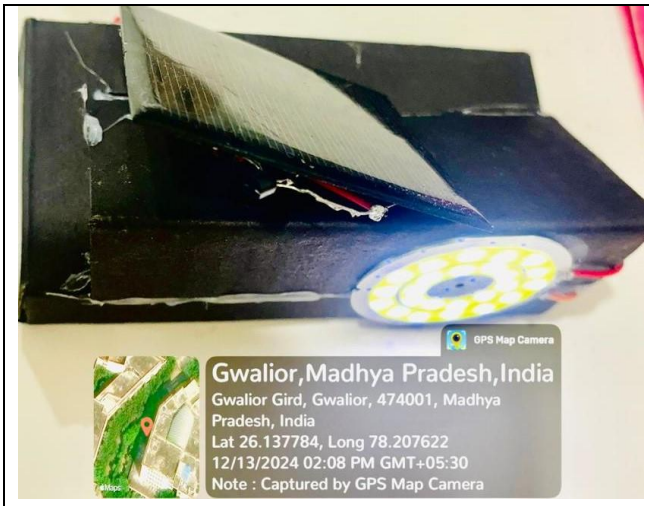
COMPLETED PBLs
Department of EE
July-Dec 2024

SOLAR POWERED PORTABLE MOBILE CHARGER

A Project-Based Learning (PBL) initiative on the Solar-Powered Portable Mobile Charger with a 20W monocrystalline photovoltaic (PV) module. The project involves designing and constructing a portable charger capable of efficiently charging mobile devices using solar energy. The primary component, a 20W monocrystalline PV module, & other key components include a charge controller, which regulates the voltage and current from the solar panel to prevent overcharging of the battery; a lithium-ion battery of 9V, which stores the energy generated by the solar panel for later use; a DC-DC converter of buck-boost type, which ensures that the output voltage is stable and appropriate for charging mobile devices; and USB output ports for connecting various mobile devices.

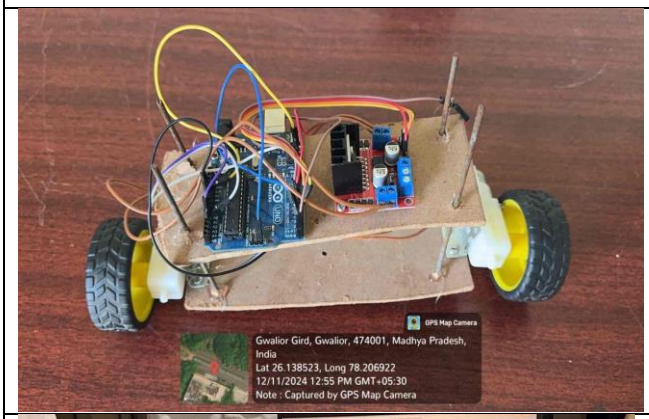
SMALL HYDRO POWER PLANT MODEL

The Project-Based Learning (PBL) on the small hydropower plant model, developed by students, involves a functional prototype that demonstrates the generation of electricity using kinetic energy of water. The model utilizes a 12V DC motor, which is powered by water flow to simulate the operation of a small hydropower plant. The motor drives a 12V pump, circulating water through the system, and in turn, powers four 5mm white LED lights, showcasing the ability to convert mechanical energy into electrical energy. This hands-on project highlights the principles of hydropower, energy conversion and sustainable power generation.



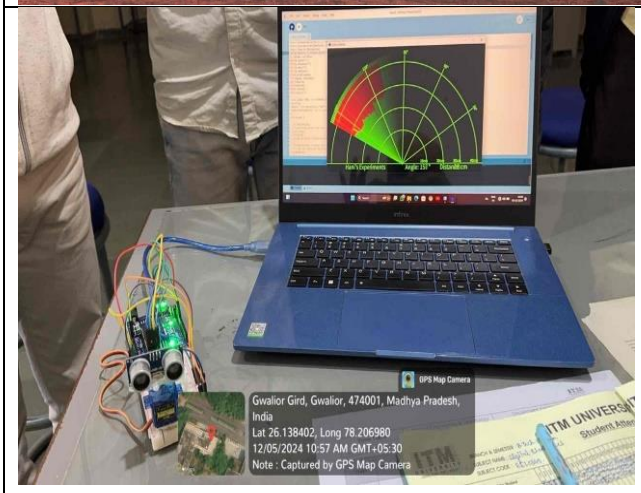
A SMART SOLAR POWERED LIGHT

A group of students successfully designed and implemented a project-based learning (PBL) initiative to create a small solar-powered automatic DC LED light. The system utilized a 7V monocrystalline solar cell as its primary energy source, ensuring high efficiency in converting sunlight into electricity. A 4V rechargeable battery was integrated into the circuit to store energy, enabling the light to function during low sunlight conditions or at night. The automatic functionality was achieved through a sensor-based control system, which detected ambient light levels and activated the LED accordingly.



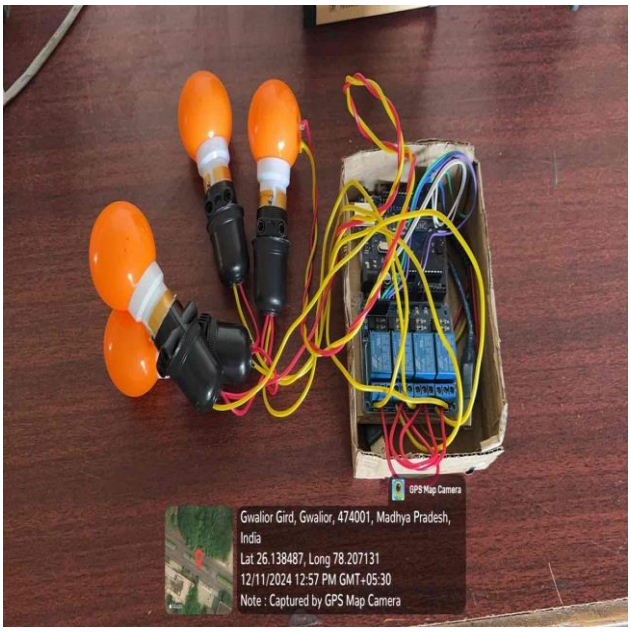
SELF-BALANCING ROBOT

The self-balancing robot developed by students as part of their Project-Based Learning (PBL) initiative which involved designing and building a robot capable of maintaining balance on two wheels using principles of control systems, dynamics and sensor integration. The students implemented a PID (Proportional-Integral-Derivative) controller, leveraging gyroscopic and accelerometer sensors to monitor and adjust the robot's orientation in real-time.



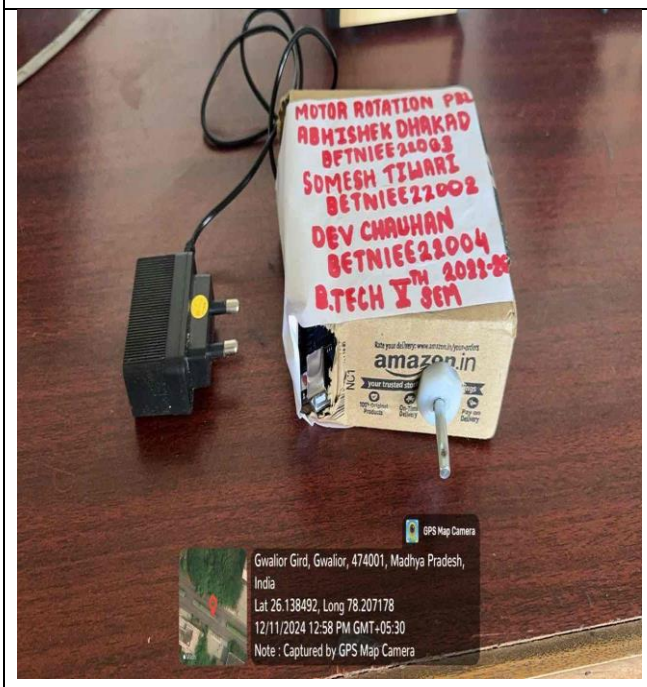
RADAR SYSTEM

A group of students successfully completed a Project-Based Learning (PBL) which involved designing and implementing a functional radar prototype capable of detecting and tracking objects within a specified range. The students explored key radar principles, including signal transmission, reflection, and Doppler effect analysis, integrating theoretical knowledge with practical application. Using microcontrollers, sensors, and programming, they developed a system that displayed detected objects on a graphical interface, providing insights into its distance and speed.



AUTOMATIC LOAD SHEDDING SYSTEM WITH ARDIUNO UNO

The project on "Automatic Load Shedding System with Arduino UNO" aims to efficiently manage electrical loads during power shortages. Using an Arduino UNO as the central controller, the system detects overload conditions and automatically disconnects non-essential loads to prevent system failure. Key components include a current sensor (ACS712) for monitoring electrical current, a relay module to control the connection of loads, and a voltage sensor to measure system voltage. Additionally, the system employs a real-time clock (RTC) for time-based operations and an LCD display for status monitoring. The project helps students understand load management, automation, and real-time control using embedded systems.



SPEED CONTROL OF STEPPER MOTOR BY USING MICROCONTROLLER & RELAY MODULE

The project on "Speed Control of Stepper Motor using Microcontroller and Relay Module" focuses on controlling the rotational speed of a stepper motor through a microcontroller, specifically an Arduino. The system utilizes a relay module to switch the motor's phases, enabling precise control over its speed. Key components include the stepper motor (typically a 28BYJ-48 model), which provides accurate positioning, and an Arduino microcontroller (such as the Arduino UNO) to generate control signals. A potentiometer is used for manual speed adjustment, and the relay module handles the switching of motor phases. This project allows students to explore motor control, embedded systems, and automation.