

# SEC-UR-BIKE

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**Abstract - Now-a-days two wheeler theft has become one of the major concerns among public. The total number of motor vehicles stolen in 2019 are 2,38,675 and in that the count for two wheelers stolen are 2,01,370, which is 84.37%. That is, the theft crime rate has increased by 8% in comparison to 2018. The recovery rate of the two wheelers is approximately 25% of the stolen vehicles. The value of the stolen two wheelers alone is Rs. 635 Crores. To increase the recovery rate, we propose to develop a module, which is to be installed in the frame of the bike. This module helps the vehicle owner to stop the theft instantly. This module has a keypad to enter the pass code. If entered pass code is correct, automatically the module will be deactivated. The module can cover a range of 100 m radius area from wherever the vehicle gets parked. If the vehicle crosses this area, an alert message is sent to owner's number with coordinates through which the owner can take action to stop the bike. If the primary battery is disconnected power will be drawn from secondary battery and at once the front wheel is locked, engine gets turned off by disconnecting the relay, this happens using a SIM inside the module. This process can help the vehicle owner to recover his vehicle as soon as possible.**

## INTRODUCTION

India is one of the Asian country where two wheelers are the most used vehicles. India has many two wheeler manufacturing industries and approximately 1 lakh two wheelers are sold in this country per year, also It exports two wheelers to other Asian countries. In our country every house consists of at least one two wheeler and some household prefer buying more than one two wheeler instead of a four wheeler because of its convenience of travelling fast in city traffic. Two wheelers do not take much parking space. Insurance company provide insurance policies to two wheelers also. Nowadays every two wheeler sold has insurance along with it and it is mandatory. And the two wheeler number is increasing every year, theft rate is also increasing and also recovery rate is very low. Every year source or the other security system is invented but it gets easier for thief to steal the two wheelers by deactivating the security system. The existing security system consists of alarm system OTP system and GPS tracking. There

were so many loop holes in the existing system which helped the thief

to steal it easily, the loop holes are like easy disconnecting of alarm wire, breaking odd the OTP module place on the two wheeler, GPS module deactivating by cutting off primary battery

.Considering all these loop holes, we are making this module which indicates users immediately about the theft and tracking gets easier as it keeps in updating the location through SMS .The module consists of secondary battery for backup and also kept inside the bike's frame . This is not the final solution for the theft problem but for now it is the best solution to avoid theft.

## SYSTEM DESIGN

The security system available in most of the existing bikes are costly and have limitations. The "Smart BikeSecurity System" [1] is invented to provide physical security and to protect the two wheelers from theft. It is designed in such a way that recovery of the vehicle is at most possible in any cases, such as theft by lifting the vehicle, towing the vehicle, starting the engine of the vehicle. With the help of range which have been set by the GPS module and the controller will monitor continuously. Motor vehicles and fuel theft scenes are increasing rapidly all over the world [2]. So securing our bike plays a important role in day to day busy schedule. Many advanced motor vehicle securing modules best suit the four wheelers. As of safety of the two wheelers is concerned, the products available in the current stage is of no equal to the well-versed stealers. In order to improve the safety and automatic traffic management to efficiently transport the patient from their location to hospital using ambulance is discussed with an Intelligent Transport System (ITS) [3]. To prevent the vehicle stealing, vehicular communication from any place to anywhere using GSM system and a password based system with buzzer alert is developed [4]. Another security system with GSM and SMS based OTP registered theft security system is defined and developed [5]. Two wheeler accident prevention and identification system with an add on alert system for theft prevention is implemented [6]. Bike theft with security locking and conveying theft information to 4 or 5 contacts using GPS hardware is implemented [7]. Security system with micro controller, GPS

module, GMS module and a compactable camera for theft prevention is discussed and developed [8]. An idea of misplacing the squandered keys is recovered by using the fingerprint which is globally unique [9]. The innovative method used to identify the location of the theft motorcycle with switching off the engine from remote and capturing the image of theft using the software which is connected to a controller in coordination with the entire system [10, 16]. Another method of motorcycle security system that describes the theft and give an alert message to the client using the hand held device such as mobile phone during the occurrence of theft and the system is capable of implementing the entire unit with reasonable price [11]. Implementation of a security system using password and creation of an alert signal when the password is entered incorrectly is developed [12, 17]. A system with various layers of implementation and the layers is capable of protecting the existing anti-theft system is developed and implemented [13, 18]. An embedded system with radio frequency identification and global system for mobile communication is developed to enhance the safety and security of the motorbike is represented in [14, 19]. An enhanced route optimization method for enhancing the efficiency for a sensor network is mentioned [15, 20]. A theft security system using GPS, GSM infrared sensors and DTMF technology with the support of controller is developed and implemented successfully [21, 23, 25]. A two wheeler vehicle security system with additional features to improve the reliability and easy design with SMS alert system is implemented in [22, 24, 26].

When the stealing happens, the current security system will only make the bike static and buzz the alarm. How about the owner is intimated about the theft when it is happening by a message to his/her phone, even without internet, and user operates the bike and make it secure which can also be done without internet. It is a thoughtful restraint. In the projected security system an innovative structure is involved in totalling the engine immobilizer and alarm unit using the alert generating system by SMS regarding the theft made creating the client to have control of system by SMS remotely. To overcome the above limitations, the SEC-UR-BIKE is designed and implemented. The objective of the system is to lessen the human power obligatory for the safekeeping, to become careful position of the vehicles, to diminish the theft and to control vehicle using SMS is developed. The module is divided into

3 segments: power supply, microcontroller programming and I/O interface. The power supply segment contains 2 batteries, one is the bike's battery which is the primary battery and another is the secondary battery which is additional battery kept inside the module, in case the primary battery is disconnected this will act as a backup to keep the system running also it can't be disconnected easily. The microcontroller segment has GPS and GSM connected to it for sending and receiving message and locating the vehicle, also the keypad to enter pass code. I/O interface has LCD display for displaying keypad entries and relay locking system to stop the vehicle from theft. The basic structural diagram in block of the suggested system design is illustrated in figure 1.

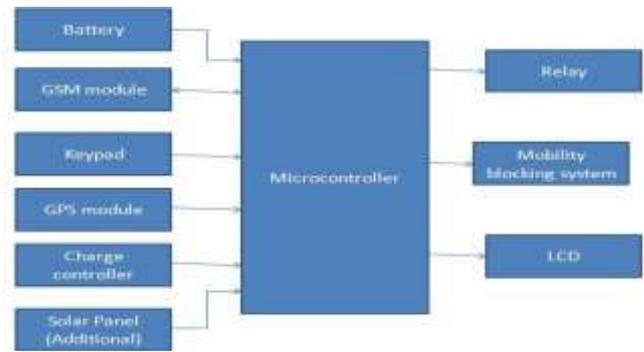


Figure 1 System Block Diagram

### SYSTEM DESCRIPTION

We have taken up to design a much better and precised anti-theft cum vehicle tracking security system which lets the user to command the vehicle from anywhere. First of all we are inserting the entire module inside the frame of the bike. The purpose we are inserting the module inside frame is because it's hard to access that place for user as well as thief too. If user or thief need to access the module they need to dismantle some bike parts. The module contains a microcontroller which is used as the main control unit, that will integrate all the modules used in the system. Depending on the information being received by different modules it controls the whole system. GPS is known as Global Positioning System is used to trace the location of vehicle. A GPS framework computes its position by accurately timing the signal sent by GPS satellites high over the Earth. GPS Receiver gets the location information from satellites. The current longitude and latitude data are being provide by the module is sent to the registered mobile number through SMS as a Navigation link which is then directed to the Google maps. The working of the system is pictorially represented in figure 2 and 3.

### Flowchart: Case 1-

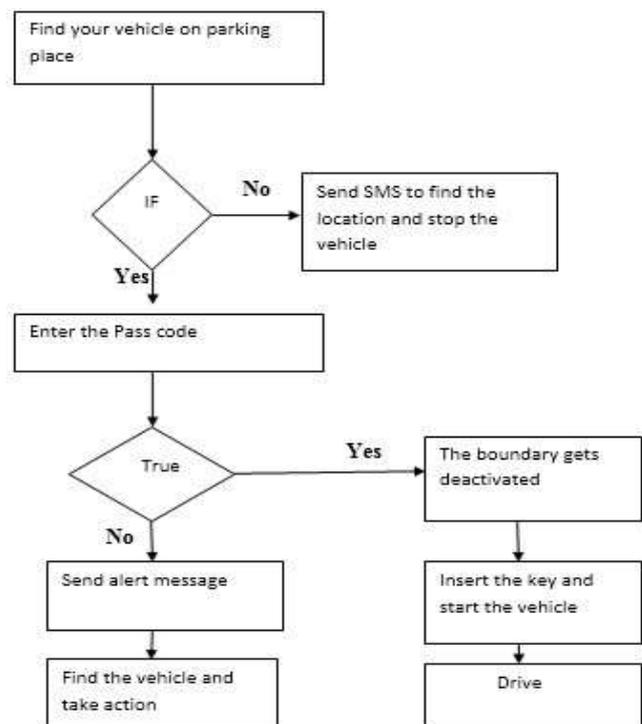
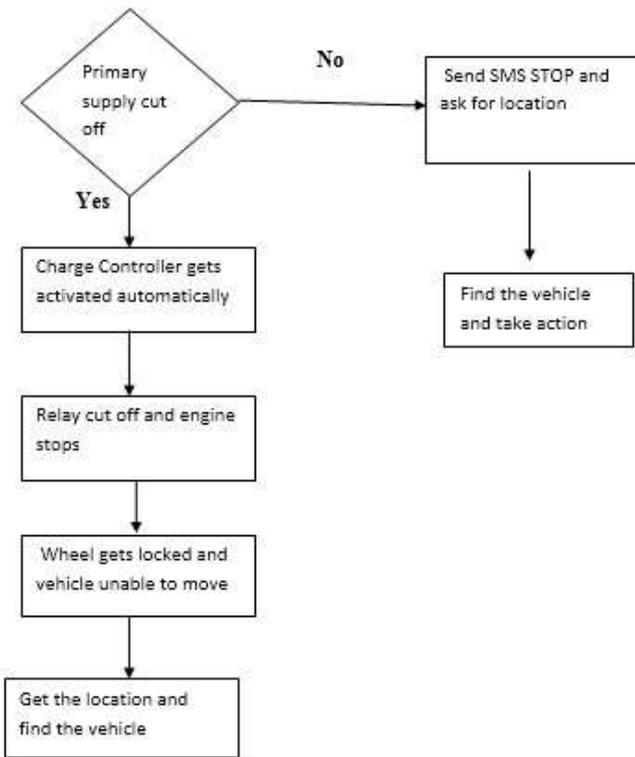


Figure 2 Flowchart

**Case 2-**



**Figure 3 Flowchart**

GSM is known as Global System for Mobile Communication used for communication purpose. GSM module is basically used here for receiving and sending message. Global system for mobiles (GSM) technology is used to establish cellular connection. It is used for transmitting mobile voice and data services. It contains everything needed to support the microcontroller. Secondary battery is used in the system, if primary battery is cut off by the thief power will be drawn from secondary battery tracking system will work continuously. A DC to DC charge controller used to eliminate the down time for changing from the primary to secondary battery. All these segments will be present inside the frame as a module except a wire that connected to the primary battery. A keypad is installed to enter the pass code and LCD is also present. If pass code entered by user is correct automatically module will be deactivated, if wrong the user can't start the vehicle and he/she will get a message, to re-enter the pass code he has to do with the mobile only. Whenever the bikes stop at a location it will take it as a home location from home location 100-meter radius will be created. If bikes cross that 100m radius user will get a notification that your bike has been stolen. We are using a primary and a secondary battery. Primary battery (bike battery) supplies the total power for the module. Secondary battery is backup battery if primary is cut off by the thief. Secondary battery will be placed inside the frame along with the module. If primary wire is cut off by the thief user will get a message, after that secondary battery will start working and automatically engine will turn off and also manually we can off the engine by sending a SMS. Relay is used to cut-off the power supply for the motor bike and locking system is used to lock the motorcycle wheel.



**Figure 4 16x2 LCD Display**

16x2 Display consists of two rows and each row can print 16 characters. Each character is built by a 5x8 pixel box. The operating voltage of LCD is 4.7 to 5.3 v. It consumes 1mA current without backlight. It is used for the display of output such as GPS Data and acknowledgement messages from the controller. It is also used for the display of pass code.



**Figure 5 Keypad 4x4**

It has a 16 built in Push button contacts in Row and Column lines. It has 8 output terminals where 4 terminals are allocated for rows and 4 for columns. It is used to enter the pass code.



**Figure 6 I2C Converter**

I2C module has an inbuilt PCF 8574 I2C chip that converts I2C serial data to parallel data for the LCD display. For interfacing 16x2 LCD display with minimum number of inputs to the controller I2C module is used. It helps in saving loads of GPIO pins for other modules.



**Figure 7 STM32 Micro Controller**

STM32 micro controller consists of 2 transmitter and 2 receiver pins which are used for connecting GSM and GPS modules. Analog pins are used to connect servo motor, keypad, relay and I2C module.



**Figure 8 ON/OFFkey**

It is used to switch on and off the module. It indicates the real bike key system. It gives digital output 1 and 0, if its 1 a text in LCD gets displayed asking to enter the passcode. if its 0 system will be in off state.



**Figure 9 Neo6M GPS module**

GPS module locates the vehicle and sends the co-ordinates as a link to user's mobile using GSM module. When user parks the vehicle at a place, GPS takes that location as a home location and creates a 100-meter radius area as a security zone. when vehicle crosses a hundred meter without correct key and pass code GPS sends link along with co-ordinates.



**Figure 10 Buck Converter**

Since 12v battery is used for GSM, instead of using separate battery for the modules which require 5v input we are using buck converter to step down 12v voltage to 5v voltage and providing it to other modules.



**Figure 11 118MHZ Antenna**

It is used to receive signal from the satellite for GPS. Because of this antenna GPS is able to communicate with the satellite directly.



**Figure 12 SIM 900A GSM Module**

GSM module is used to communicate with users mobile phone and GPS. Sends and receives message from and to the users mobile it takes location from the GPS and sends along with theft alert in case of theft. It also helps to reset passcode if user wishes.



**Figure 13 Servo Motor**

It is used represent the wheel locking system of the bike. When alert message is sent along with location at the time this locking system locks the wheel and prevent the theft by immobilizing the two wheeler.



**Figure 14 Relay**

Relay is connected between battery and dynamo, when battery and dynamo is connected only spark will get generated and engine will start. When user sends message to cutoff relay at the time of theft and relay disconnects the connection between battery and dynamo and thief can't start the bike.



**Figure 15 Primary Battery**

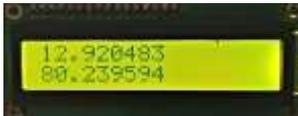
Primary battery is the main bike battery. This battery will be used by the bike as well as the "SEC-UR-BIKE" module also. Here we are using 12V 8AH rechargeable battery as primary battery, and also charges secondary battery.



**Figure 16 Secondary Battery**

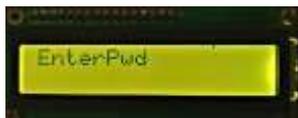
Here secondary battery is used as backup battery which is kept in the module inside the bike's frame. This battery gets activated when the primary battery is cut off by the thief, who is thinking to deactivate the module but the secondary battery helps the module to run even after primary battery is disconnected and sends theft alert along with location.

**OUTPUTS:**



**Figure 17 GPS Co-ordinates on LCD Display**

When user send the message saying "GETLOC%" LCD prints the co-ordinates and GSM sends the location to the users mobile.



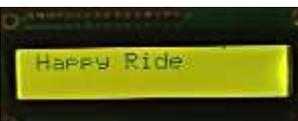
**Figure 18 Indication to User for entering Pass code**

When user start the vehicle using key the module asks for pass code by popping a message on LCD Display.



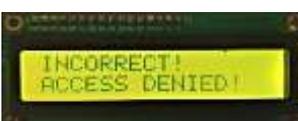
**Figure 19 Entering Pass code**

If the entered pass code is correct then the following message gets displayed on the LCD.



**Figure 20 Message Displayed If pass code is correct**

If entered Pass code is wrong, the following message gets displayed and theft alert message is sent to the users mobile along with location.



**Figure 21 Denial message If Pass code is wrong**

By mistake if the user itself enters the Pass code wrongly he can re-enter the pass code by clicking the "\*" in the keypad and ignore the theft alert message sent to the mobile by GSM.

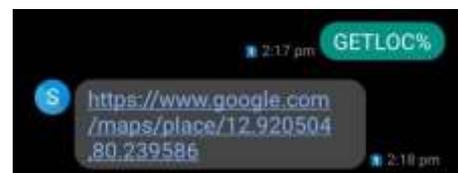


**Figure 22 Reset Passcode Message sent by the user to reset the pass code.**



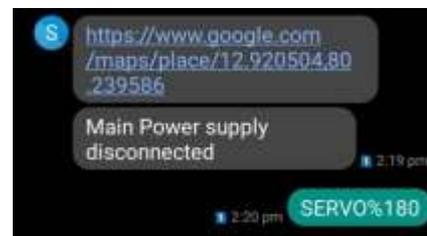
**Figure 23 SMS received about theft**

If the pass code is entered wrong or the vehicle cross 100m radius without key and pass code, an alert message with location is sent to users.



**Figure 24 Command to get location**

If user wants to know the location of the bike, he/she can type "GETLOC%" and send a message. The GSM module will take the coordinates from GPS module and sends back a link which gets mapped to Google maps.



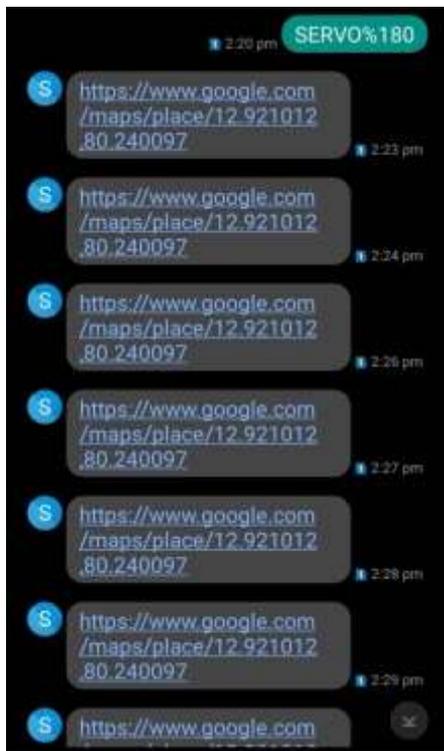
**Figure 25 Command for activating locking system**

A message to the user mobile is sent if primary battery is disconnected along with the location where it got disconnected. Immediately the user can send a message saying "SERVO%180" it will activate wheel locking system which will immobilize the two wheeler. If the user wants to deactivate locking system, he/she can type "SERVO%0".



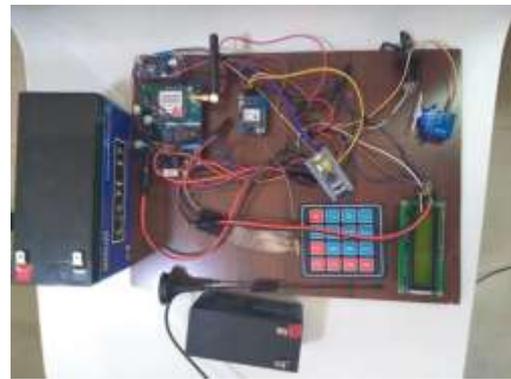
**Figure 26 Command to cutoff relay**

After activating locking system user can cutoff the relay by sending and message "RELAY%1", which will make the relay to cutoff and thief can't start the engine.



**Figure 27 Continuous updating of location**

After the theft alert is given, activating locking system and relay is cutoff, the module keeps updating the location for every one minute using secondary battery power.



**Figure 28 SEC-UR-BIKE module**

The module is divided into 3 segments: power supply, microcontroller programming and I/O interface. The power supply segment contains 2 batteries, one is the bike's battery which is the primary battery and another is the secondary battery which is additional battery kept inside the module, in case the primary battery is disconnected this will act as a backup to keep the system running also it can't be disconnected easily. The microcontroller segment has GPS and GSM connected to it for sending and receiving message and locating the vehicle, also the keypad to enter pass code. I/O interface has LCD display for displaying keypad entries, locking system and relay cutoff to stop the vehicle from theft.

### CONCLUSION

The proposed system is the two wheeler security system which provides high security and immediate alert to user. Also because of this proposed solution theft rate will be reduced which benefits the government by reducing the government exchequer. Immediate alert system can provide peace of mind to the user.

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