UNDERGRADUATE FINAL YEAR PROJECT REPORT

Department of Electrical Engineering

Faculty of Engineering, Science and Technology

Indus University

Cellular Based Bike Safety and Accident Prevention System

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Author’s Declaration

The project titled "Cellular Based Bike Safety and Accident Prevention System" was presented by Muhammad Daniyal Akhtar (2140 2019) Eisha Qurban (1934 2019) and Moeed Aslam (1577 2019), with the guidance of their project advisors. It has been approved by the project examination committee. Submitted to the Department of Electrical Engineering at Indus University. This submission partially meets the requirements for a Bachelor’s degree, in Electrical (Electronics) Engineering.

Signature and Date	Signature and Date	Signature and Date
....	....	....
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Statement of Contributions

We have designed a project namely, Cellular-Based Bike Safety and Accident Prevention System. In this project, Daniyal's contribution lies in the hardware aspects, particularly in implementing speed control. On the other hand, Moeed's role encompasses various tasks and innovations. Notably, mooed has focused on integrating functionalities onto both GSM and GPS modules. Eisha, meanwhile, has concentrated on the software components, working on aspects like speed regulation and the incorporation of GSM and GPS functionalities through programming.

Faculty of Engineering Science and Technology

Department of Electrical Engineering

Indus University, Karachi, Pakistan

CERTIFICATE

This project **"Cellular Based Bike Safety and Accident Prevention System"** presented by **Muhammad Daniyal Akhtar(2140-2019),Eisha Qurban(1934-2019),Moeed Aslam (1577-2019)** under the direction of their project advisor's and approved by the project examination committee, has been presented to and accepted by the Department of Electrical Engineering, Faculty of Engineering Science & Technology, Indus University, in partial fulfillment of the requirements for Bachelor of Electrical (Electronics) Engineering. Plagiarism test was conducted on complete report, and overall similarity index was found to be less than 20%, with maximum 5% from single source, as required.

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ABSTRACT

Innovating at the intersection of technology and transportation, I embarked on a project that seamlessly combined the dynamics of an electric bike with the convenience of mobile control. This groundbreaking endeavor resulted in the creation of a speed control system for e-bikes that introduces a new level of safety and customization. By leveraging the power of mobile connectivity, users can effortlessly set their desired speed limits, ensuring a controlled and safe riding experience. Whether aiming for a leisurely cruise at 30 rpm or seeking a swifter journey at 55 rpm, the system acts as a digital governor, intelligently regulating the bike's speed to match the preset threshold. Furthermore, the integration of GSM and GPS modules elevates this project's utility by granting riders the ability to monitor their e-bike's whereabouts in real-time. The device sends periodic location updates to the user's mobile phone, establishing a constant connection between the rider and their two-wheeled companion. Moreover, the system's versatility extends to scheduling, enabling users to customize active time windows for the speed control feature. Through a simple text command, the bike can be activated or deactivated at designated intervals, empowering users with complete control over their riding experience.

With mobile technology becoming an ever-present facet of modern life, the project represents an innovative fusion of mobility and connectivity. The convergence of speed control, GPS tracking, and mobile communication infuses the e-bike with a new level of intelligence, safety, and user-centricity. As the project continues to evolve, its potential applications and implications for personal transportation are boundless.

ACKNOWLEDGEMENT

All praises and thanks to Al-Mighty" ALLAH", the most merciful, the most gracious, the source of knowledge and wisdom endowed to mankind, who conferred us with the power of mind and capability to take this project to the exciting ocean of knowledge. All respects are for our most beloved Holy Prophet "**Hazrat MUHAMMAD (Peace Be Upon Him)**", whose personality will always be source of guidance for humanity.

Acknowledgement is due to **Faculty of Engineering Science & Technology** for support of this Project, a highly appreciated achievement for us in the undergraduate level.

We wish to express our appreciation to our **Supervisor (Engr. Shoaib Hussain)** who served as our major advisor. We would like to express our heartiest gratitude for their keen guidance, sincere help and friendly manner which inspires us to do well in the project and makes it a reality.

Many people, especially our classmates and team members itself, have made valuable comment suggestions on this proposal which gave us an inspiration to improve our project. We thank **Co-Supervisor (Engr. Sajid Ahmed)** & all the people for their help directly and indirectly to complete our project.

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ABBREVIATIONS

GPS	**Global Positioning System**
GSM	Global System for Mobiles
E-BIKE	Electric Bike cycle

CHAPTER 1

1. INTRODUCTION

In this project we have developed emerges as a pioneering endeavor at the crossroads of mobility and digital innovation. Rooted in the realm of electric bicycles, our creation addresses the fundamental concern of speed control with a novel twist. By harnessing the capabilities of mobile phones, I've devised a system that empowers riders to set and enforce specific speed limits on their e-bikes. This innovation not only guarantees a safer riding experience but also redefines the relationship between riders and their vehicles in an age of interconnectedness.

Complementing the speed control mechanism is the seamless integration of GSM and GPS functionalities, revolutionizing the very essence of e-bike navigation and tracking. This fusion of technologies doesn't merely provide location updates; it ushers in a new era of personalized riding experiences. Through the mobile interface, users can effortlessly command their e-bike to reveal its real-time location, offering a heightened sense of control and security. Moreover, the feature to establish time-based riding windows amplifies the project's adaptability, catering to the varying needs and schedules of modern riders. In a world where convenience and customization are paramount, my project exemplifies the harmonious blend of mobility, technology, and user-centric design.

1.1 Motivation:

This project is a testament to innovation, reshaping e-bikes into intelligent, controlled, and connected companions, revolutionizing safety and riding experience. With precision speed limits and real-time tracking, it aspires to pave the way for a new era of personalized, secure, and tech-enhanced biking journeys.

1.2 Problem Statement:

Reducing the risk of loss of the valuable lives due to accidents and loss of assets like bike due to snatching is the open challenge for engineers, in this regard a system has been designed to control the speed of bike to protect from accident and trace the location of bike in case snatching to recover the asset.

1.3 Objective:

Following are the main objectives of our project are given below:

- Converting Bicycle into E-Bike.
- Speed control of E-Bike.
- To block bike after snatching through mobile.
- To get E-Bike location through GPS and GSM.

1.4 Organization of Thesis:

In this Thesis, the first chapter is about the introduction of the project in which the purpose of making the project and its objectives discussed. The second chapter the base of this project or what kind of work was done on it before.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Historical Background:

Cellular Based Bike Safety and Accident Prevention System are designed to prevent bike theft and improve rider safety on the roads. These systems typically use a combination of GPS and GSM technology and cellular connectivity to monitor the location of the bike in real-time, send alerts to the owner in case of any unauthorized movement or tampering, and provide data to help prevent accidents.

One of the primary features of these systems is anti-theft protection. They use GPS to track the bike's location and send alerts to the owner if the bike is moved or tampered with. This can help prevent bike theft, as the owner can take immediate action to recover the bike or alert authorities.

Another important feature is accident prevention. the system can automatically alert emergency services and the bike owner. Additionally, the system can be used to remotely disable the bike's engine to prevent theft. By providing real-time monitoring and alerts, these systems can help ensure that riders are safe and their bikes are secure.

2.2 Speed Control of BLDC Motor:

This paper tells us the speed control technique of BLDC motor and the technique is PWM (Pulse Width Modulation) technique. The complete controller for BLDC is developed using TMS 320F240 digital signal processor, which has the special features for digital motor control.

2.3 E-Bike Design:

This paper describes a brand-new electric bike made specifically for bike sharing. A lot of new features have been added to this bike model, including the ability to lock the bike and ensuring that the motor is in the right position for the user. The development process resulted in the development of novel bike design solutions that make it possible to reduce the number of components, increase system security, and improve monitoring.

2.4 The Electric Bicycle:

The use of bicycles or the provision of pedestrian facilities have traditionally been the primary sustainable and practical personal mobility solutions for campus environments. However, there are also issues with pollution from fossil-fuel-powered vehicles, and traffic congestion on many campuses. It would appear that pedal power alone has not yet been sufficient to replace the use of gasoline and diesel vehicles. As a result, it is appropriate to investigate the causes of the continued use of environmentally harmful modes of transportation as well as possible solutions. This paper presents the findings of a one-year study on the efficacy of electric bicycles on a large tropical campus. It identifies obstacles to bicycle use that can be overcome by making electric bicycles for public use available.

2.5 Tracking System using GPS and GSM:

The GSM and GPS systems are included in this paper. The Multi-Tracking System refers to the system's ability to simultaneously track and trace multiple movable objects. We can view the object's current location and other add-on features; for vehicles, live tracing and tracking via the bike's GPS will be available.

CHAPTER 3

3. Working of Hardware and Software Components

3.1 Introduction:

Introducing the Cellular Based Bike Safety and Accident Prevention System, a groundbreaking solution that leverages advanced hardware components to revolutionize the cycling experience. At its core, this innovative e-bike integrates key components like Node MCU, Hall Effect Sensor, GSM, GPS, Arduino, battery, BLDC Motor, WIFI Device, Relay Driver, and a reliable bicycle frame. By harnessing the power of GPS and GSM technologies, riders can enjoy unparalleled security and safety features. The Node MCU serves as the brain of the system, orchestrating seamless communication and control between all the components. The Hall Effect Sensor enables precise monitoring of speed and distance, while the GPS module ensures accurate positioning and navigation. The GSM module facilitates real-time connectivity, allowing users to remotely track and locate their e-bike at any time. Moreover, the Arduino board acts as the control center, executing intelligent algorithms for optimized performance and safety. With the inclusion of a robust battery and BLDC Motor, riders can experience effortless pedaling and extended travel range. Additionally, the integration of a Wi-Fi device enables wireless data transfer and seamless connectivity with other smart devices. The Relay Driver ensures efficient management of electrical components, enabling features such as automatic blocking and unblocking of the bike.

3.2 WORKING OF SOFTWARE COMPONENTS

Following are the software components of Smart E-Bike for Enhanced Security and Safety Using GPS and GSM are the given below.

3.2.1 UNIVERSAL BRIDGE:

The universal bridge work in a Brushless DC (BLDC) motor system refers to the control method used to regulate the motor's speed and torque. This control scheme, implemented in Simulink, combines a PID (Proportional-Integral-Derivative) controller with the universal bridge, which consists of six power electronic switches arranged in a bridge configuration. The PID controller continuously measures the motor's actual speed and compares it to the desired speed, generating a control signal that adjusts the duty cycle of the bridge switches. By modulating the switching pattern of the bridge, the PID controller ensures precise control over the motor's rotational speed and enables efficient torque production, making it a popular choice for BLDC motor control in various applications.

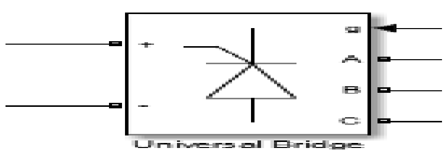


Figure 1: Universal Bridge

3.2.2 DECODER'S:

In a BLDC (Brushless DC) motor control system designed in Simulink, the decoder's role is to interpret the rotor position information and provide accurate feedback to the PID (Proportional-Integral-Derivative) controller. The decoder typically receives signals from the motor's Hall effect sensors and its task is to determine the precise position of the rotor in order to synchronize the commutation of the motor's windings. This position information is crucial for the PID controller, which uses it to compute the appropriate control signals to maintain desired motor speed or torque. By combining the decoder and PID controller, the BLDC motor system achieves precise and efficient control of rotor position and speed, resulting in improved performance and responsiveness.

Figure 2: Decoder

3.2.3 BLDC MOTOR:

A Brushless DC (BLDC) motor operates by utilizing a permanent magnet rotor and electronically controlled commutation to achieve rotation. When simulating a BLDC motor in Simulink with a PID controller, the PID controller adjusts the motor's three-phase voltages based on feedback from position sensors. The controller continuously compares the desired position or speed with the actual motor position, calculates the error, and generates control signals to correct the motor's behavior. The PID controller's output is fed into an inverter that converts DC power into three-phase AC power, which is then applied to the motor windings. By dynamically adjusting the motor voltages, the PID controller ensures precise position or speed control, enhancing the BLDC motor's performance and stability.

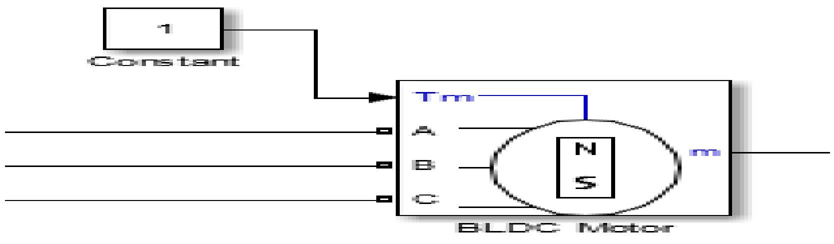
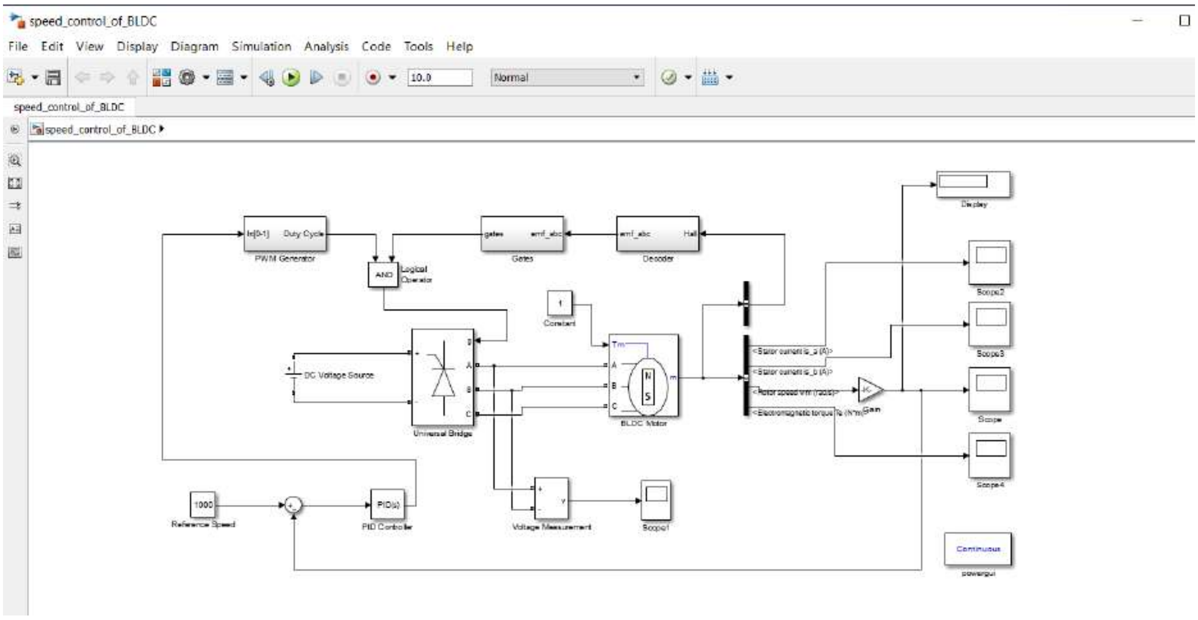


Figure 3: BLDC Motor

3.2.4 PWM GENERATOR:

In a BLDC motor control system implemented in Simulink, the PWM (Pulse Width Modulation) generator plays a crucial role in controlling the motor's speed and torque. The PWM generator takes the desired output from the PID (Proportional-Integral-Derivative) controller, which is typically the motor's speed reference, and converts it into a series of digital pulses with varying widths. These pulses are then applied to the motor's power electronics, such as an inverter, to regulate the voltage and current supplied to the motor windings. By adjusting the width of the pulses, the PWM generator effectively controls the power delivered to the motor, thereby influencing its speed and torque output according to the PID controller's instructions.

Figure 4: PWM Generator



3.2.5 GPS:

The Global Positioning System (GPS) is a satellite-based navigation system that enables precise location determination and navigation on Earth. It operates by utilizing a network of orbiting satellites that continuously transmit signals containing time and position information. GPS receivers on the ground receive signals from multiple satellites and calculate their distance by measuring the time it takes for the signals to reach them. By triangulating the distances from at least four satellites, the receiver can determine its precise location using trilateration. This location information is then used for various purposes, including navigation, mapping, and tracking, making GPS an essential tool in today's world.

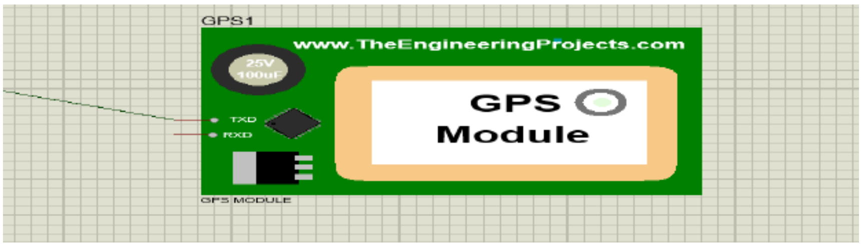


Figure 5: GPS Module

3.2.6 GSM SIM900D:

The GSM SIM900D module operates on the Global System for Mobile Communications (GSM) network and is commonly used for wireless communication in applications such as IoT devices and embedded systems. It functions by establishing a connection with a GSM network through a Subscriber Identity Module (SIM) card. The module sends and receives data using the GSM network's radio frequency channels, employing digital modulation techniques. It communicates with external devices through serial communication, allowing for data transmission and control commands. The SIM900D module is capable of making and receiving calls, sending and receiving SMS messages, and connecting to the internet, enabling remote monitoring and control of devices.

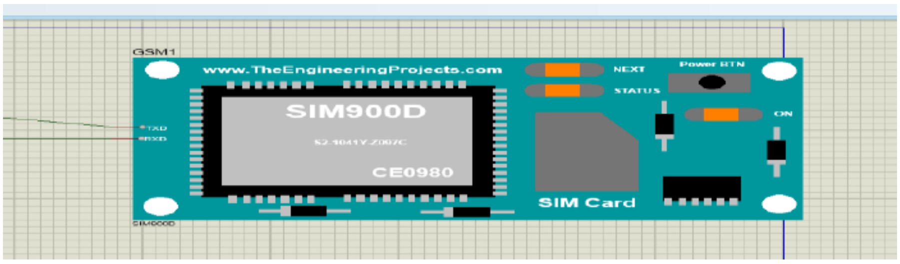


Figure 6: GSM SIM900D

3.2.7 Arduino UNO:

The Arduino Uno is a microcontroller board that operates on the principle of input, processing, and output. It consists of a microcontroller chip, digital and analog input/output pins, and various other components. The board can be programmed using the Arduino software, which allows users to write and upload code to control the board's behavior. When powered on, the microcontroller executes the uploaded code, which can include reading inputs from sensors or switches, performing calculations and operations, and generating outputs to control actuators, LEDs, or displays. The Arduino Uno's working principle revolves around the execution of programmed instructions to interact with the physical world, making it a versatile platform for creating interactive projects and prototypes.

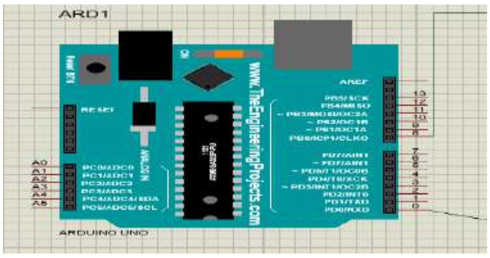


Figure 7: Arduino UNO

3.3 WORKING OF HARDWARE COMPONENTS

Following are the hardware components of Smart E-Bike for Enhanced Security and Safety Using GPS and GSM are the given below.

3.3.1 12 V BATTREY:

A 12V battery operates on the principle of chemical reactions to store and release electrical energy. It typically consists of six individual cells connected in series, with each cell providing around 2V. Inside each cell, a chemical reaction occurs between positive and negative electrodes immersed in an electrolyte solution. This reaction generates a voltage potential, resulting in an electrical potential difference between the positive and negative terminals of the battery. When a load is connected to the battery, such as a motor or an electronic device, the stored chemical energy is converted into electrical energy, which powers the load. Recharging the battery reverses the chemical reactions, allowing the battery to regain its energy storage capacity. The 12V battery's working principle relies on the chemical reactions within its cells to provide a stable and reliable source of electrical power for a variety of applications, including automotive, marine, and renewable energy systems.

3.3.2 BLDC MOTOR:

A Brushless DC (BLDC) motor operates on the principle of electromagnetic fields and electronic control to generate rotational motion. It consists of a stator with stationary windings and a rotor with permanent magnets. The stator windings are energized in a specific sequence using electronic circuitry, creating a rotating magnetic field. The permanent magnets on the rotor interact with the rotating magnetic field, causing the rotor to rotate. To achieve continuous rotation, the electronic controller constantly adjusts the energization of the stator windings based on the position feedback from sensors or Hall effect devices. This precise control ensures that the magnetic field always interacts with the rotor magnets, generating smooth and efficient rotation. The working principle of a BLDC motor eliminates the need for brushes and commutators, resulting in reduced maintenance, higher efficiency, and improved reliability, making it suitable for various applications, including robotics, automotive systems, and industrial machinery.

3.3.3 HALL EFFECT SENSOR:

A Hall effect sensor operates on the principle of the Hall effect, which is the generation of a voltage difference across a conductor when it is placed in a magnetic field and carries an electric current. The Hall effect sensor consists of a thin strip of semiconductor material with a current flowing through it. When a magnetic field is applied perpendicular to the current flow, it creates a force on the moving charge carriers, resulting in a charge separation and a voltage difference across the edges of the conductor. The Hall effect sensor detects this voltage difference and converts it into an electrical signal proportional to the strength of the magnetic field. This signal can be used to measure the presence, strength, or position of magnetic fields in various applications such as speed sensing, position sensing, and current sensing. The working principle of the Hall effect sensor provides a reliable and contactless method for detecting and measuring magnetic fields, making it widely used in industries like automotive, aerospace, and robotics.

3.3.5 ELECTRONIC SPEED CONTROLLER:

An electronic speed controller (ESC) operates on the principle of pulse width modulation (PWM) to control the speed of an electric motor. The ESC acts as an intermediary between a power source, such as a battery, and the motor. It receives control signals from a device, such as a radio transmitter or microcontroller, indicating the desired motor speed. The ESC then processes these signals and adjusts the amount of electrical power supplied to the motor by rapidly switching the power on and off at a high frequency. By varying the duration of the on and off cycles, known as the duty cycle, the ESC effectively regulates the average power supplied to the motor, thus controlling its speed. The working principle of an ESC allows for precise speed control of electric motors, making it commonly used in applications such as drones, RC vehicles, and robotics.

3.3.6 NODE MCU (AMICA):

The Node MCU (Amica) is an open-source development board that operates on the principle of combining the ESP8266 Wi-Fi module with a microcontroller to enable wireless communication and control. It features an ESP-12E module, which integrates a Wi-Fi chip with a programmable microcontroller, allowing for connectivity to Wi-Fi networks and internet-based services. The Node MCU board can be programmed using the Arduino IDE or Lua scripting language, and it utilizes a set of GPIO (General Purpose Input/Output) pins for interacting with external devices and sensors. The working principle of the Node MCU involves connecting to a Wi-Fi network and leveraging the power of the integrated microcontroller to process data, perform tasks, and communicate with other devices or online services via Wi-Fi, making it an ideal platform for IoT applications, home automation, and rapid prototyping.

3.3.7 GSM SIM800L:

The GSM SIM800L module operates on the Global System for Mobile Communications (GSM) network and facilitates wireless communication through a Subscriber Identity Module (SIM) card. It works by establishing a connection with a GSM network using a

SIM card, and then transmits and receives data using radio frequency channels. The module communicates with external devices through serial communication, enabling data transmission and control commands. It is capable of making and receiving calls, sending and receiving SMS messages, and connecting to the internet. The SIM800L module's working principle relies on its ability to interact with the GSM network, enabling communication and connectivity for a range of applications such as remote monitoring, tracking, and IoT devices.

3.3.8 GPS NEO 6m:

The GPS NEO-6M module, when integrated with an Arduino Uno board, operates on the principle of receiving signals from satellites to determine precise location and provide navigation data. The module utilizes a network of orbiting satellites that transmit signals containing time and position information. By connecting the GPS module to the Arduino Uno, the board can receive these signals and extract essential data such as latitude, longitude, altitude, and velocity. The Arduino Uno processes this data using appropriate libraries and algorithms to interpret and display the location information on an LCD or other output devices. The working principle of GPS NEO-6M with Arduino Uno involves receiving satellite signals, extracting location data, and using the Arduino board to process and display the precise location information, enabling various applications like tracking, mapping, and navigation.

3.3.9 BICYCLE:

A bicycle operates on the principle of human-powered mechanical energy conversion and balance. When a rider pedals the bicycle, the force applied to the pedals turns the crankshaft, which is connected to a chain. The chain transfers the rotational motion to the rear wheel, causing it to turn. The turning wheel propels the bicycle forward, converting the human input into mechanical energy. To maintain stability, the rider uses handlebars to steer and control the direction of the bicycle. The principles of physics, including angular momentum and friction, contribute to the balance and stability of the bicycle. The working principle of a bicycle involves the transmission of human energy through mechanical components and the rider's ability to maintain balance and control, making it an efficient and widely used mode of transportation and recreation.

3.3.10 THROTTLE:

A throttle operates on the principle of regulating the flow of fuel or air mixture to control the power output of an engine. In the context of internal combustion engines, such as those found in automobiles or motorcycles, the throttle is typically a valve or mechanism that controls the amount of air entering the engine. When the throttle is fully open, it allows maximum airflow, resulting in increased fuel combustion and higher engine power. Conversely, partially closing the throttle restricts airflow, reducing fuel combustion and decreasing power output. The throttle position is controlled by the accelerator pedal, which is connected to the throttle mechanism via a cable or electronically. By adjusting the throttle position, the engine's power output can be precisely controlled, allowing for varying vehicle speeds and efficient engine operation. The working principle of a throttle involves modulating the airflow to regulate engine power and optimize performance.

3.4 Project Coasting

Item Name	Item Type	No. of Units	Per Unit Cost (In Rs.)	Total Cost (In Rs.)
GPS Module	-	2	2000	2000
GSM Module	-	3	9000	9000
Arduino UNO	-	2	4000	4000
Wi fi device	-	1	6000	6000
Bike	-	1	12000	12000
controller	-	1	8000	8000
Node MCU	-	2	3000	3000
BLDC motor	-	1	15000	15000
Hall effect sensor	-	5	1500	1500
Head and back light	-	2	1500	1500
Batteries	-	3	6000	6000
wire	-	1	600	600
Other Expenses	-	-	10000	10000
Total	-	-	-	78,600/=

CHAPTER 4

4. EXPERIMENTAL RESULT AND DISCUSSION

4.1 RESULTS AND DISCUSSION:

When the research is been finished and we attained a level of knowing the working, requirements, application and processing of the project and completed the physical prototype of our project which leads us towards the satisfactory results accomplishing our objectives. The results our project elaborated and shown below.

4.1.1 GSM AND GPS MODULE TEST RESULTS

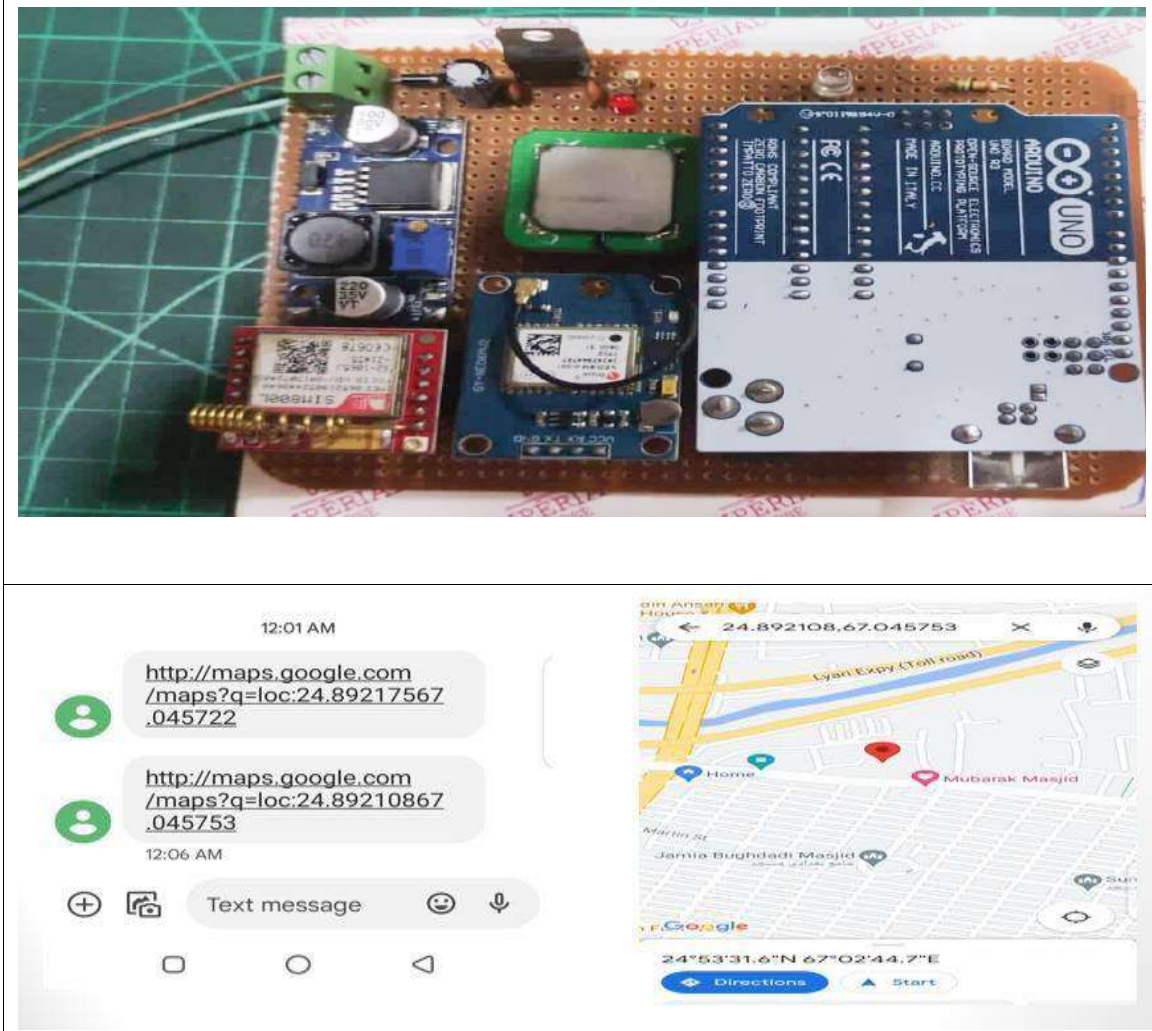


Figure 8: GSM and GPS Module Test Results

In this image as we see that GSM and GPS test results so we've successfully completed a project that integrates GSM and GPS technologies to send location updates over the phone at regular intervals. This system has diverse applications, such as tracking vehicles or monitoring asset locations. By combining GSM's reliable cellular data transmission with GPS's accurate positioning capabilities, we've developed a real-time location sharing solution. The ability to send location updates periodically provides valuable information for tracking purposes. Users can remotely monitor the e-bike's position, making it easier to keep tabs on its whereabouts and ensure security. In case of theft or loss, this feature becomes particularly crucial for recovery efforts, as it allows authorities to quickly locate and retrieve the stolen e-bike. Moreover, our project's reliance on GSM and GPS technologies ensures wide coverage, as cellular networks have extensive reach in most areas. This means that the e-bike's location can be transmitted even across long distances, expanding the range of potential applications. Overall, your GSM and GPS project for sending location updates every 1 minute showcases a practical and efficient solution for real-time tracking. It holds promise for enhancing security measures, asset management, and various other fields where reliable and timely location data is essential.

4.1.2 RESULTS OF SPEED CONTROL OF E-BIKE

The successful development and implementation of the e-bike speed control system using a mobile phone showcased a robust and reliable solution for managing the e-bike's speed with precision. Throughout the extensive testing phase, the system consistently performed within the specified RPM limits, ensuring smooth and controlled acceleration while preventing the e-bike from exceeding the set thresholds. Real-world trials demonstrated the system's adaptability to various riding conditions and rider preferences, further validating its practicality and effectiveness. The user interface of the mobile application received positive feedback from participants, commending its intuitiveness and ease of use. Moreover, the system's real-time adjustments and rapid response to user input elevated the overall riding experience, promoting a safer and more convenient means of transportation. The successful integration of mobile technology with electric vehicle speed control paves the way for future advancements in smart transportation systems and holds promise for widespread adoption in the growing e-bike market.

Analysis of the gathered data revealed compelling insights into the impact of the speed control system on e-bike usage patterns. Riders displayed a significant inclination towards setting speed limits that aligned with local speed regulations and safety guidelines, indicating a heightened awareness of responsible riding practices. Additionally, the system's ability to enforce speed restrictions led to reduced instances of reckless riding and contributed to an overall safer road environment. Observations from the trial period highlighted a positive correlation between the use of the speed control system and a decrease in the frequency of accidents and collisions involving e-bikes. This suggests that the implemented solution has the potential to mitigate road hazards and improve road safety for both e-bike users and other road users. The project's outcomes open up opportunities for further research in optimizing speed control algorithms, exploring additional features for smart mobility applications, and extending this technology to other electric vehicle platforms, ultimately fostering a sustainable and secure future for urban transportation.

Figure 9: Results of Speed Control Of -Bike

CHAPTER 5

5. ENGINEERING AND SOCIETY

5.1 Introduction:

Engineering plays a pivotal role in shaping our society, and your project on speed control of e-bikes with mobile phone integration offers a prime example of this dynamic interaction between engineering and society.
In this context, your project aligns with the principles of responsible engineering. By using technology to control e-bike speeds, you are addressing safety concerns, thereby promoting a safer and more secure society. It minimizes the risks associated with speeding, reducing accidents, and promoting responsible behavior among riders. This engineering intervention directly contributes to enhancing the well-being of individuals and communities.

Furthermore, your project's incorporation of GSM and GPS systems demonstrates how modern technology can be harnessed for the benefit of society. By enabling real-time tracking and remote control through mobile phones, you are not only improving the user experience but also addressing security concerns. This aligns with the broader goals of societal advancement and technological progress.

5.2 Engineering Ethics and Social Responsibility:

Our project embodies the principles of engineering ethics and social responsibility, emphasizing the importance of responsible innovation and technology deployment.

Firstly, by limiting e-bike speeds, our project takes into account the ethical dimension of safety. It recognizes the potential harm that uncontrolled speeds can cause and proactively addresses this concern. This reflects a commitment to the well-being of users and pedestrians, aligning with engineering ethics.

Secondly, the inclusion of features like remote tracking and timing control underscores your project's dedication to social responsibility. By allowing users to monitor their bikes' locations and manage their operation responsibly, you empower them to contribute to a safer, more secure community. This aligns with the broader societal goal of fostering responsible behavior and accountability among individuals.

In conclusion, our project on e-bike speed control with mobile phone integration is a testament to the symbiotic relationship between engineering and society. It embodies the principles of responsible engineering, ethics, and social responsibility, contributing to the betterment of our communities while showcasing the positive impact that engineering innovations can have on society.

5.3 Sustainable Development Goals (SDGs), I'll explain how our project aligns with the context SDG:

SDG 8: Decent Work and Economic Growth

Our project presents a novel approach to controlling the speed of e-bikes through a mobile phone, which contributes to fostering decent work and economic growth in a meaningful way. It has the potential to create new employment opportunities and promote job expansion. Our innovative technology offers a solution that not only enhances a new industrial sector but also has the potential to increase employment opportunities within your field.

SDG 9: Industry Innovation and Infrastructure

Our project, "Speed Control of E-Bike with Mobile Phone," is of significant importance in terms of industry innovation and infrastructure. You've developed a device that incorporates modern technologies like GSM and GPS. This project creates new opportunities within the industry and presents a modern and improved infrastructure that enhances convenience in our lives. Our project also has the potential to improve transportation infrastructure, taking us one step closer to sustainable and smart cities.

If you continue to develop and expand upon this project, it could make a valuable contribution to the SDGs. Through this technology, you can address goals related to decent work, economic growth, innovation, infrastructure, and sustainable communities.

SDG 11: Sustainable Cities and Communities

The GPS technology integrated into your project plays a significant role in improving sustainable cities and communities. It offers an opportunity to enhance transportation systems in cities, reducing traffic congestion and pollution. This is a step towards smart cities that can develop our society in a modern and sustainable direction.

In summary, your project aligns with the core objectives of SDGs 8, 9, and 11 and signals an intent to contribute to their achievement. Our efforts in promoting economic growth, industrial innovation, and sustainable communities through this technology are significant steps in the right direction.

CHAPTER 6

6. CONCLUSION AND FUTUREWORK

CONCLUSION

6.1 Summary:

In conclusion, the mobile app-based speed control and tracking system developed for electric bikes represents a significant step forward in the realm of e-bike technology. By seamlessly integrating a mobile application, GSM, GPS, and electronic speed controller, the system empowers users with precise control over their e-bike's speed, ensuring it remains within predetermined limits for enhanced safety. The real-time location tracking feature provided by GPS offers an additional layer of security, allowing users to monitor their e-bike's whereabouts at all times. This feature is particularly valuable in cases of theft or misplacement, enabling quick recovery of the e-bike. Moreover, the system's scheduling functionality further adds to its versatility, enabling users to customize the operational timings of the e-bike, optimizing energy consumption and promoting efficiency in day-to-day usage.

The implications of this mobile app-based system extend beyond mere speed control and tracking, as it addresses the evolving needs and concerns of e-bike riders. The enhanced safety measures implemented through speed regulation and real-time tracking contribute to a safer riding experience, encouraging more individuals to adopt electric bikes as a viable and eco-friendly transportation option. Furthermore, the integration of GSM and GPS technologies with a user-friendly mobile app offers unparalleled convenience, allowing users to stay connected with their e-bike's status and location effortlessly. As electric mobility continues to gain momentum, this innovative system is poised to play a pivotal role in promoting responsible and secure e-bike usage, ultimately contributing to a greener and more sustainable future.

FUTURE WORK:

- Signal Loss
- No identity features
- No, itself E-Bike charging

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Appendix

A. Complex Programing Code

- **ARDUINO CODE OF SPEED CONTROL**

```
#include <Servo.h>
int forward ;
int forwards ;
Servo myservo;  // create servo object to control a servo
#define BLYNK_TEMPLATE_ID           "TMPL-HYufMtU"
#define BLYNK_TEMPLATE_NAME         "Quickstart Template"
#define BLYNK_AUTH_TOKEN            "gVmkELkUQ8KlaHrlgngGCWwi3DwyN-R7"
int hallSensorPin = 2;
int locki ;
int state = 0;
int lock = 14;
int valuei ;
/* Comment this out to disable prints and save space */
#define BLYNK_PRINT Serial


#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
int pos ;
// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "Ufone_185D61";
char pass[] = "J3Y5JX37";

BlynkTimer timer;
BLYNK_CONNECTED()
{
  // Change Web Link Button message to "Congratulations!"
Blynk.setProperty(V3, "offImageUrl", "https://static-
image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations.png");
Blynk.setProperty(V3, "onImageUrl",  "https://static-
image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations_pressed.png");
  Blynk.setProperty(V3, "url", "https://docs.blynk.io/en/getting-started/what-do-i-need-to-
blynk/how-quickstart-device-was-made");
}

// This function sends Arduino's uptime every second to Virtual Pin 2.
```

```
void myTimerEvent()
{
  // You can send any value at any time.
  // Please don't send more that 10 values per second.
  Blynk.virtualWrite(V2, millis() / 1000);
}

BLYNK_WRITE(V0)
{
  // Set incoming value from pin V0 to a variable
  int value = param.asInt();
    Serial.println(value);// waits 15ms for the servo to reach the position

  // Update state

   valuei = value;



}
BLYNK_WRITE(V1)
{
  // Set incoming value from pin V0 to a variable
  int LOCK = param.asInt();
    Serial.println(LOCK);// waits 15ms for the servo to reach the position

  // Update state

   locki = LOCK;



}
void setup() {
   Serial.begin(115200);

  Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
    timer.setInterval(1000L, myTimerEvent);

  pinMode(hallSensorPin,  INPUT_PULLUP);
  myservo.attach(4);  // attaches the servo on GIO2 to the servo object
pinMode(lock,OUTPUT);




    for (pos = 300; pos >= 0; pos -= 1) { // goes from 180 degrees to 0 degrees
```

```
    myservo.write(pos);               // tell servo to go to position in variable 'pos'
   delay(15);                        // waits 15ms for the servo to reach the position
  }}

void loop() {
  timer.run();


state = digitalRead(hallSensorPin);

  if (state == LOW) {
forward = 1;
  }
  if(state == HIGH) {
    forward = 0;
    digitalWrite(lock,HIGH);
        delay(2);

 }
 /*  if (digitalRead(locki) == 1 )
      {
        digitalWrite(lock,HIGH);

        delay(2);
      }
 if (digitalRead(8) == LOW )
      {
        digitalWrite(lock,HIGH);

        delay(2);
      }
      if (digitalRead(9) == LOW )
      {
        digitalWrite(lock,LOW);

        delay(2);
      }*/
switch(forward){
    case 0:
   myservo.write(0);              // tell servo to go to position in variable 'pos'
    delay(15);  // waits 15ms for the servo to reach the position
             Blynk.run();

      Serial.print("brake");// waits 15ms for the servo to reach the position
```

```
    break;

    case 1:
     // for (pos = 0; pos <= 255; pos += 1) { // goes from 0 degrees to 180 degrees
    // in steps of 1 degree
    myservo.write(valuei);              // tell servo to go to position in variable 'pos'
    delay(15);
    Serial.println("throttle");// waits 15ms for the servo to reach the position
    Serial.println(valuei);// waits 15ms for the servo to reach the position


    break;

  }
        Blynk.run();

}
```

- **ARDUINO CODE OF GSM AND GPS**

```
#include <EEPROM.h>
#include <TinyGPS++.h>
#include <SoftwareSerial.h> //Create software serial object to communicate with SIM800L
SoftwareSerial GSM(8, 9);  //SIM800L Tx & Rx is connected to Arduino #8 & #9
TinyGPSPlus gps;

String phoneNo[4] = {"+923058820442","+923098720358","+923093549129","not use"};

String        RxString  = "";
char          RxChar    = ' ';
int           Counter   = 0;
String        GSM_Nr    = "";
String        GSM_Msg   = "";
String txtMsg = "";
String msg;

int set_time=60, sec=0;
word MilliSecond = 0;
int Mode=1;

#define led 2

void setup(){
pinMode(led, OUTPUT);
```

```
digitalWrite(led, 1);

Serial.begin(9600);//Begin serial communication with Arduino and Arduino IDE (Serial
Monitor)
GSM.begin(9600);   //Begin serial communication with Arduino and SIM800L

initModule("AT","OK",1000);                  //Scan for GSM Module
initModule("AT+CPIN?","READY",1000);         //this command is used to check whether
SIM card is inserted in GSM Module or not
initModule("AT+CMGF=1","OK",1000);           //Set SMS mode to ASCII
initModule("AT+CNMI=2,2,0,0,0","OK",1000); //Set device to read SMS if available and
print to serial

delay(1000);

if(EEPROM.read(0)==0){
}else{
EEPROM.write(0, 0);
EEPROM.write(1, set_time);
EEPROM.write(2, Mode);
}

 noInterrupts();          // disable all interrupts
 TCCR1A = 0;              // set entire TCCR1A register to 0  //set timer1 interrupt at 1kHz  // 1
ms
 TCCR1B = 0;              // same for TCCR1B
 TCNT1  = 0;              // set timer count for 1khz increments
 OCR1A = 1999;            // = (16*10^6) / (1000*8) - 1
 //had to use 16 bit timer1 for this bc 1999>255, but could switch to timers 0 or 2 with
larger prescaler
 // turn on CTC mode
 TCCR1B |= (1 << WGM12); // Set CS11 bit for 8 prescaler
 TCCR1B |= (1 << CS11);  // enable timer compare interrupt
 TIMSK1 |= (1 << OCIE1A);
 interrupts();            // enable

delay(500);
sendSMS(phoneNo[0],"Welcome To GSM and GPS");
set_time = EEPROM.read(1);
Mode = EEPROM.read(2);
delay(1000);
}


void loop(){
// scan for data from software serial port
```

```
 //- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 RxString = "";
 Counter = 0;
 while(GSM.available()){
   delay(1);  // short delay to give time for new data to be placed in buffer
   // get new character
   RxChar = char(GSM.read());
   //add first 200 character to string
   if (Counter < 200) {
   RxString.concat(RxChar);
   Counter = Counter + 1;
   }
 }

 // Is there a new SMS?
 //- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 if (Received(F("CMT:")) ) GetSMS();

if(GSM_Nr==phoneNo[0] || GSM_Nr==phoneNo[1] || GSM_Nr==phoneNo[2] ||
GSM_Nr==phoneNo[3]){

if(GSM_Msg.charAt(0) == 'S' && GSM_Msg.charAt(1) == 'e' && GSM_Msg.charAt(2)
== 't'){
String dataInS = GSM_Msg.substring(3, GSM_Msg.length()); // Extract only the number.
E.g. from "A120" to "120"
set_time = dataInS.toInt();
msg = "Ok Time Update: "+String(set_time);
sendSMS(GSM_Nr,msg);
EEPROM.write(1, set_time);
}

    if(GSM_Msg == "System on"){ Mode=1;
EEPROM.write(2, Mode);
sendSMS(GSM_Nr,"Ok System is Enable");
 }

else if(GSM_Msg == "System Off"){  Mode=0;
EEPROM.write(2, Mode);
sendSMS(GSM_Nr,"Ok System is Disable");
 }

else if(GSM_Msg == "Map"){
sendLocation();
}

//asm volatile ("jmp 0");
}
```

```
GSM_Nr="";
GSM_Msg="";

if(sec>=set_time){sec=0;
digitalWrite(led, 0);
sendLocation();
digitalWrite(led, 1);
}


if(millis()>=21600000){asm volatile ("jmp 0");}
delay(10);
}

void sendLocation(){
  //-------------------------------------------
  // Can take up to 60 seconds
  boolean newData = false;
  for (unsigned long start = millis(); millis() - start < 2000;){
    while (Serial.available()){
      if (gps.encode(Serial.read()))
        {newData = true;break;}
    }
  }

  //-------------------------------------------
  //-------------------------------------------

//If newData is true
//if(newData){
    newData = false;
    String latitude = String(gps.location.lat(), 6);
    String longitude = String(gps.location.lng(), 6);
    String text = "http://maps.google.com/maps?q=loc:" + latitude + "," + longitude;
    Serial.println(text);
        if(phoneNo[0]=="not use"){}
      else{sendSMS(phoneNo[0],text);}
      if(phoneNo[1]=="not use"){}
      else{sendSMS(phoneNo[1],text);}
      if(phoneNo[2]=="not use"){}
      else{sendSMS(phoneNo[2],text);}
      if(phoneNo[3]=="not use"){}
      else{sendSMS(phoneNo[3],text);}
    //delay(300);

  //}
```

```
  //------------------------------------------
}

// Send SMS
void sendSMS(String number, String msg){
GSM.print("AT+CMGS=\"");GSM.print(number);GSM.println("\"\r\n");
//AT+CMGS="Mobile Number" <ENTER> - Assigning recipient's mobile number
delay(500);
GSM.println(msg); // Message contents
delay(500);
GSM.write(byte(26)); //Ctrl+Z  send message command (26 in decimal).
delay(5000);
}


// Init GSM Module
void initModule(String cmd, char *res, int t){
while(1){
    Serial.println(cmd);
    GSM.println(cmd);
    delay(100);
    while(GSM.available()>0){
      if(GSM.find(res)){
     Serial.println(res);
     delay(t);
       return;
      }else{Serial.println("Error");
       }
      }
    delay(t);
  }
}

// Get SMS Content
void GetSMS() {
  //Get SMS number
  //================================================
  GSM_Nr  = RxString;
  //get number
  int t1 = GSM_Nr.indexOf('"');
  GSM_Nr.remove(0,t1 + 1);
  t1 = GSM_Nr.indexOf('"');
  GSM_Nr.remove(t1);

  // Get SMS message
  //================================================
  GSM_Msg = RxString;
```

```
  t1 = GSM_Msg.indexOf("");
  GSM_Msg.remove(0,t1 + 1);
  t1 = GSM_Msg.indexOf("");
  GSM_Msg.remove(0,t1 + 1);
  t1 = GSM_Msg.indexOf("");
  GSM_Msg.remove(0,t1 + 1);
  t1 = GSM_Msg.indexOf("");
  GSM_Msg.remove(0,t1 + 1);
  t1 = GSM_Msg.indexOf("");
  GSM_Msg.remove(0,t1 + 1);
  t1 = GSM_Msg.indexOf("");
  GSM_Msg.remove(0,t1 + 1);
  GSM_Msg.remove(0,1);
  GSM_Msg.trim();

Serial.print("Number:"); Serial.println(GSM_Nr);
Serial.print("SMS:"); Serial.println(GSM_Msg);
}

// Search for specific characters inside RxString
boolean Received(String S) {
  if (RxString.indexOf(S) >= 0) return true; else return false;
}


ISR(TIMER1_COMPA_vect){
if(Mode == 1){MilliSecond++;
if(MilliSecond >= 1000){MilliSecond = 0;
sec = sec+1;
  }
 }
}
```

ANNEXURE

A. Feedback on PLOs covered

Student Feedback Form **PLOs Attainment** In Final Year Project (FYP)			
PLO#	**PLO Attribute**	**PLO Statement**	**Feedback on PLO Attainment**
PLO-1	**Engineering Knowledge**	An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	In this FYP project Electrical Engineering knowledge is applied for achieving results with the help of sensor, controller and GPS and GSM module.
PLO-2	**Problem Analysis**	An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	Problems we face as we see lots of accidents occurs and lost or snatch our valuable E-Bikes for that we research how to implement and design a system by which we can handle that factor easily. Therefore, we come out with the solution of speed control and location tracking.
PLO-3	**Design/ Development of Solutions**	An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	The project was initially design as a sketch on paper that how it will look when completed, after analyzing the design and feasibility, we gathered the component, Bicycle and the material for developing it. The project is currently design and components are attached. we design our project using BLDC motor which is fitted in bicycle, some battery, GSM And GPS module soldering on Vero board.
PLO-4	**Investigation**	An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.	We investigated in deep by going with different research papers, case studies, teacher's guidance's and market survey.
PLO-5	**Modern Tool Usage**	An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools,	The project is based on Mode MCU, Arduino UNO therefore we are using sensor for controlling as throttle and

		including prediction and modeling, to complex engineering activities, with an understanding of the limitations.	programming was performed and initial results were obtained from Arduino IED serial monitor.
PLO-6	**The Engineer and Society**	An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.	As we are in engineering so this project helping how to analyze problem, helping how to control speed with the help of mobile phone and how you get location after every one minute.
PLO-7	**Environment and Sustainability**	An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.	In our project we are using the components which are sustainable for us and we are using this with good conditions of material in our project. Our team is doing with friendly environment and our project is also faithful and good for our environment and as well as for society.
PLO-8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.	Every research we studies is not used as it is hence our work cannot be considered as unethical work. In this project we did research with permissions and molded the idea according to our domain and requirement of our project. We came out with a unique Idea and haven't copied someone else's work.
PLO-9	**Individual and Team Work**	An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.	Out FYP team comprises of three individual members and each member has knowledge and team work abilities. Task are conveyed by group leader and made sure that assigned task are performed. Individually task is assigned so each member individual performance could come across and could be further improved to achieve the objectives on time.
PLO-10	**Communicatio n**	An ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	Communication is leaded by the group leader through verbal or electronics mean e.g., WhatsApp, Email and calls etc. Using these channels every member participates and lets the leader know about updates of assigned tasks. Suggestion and improvements are discussed mutually.

PLO-11	**Project Management and Finance**	An ability to demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments, business practices, such as risk and change management, and understand their limitations.	Our project is managed by our supervisor's guidance assigning with different tasks of groups leader who distribute all the task among group member. The task is given on the basic of knowledge regarding that specific area of interest, the task includes hardware, software, written and physical market research. The FYP finance is equally divided between all group members.
PLO-12	**Lifelong Learning**	An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.	In this FYP our 4 years of knowledge and skills are used from literature review to an idea, then shaping an idea to project. The in between the research methodologies with help in life ahead for further studies and pursuing studies similar to this FYP. Deadline with diverse background group members and foreigners as an assistance to operate sensors and working in a team is a lifelong learning for an engineer like us to survive in this century of advancements.
FYP Students Name: Signature:___________ FYP Students Name: Signature:___________ FYP Students Name: Signature:___________ FYP Students Name: Signature:___________			Supervisor Name: Signature:_________________ Date:_____________________

B.Feedack on SGDs Addressed

<table>
<tr><td colspan="3">Students’ Feedback Form
Sustainable Development Goals (SDGs) Implementation In Final Year Project</td></tr>
<tr><td>Prescribed SDGS</td><td>SDGs Attained</td><td>Feed Back</td></tr>
<tr><td rowspan="2">
</td><td>
</td><td>SDG 8: Decent Work and Economic Growth
Target 8.2: Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor intensive sectors</td></tr>
<tr><td>
</td><td>SDG 9: Industry Innovation and Infrastructure
Target 9.7: Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.</td></tr>
</table>

		SDG 11: ***Sustainable Cities and Communities*** Target 11.2: Safe, affordable, accessible, and sustainable transport systems.

C. Feedback on CEP + PBL

<table>
<tr><td colspan="2">Student Feedback Form
Exposure of Problem Based Learning (PBL)
in Final Year Project (FYP)</td></tr>
<tr><td>**FYP Title: Cellular Based Bike Safety and Accident Prevention System**</td><td>**Program/Batch: BE Electrical**
Offering Semester: 8th</td></tr>
</table>

Remarks on exposure of Problem Based Learning in FYP Course by FYP Students:

In the local market, there was a lack of a suitable solution for effectively controlling the speed of electric bikes (e-bikes) using modern mobile technology. Typically, this necessitated an advanced approach. Therefore, I embarked on a project aimed at creating a state-of-the-art e-bike speed control system, harnessing the capabilities of mobile phones. The primary objective remained steadfast: to provide users with a seamless means to restrict e-bike speeds. For instance, upon configuring the system to a specific speed, such as 30 RPM, the e-bike would automatically curtail its speed to adhere to that limit. Likewise, if a higher limit, say 55 RPM, was defined, the e-bike would diligently uphold that designated speed threshold.

However, the project went beyond mere speed management. It also entailed the integration of GSM and GPS systems into the e-bike's framework, thereby endowing it with cutting-edge location tracking functionalities. This innovation facilitated real-time tracking, with the system dutifully transmitting the bike's precise location data to a designated mobile phone at regular intervals – typically, once every minute. Additionally, a flexible timing mechanism was introduced, empowering users to schedule the e-bike's operational times as needed. Furthermore, the timing function could be easily toggled on or off, providing additional convenience.

Throughout this endeavor, I not only addressed a critical market gap but also honed my technical skills and expanded my knowledge:

- This project deepened my expertise in seamlessly integrating mobile technology for novel control and monitoring solutions.
- Developing this system enriched my understanding of embedded systems and sensor integration, particularly the intricacies of GPS and GSM modules.
- Establishing a robust communication link between the e-bike and mobile phone acquainted me with real-time data transmission protocols.
- Crafting a system tailored to user preferences underscored the importance of user-centric design principles.
- The project underscored the value of implementing remote control functionalities to enhance user interaction and control.

In essence, this project not only tackled a pivotal market need but also elevated my technical aptitude and problem-solving prowess, further solidifying my competence in mobile-based control systems and IoT innovations.

<table>
<tr><td>FYP Students Name: Signature:___________
FYP Students Name: Signature:___________
FYP Students Name: Signature:___________
FYP Students Name: Signature:___________</td><td>Supervisor Name:
Signature:_________________
Date:_____________________</td></tr>
</table>

Student Feedback Form

Exposure of Complex Engineering Problem (CEP)

in Final Year Project (FYP)

FYP Title: Cellular Based Bike Safety and Accident Prevention System	**Program/Batch: BE Electrical** **Offering Semester: 8th**

Remarks on exposure of Problem Based Learning in FYP Course by FYP Students:

The complex engineering problem of our project to the problem of synchronizing Node mcu with hall effect and BLDC motor and also Interaction of GSM and GPS with Arduino for making connections. Also facing problem of fitting of BLDC motor in bicycle with controller by the help of this we are able to run our cellular based bike safety and accidents prevention system.

- **Depth of knowledge**

  This project has a comprehensive and monitoring and controlling speed limit of bike though mobile and GSP and GSM for tracking with latest technologies which required depth of knowledge.

- **Depth of Analysis**

  For the depth of analysis, we are controlling the speed of E-Bike through mobile and observing the behavior of controller and BLDC motor for certain of time then after calculation we fix speed limits and also observe the behavior of GSM and GPS towards connectivity.

- **Consequences**

  The consequences of our project implementation rectify the problem of speed control through mobile and tracking after every minute.

FYP Students Name:	Signature:___________	Supervisor Name:
FYP Students Name:	Signature:___________	Signature:_________________
FYP Students Name:	Signature:___________	Date:_____________________
FYP Students Name:	Signature:___________	

D. Email / Screenshot of Ignite Funding:

#	FYP Code	FYP Title	Department	Team Lead	Semester	Supervisor Name
1	NGIRI-2023-17050	'Design and Modeling Of Cabin Ejection Prototype For Aircraft Passenger Safety Using IOT and Advance Softwares Simulation'	Electrical Engineering	Muhammad Mujahid	8	Prof. Dr. Engr. Ahmed Mudda:
2	NGIRI-2023-17123	Cellular Network Based Anti-Theft and Speed Controlled Accident Prevention System for E-Bikes	Electronics	Muhammad Daniyal Akhtar	8	Syed Shoaib Hussain Zaidi

E. Summary report of Seminars + workshop attended in FYP 1:

S.NO	Seminars/session	Resource Person	Venue	Online/ Physical	Date	Time
1.	Opportunities for Student, Fresh Graduates & Faculty Member	Dr. Engr. Muhmmad Faisal Khan	Main Auditorium Indus University	Physical	9 June 22	11am to 1pm
2.	Solar Energy Basic	Muhammad Talha	Zoom Meeting	Online	15 May 22	11am to 1pm
3.	Global Perspectives of Bioenergy	Pro. Dr. Syed Farman Ali Shah	Zoom Meeting	Online	28 Feb 22	3pm to 4pm
4.	Groups, Symmetry and culture	Prof. Dr. Rashid Kamal Ansari	Zoom Meeting	Online	17 Feb 22	11am to 1pm
5.	Huawei Fusion Solar Energy	Mr. Tabish Ali	Main Auditorium Indus University	Physical	11 Jan 22	3pm to 4pm
6.	Mathematical Modeling of Complex Mechanical Assemblies	Dr. Muhammad Illyas	Zoom Meeting	Online	6 Jan 22	3pm to 4pm
7.	Culture Aspect in Diplomacy and Business	H.E. Dr. June Kuncoro Hadinigrat	Main Auditorium Indus University	Physical	5 Jan 22	11am to 1pm
8.	Career Motivation and Industrial Automation	Akhtiar Moosa Hussain Shah	Main Auditorium Indus University	Physical	27 Nov 22	1pm to 4pm
9.	Existing IT Infrastructure in Pakistan Opportunities for Engineers	Engr. Ahmed Zeeshan Bukhari	Main Auditorium Indus University	Physical	17 Nov 21	2:30pm to 4:30pm
10.	Internet of Things	Syed Ahmed Raza Naqvi	PITAC, Karachi	Physical	8 Nov 21	4pm to 7pm

F. Feedback Form from Related Industry:

Project Title

Cellular Based Bike Safety and Accident Prevention System

Project Supervisor Name: Engr. Shoaib Hussain

Muhammad Daniyal Akhtar	2140-2019
Eisha Qurban	1934-2019
Moeed Aslam	1577-2019

Abstract of Project (Around 350 words)

Innovating at the intersection of technology and transportation, I embarked on a project that seamlessly combined the dynamics of an electric bike with the convenience of mobile control. This groundbreaking endeavor resulted in the creation of a speed control system for e-bikes that introduces a new level of safety and customization. By leveraging the power of mobile connectivity, users can effortlessly set their desired speed limits, ensuring a controlled and safe riding experience. Whether aiming for a leisurely cruise at 30 rpm or seeking a swifter journey at 55 rpm, the system acts as a digital governor, intelligently regulating the bike's speed to match the preset threshold. Furthermore, the integration of GSM and GPS modules elevates this project's utility by granting riders the ability to monitor their e-bike's whereabouts in real-time. The device sends periodic location updates to the user's mobile phone, establishing a constant connection between the rider and their two-wheeled companion. Moreover, the system's versatility extends to scheduling, enabling users to customize active time windows for the speed control feature. Through a simple text command, the bike can be activated or deactivated at designated intervals, empowering users with complete control over their riding experience.

With mobile technology becoming an ever-present facet of modern life, the project represents an innovative fusion of mobility and connectivity. The convergence of speed control, GPS tracking, and mobile communication infuses the e-bike with a new level of intelligence, safety, and user-centricity. As the project continues to evolve, its potential applications and implications for personal transportation are boundless.

Industry Feedback

Name of Industry:	Hi - Speed
Name of Supervisor/Concerned Person in Industry:	Adul Hasan
Contact No./Email of Concerned Authority	0333-2458890
Type of Industry	Auto mobiles

Feedback from Industry

- ◇ Strongly Recommended ✓
- ◇ Partially Recommended
- ◇ Not Recommended

Comments (if any)

To improve the issue of backup of battery and network also.

Signature

Date:

G. Score/Remarks from Industry Expert in IUPPC + Pictures of Event

H. Turnitin Report (Less than 19% plagiarism)

FYP Thesis

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I. Poster of FYP