

Anti-Theft System for Two Wheelers

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Abstract: *This project presents a smart bike with monitoring system for cyclist via internet of things (IoT). The system is designed for real time monitoring of cyclist in terms of health condition and cyclist's performance. The whole system consists of various sensors such as heart rate sensor, pulse oximetry sensor, magnet reed sensor and GPS module. The sensors are connected to the microcontroller and Wi-Fi module that can be accessed through an IoT platform which is blink application. The data of the cyclist in terms of health condition and cyclist's performance can be monitored by the cyclist as well as their coach. First, heart rate sensor was used to monitor the heart rate of the cyclist within time whereas pulse oximetry sensor was used to measure the oxygen saturation inside the cyclist's body. Meanwhile, magnet reed sensor was mounted to the frame of the bike to measure the speed and distance travelled by the cyclist. Plus, GPS module was used to track and trace the position of the cyclist. The data that have been transmitted can be synchronized or displayed on smartphone via blink application. Therefore, GUI interface of blink application displayed the parameter such as heart rate, pulse oximetry, speed, distance travelled and position for the cyclist and coach to monitor their health condition and cyclist's while in training or tournament. IoT is the internetworking of physical devices, vehicles, and other devices embedded with the electronics, software, sensors and network connectivity that enable to get data of those objects. Confiscating details from their own vehicle without making any physical touch is a hardly possible one. Augmentation of Smartphone makes a large impact in society by diminishing their toil. A surge movement of applications in the Smartphone may cutback the human's accent. In India transportation is a booming field where the count of vehicles increasing day by day. Security and maintenance of those vehicles is a risky one. Monitoring vehicle parameters like fuel, engine oil, tyre pressure is an ideal to know without making any physical touch of the vehicle. Digital locking system is a much needed one in this digital domain. Tracking of our vehicle is also a vital one when your vehicle is not with you. IoT based vehicle parameter monitoring system is a capable one which leads to monitor our vehicle's parameters such as fuel level, tyre pressure, engine oil level through an Android App. It's Smart RFID digital key secure your vehicle more than by accessing by keys. In this app we can save our vehicle documents, user driving license, insurance copy and other documents. Notification for engine oil, battery rejuvenation is also done. Message and share's location to trusted persons whenever ensue accidents..*

Keywords: Bicycle, protection, safety, cycle parking, cycle

I. INTRODUCTION

Now a day's bike is the important thing in daily life it is too much critical to make the bike secured day by day. As the world moving towards the new edge of technology that is IoT so the system smart bike make the bike smart using the concept of IoT. System proposed the concept of smart bike which make the automation over the bike in which the bike is make secured in the way in which the all-parameter security get implemented on that. In the proposed system is able to view the current location of the bike using GPS tracking sensor. System also added the new parameter like ON and OFF the bike using the mobile which will provide the new smart way to start the bike.

In this the bike will get completely automatic using the proposed work. sometime accidents are a major cause of death and disability. Public awareness and safety are one of the most important confrontations in the place of effective welfare for the bikers. A bike accident in highways and roadways is one of the increasing fatality rates for the previous years. With the help of project, it is desire to reduce the feasibility of dying because of bike accidents. By using this system, it is possible to make advanced the two wheelers system by the sensor that monitors and control the speed.

The sensor used in project to control the speed is the speed sensor. Here ultrasonic sensor is also placed in order to maintain the distance between the vehicles to avoid collision between the vehicles. The riders will be given indication when the control of the bike exceeds the particular limit. The microcontroller used in this vehicle controls the whole sensors and devices connected in the speedometer and in the gear box.

The buzzer alarms if the speed goes above 80km/hr. Because of this death, accidents and collisions can be avoid. The aim of project is to initially check whether the person riding the bike is aware about the speed control, distance between the vehicles in order to avoid the hazards. The emergency help is get directly connected to the system in which the bike is always in secured network.

II. OBJECTIVE

Public awareness and safety are one of the most important confrontations in the place of effective welfare for the bikers. And now a days bike is the important thing in daily life it is too much critical to make the bike secured day by day majority of people that are riding a simple bike which has no feature than riding, and majority of accidents are a major cause of death and disability. A bike accident in highways and roadways is one of the increasing fatality rates for the previous years.

With the help of project, it is desire to reduce the feasibility of dying because of bike accidents. System proposed the concept of smart bike which make the automation over the bike in which the bike is make secured in the way in which the all-parameter security get implemented on that. Here ultrasonic sensor is also placed in order to maintain the distance between the vehicles to avoid collision between the vehicles. The riders will be given indication when the control of the bike exceeds the particular limit.

The proposed system is an IoT solution to the two problems that jeopardize the safety and health of the public. Firstly, in collisions involving a bike and another vehicle, the common key contributory factors to this type of traffic accidents recorded by police are negligence and failure to have a clear sight by either the driver or the rider.

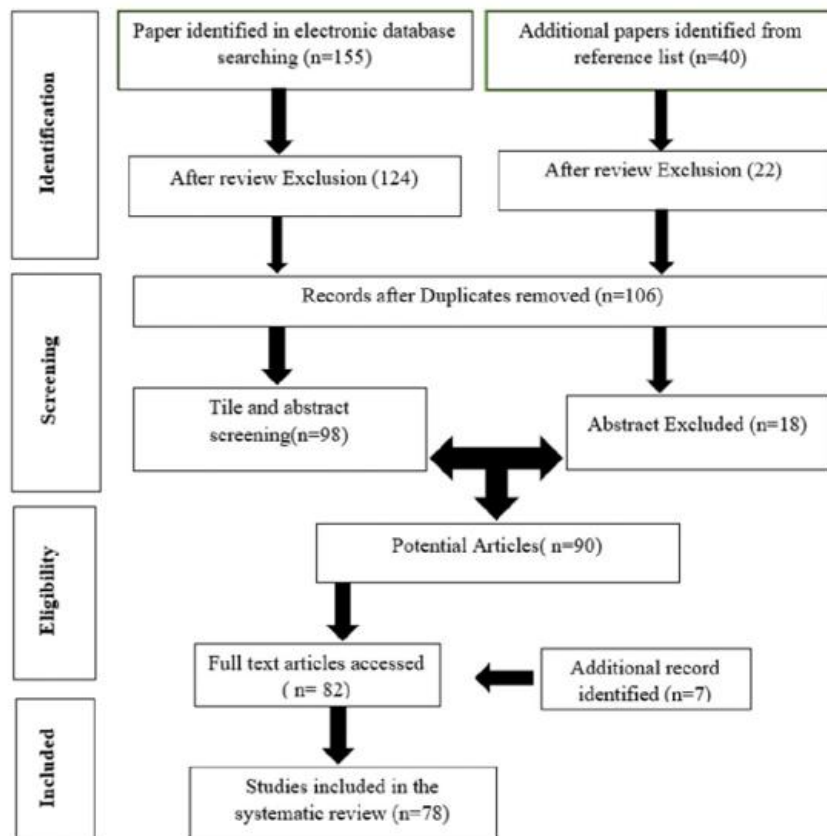


Figure 1: Flow chart for research paper identification and selection strategy

The search engines Google Scholar, Scopus, and Science Direct were used to identify the most important articles relevant to this review. The combination of keywords “Anti-theft system”, “two-wheeler parking”, “automation”, “safety” and “alarm system” were used. The last search took place on May 15, 2022. Figure 1, illustrates the process of identifying and selecting relevant research articles.

The first stage involves searching for articles according to their titles and abstracts. Afterward, existing articles are sorted in order to select the appropriate ones that meet the following three basic criteria, namely: a) the subject should be related to Anti-theft system, b) the working of anti-theft system, and c) the subject should be related to automation. References in the list also led to the identification of additional papers. The final number of papers left in the database is 106 after exclusion from the database. In the second stage, abstracts from these papers are screened, which resulted in 90 potential articles being shortlisted. Then, the articles are read through to determine if they are relevant or not. 78 articles were deemed relevant at the end of the process.

III. AIM

The government has adopted in the field of “Internet of Things” as national strategic project, announcing that it is a master plan to achieve a leading country of a hyper connected digital revolution. The government has a promotional strategy of reinforcing the competitiveness in software (SW) sensor and its application-based component and devices.

IoT basically refers to the internet environment where people and machines all are connected to the guided and unguided network so as to mutually collect, create, utilize, and share information and services that includes sensors i.e., input information, devices for acquisition, Clyde sharing of data i.e., utilization for application software.

IV. SCOPE

The future scope of IoT, which will transform any real-world object into intelligent virtual object. The IoT aims to unify everything in this world under a common infrastructure; giving us not only controls of the things around us, but also keeping us informed of that the state of the things. In this discussion, that we have presented a study that addresses IoT concepts through systematic review of corporate white papers, scholarly research papers, professional discussions with experts and online databases. Moreover, this research article focuses on definitions, geneses, basic requirements, characteristics and aliases of Internet of Things. The IoT is an innovative idea which will transform any real-world object into intelligent virtual objects in the future. It enables user to identify everything in this world uniquely, take control over identified the things (e. g. Door Locks, Microwave, Lights, TV, Coffee Maker etc.) and keep informed about state of the things. This term IoT describes several technologies and research disciplines which tells that the internet reachable to every real-world physical objects. Sensors are a way of interacting with the physical world. Sensors have been used for continuous monitoring of data on traffic demand, while accomplishing their primary safety and objectives. These systems could benefit riders by minimizing their distraction on road. And sensors will alert us when some obstacle is there through feedback signals delivered to the smart phone. In other words, it alerts when there’s a car or another bike coming up from behind you, and lets you know with notification so you don’t have to look away from the road ahead and calculates all the points where the distance between our bike and vehicle on the road is minimum than normal distance and is send to smart phone.

- Vehicle Maintenance and security of vehicle is one of the major problems for a common man nowadays and alongside the thieves are getting intelligent too as "they can break any security system" easily and loot the vehicle.
- As a common man one will not be satisfied on spending too much on Maintaining his vehicle and no one will his/her bike being looted
- Here we provide "IoT BASED VEHICLE PARAMETERS MONITORING AND SECURITY SYSTEM" In this project we are implementing an easy way to monitor an individual vehicle’s parameters such as fuel level, Tyre pressure level, Engine oil level etc., using IoT Technology.
- In addition to that the bike is secured by means of "DIGITAL LOCKS" and can be tracked using advanced GPS systems

V. TECHNICAL DETAILS

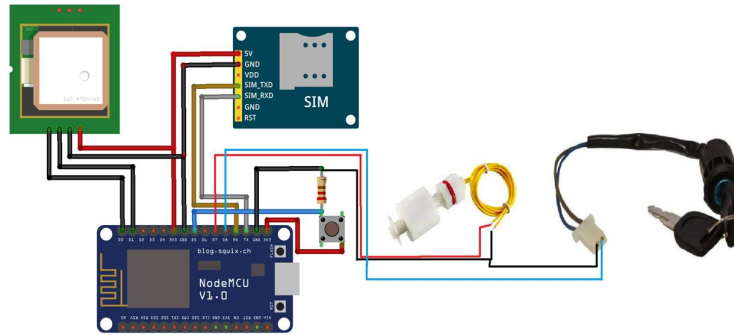


Figure 2: Arduino Board.

We have used software serial for communicating with GPS. so, connect the connect the TX of the gps to D4 of the Arduino board. RX to D3 of the Arduino board. Connect the TX and RX of the GSM module to the RX and TX of the Arduino board.

Now you can receive the GPS co-ordinates as SMS. The SMS consist of web link which will redirect to the GOOGLE MAP. Circuit Connections of this **Vehicle Tracking System Project** is simple and is shown in the image below. Here Tx pin of GPS module is directly connected to digital pin number 10 of Arduino. By using software serial library here, we have allowed serial communication on pin 10 and 11, and made them Rx and Tx respectively and left the Rx pin of GPS Module open. By default, Pin 0 and 1 of Arduino are used for serial communication but by using SoftwareSerial library, we can allow serial communication on other digital pins of the Arduino. 12 Volt supply is used to power the GPS Module. GSM module's Tx and Rx pins of are directly connected to pin Rx and Tx of Arduino. GSM module is also powered by 12v supply. An optional LCD's data pins D4, D5, D6 and D7 are connected to pin number 5, 4, 3, and 2 of Arduino. Command pin RS and EN of LCD are connected with pin number 2 and 3 of Arduino and RW pin is directly connected with ground. A Potentiometer is also used for setting contrast or brightness of LCD.

When we ready with our hardware after programming, we can install it in our vehicle and power it up. Then we just need to send a SMS, "Track Vehicle", to the system that is placed in our vehicle. We can also use some prefix (#) or suffix (*) like #Track Vehicle*, to properly identify the starting and ending of the string, like we did in these projects: GSM Based Home Automation and Wireless Notice Board

Sent message is received by GSM module which is connected to the system and sends message data to Arduino. Arduino reads it and extract main message from the whole message. And then compare it with predefined message in Arduino. If any match occurs then Arduino reads coordinates by extracting \$GPGGA String from GPS module data (GPS working explained above) and send it to user by using GSM module. This message contains the coordinates of vehicle location.

5.1 Initialization Function

gsm_init () ' is used for initialising and configuring the GSM Module, where firstly, GSM module is checked whether it is connected or not by sending 'AT' command to GSM module. If response OK is received, means it is ready. System keeps checking for the module until it becomes ready or until 'OK' is received. Then ECHO is turned off by sending the ATE0 command, otherwise GSM module will echo all the commands. Then finally Network availability is checked through the 'AT+CPIN?' command, if inserted card is SIM card and PIN is present, it gives the response +CPIN: READY. This is also check repeatedly until the network is found.

VI. ALGORITHM (FOR OPENING AND CLOSING OF THE LOCK)

- Step.1 To open, Owner shows the Mobile App
- Step.2 If Key on provided to Nodemcu
- Step.3 then Servo motor rotates and the socket for inserting key opens
- Step.4 Owner inserts the key and starts ignition
- Step.5 else Servo motor does not open and no possibility of ignition

- Step.6 To lock, the owner takes out the key from the socket
- Step.7 Float sensor interfacing With Nodemcu
- Step.8 Servo motor rotates to close the socket

VII. ALGORITHM (FOR DETECTION OF THEFT AND AWARING THE OWNER OF THE VEHICLE)

- Step.1 If Thief inserts the key and tries to open
- Step.2 there will be a short circuit between upper plate and servo motor
- Step.3 then Circuit for Arduino and GSM-900 will be completed
- Step.4 and call and message will be auto generated to the bike owner
- Step.5 The bike owner will be aware about the activity

VIII. COMPONENT USED

8.1 NODE MCU



- NodeMCU is a IoT Module based on ESP8266 WIFI Module.
- NodeMCU uses Lua Scripting language and is an open-source Internet of Things (IoT) platform.
- This module has CH340g USB to TTL IC.
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A. Specification of Node-MCU IoT Module

- It is based on ESP8266, integrates GPIO, PWM, IIC, 1-Wire and ADC all in one board.
- Power your development in the fastest way comminating with NodeMCU Firmware!
- USB-TTL included, plug play
- 10 GPIO, every GPIO can be PWM, I2C, 1-wire.

B. Features of Node-MCU IoT Module

- Open source IoT Platform
- Easily Programmable
- Low cost & Simple to Implement
- WI-FI enabled

8.2 NEO-6M GPS



This is a complete GPS module that is based on the Ublox NEO-6M. This unit uses the latest technology from Ublox to give the best possible positioning information and includes a larger built-in 25 x 25mm active GPS antenna with a UART TTL socket. A battery is also included so that you can obtain a GPS lock faster. This is an updated GPS module that can be used with Ardupilot mega v2. This GPS module gives the best possible position information, allowing for better performance with your Ardupilot or other Multirotor control platform.

The Ublox NEO-6M GPS engine on this board is a quite good one, with the high precision binary output. It has also high sensitivity for indoor applications. UBLOX NEO-6M GPS Module has a battery for power backup and EEPROM for storing configuration settings. The antenna is connected to the module through a Ulf cable which allows for flexibility in mounting the GPS such that the antenna will always see the sky for best performance. This makes it powerful to use with cars and other mobile applications.

The Ublox GPS module has serial TTL output, it has four pins: TX, RX, VCC, and GND. You can download the u-centre software for configuring the GPS and changing the settings and much more.

A. Specifications

1. Anti-jamming technology
2. UART Interface at the output pins (Can use SPI, I2C and USB by soldering pins to the chip core)
3. Under 1 second time-to-first-fix for hot and aided starts
4. Receiver type: 50 Channels – GPS L1 frequency – SBAS (WAAS, EGNOS, MSAS, GAGAN)
5. Time-To-First-fix: For Cold Start 32s, For Warm Start 23s, For Hot Start <1s
6. Maximum navigation update rate: 5Hz
7. Default baud rate: 9600bps
8. EEPROM with battery backup
9. Sensitivity: -160dBm
10. Supply voltage: 3.6V
11. Maximum DC current at any output: 10mA
12. Operation limits: Gravity-4g, Altitude-50000m, Velocity-500m/s
13. Operating temperature range: -40°C TO 85°C

8.3 GSM Module



GSM module is used to establish communication between a computer and a GSM system. GSM module consists of a GSM modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.

A. Specifications

1. The onboard two set power supply interface VCC5 5V power supply, VCC4 interface, 3.5–4.5V power supply, optional power on self-starting (default) and control start.
2. The onboard SMA (default) and IPX mini antenna interface, SIM900A interface reserved reset.
3. The size of the module is 49*50, all the new and original device.
4. The computer can give early computer debugging USB module power supply,
5. a very large amount of data under the condition of the recommended current more than 1A.
6. Standby dozens of MA data can be set to provide dormancy, dormancy of 10MA low power.

7. Support 2, mobile phone 3,4G card.
8. The serial port circuit: support for 3.3V single chip microcomputer.
9. TTL serial port support 3.3 and 5V single chip microcomputer.
10. The SIM card circuit to increase the SMF05C ESD chip.
11. Antenna circuit: guarantee short and straight, so as to ensure the signal strength.
12. PCB display screen printing mark: each interface, convenient development two times,
13. the SIM900/A hardware is completely following the design when the design manual.
14. Two power supply interfaces: VCC5, 5V DC above 1A.
15. Computer 5V power supply can be early computer USB.
16. DC long data circuit over larger recommended 5V1A.
17. VCC4, 3.5–4.5V power supply, ibid., suitable for lithium battery.
18. Control pin all leads.
19. A TTL level, compatible with 3.3V and 5V.
20. The two-antenna interface, the default SMA straight head, connector for IPXmini antenna.

B. Pin Description

1. GND – GNDSIMR SIM900A RXD, TTL level,
2. cannot be directly connected to the 232 level SIMT SIM900A TXD, TTL level,
3. cannot be directly connected to the 232 level RST – SIM900A reset,
4. active low VCC_MCU when the SIM900A module and 5V TTL level communication,
5. this pin is connected to DC 5V;
6. when the level of communication of SIM900A and 3.3V TTL, this pin is connected to DC 3.3V.
7. VCC5—DC 5V input.
8. VCC4—DC 3.5–4.5 input
9. Onboard Resources: Serial port circuit (with protection)
10. Antenna interface circuit (SMA bend female port) SIM card circuit
11. (Flip SIM slot) 4*3.5 fixture hole 4pcs SIM900A serial port output terminal
12. Size: 49mm x 47mm
13. Net Weight: 28g Weight: 38g

8.4 Float Sensor

A float switch is a device used to sense the level of liquid within a tank, it may actuate a pump, an indicator, an alarm, or other device. A float switch is a device used to sense the level of liquid within a tank. The switch may actuate a pump, an indicator, an alarm, or other device. Use them with hydroponics, saltwater tank, freshwater tank, gardening, aquariums for power head control, pet bowls, fish tanks, filtration, heating, pumps, ponds, basement alarms, boats, air condition drain pans, pressure washers, carpet cleaning Mach, reef aquarium, fluid control, ice machines, coffee pots, marine, automotive, automobiles, tropical fish tanks, evaporator coils, condensation line, in relays, or whatever your project may be. It can be easily converted from normally open to normally close by inverting the float. Note: because the current that the switch can carry is much little (0.5A), you must use a relay or contactor when it is connected by a load, relay and contactor are not included here.

A. Specifications

1. Cable Length: 30.5(cm)
2. Maximum Load: 50 W
3. Max Switching Voltage: 100V DC
4. Minimum Voltage: 250V DC
5. Maximum Switching Current: 0.5 A
6. Max Load Current: 1.0 A
7. Max Contact Resistance: 0.4 Ω Temp Rating: -20~ 80 degree



What a Magnetic Reed Liquid Level Sensors Work:

The purpose of a float switch is to open or close a circuit as the level of a liquid rises or falls. Most float switches are "normally closed," meaning the two wires coming from the top of the switch complete a circuit when the float is at its low point, resting on its bottom clip or stop (for example, when a tank is dry).

Most float switches utilize a magnetic reed switch to open or close the circuit. The reed is encased in a glass tube, which is cemented into a plastic or stainless-steel stem with epoxy. The illustration to the left demonstrates how a magnet can be used to open or close a circuit by moving it closer to or farther away from a reed switch.

When the magnet comes close to the two contacts, they draw together and touch, allowing current to pass through. When the magnet is moved away, the contacts demagnetize and separate, breaking the circuit.

In a float switch, the magnetic reed switch is hermetically sealed in a stem, most often made from plastic or stainless steel. The float encases a sealed magnet, which moves up and down the length of the stem as a fluid level rises and falls.

As the magnet passes by the contacts in the encased reed switch, they draw together and complete a circuit between the two lead wires.

The operation shown can usually be reversed by removing the bottom clip from the switch, inverting the float and replacing the clip. When this change is made, the switch circuit will be open when the float is resting on the bottom clip and closed when the float rises.

Properly used, float switches can deliver millions of on/off cycles, for years of dependable operation. Failures are normally due to overloading, frequently caused by spiking voltage. Before designing a circuit, which uses a float switch, be sure to read our Technical Page on Spiking Voltage & Float Switches.

8.5 Power Lock Ignition Key Switch



Power Lock Ignition Key Switch - 2 pin has 2 Female Pin, Plastic Make. This plastic ignition key switch features a 2 pin male connector (white) and includes 2 keys. It is applicable for Nodemcu controllers

Type: Ignition Switch Material: ABS Colour: as picture show Application: ignition switch for Off Road Vehicle, Electric Motorcycle etc. Fits: most 50cc, 70cc, 90cc, 110cc, 150cc, 250cc for Kazuma, for Tank, for Roketa and etc. Feature: This ignition switch set is waterproof; it has 4 wires male connection.

Package includes: 1 pc Ignition Switch

Note:

1. Due to the light and screen difference, the item amp;#39;s colour may be slightly different from the pictures.
2. Please allow 1-2cm differences due to manual measurement

Usefulness:

- a. Security: You can monitor your bike through your mobile phones, with the ability to control it. They can provide personal safety.
- b. Stay Connected: You and your parents can always be in the network. You can virtually stay connected.

- c. Your Pocket Personal Assistance: IoT Applications can provide personal assistance who can alarms on every action.
- d. Road Safety: It is an IoT based smart bike monitoring system in bike that can detect a bike crash or accidents on roads. If a crash or accident has occurred and it automatically notifies the parents about accidental location.
- e. The IoT is a diverse and complex network. Any failure or bugs in the software or hardware will have serious consequences. Even network failure can cause a lot of inconvenience
- f. There is always the possibility of hackers not breaking into the system and stealing the data. There is a possibility of misusing your information...
- g. As devices from different manufacturers will be interconnected in IoT, based system presently, there is no international standard of compatibility for the tagging and monitoring equipment.

This system is an IoT-based solution. Historical data produced by sensors and stored in the IoT database allows bike riders to make informed decision for the route. In addition, this big data can be also used by the government for better monitoring of the environment. Future works will be oriented towards studying data management and analysis for optimal application of the big data. From experimental result section, it is clear that proposed intelligent system is the best in its kind for providing a better alert and can detect more type of miss-driving as compared to normal driving skills.

The main idea of this system is to minimize the road accidents which are increasing day by day by alerting and warning the driver of their ride styles and providing them the best security necessary and also send the alerts to the parents and one concerned person about the driving behaviour of the driver. Stat authority can use this data for grabbing and finding the driver with these unfit driving skills and can be use to study the driving behaviour or a specific area.

8.6 Fuel level Monitoring Module

In this module we are using the Float level sensor to detect the fuel level in the fuel tank. The float level works on the principle of buoyancy which states that “the buoyancy force action on the object is equal to the mass of the liquid displaced by the object.” As a result, floats ride on the liquid surface partially submerged and move the same distance the liquid level moves. When there is a change in the fuel level, variable resistance present in the float sensor varies accordingly. Thus, fuel level is directly proportional to the resistance. Based on the variance in the resistance value the respective fuel level is obtained. These electrical data from the float level sensor is received by RENESAS GR-PEACH board and transmitted to the Blynk App platform. Then those data are transmitted to the mobile application

8.7 Battery Level Monitoring Module

The condition and level of the battery is monitored by taking voltage reading from the battery frequently. This voltage value is read by the RENESAS GR-PEACH board and those values are sent to the Blynk platform. These data are then transmitted to the mobile application. Additional hardware requirement is not needed for this setup.

8.8 Engine oil monitoring Module

To monitor the condition of the engine oil LM35 is used. This LM35 takes the temperature in a regular interval from engine. The regular reports will be correlated with the standard temperature value of the engine. Whenever there is a disparity in these values there is change in the condition of the engine oil. Thus, the engine oil is monitored regularly by this concept and the regular reports are sent to the mobile application from the RENESAS GR-PEACH board

8.9 GPS Tracking Module

This module is enabled with GPS which allows the user to locate the vehicle when it is not with him/her. The GPS MODULE which is fixed in the vehicle sends the data to the RENESAS GR-PEACH board from which the details are fetched by the mobile application.

8.10 The Android Application

The user-friendly android app enables the user to track, monitor, and set the critical levels to have an alarm for his/her convenience. The user can also set Alarm in the application if the fuel goes below a particular state and engine oil & temperature as well as the battery level. The application is integrated with Google maps in order to track the vehicle

8.11 The SMS Facility

The user will receive SMS on unauthorized access and location of vehicle. These data are sent to server and the User-friendly android application receives the data from server and displays everything including Location.

IX. CONCLUSION

The project " Anti-theft system for two wheelers " has been designed to be very inexpensive, easy to operate, and helpful for minimizing the vehicle theft , as well as being able to be modified to improve the system with new technology and software. After calculation and experimentation, the result is very satisfying. Since this is an innovative way of reducing the theft, we can conclude that it is a very reliable method. As a result of the work conducted by us, we have been able to make an impressive contribution to the world of technology and it has a lot of uses in small vehicles. The system is very easy to operate and understand so it can be used in rural as well as urban areas of the country. The theft is detected by the different types of software and a signal is sent to the owner of the vehicle through the application on the phone will alarms the owner In this paper a small anti-theft system is designed to stop the thefts from happening . This system is designed in such a way that more modifications can be done to it in future and make the system more reliable

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