SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR

ELECTRONIC WORKSHOP LAB
MINI PROJECT REPORT

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"Smart Anti-theft Systems of Bike"

Submitted By:

Group no. 06

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1. Introduction

Most of our daily activities take place outside our home. Without transportation there are many activities we could not take part in. Motorcycle is one of the least expensive and a convenient mode of transportation but unfortunately, it is easy to steal, easy to disassemble, and easy to ship as parts.

As motorcycle industry went boom, motorcycle theft in the country has ran rampant over the years and recovery rate is significantly low. Motor vehicle theft remained the least-solved crime in 2018 though the number of cases reported increased by 12.9% as compared to 2017, show data provided by the Delhi Police.

In 2018, the total number of motor vehicle theft cases reported stood at 44,158, as compared to 39,084 in 2017 – which accounted for about 19% of the total crimes reported. However, only 19.6% cases were solved, the police data also stated. Motorcycle theft indeed has become a big problem of the community. Although, the authorities are said to be doing the best they can to stop these thieves, it still ranks high up in the list of crimes committed in the streets every day. One of the existing solutions for motorcycle napping available in the market today is the Scorpio Ride “Core” Cellular Motorcycle Alarm and GPS Tracking System. It uses iOS or Android app and a module installed inside the bike. . It sends a Short Message Service (SMS) alerts to notify the user for any tampering of the motorcycle. It has also camera module installed for the authentication of the user in the model. The camera module is not efficient for authentication of user as light intensity of surrounding changes according to the location and time. It has also the ability to track vehicle's location. This system does not have enough preventive measures during theft attempt.

Due to these reasons, this study proposed to adapt the car security system solutions to motorcycles. This study also wished to develop and improve its functions to better suit its purpose. This innovation of a vehicle security system has the ability to turn off the vehicle engine and send real-time alerts to the vehicle owner. Thus, preventing the theft from taking the motorcycle. This security system also features the ability to locate the motorcycle to help ease stolen motorcycles search and recovery. This is possible through the use of Global System for Mobile communication (GSM), Global Positioning System (GPS) Technology and sensors.

2. Impact of Project on society and the environment

Security plays a vital role in today's society. Safety of vehicles is extremely essential for every private and public vehicle owner. For this reason, various security systems have been carried out, but most of these security systems are expensive, complicated and best suits to cars.

So, we have proposed an anti-stealing system for the motorcycle user community that has been built using some low-cost sensors and SMS service. Our system can not only can locate or track the motorcycles for the users, but also can prevent it from getting stolen. The proposed device is Affordable, can easily be hidden in a motorcycle, and is easy to use. We believe such a system will be beneficial for the users in tracking their motorcycles and protecting them from getting stolen. Thus, it can increase the security of motor cycle and can result in downfall of the theft rate benefitting our society.

3. Block diagram and Functional description

This is the description of major functional blocks of the model.

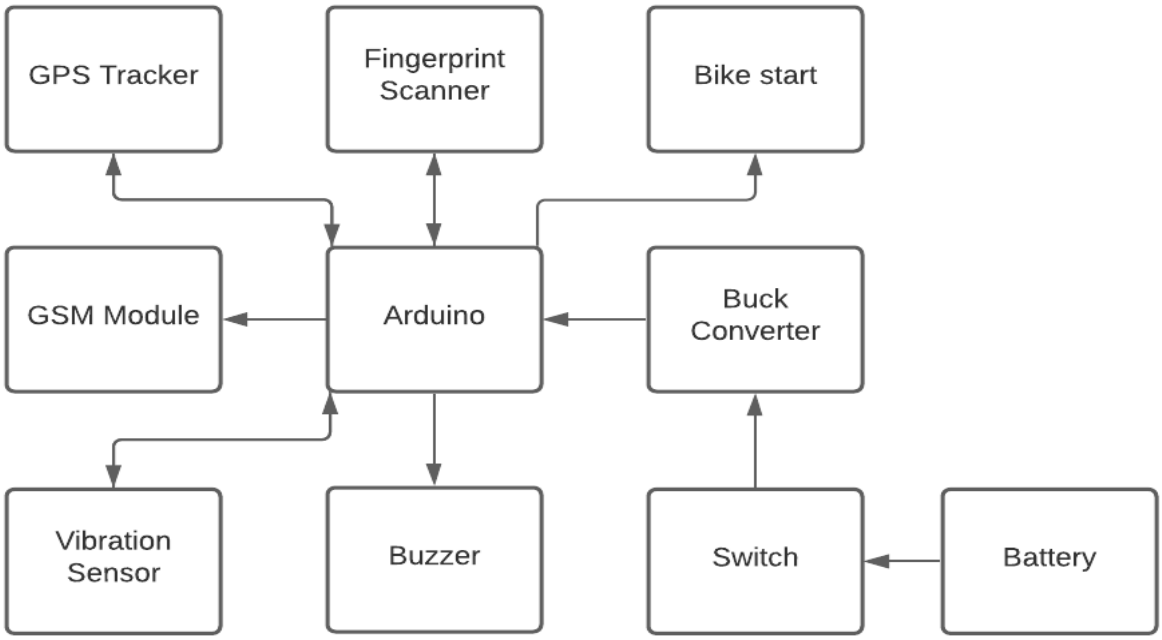

Fig. 1 Block Diagram

The power switch will turn on Arduino and all the sensors which is powered by battery of the bike. Buck converter will convert the high voltage from battery to lower voltage to power all the sensors and Arduino. If key is low then ignition sensor will send the low input to Arduino, then it will enable vibration detector to detect any vibration around the bike. If vibration is detected Arduino will enable buzzer for 6 seconds and send alert to the user. Alert message will contain maps link with latitude and longitude which will show current location of the bike. If key is high, then ignition sensor will send high input to Arduino, then it will enable fingerprint sensor and disable vibration detector. When user put their registered finger on sensor then Arduino will enable relay which will act as a starter and ultimately turn on the engine. If unregistered finger is sensed by sensor, then starter will not work.

4. Circuit diagram and its description

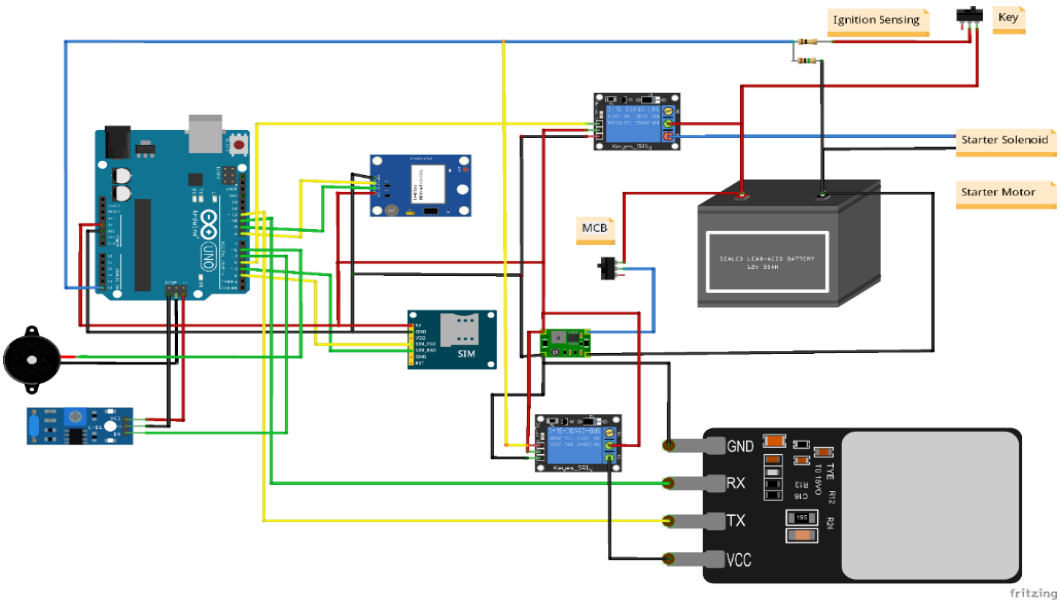

Fig. 2 Circuit Diagram

- Arduino (UNO-R3)

  It is the main processing and Control Unit of the system and will act as a link between software and hardware modules. It is interfaced with other modules and acts as the central processing unit programmed to carry out the systematic instructions of the modules.

- Fingerprint Sensor (R-307)

  This module is used for authentication by verifying the fingerprint of the user. It gives a logic high when the fingerprint is verified and hence is used to start the bike in this system.

- GPS Tracker

  It is used to track the location of the vehicle. The GPS receiver will continuously give the data indicating the position of the vehicle in terms of latitude and longitude in real time.

- GSM Module

  It is used to establish a wireless communication between Arduino and user's device. The GSM module will send the position (Latitude and Longitude) of the vehicle and also the alert notifications to cell phone from a remote place.

- Vibration Sensor

  It detects the Sudden Impact/Shock, displacement, proximity and acts as an anti-theft alert. When the ignition key is off vibration sensor is enabled and on detecting any impact, it sends high logic to Arduino hence enabling the buzzer.

- Buck Converter
  In this system it is used to step-down the voltage from 12V to 5V for usage of Arduino and other components.

- Battery
  It is used to power all the components in the device.

- Switch here acts as a cut-off between all the model and the battery.

- Ignition Sensor
  It is used to check the status of ignition key and hence depending on it, fingerprint sensor is enabled or disabled.

- Relay
  It is used for isolating a low voltage circuit from high voltage circuit. It is also used as a switch in this circuit at the started solenoid and to enable and disable the fingerprint sensor.

5. PCB layout and Artwork

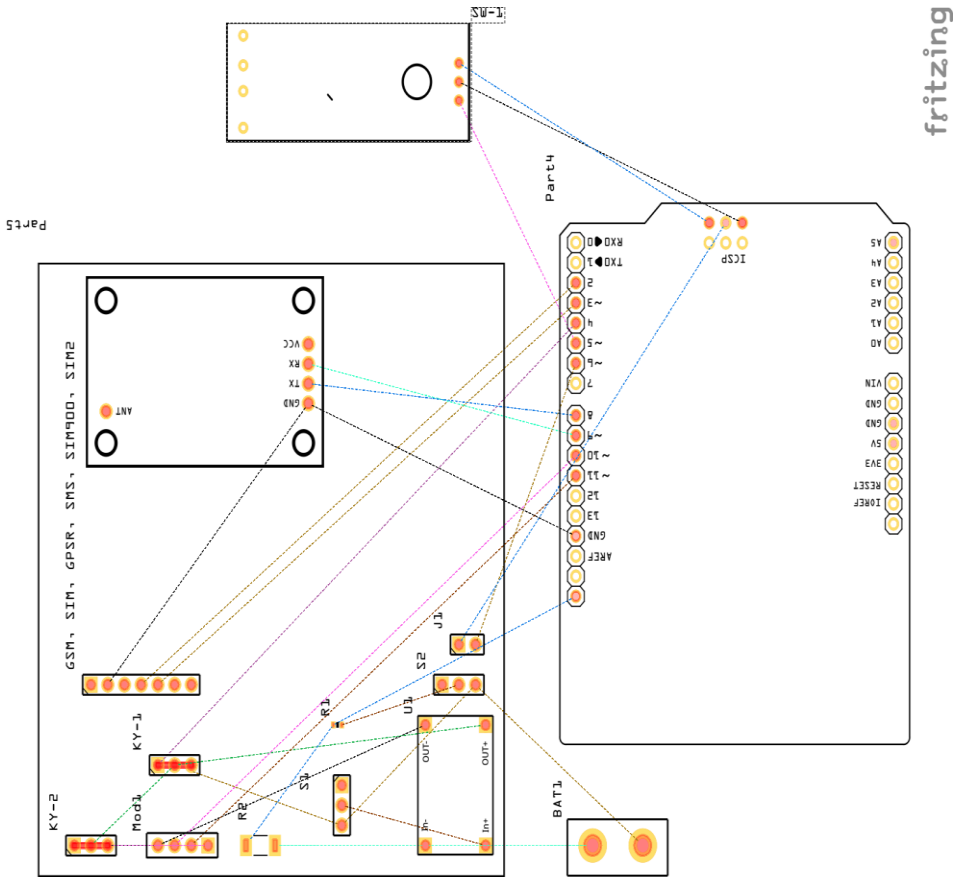

Fig. 3 PCB layout

The circuit diagram shown in the Fig.2 was made using the Fritzing software and the circuit diagram was converted to a PCB design.

6. Working of Project

Fig. 4 Implementation on Bike

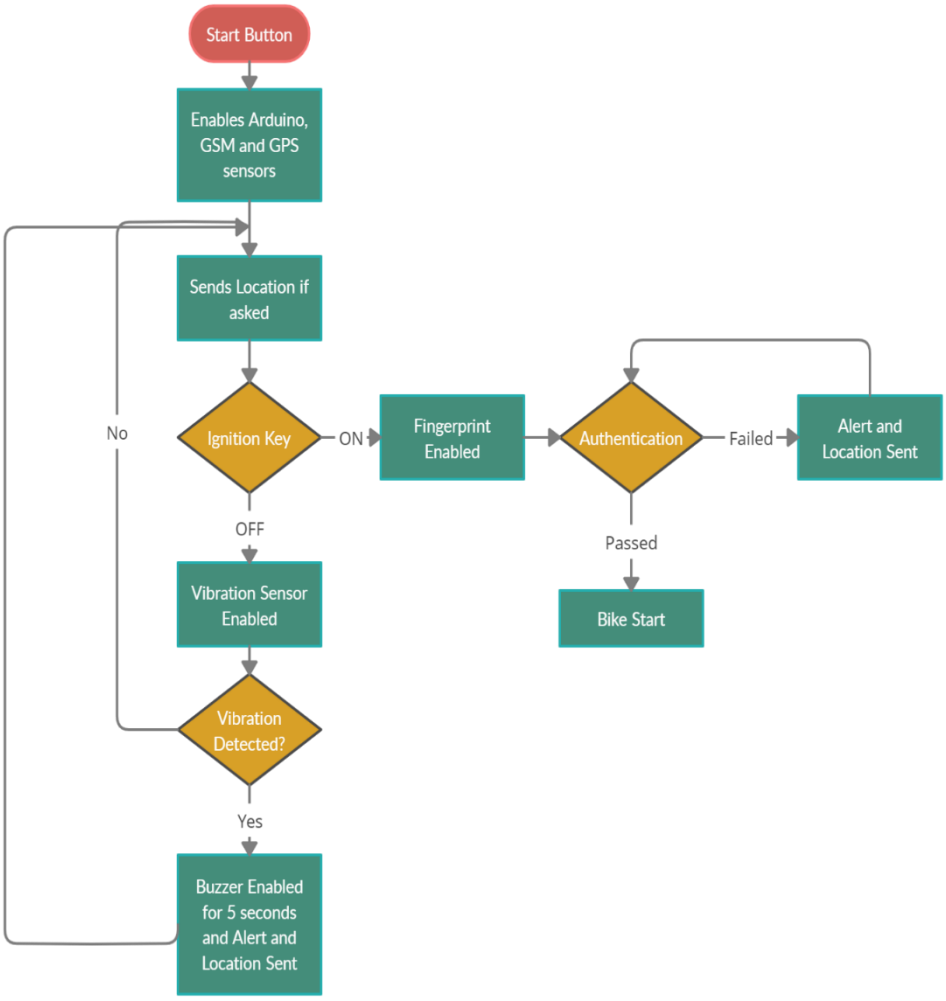

Fig.5 Code Flowchart

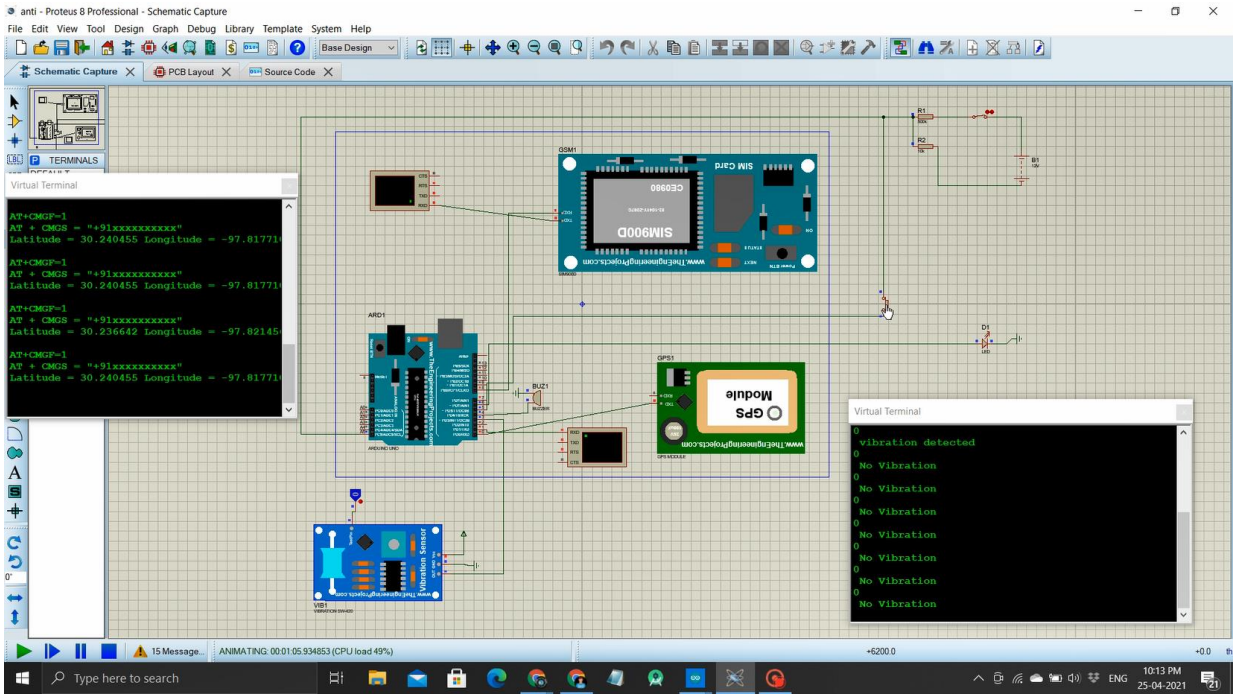

Fig.6 Simulation on Proteus

First of all, there is power switch that will turn on the Arduino UNO and other components which are powered by the battery of the bike. The Switch here comes with some essential functionality that overcomes the unnecessary wastage of battery power. The user can turn off the switch to completely cut-off the model, as and when needed.

Then comes the Buck converter, a DC-to-DC step down voltage regulator that will convert the high voltage input from battery i.e., 12V to a lower voltage output i.e., 5V to power the Arduino UNO and other components.

Without removing it's incorporated and basic level of security, that is the Key, a new level of security is introduced, that is the fingerprint scanner. The self-start in bike is replaced by the fingerprint scanner.

When the key is turned on, the ignition sensing pin will receive a logic high and enable the fingerprint scanner and disable the vibration sensor. Whenever a finger is placed on the fingerprint scanner, it will be verified with the registered fingerprint and. If it matches, it will give a logic high to the relay and the relay will in turn power on the starter motor and the bike will start. If the fingerprint is not verified, an alert will be sent to the owner which will include the coordinates (latitude, longitude) and the Google Maps link which will show current location of the bike. When key is turned off, it will enable the vibration sensor to detect any sudden impact on the bike. If any sudden impact is detected, the Arduino will send alert to the user via SMS.

The GPS tracker is used to continuously track the location of the bike. And the GSM module is used to establish a wireless communication between the user and Arduino.

7. Result and Future Scope

After the implementation of the all the modules successfully the final device will be in a posture to make all of our objectives with which we started our project. This project will implement our intentions that are: authenticating the user using fingerprint scanner, starting the bike using the same, detecting if any displacement occurring in the vehicle and enabling the buzzer, alerting user by sending a SMS, tracking the vehicle based upon the request made by the user through SMS. To power up all the components in our project vehicle battery is used.

This project consists of anti-theft system that is useful in detecting the theft of the vehicle which is implemented based on GSM and GPS technology. With the help of SMS, one can check for the location of the vehicle. Vibration sensor helps in detecting any sudden impact or displacement in the vehicle. GSM, GPS and vibration sensor are interfaced on the Arduino UNO R3 board and GPS sends the data to the Arduino UNO R3 that is the location of the vehicle through GPS coordinates. GPS sends the coordinates along with the Google Maps Link to the Arduino UNO R3 board. Arduino UNO R3 receives the data from the GPS. Then the GSM get the GPS value and sends the location of the vehicle to the user via SMS. By such method, theft is prevented by the user itself.

We have proposed a cost-effective anti-theft system, which can be expected to drastically reduce the automobile thefts, are entirely feasible as factory installed devices.
The future scope which can be added to the project can be,

Our project gives the location of the vehicle when requested by the user, so we can add a database and a cloud linkage to our device. This proposed system will continuously monitor a moving vehicle and report the status of the vehicle. The GPS receiver will continuously give the data indicating the position of the vehicle in terms of latitude and longitude in real time. The GSM module will send the position (Latitude and Longitude) of the vehicle to cell phone from a remote place. Google map can display the location and name of the place on cell phone in real time and we can monitor it.

In this project, the battery drainage can be considered the main issue. To improve efficiency, a Battery Monitoring System can be implanted/integrated. Our research can focus on the development of Arduino Uno-based BMS. It can be used for maintaining and monitoring stationary battery systems to maximize the performance of the developed system and reduce battery maintenance and replacement costs by providing the most reliable form of predictive maintenance.