought and traded online, often using cryptocurrency, and they're usually encoded with the same software as many other cryptos. Both cryptocurrency and actual money are "fungible," which means they may be traded or swapped for one another.

NFTs are often one-of-a-kind or extremely limited-run objects with unique identifying numbers. Each NFT contains a digital signature that prevents NFTs from being substituted for or compared to one another. NFTs provide a one-of-a-kind chance for artists and content providers to monetize their work. Artists, for example, are no longer reliant on galleries or auction houses to sell their work. Instead, the artist may sell it directly to the buyer, allowing them to keep a bigger percentage of the earnings.

Additionally, artists may integrate royalties into their software so that they get a share of revenues when their work is sold to a new owner. This is a desirable feature because most artists do not earn subsequent revenue after their initial sale.

Is it true that you should buy NFTs just because you can? Investing in NFTs, in other words, is mostly a personal choice. If you have some additional cash, it's worth considering, especially if the artwork has personal meaning to you. Keep in mind, however, that the value of an NFT is purely decided by what someone else is willing to pay for it. As a consequence, rather than fundamental, technical, or economic reasons influencing stock prices, at the very least, forming the basis for investor demand, demand will drive the price.

P. Sucharitha

18RH1A04H1
III ECE



DATA SCIENCE



Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from noisy, structured and unstructured data, and apply knowledge and actionable insights from data across a broad range of application domains. Data science is related to data mining, machine learning and big data.

Data science is a "concept to unify statistics, data analysis, informatics, and their related methods" in order to "understand and analyze actual phenomena" with data. It uses techniques and theories drawn from many fields within the context of mathematics, statistics, computer science, information science, and domain knowledge. A data scientist is someone who creates programming code and combines it with statistical knowledge to create insights from data.

This field encompasses preparing data for analysis, formulating data science problems, analyzing data, developing data-driven solutions.

Technologies and techniques :

There is a variety of different technologies and techniques that are used for data science, depending on the application.

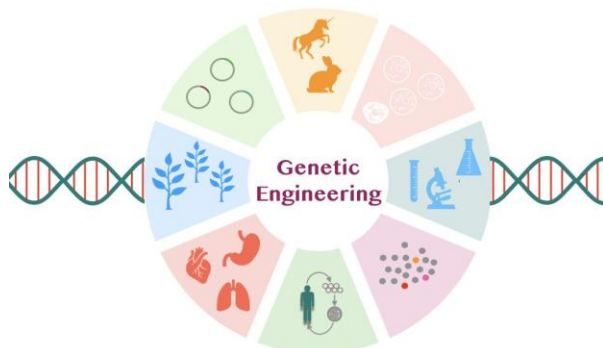
- Linear regression, Logistic regression
- Decision trees are used as prediction models for classification and data fitting. The decision tree structure can be used to generate rules able to classify or predict target/class/label variable based on the observation attributes.
- Cluster analysis is a technique used to group data together.

D. Akshitha

18RH1A0450
III ECE A



GENITIC ENGINEERING TECHNOLOGY



The process of changing an organism's DNA is defined as genetic engineering. This definition of genetic engineering encompasses any creature whose DNA has been changed by humans. Genetic engineering is fraught with controversy, as some individuals believe it is immoral to modify the DNA of living beings. Concerns have also been raised regarding how genetically modified creatures may interact with other organisms and the ecology. However, genetic engineering has many practical applications, addressed further below, among the most critical uses in medicine and agriculture.

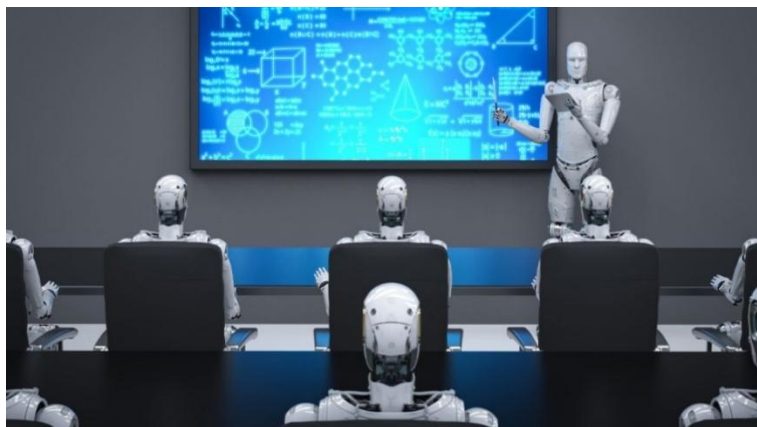
DNA that comprises genes or patterns from two or more species is known as recombinant DNA. Genetic engineering is based on recombinant DNA, which may produce genetically engineered creatures (GMOs). An organism whose DNA has been manipulated by humans is a genetically modified organism (GMOs). Organisms that have had DNA from another species integrated into their DNA are known as transgenic organisms. As a result, while all transgenic species are genetically modified organisms

D. Akshitha

18RH1A0450
III ECE A



ROBOTS IN THE BOARDROOM



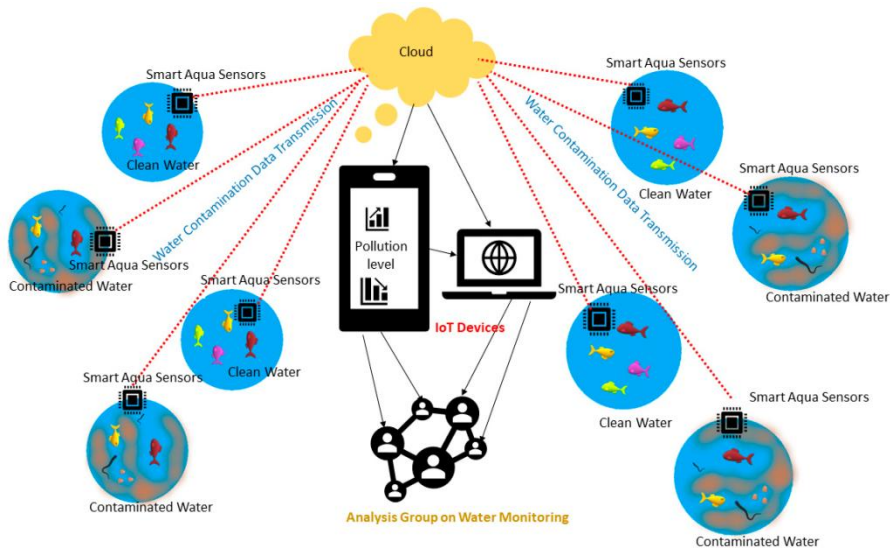
Artificial intelligence and corporate law promises to be dynamic. Due to its rapid technological development, artificial intelligence will enter corporate boardrooms in the very near future. This paper explores the interplay between artificial intelligence and corporate law, and analyzes how the two fit together. Do current corporate law rules match the challenges posed by artificial intelligence, or do they need to be adapted? More specifically, the paper focuses on the directors of corporations. We consider the extent to which human directors should be allowed – or required – to rely on artificial intelligence. Moreover, technology will probably soon offer the possibility of artificial intelligence not only supporting directors, but even replacing them. Another question is therefore whether or not such a replacement is legally admissible. At any rate, the legal strategies currently adopted by corporate law are tailored to human directors. The paper tests whether those strategies would still be suitable for boardrooms filled with robo-directors. It concludes that corporate law is highly relevant for the use of artificial intelligence in corporations, but that it will also need to be adapted to the challenges posed by this technology. In that sense, the interplay between in both directions.

NVN Bhargavi

19RH1A04F2

II ECE C

SMART MONITORING



SMART may not function equally well for all hard disks that it has been installed on and enabled. We suggest you conduct some research on using this system (perhaps for your specific drives) before deciding how much you can rely upon it. Different hard disk manufacturers appear to have various ideas on what to include or exclude for SMART monitoring. Among the data different drives provide there can be different threshold settings for what/when SMART should report changes to the hard drive.

Enable SMART monitoring in your BIOS setup. With SMART enabled, if a write operation fails, bad sectors are taken out of service and the data is immediately written to a spare sector. In other words, the bad sector is reallocated

O.Sravya

19RH1A04G3

II ECE C

IMPORTANT WEBSITES

www.ieee.org/india

www.engineering.careers360

www.technologyreview.com

www.mathworks.in/products/matlab/

www.microwaves101.com/

www.ece.utoronto.ca/student-life-links

<https://www.ece.org/>

[Science Commons.org](http://Science.Commons.org)

[MathGV.com:](http://MathGV.com)

<http://www.engineeringchallenges.org/>

<http://engineering.stanford.edu/announcement/stanford-announces-16-online-courses-fall-quart>

<http://www.tryengineering.org/>

<http://www.engineergirl.org/>

<http://www.discoverengineering.org/>

<http://www.eng-tips.com/>

<http://efymag.com>

<http://efymagonline.com/>

<http://electronicsforu.com>

www.dspguide.com

www.howstuffworks.com

<http://nptel.iitm.ac.in>

<http://www.opencircuitdesign.com/>

<http://www.futuresinengineering.com/>

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