IEEE EDS SB MJCET –PROJECT EXPO EVENT REPORT

TRANSISTOR WEEK

The EDS student branch MJCET organized a professional event on celebrating 75th anniversary of Transistor, in collaboration with ECE Department. The event was held on December 31st 2022, from 10am to 4pm in offline mode at Ece Department. In this event we had shown the EVOLUTION OF TRANSISTOR till date and how it will reorient in future. This event was for improving the students' knowledge in the electronics domain. The event was attended by 400 students and staff members

Project expo event

Celebration of 75th transistor anniversary

Presentation on Evolution of transistor.

During the presentation on the "evolution of transistors," the students provided a detailed explanation of the working principles of the first transistor. The first transistor, invented at Bell Laboratories in 1947 by John Bardeen, Walter Brattain, and William Shockley, marked a significant milestone in the field of electronics.

The students began by describing the structure of the first transistor, which consisted of three layers of semiconductor material. They explained that the transistor was composed of a thin layer of N-type (negative-type) semiconductor material sandwiched between two thicker layers of P-type (positive-type) semiconductor material. This structure is known as a P-N-P junction.

Next, the students delved into the working of the first transistor, focusing on its three terminals: the emitter, base, and collector. They explained that when a small current is applied to the base terminal, it allows the flow of majority charge carriers (electrons or holes) from the emitter to the base region.

They went on to explain that the base current controlled the flow of charge carriers through the transistor. A small input current at the base would regulate a much larger current flow from the emitter to the collector, effectively amplifying the signal.

The students then discussed the concept of doping, which involves intentionally adding impurities to semiconductor materials to alter their electrical properties. They explained that the N-type and P-type regions of the transistor were achieved through controlled doping.

To provide a comprehensive understanding, the students elaborated on the process of transistor operation. They explained that the presence or absence of the base current controlled the conductivity of the transistor. When the base current was present, it allowed a large flow of current between the emitter and the collector, creating an "on" state. Conversely, when the base current was absent, the transistor entered an "off" state, blocking the current flow between the emitter and collector.

The students also highlighted the importance of biasing the transistor, which involved applying appropriate voltage levels to ensure proper transistor operation. They discussed the use of voltage dividers and biasing resistors to establish the required voltage levels for the emitter and base regions.

In conclusion, the students provided a comprehensive explanation of the first transistor's working principles. They covered its structure, the role of different terminals, and the impact of biasing and doping on its functionality. Through their detailed description, the students effectively conveyed the significance and impact of the first transistor in revolutionizing the field of electronics.

Scara Robot:

The SCARA project involved designing and implementing a Selective Compliance Assembly Robot Arm (SCARA) for industrial applications. The aim of the project was to create a robotic arm that could perform precision movements and assembly tasks with high accuracy and repeatability. The SCARA robot was designed with a horizontal arm that could move in a circular motion, while the vertical arm could move up and down. The robot was also equipped with a gripper that could grasp and release objects with high precision.

To achieve the desired level of precision, the SCARA robot was programmed using advanced motion control algorithms. These algorithms ensured that the robot could perform smooth and accurate movements, even when performing complex assembly tasks. The SCARA robot was also designed with a user-friendly interface that allowed operators to easily control the robot's movements and programming. The project was a success, and the SCARA robot was able to perform a wide range of assembly tasks with high accuracy and precision, making it a valuable tool for industrial applications.

Smart oxygen concentrator:

The Smart Oxygen Concentrator project aimed to design and develop a device that could deliver controlled and monitored oxygen therapy to patients with respiratory disorders. The device was equipped with advanced features, including remote control capabilities that allowed doctors to adjust the flow of oxygen remotely and monitor the patient's vital signs. The device also included a camera that enabled doctors to visually monitor the patient's condition by seeing the oxygen level of concentrator. The Smart Oxygen

Concentrator project aimed to provide a more convenient and efficient way of delivering oxygen therapy while enhancing the level of care provided to patients.

Mechanum Rover:

The Mechanum rover is a mobile robot with four wheels that can move in any direction without having to turn. The rover is designed to traverse rough terrains, making it useful for exploration and research purposes. The wheels are equipped with special rollers that enable the rover to move sideways, forward, and backward with ease. The project focuses on developing a robust rover that can be used in various fields, including mining, agriculture, and space exploration. The rover is designed to be controlled remotely using a wireless connection and can be equipped with various sensors and instruments for data collection. The project aims to develop a reliable and efficient rover that can withstand harsh conditions and operate in a range of environments.

Robotic Arm

This project aims to design and develop a robotic arm that can be 3D printed in-house and controlled using a smartphone. The robotic arm has a well-designed gripper that can pick and place objects of different shapes and sizes with precision. The arm's movement and gripper action are controlled using a smartphone app, making it easy and convenient to operate. This robotic arm has applications in various industries, such as manufacturing, packaging, and logistics, where repetitive tasks can be automated, reducing labor costs and increasing efficiency.

By 3D printing the robotic arm, it becomes more affordable and accessible, making it an ideal solution for small businesses and startups.

Smart 3D Printer:

The Smart 3D Printer project aimed to enhance the functionality of a conventional 3D printer by integrating it with a Raspberry Pi module. The Raspberry Pi, along with a web-based interface, enabled remote access to the 3D printer from anywhere in the world. The users could initiate a print, pause, or stop it as required, and monitor the progress in real-time using the camera attached to the printer. The

project eliminated the need for the user to be physically present in front of the 3D printer, allowing them to save time and resources while improving their overall experience. With the Smart 3D Printer, users can now easily manage multiple prints, monitor progress, and receive notifications on completion, all from their mobile devices.

IIOT Project

The Industrial Internet of Things (IIoT) project that was implemented involved a conveyor belt, a robotic arm and a camera. The aim of the project was to detect the objects on the conveyor belt using machine learning algorithms and segregate them based on their type. The system could be used in waste segregation or plastic bottle segregation, among other applications. The project was implemented using a combination of hardware and software.The system worked by capturing images of the objects on the conveyor belt using the camera and jetson nano. The machine learning algorithms were then used to detect the objects and classify them based on their type. If an object was identified as belonging to a specific category and it was desired for it to pass, it was allowed to do so. However, if it was not required to pass, the robotic arm was used to push the object off the conveyor belt. The system was effective in segregating the objects based on their type, thereby reducing the need for manual segregation and increasing the efficiency of the process. Overall, the project demonstrated the potential for IIoT solutions to streamline industrial processes.

Food Serving Bot:

The food serving bot is a novel device that is designed to serve food in a restaurant. It can be easily controlled using a smartphone application, which allows the user to select the desired food item and specify the table number. The bot is equipped with a set of sensors and cameras that enable it to navigate through the restaurant without colliding with any obstacles. The device is also designed to avoid people, and it can be programmed to stop if someone walks in front of it. The food serving bot is a cost-effective solution that can reduce the workload of restaurant staff and provide an enhanced dining experience for customers.

Telepresence Bot:

The Telepresence project aims to provide an immersive remote communication experience that can be controlled using a mobile phone.

The system consists of a mobile robot equipped with a camera that can move around a physical space and capture live video feeds

. The user can control the robot's movement and view the live stream using a dedicated mobile application. This project is particularly useful for remote meetings, teleconferences, and virtual tours, allowing the user to interact with the physical environment remotely. With the help of this technology, individuals can participate in events or meetings that they would have otherwise missed due to geographic constraints.

Prosthetic Arm:

The aim of the project was to develop a prosthetic arm that could accurately mimic the movements of a human hand, including all five fingers and the palm. The arm was designed with advanced sensors and control systems that allowed it to respond to the user's muscle movements and translate them into

precise, natural hand movements. The result was a highly functional and realistic prosthetic arm that could help individuals with upper limb amputations perform a wide range of everyday tasks with ease and confidence. The prosthetic arm was also designed to be lightweight, durable, and comfortable, making it suitable for long-term use and allowing the user to enjoy a better quality of life.

5G Communication:

The students effectively explained the workings of 5G technology and employed dummy models to provide a clear and efficient demonstration. They highlighted the key differences between 5G, 4G, 3G, and 2G technologies.The students began by describing how 2G technology introduced basic voice communication through digital signals. They emphasized its limitations in terms of data transfer speeds and the lack of support for advanced features like video streaming and high-speed internet browsing.

Next, the students explained how 3G technology brought significant advancements, enabling faster data transfer rates, multimedia messaging, and limited internet access. They showcased a dummy model representing 3G infrastructure, illustrating its improved capabilities compared to 2G.

Moving on to 4G, the students demonstrated its substantial leap in performance and introduced the concept of LTE (Long-Term Evolution) technology. They highlighted the significantly higher data transfer speeds, improved network capacity, and enhanced support for multimedia applications. The dummy

models visually depicted the advanced infrastructure of 4G networks, such as base stations and data centers.

Finally, the students showcased the revolutionary features of 5G technology. They explained its key characteristics, including ultra-fast data transfer rates, low latency, massive device connectivity, and support for emerging technologies like the Internet of Things (IoT) and autonomous vehicles. The students used dummy models to represent the advanced infrastructure required for 5G networks, such as small cells, beamforming antennas, and cloud-based network architecture.

Throughout the presentation, the students highlighted the transformative potential of 5G technology in various industries, such as healthcare, transportation, and manufacturing. They emphasized how 5G would enable real-time remote surgeries, autonomous vehicle communication, and seamless connectivity for smart cities.

Overall, the students effectively conveyed the technical aspects of 5G technology and its advantages over previous generations. Their use of dummy models enhanced understanding and provided a visual representation of the infrastructure involved, making it easier for the audience to grasp the concepts and appreciate the potential of 5G technology.

All Terrain Bot:

The "All Terrain Bot" created by the students for the project expo is an exceptional robotic system designed to navigate diverse terrains with efficiency and agility. This innovative creation showcases remarkable features that set it apart from traditional robots.

The All Terrain Bot boasts a robust and rugged design, equipped with sturdy wheels or tracks that enable it to traverse various challenging environments. Whether it's rough terrains, inclines, or uneven surfaces, this bot is built to conquer them all.

The students incorporated advanced sensors into the All Terrain Bot to enhance its navigational capabilities. These sensors, such as LiDAR or ultrasonic sensors, enable the bot to detect obstacles and adjust its path accordingly. The bot can intelligently map its surroundings and make real-time decisions to ensure safe and efficient traversal.

Moreover, the All Terrain Bot features a sophisticated control system, allowing it to adapt its movement and speed based on the terrain conditions. It can analyze the terrain's roughness, slopes, and obstacles to optimize its locomotion and maintain stability.

One notable aspect of this project is the students' attention to versatility and adaptability. They designed the All Terrain Bot to be customizable, allowing for easy attachment of additional modules or tools based on specific applications. For example, it can be equipped with a robotic arm for material handling, a camera for surveillance, or sensors for environmental data collection.

During the presentation, the students showcased the All Terrain Bot's remarkable performance in real-time. They demonstrated its ability to navigate challenging terrains effortlessly, showcasing its stability, speed, and obstacle avoidance capabilities.

The students also highlighted the potential applications of the All Terrain Bot. They discussed its usefulness in search and rescue missions, agricultural tasks, exploration in hazardous environments, or even as a companion for outdoor enthusiasts.

Overall, the All Terrain Bot created by the students for the project expo is an extraordinary robotic system that combines robustness, advanced sensors, adaptive control, and versatility. Its exceptional performance and potential applications make it a standout project, impressing the audience with its ability to conquer diverse terrains and showcasing the students' innovative engineering skills.

Smart inspection Bot:

The "Smart Inspection Bot" developed by the students for the ECE project expo is a cutting-edge robotic system designed to revolutionize the inspection and monitoring processes in various industries. This

innovative creation showcases advanced features that enhance efficiency, accuracy, and automation in inspection tasks.

The Smart Inspection Bot incorporates a combination of sensors, cameras, and intelligent algorithms to enable comprehensive and precise inspection capabilities. It is equipped with high-resolution cameras that capture detailed images or videos of the target areas. These visuals can be streamed in real-time to a control center or stored for further analysis.

The students integrated artificial intelligence and machine learning algorithms into the Smart Inspection Bot, allowing it to automatically analyze captured data. It can detect defects, anomalies, or irregularities in the inspected objects or environments. The bot's intelligent algorithms enable it to differentiate between normal and abnormal conditions, alerting operators or triggering automated actions when necessary.

The Smart Inspection Bot also features autonomous navigation capabilities. It utilizes advanced positioning systems, such as GPS or indoor localization technologies, to navigate predefined inspection routes or specific areas of interest. The bot can navigate complex environments, avoid obstacles, and ensure thorough coverage of the inspection area.

To enhance versatility, the students designed the Smart Inspection Bot with modularity in mind. It can be easily equipped with additional sensors or tools based on specific inspection requirements. For example, it can integrate thermal cameras for temperature monitoring, gas sensors for detecting leaks, or even robotic arms for interactive inspections.

During the project expo, the students demonstrated the Smart Inspection Bot's remarkable capabilities. They showcased its ability to autonomously navigate through challenging environments, capture high-quality inspection data, and provide real-time analysis and alerts. The bot's potential applications include industrial inspections, infrastructure monitoring, safety assessments in hazardous environments, and quality control in manufacturing.

Overall, the Smart Inspection Bot developed by the students is an impressive project that combines advanced sensors, intelligent algorithms, and autonomous navigation to streamline and improve inspection processes. Its ability to perform thorough and automated inspections with precision and efficiency makes it a valuable asset in various industries, offering enhanced productivity and accuracy while reducing human involvement and risk.

Low cost Ventilator:

The "Low-Cost Ventilator" developed by the IEEE team for the project expo is an affordable and accessible solution designed to address the need for respiratory support in resource-constrained environments.

This ventilator offers essential functionality while keeping costs low. The IEEE team focused on using readily available components and simplified design to make it affordable and easy to produce. The ventilator features adjustable settings for breath rate, tidal volume, and oxygen concentration. Its user-friendly interface allows healthcare professionals to monitor and adjust parameters as needed. The Low-Cost Ventilator showcased by the IEEE team is a commendable effort to provide a cost-effective solution for respiratory care where access to conventional ventilators may be limited.

Password based circuit breaker:

The "Password-Based Circuit Breaker" developed by the students for the IEEE ECE project expo is an innovative solution designed to enhance the security and control of electrical circuits. This system offers an added layer of protection by incorporating a password-based authentication mechanism.
The students integrated a microcontroller with the circuit breaker, allowing users to set a unique password to activate or deactivate the circuit. The password can be input through a keypad or via a mobile application connected to the system.

Upon entering the correct password, the circuit breaker allows the electrical circuit to function normally. However, if an incorrect password is entered, the circuit breaker remains in a deactivated state, preventing the flow of electricity and ensuring safety.

The Password-Based Circuit Breaker provides several advantages. It allows users to restrict unauthorized access to electrical circuits, preventing misuse or tampering. Additionally, it offers a convenient and user-friendly interface for controlling circuit operations securely.

During the project expo, the students demonstrated the effectiveness and reliability of the Password-Based Circuit Breaker. They showcased its ability to accurately authenticate passwords and promptly respond to user inputs.

Overall, the Password-Based Circuit Breaker developed by the students is a valuable project that enhances the security and control of electrical circuits. Its implementation of password-based authentication adds an extra layer of protection, ensuring authorized access and preventing potential hazards.

3D- Object Scanner:-

The 3D Object Scanner created by the students is a remarkable device designed to capture detailed three-dimensional models of physical objects. It utilizes advanced imaging technologies, such as structured light or laser scanning, to accurately capture the shape, texture, and geometry of the object. The scanner employs a combination of sensors, cameras, and intelligent algorithms to process the captured data and generate a digital 3D representation of the object. This allows users to easily replicate or manipulate the object in virtual environments or use the digital model for various applications like 3D printing, virtual reality, or animation.

Forest Fire Detection Drone:

The Forest Fire Detection Drone created by the students is an impressive innovation aimed at early detection and monitoring of forest fires. This drone is equipped with sensors that are strategically placed on the bottom side of the drone to efficiently detect signs of fire in forested areas.

The sensors integrated into the drone are designed to detect heat signatures, smoke, and other indicators of a potential forest fire. These sensors can accurately identify the presence of fire and rapidly transmit this information back to a control center or designated authorities.

The Forest Fire Detection Drone utilizes advanced technologies such as thermal imaging, infrared sensors, and smoke detectors to ensure reliable and accurate detection. It operates autonomously, patrolling designated areas of the forest and continuously monitoring for any signs of fire.

When a fire is detected, the drone immediately sends an alert along with the precise GPS coordinates of the fire's location. This prompt notification enables swift response from firefighting teams, allowing them to quickly reach the scene and initiate firefighting efforts, thus minimizing the potential damage caused by the fire.

The students' Forest Fire Detection Drone offers numerous benefits. Its ability to rapidly identify and report forest fires enhances the overall response time, enabling firefighting resources to be deployed more efficiently. By providing real-time information on the fire's location, it facilitates faster decision-making and coordination among firefighting teams.

Additionally, the drone's aerial perspective enables it to cover large forested areas that may be challenging to monitor using traditional ground-based methods. It can survey the forest from above, detecting fires in remote or inaccessible locations that may otherwise go unnoticed.

Overall, the Forest Fire Detection Drone created by the students is a valuable tool in the fight against forest fires. Its ability to detect fires early and provide crucial information to responders plays a crucial role in minimizing the destruction caused by forest fires and protecting natural resources.

CNC Laser Engraver:

The CNC Laser Engraver created by the students during the expo is a precision machine that combines computer numerical control (CNC) technology with laser engraving capabilities. This innovative device utilizes a high-powered laser beam to etch intricate designs or patterns onto various materials with remarkable accuracy. The students integrated a user-friendly interface that allows users to upload their designs and control the engraving process effortlessly. The CNC Laser Engraver is equipped with advanced safety features to ensure safe operation. Its versatility and precision make it an ideal tool for creating personalized artworks, signage, or even intricate details on small objects.