

Automobile Theft Identification with Notification by using RFID

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Abstract— As we all know vehicle theft is arguably the fastest growing type of crime in India. Some urban areas see over 100 vehicles stolen every day, and the figures aren't much better for those living in rural regions. While a majority of stolen vehicles are motorcycles and scooters, an increasingly large percentage of cars and trucks are being taken. Perhaps most notably, only a relatively small number of drivers in most Indian cities have access to anti-theft technologies [1]. To stop these crimes we have invented our project with the new technology including RFID, GPS and GSM receiver, so that we can get the exact location of vehicle and able to stop the engine.

Keywords: GSM, IR Sensors, GPS System, Arduino UNO, RFID Reader and Key

I. INTRODUCTION

Several major tech companies have been promoting products that could help to at least allow police officers to trace vehicles after they've been stolen. According to the police department in Delhi, motor vehicle crime is the least-solved offense. Over 44,000 vehicles were stolen in 2018, but less than 20 percent of these were solved. The number of successfully recovered cars in usable condition is probably much lower than this[1]. To decrease the number of vehicle thefts we have introduced a model consisting of one microcontroller that is Arduino UNO, using some sensors like IR sensors, GSM, GPS and RFID that is Radio Frequency Identification consists of RFID tags which works as a receiver for this project. In this project we are using Theft Mode which is indicated by IR sensors. Here IR sensors are situated where the maximum possibility of intruder attacks. This mode will incur the theft person, if some intruder make the hand in front of IR sensor then LED will glow up and Buzzer will create theft sound and the latitude and longitude location will be sent to owner's mobile. Here RFID is used for the user input, if there is an authorized access then the engine will ON and gives the accurate location of the vehicle to the owner's mobile. If there is an unauthorized access then engine will not start and shows invalid and message will be delivered to owner's mobile. This is the brief introduction of our project.

II. PROBLEM AND ITS SOLUTIONS

As we know in automobile industry the major problem is that a vehicle theft, when a vehicle is stolen then there are less chances of recovery for that vehicle. Police performs their roles but still only few persons are able to get back their own vehicle safely or in ruptured manner. Recovery rates for stolen vehicles vary, depending on the effort a jurisdiction's police department puts into recovery, and devices a vehicle has installed to assist in the process. Police departments use various methods of recovering stolen vehicles, such as random checks of vehicles that come in front of a patrol unit, checks of all vehicles parked along a street or within a parking lot using automatic number plate recognition (ANPR) or keeping a watch list of all the

vehicles reported stolen by their owners. Our project is based on RFID input as soon as user input is in RFID then only the engine will ON otherwise engine will ON in theft mode which is indicated by IR sensors[2].



Fig. 1: It depicts vehicle theft

The main goal of our project is to prevent vehicle theft and engine locking by giving notification to the owner's mobile. In UK, Vehicle tracking systems, such as Lo Jack, automatic vehicle location, or On Star, may enable the location of the vehicle to be tracked by local law enforcement or a private company. Other security devices such as microdot identification allow individual parts of a vehicle to also be identified and potentially returned[2].

III. PROPOSED METHOD

In this proposed work, a vehicle tracking and locking the engine remotely is our prime objective, firstly, we have implanted RFID (Radio-frequency identification) reader that would work as a key. RFID uses electromagnetic field to automatically identify and track tags attached to objects. The owner will only have the RFID authentic tag that would let the system know that it's a valid and authenticate user. These RFID may have multiple tags with same frequency set up for spare pieces. By using the vehicle, the owner have to turn on the theft mode which will do the rest of his safety work. This system too include the accelerometer which is used to measure acceleration forces, it typically contain a piezoelectric crystal element bonded to a mass. When the accelerometer is subject to an accelerative force, the mass compresses the crystal, causing it to produce an electrical signal that is proportional to the level of force applied. this device would work in the theft mode and tell the user whether the vehicle is in momentum or not. If the vehicle stopped by any means the owner will get to know. These things work within the theft mode but our one component is placed outside the system for its own protection, its IR sensor that would sense and command the buzzer if it finds any disturbance in the system. If the thief knows the exact location, that were our system is placed and tries to nullify it, even then the buzzer will blow.

IV. BLOCK DIAGRAM AND WORKING

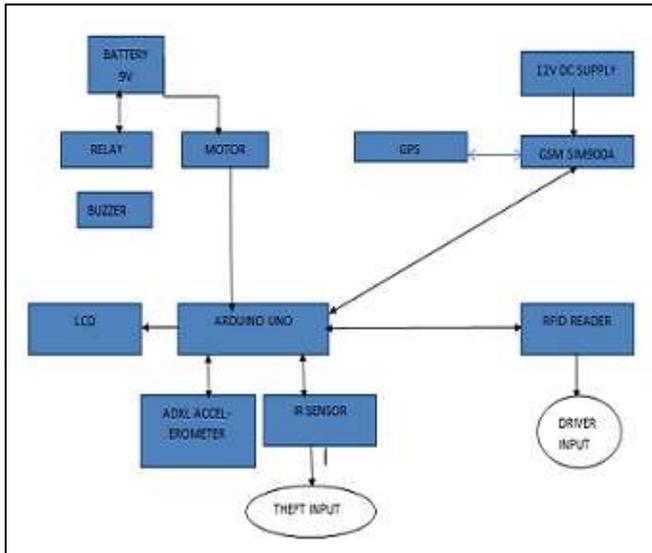


Fig. 2: Block diagram of the project

In our project we have introduced RFID as a driver input means the vehicle will operate only by RFID tags. For RFID inputs we have authorized RFID keys whose data is successfully matched with the RFID card reader. Here Arduino UNO is the brain of this system. It is a micro-controller operated by Atmega 328p controller which controls all the input/output functioning of the system. All the commands coming from the hardware devices that are attached with it is controlled by Arduino UNO. When there is authorized access then the engine will start and authorized access is done only when driver puts the key on RFID reader then engine will start and give the output as Engine ON and message will be delivered with the present location with the help of GSM and GPS to the owner's mobile. For an authorized access the vehicle will not start and message will be delivered as Invalid. For theft mode we have used one IR sensor which senses the object in front of it. As soon as there is an intruder tried to stole the vehicle, his hands or any body part will come in front of it then a buzzer will ON and LED will glow and engine will start then message will be delivered to owner's mobile regarding vehicle theft and to stop the engine we will send Acknowledgement to the Arduino with STOP command then the vehicle will stop and getting the exact location of the vehicle with the help of GSM and GPS. Here ADXL Accelerometer is used when there is any accident, if there is an accident then the X-Y-Z coordinates will get changed and we get a message that the accident happens on owner's mobile.

V. HARDWARE COMPONENTS

The components which are used to describe this model physically are

- 1) Arduino UNO
- 2) ADXL Accelerometer
- 3) RFID Reader
- 4) LCD
- 5) Relay
- 6) Battery
- 7) IR Sensor
- 8) Motor

- 9) Buzzer
- 10) GPS
- 11) GSM

1) Arduino UNO

Here in this project Arduino UNO is used to transfer or receive data and interrupts that are coming from the GPS, GSM, IR sensor, RFID reader, ADXL Accelerometer. It is an open source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board and a piece of software that is IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

2) ADXL Accelerometer

Adxl Accelerometer is used to detect the X Y Z coordinates of the working system. It is a 3 axis accelerometer with high resolution measurement. Digital output data is formatted as 16 bit two's complement and is accessible through either a SPI or I2C digital interface. This is the use of this accelerometer in this.

3) RFID Reader

A RFID reader is the brain of the RFID system and is necessary for any system to function. It is a device used to gather information from an RFID tag, which is used to track tags attached to the objects[3].

4) LCD

It is used to display as a output screen, we have use 16x2 Lcd display it means 16 columns and 2 rows. Its operating voltage about 5V coming from battery and Arduino UNO.

5) Relay

It is an electromechanical switch. It is an electrically operated switch. It consists of a set of input terminals and a set of operating contact terminals. Here relay is used for controlling the signals coming to the motor.

6) Battery

It is used for giving DC supply to motor, buzzer and relay that are connected to the Arduino UNO microcontroller.

7) IR Sensor

It measures and detects infrared radiation by measuring the temperature of each color of light. Here we are using 1 IR sensor to detect theft mode by simply making hand in front of it. IR sensors have different ranges. It has one transmitter and one receiver.

8) DC Motor

It converts dc electrical energy into mechanical energy by the use of magnetic fields. Here in this project it is showing the vehicle is moving or not.

9) Buzzer

It is an audio signaling device, which may be mechanical, electromechanical or piezoelectric. Here it is used for getting beep for intruder is coming.

10) GPS

It is global positioning system used for detecting the accurate latitude and longitude values of the vehicle.

11) GSM

Here we are using GSM SIM 900A which means it will operate at 900 Mhz.,used for sending SMS .[3]

VI. MODEL DESCRIPTION AND RESULTS

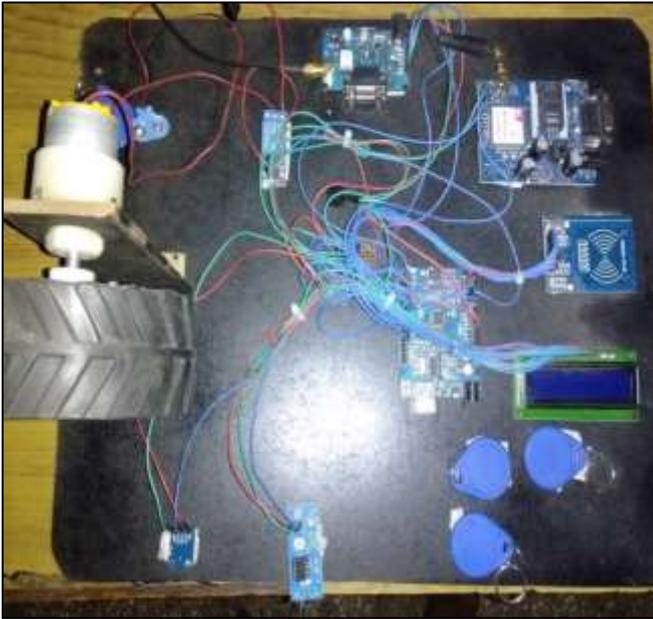


Fig. 3: Model of the project

In the above figure 3 it is clearly visible the model of vehicle theft detection using RFID (right side) with Arduino UNO at middle. In this project we assembled all the components like IR sensor, Buzzer, GPS, GSM, ADXL Accelerometer, RFID and other circuit elements very carefully. This is the final prototype model and this can be implemented at real time purposes in cars and bikes also by making circuit more complex and easy to handle. Here RFID is used to detect the authorized access and for unauthorized it will be showing invalid key. Adxl Accelerometer is used to detect the X Y Z coordinates of the working system. This is the use of this accelerometer in this. LCD is used to display as a output screen, we have use 16x2 lcd display it means 16 columns and 2 rows. The operating voltage of LCD is about 5V coming from the Battery and Arduino UNO. Battery is used for giving DC supply to motor, buzzer and relay that are connected to the Arduino UNO microcontroller. Here we are using GSM SIM 900A which means it will operate at 900 Mhz. It is used for sending SMS to the owner's mobile. IR sensor measure and detects infrared radiation by measuring the temperature of each color of light. Here we are using 1 IR sensor to detect theft mode by simply making hand in front of it. In this proposed work, GPS and GSM technology is used to track the theft vehicle. GPS is global positioning system used for detecting the accurate latitude and longitude values of the vehicle. Here in this project Arduino UNO is used to transfer and receive data simultaneously and interrupts that are extracting from the GPS, GSM, IR sensor, RFID reader, ADXL Accelerometer. This is the upper side view of the project. All the required components are attached to it. Now IR sensor will used as a theft mode as someone comes in front of it then the buzzer will start and location is sent to the owner's mobile. Relay is an electromechanical switch. It is an electrically operated switch. In this project Relay is used for switching mechanism to control the various input and outputs from this system. This project detects the vehicle theft and activates the Tracking system.

Microcontroller interrupts the vehicle location with the help of GPS modem then Microcontroller sends message to owner of the vehicle. Here Arduino UNO is used as a microcontroller which is the brain of the system. Buzzer converts dc electrical energy into mechanical energy by the use of magnetic fields. Buzzer will glow when there is a vehicle theft. Here we are using GSM SIM 900A which means it will operate at 900 Mhz. It is used for sending SMS to the owner's mobile. By this method we can decrease the possibility of crimes upto great extent, as there is rapid increase of theft in our country. For getting more security we can implement this project in daily life or in real life purposes. If vehicle gets stolen in theft mode then microcontroller gets interrupted and command GSM module to send SMS to the owner's mobile.



Fig. 4: Model name showing on Output Screen

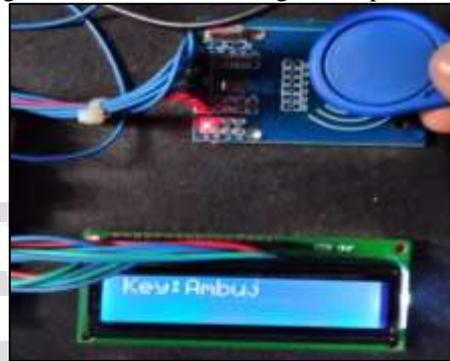


Fig. 5: Authorized access

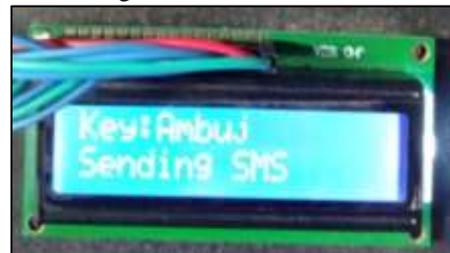


Fig. 6: Sending SMS to the owner's mobile

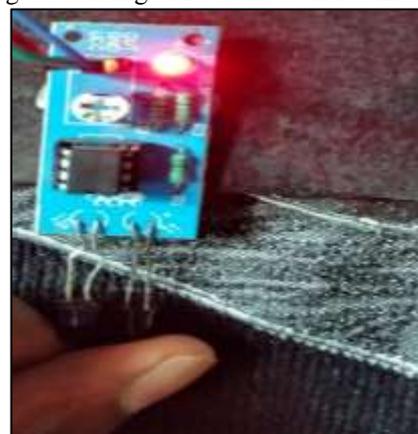


Fig. 7: Theft mode using IR sensor

VII. CONCLUSION

In our project we have concluded that we can prevent the vehicle theft by RFID control and we can also catch the intruder by using theft mode which comprises IR sensor. IR sensor is placed where there is a maximum possibility of intruder will act upon it. Our project also has new feature that is Accident notification mode which is controlled by ADXL Accelerometer. By these features we can able to prevent the vehicle theft.

VIII. FUTURE SCOPE

This paper explains the vehicle details based on the RFID technology featured by Arduino UNO and ADXL Accelerometer too. The big advantage of this project is that it is cost effective, much more reliable, secured and ease to use. By this we can transform and revolutionize the traffic management system and avoid accidents caused due to over speeding in the near future by getting exact location to owner's mobile. The above prototype can be installed in vehicles either in bikes or in cars , they both are cost effective. We can also installed ignition valve to take control of fuel of a car or bike so that fuel can be controlled and the command will take place and vehicle can be stopped.

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