

Design and Implementation of Electronics Anti-Theft System for Motorcycle

Aye Wint Mon, Min Zaw Oo, Aung Thu Hein

Abstract— In this research, a system had been developed for theft prevention and recovery of motorcycle in an easier and faster way. This proposed system has two components, the hardware and the software modules. The hardware component includes microcontroller, GSM module, gyro sensor and buzzer. C++ language is used as software component. In this study, the function of gyro sensor is to sense the position of motorcycle and will send the recorded data to the controller. The user who uses this system will be informed through a calling from the motorcycle which has been moved at once and the environment will be notified because of alarm ringing. This research intends to get good environment which protects the missing of motorcycles for every people.

Index Terms— Arduino Uno, GSM module, Gyro Sensor, Technology.

1) INTRODUCTION

Transportation is very important for everybody and nowadays, people work outside of their home. Because of this, transportation affects every aspect of our lives especially in doing our daily routines such as going to work, school, mall, bank, gym, etc., and even back to our home. Motorcycle is one of the least expensive and a convenient mode of transportation. Therefore, a lot of people use motorcycle in everywhere. Most of the people left their motorcycles in stand when they work in their workplace or shopping. A lot of public places, such as hospital, university campus and in front of the shops have no security. Therefore the thieves will target those places and many people face with the missing of motorcycles in those places. 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.

In this paper, the sample model can prevent the missing of motorcycles by calling to the owner with the GSM module. GSM module, gyro sensor module and arduino unio are main components in this research. This system will be started within a few seconds after stopping motorcycles. If somebody else try to thief or to move motorcycle, the alarm will ring continuously and call to the owner automatically. So, the owner can know at once if the missing or moving of

motorcycle is happening. Moreover, a lot of people from the environment can notify because of alarm ringing. In this way, the missing of motorcycle can be reduced in near future. If someone uses this prototype in his cycle, he can stop his motorcycle anywhere. Finally, the loosing of motorcycle will be reduced and the secure living environment will be come.

2) BLOCK DIAGRAM AND INTERFACING SYSTEM

The block diagram shows the process of anti-theft system for motorcycle vehicle.

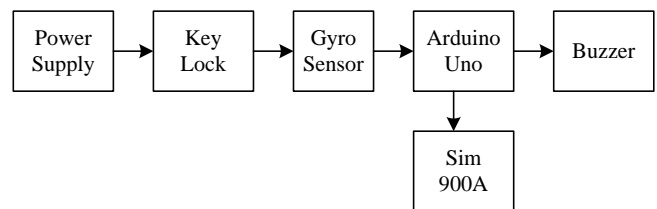


Figure 1. Block Diagram of the System

This system has six mainly components, power supply, key lock, gyro sensor, arduino uno, buzzer and sim 900A. Power bank is used as power supply because this system is less power consumption. Key lock is essential for gyro sensor which will record the position of motorcycle within a few second after key lock. Arduino uno is used as a controller for the whole system. The function of GSM module is calling to the owner when the position of motorcycle changes and the buzzer will ring to notify from the environment.

3) Interfacing with Gyro Sensor

This table 1 and figure 2 shows the connection with Arduino uno and Gyro Sensor.

Table 1. Pin Connection with Arduino Uno and Gyro Sensor

Arduino Uno	Gyro Sensor
5 V	VCC
GND	GND
A5	SCL
A4	SDA
GND	AD0

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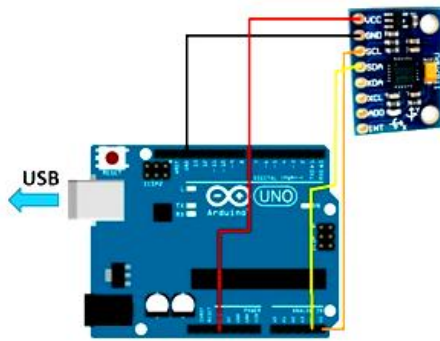


Figure 2. Interfacing Arduino uno and Gyro Sensor

4) *Interfacing with GSM Module*

This table 2 and figure 3 shows the connection with Arduino uno and GSM module.

Table 2. Pin Connection with Arduino Uno and GSM Module

Arduino Uno	GSM Module
(5V+G)	power input
D2	5VT
D3	5VR

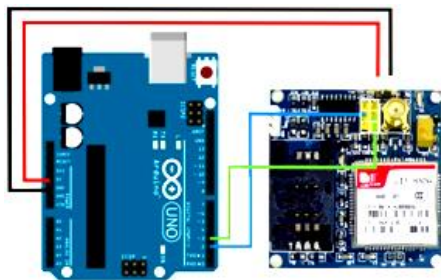


Figure 3. Interfacing Arduino uno and GSM Module

5) *Interfacing with Buzzer*

This table 3 and figure 4 shows the connection with Arduino uno and GSM module.

Table 3. Pin Connection with Arduino Uno and Buzzer

Arduino Uno	Buzzer
5V	VCC
GND	GND
D4	I/O



Figure 4. Interfacing with Buzzer Place

6) *FLOW CHART OF THE SYSTEM*

The following flow chart explains the electronics anti-theft system. The user can use this system smart and easily.

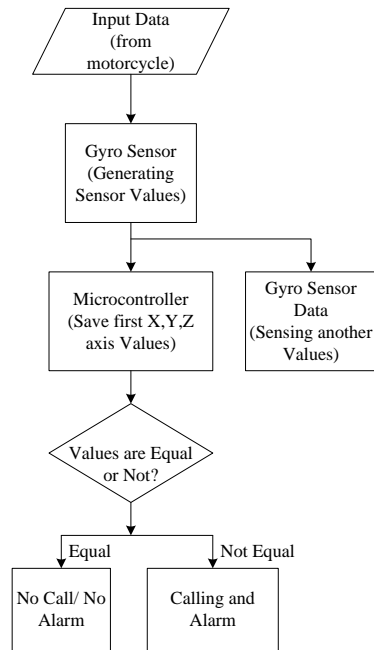


Figure 5. Flow Chart of the System

7) *OVERALL CIRCUIT OPERATION*

In this proposed system, gyro sensor is used to record the original position of motorcycle within a few seconds. The user can be use the key as the switch. After 20 seconds, the user switch the key off, gyro sensor will start its work and send the data to the microcontroller which connects with the GSM module and buzzer. When someone who used this system stops his cycle and switch off, gyro sensor will record the position of motorcycle such as x-axis, y-axis and z-axis after 20 seconds. And then, these values will be sending to the microcontroller and save them as the original values. If someone tries to move motorcycle, the recorded x, y, z values will change. At that time the controller will know the motion of motorcycles and the function of GSM module and buzzer will be started. The buzzer ringing and calling to the owner will be started at once. The owner will know something is happening in his motorcycle. The buzzer ringing and GSM module calling will stop if the motorcycle reaches its original position, the gyro sensor recorded x-axis, y-axis and z-axis value. This system will be effective for everybody and useful for secure environment.

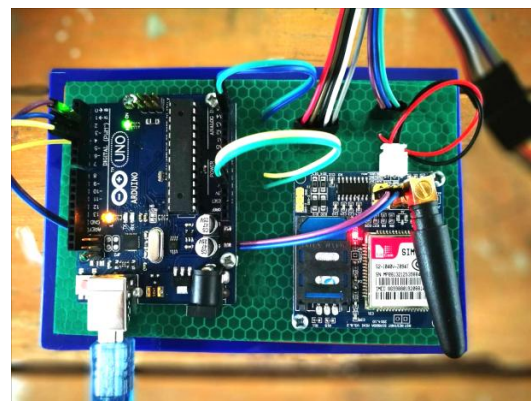


Figure 6. Overall Connection of the Circuit

8) TESTS AND RESULTS

Figure 7 shows the original position of user's motorcycle. Then, the system is activated when the user switch the key off. Gyro sensor will be recorded the original position of motorcycle after 20 seconds later. The simulation results of gyro sensor after 20 seconds are shown below.

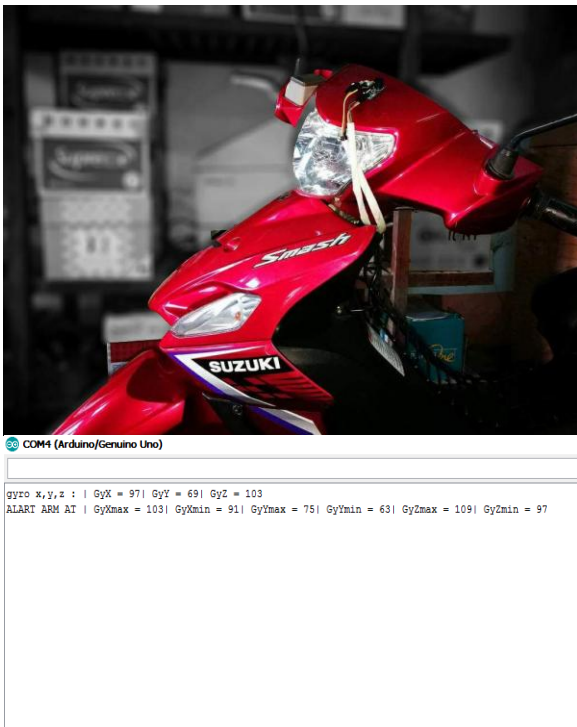


Figure 7. Original Position of Motorcycle and its X-axis, Y-axis, Z-axis Values

The figure 8 shows the results of motorcycle when someone is moving this motorcycle. At this time, Gyro sensor will record the new position. Alarm ringing and calling to the owner will start at once.

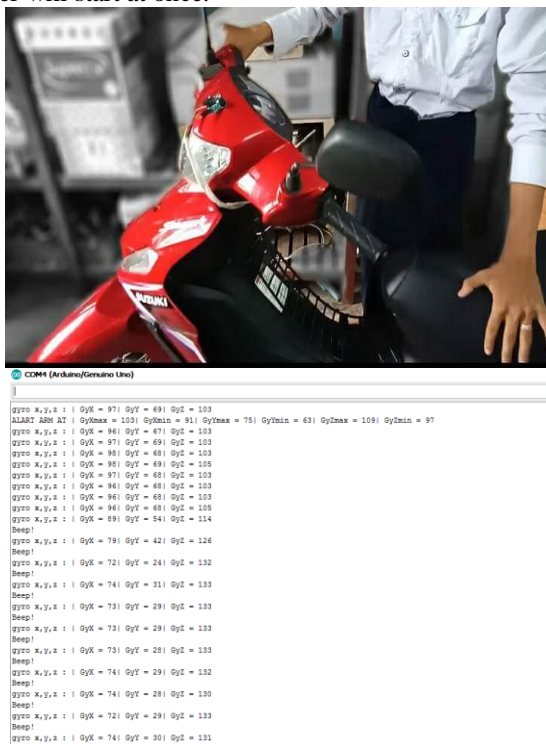


Figure 8. The New Position of Motorcycle and its Corresponding Simulation Results

The figure 9 shows the result after replacing original position of motorcycle. At this time, the alarm will stop and phone call will also stop.

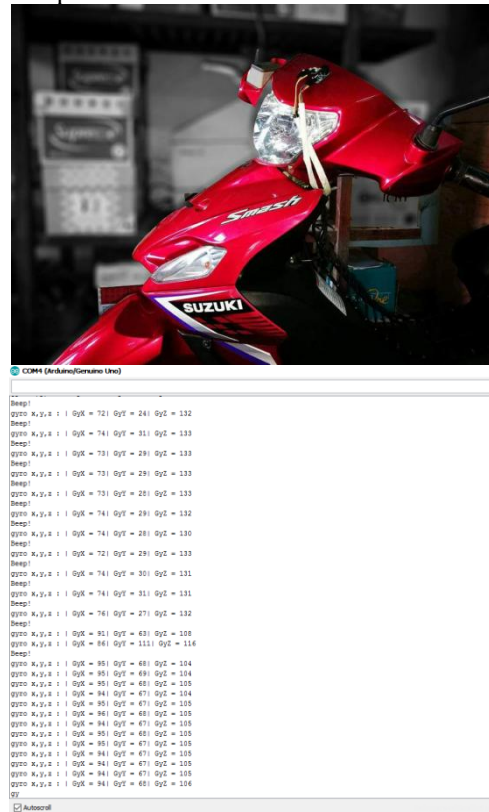


Figure 9. After Replacing the Original Position and its Simulation Results

9) CONCLUSION

Nowadays, various types of security systems, such as CCTV, RFID technology, password based security system, face detection, finger print are used in so many public places. Some systems are expensive and confuse. In this proposed system, the user can use the key (on-off) as the switch. This is easy and smart for the user. Microcontroller and GSM module are placed beside the oil tank because low frequency, 900MHz is used in this system. This frequency range is safe and cannot be explosive. This system is less power consumption and low cost, moreover, the user can know at once if his motorcycle moves because of someone. The disadvantage of this system is the damage of the key. If the thief tries to break up the key, the system cannot work. To prevent this condition, external switch can be used. If the user uses external switch, the system will work even the key is broken because of the thief. This system can be advanced by adding GPS system to track the thief and to get more precise system. RFID technology can also be used as the external switch to become smarter life. Whatever we believe that this system is very useful for motorcycle users and can be reduced the missing of motorcycles.

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