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IOT-based Wireless Controlled Smart Transportation System

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***Abstract*—**In today's world Internet of Things plays an important role in many applications such as smart home, smart transportation system etc. Vehicle theft is the major problem faced by the people in the society. The statistical survey shows vehicles which get stolen out of 4 only 1 get recovered. Present systems use key and remote to lock the vehicle. At many places CCTV cameras are present which are used to locate the stolen vehicle. But CCTV cameras are not present at all places. Control of vehicle and knowledge of their location even after theft can help recovery of the stolen vehicle fastly. The proposed system helps to find the vehicle location using GPS and the vehicle speed is gradually reduced by reducing speed of ignition motor. It helps to find the vehicle immediately after knowing it's stolen. As GPS system is used, the location of the vehicle is also known. The command sent from the smartphone goes to the GSM system which is interfaced with controller which reduces the speed of ignition motor and immobilizes it. The system developed is reliable, low cost and user friendly which can help in the recovery of vehicle if it gets stolen.

***Keywords*-**IOT, Smartphone, ignition motor GPS, GSM, Arduino

I. INTRODUCTION

For every year in India nearly 36,000 vehicles are stolen which is actually worth to Rs.115 crores of money. Out of all these, the traced count of the vehicle is 14,500 only. In less safety areas, many vehicle thefts take place. Many vehicles are stolen by the people because the opportunity for stealing the vehicle is high. The cars are left with less secured condition in the improper way, so there might be a great chance for vehicle steal. By the installation of anti - theft devices in the vehicle, the attempts which are taken by the thief's in order to steal the vehicle can be reduced. In the year 2012, 16 crores of vehicles

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were registered in the country out of which 1.7 lakhs of vehicles were under the stolen condition. Inspite of all claims established by law enforcement agencies in controlling the vehicle thefts, as per the information tabled in the Lok Sabha shows that 1.65 lakhs of vehicles were stolen in a year-2013. In many situations the owner of the vehicle may allow his driver or any family members to drive the vehicle with the help of the spare set of keys. But this method is used by the criminals in a wrong way. They can find a spare set of keys in the owner vehicle and try to drive the vehicle with the help of these keys. The one is opportunistic theft (i.e.) the owner can make a situation of parking the vehicle in an unattended way with the presence of the key in a visible manner and many vehicle thefts may takes place during the test drive where the thief can get the clear idea about the keys stored place in the vehicle. The thief can steal the vehicle at later part of time. The tracking systems were developed initially for the shipping industry as there is a need to locate where each vehicle was at any instant of time. The real time location of the vehicle is found using GPS technology and transmitted by means of GSM modem. The work proposed in this paper is divided in two stages. 1) Finding the location of the vehicle 2) Immobilizing the vehicle. Thereafter, the location of the vehicle can be easily found without delay. It provides following facilities such as stolen vehicle tracking and recovery, Remote vehicle immobilization / Door lock controls. This system can be used for monitoring the vehicle which carrying the valuable goods and to track the vehicle location to know about the delivery status of the goods carried by the vehicle.

II. LITERATURE SURVEY

Asaad M. J. et al, proposed a novel method in the year 2012. In this method vehicle tracking device is installed in specific vehicle which is used to help the owner to track location of the vehicle. This is done with the help of GPS and GSM technologies. This method will monitor a vehicle continuously and the vehicle status is automatically reported to the owner on requisition command. Ramya V et al., proposed a system in the year 2012 which detects obstacles. When an obstacle comes near the vehicle, it alerts the vehicle user about the approaching danger. The vehicle user may take the immediate action to avoid any change of accident to himself and the pedestrian. It also monitors the system for any presence of toxic gases and

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intimates the owner if it becomes aware of its presence. Peijiang Chen et al., proposed a system in 2008 in which the vehicle parameters are monitored from remote location. The various parameters received from the vehicle is sent to the remote location via GSM where a computer is used to show the results in VB. Saranya.B, Sasikala.N et al., proposed a system with a barcode scanner in which it is used to read the barcode present on the object. The microcontroller is used to check the input from the barcode scanner with the predefined code present in it. If the barcode is not matched with the code, then the microcontroller will send the signal to the driver circuits in order to control the motor operations. Kiruthikamani.G et al., proposed a system in which the speed of the vehicle is controlled by communication through the RFID Technology for a short distance range. This won't be applicable for long distances. Albert Alexe, R. Ezhilarasie et al., proposed a system based on cloud computing technology. Here the sensor datas are collected and based on that required actions have been taken. Also, the vehicle's location is found using GPS.

III. PROPOSED SYSTEM

The proposed method consists of Arduino UNO microcontroller. The monitoring system involves an Arduino development board as a processing unit and it provides the control operations on the entire system. It uses GPS Technology in order to track the location of vehicle. Whenever there is a need of a vehicle the authorized person can send a request to the server through the internet. If any vehicle is available means the response is given from the server in the form of digital code which is sent to the user and if the vehicle is not available means request message of the vehicle unavailable status is sent to the user.

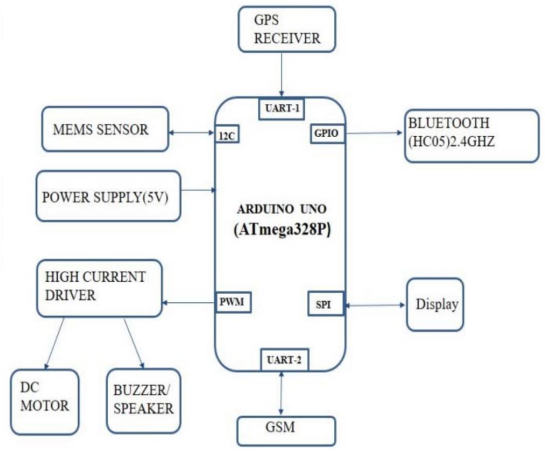

Fig 1: The implemented system block level diagram

The digital code is sent to the microcontroller system setup which is placed inside the vehicle with the help of the interfaced bluetooth module via the bluetooth connectivity in the mobile phone.

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The customized android application is installed in the smartphone in order to convey the digital code to the microcontroller system which is created using the Eclipse software. Here the GSM technology is used to instantly lock the door and stall the speed and to stop the engine motor. The relay circuit is used to switch the speed of motor in order to reduce it gradually and stopping the engine motor in the end. The command is sent from smartphone to the GSM module interfaced with Arduino UNO. The Arduino UNO is based on the command received takes the required action .i.e. it reduces speed of the ignition motor gradually and it locks the car door. This system is capable enough to control the vehicle via the command from vehicle owner. If the vehicle is theft by someone means the buzzer gets ON and the SMS is sent to the vehicle owner. So this implemented system can act as the theft prevention system with high security. The implemented system also provides the direction of the vehicle. The exact direction of the vehicle is found with the help of the 3 axis magnetometer sensor which acts as the tilt compensated compass module. So the owner receives the SMS about the exact latitude and the longitude of the vehicle position in the specific direction using the GSM technology. If the vehicle crossed the area particularly limited by the owner, then GPS fencing operation is done. The owner of the vehicle receives a SMS that the vehicle crossed the specific location.

1. HARDWARE MODULES

A. Arduino UNO ATmega328P The Arduino UNO ATmega328P is a microcontroller consists of 14 pins which acts as the digital input/output pins among these 14 pins, 6 can be used as PWM outputs. There are 6 analog inputs pins (A0-A5) and a crystal oscillator of 16 MHz of frequency range are present. The power can be given to the microcontroller by simply connecting with the personal computer using the USB cable or using adapter or battery circuits. The controller has 32KB of flash memory out of which 0.5KB is used for boot loading operation. It contains 2KB of SRAM and 1KB of EEPROM. Here the arduino is programmed such that depending upon command received from GSM it controls the vehicle.

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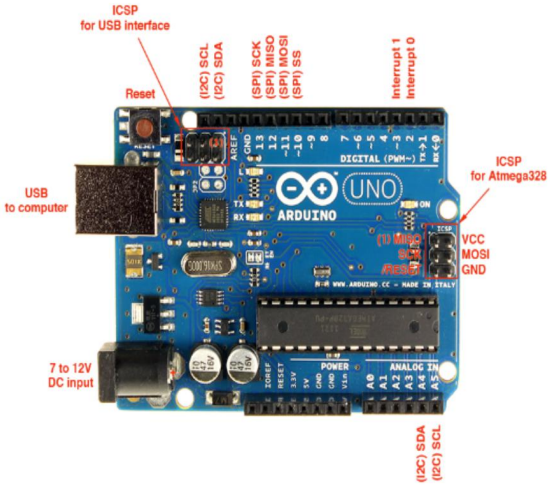

Fig 2: Arduino UNO

B. Bluetooth Module HC-05 bluetooth module is used to transmit the digital code from the smartphone of the user to the front-end embedded controller placed in the vehicle. It provides 3.3-5 V I/O operations.

Fig 3: The HC05 Bluetooth module

It has typical -80dbm sensitivity. It has UART interface with the programmable baud rate. It has the feature of auto-connect to the last device on power as default operation and it also permits pairing of devices connection as default. The auto-pairing PINCODE for HC05 bluetooth module is "1234" as a default one.

C. GSM Module GSM system was developed for the purpose of communication as a digital system using TDMA technique. It digitizes the data and then sends it through a channel in which different time slots is followed for the various streams of the client data. The capability of the digital system is to carry the datas of data rates 64 kbps to 120 Mbps. The GSM module is used to control the vehicle from the remote place and provide security to the vehicle used. Serial pins of Arduino processor (RX and TX) is interfaced to the GSM module to control it by means of AT commands so as to receive SMS and set the mode. Arduino UNO controller will initialize the GSM module operation and wait for receiving SMS. The 0.96-inch OLED display is connected to PORT0 of Arduino UNO.

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Fig 4: SIM800C GSM modem

It will show what the system is actually doing. When the system operation is started GSM module will be in text mode by sending "AT+CMGF=1", AT command. After this setting, Arduino UNO will display in LCD that it's waiting for SMS and this message format persists until it receives SMS. The data sent from each satellite down to earth contains different pieces of information that allows the GPS receiver to accurately find the position of the vehicle and time.

D. GPS Module If the GPS receiver's antenna is able to get signal from four satellites it will calculate the position accurately. The chipset in the GPS contains a processor that is responsible for the user interface, the calculations, as well as circuitry for the antenna. Through the chipset only the data can be sent to the GPS receiver to configure different parameters like update rate, baud rate etc. The GPS module uses the data format of NMEA. The GPS module is interfaced with UART port of Arduino in order to find the exact location of the vehicle. Voltage convertor circuit is used to convert RS232 voltage to TTL.

E. DC motor The DC motor is used to start and stop the vehicle movement when the code from the smartphone is paired with the front-end microcontroller. It is a class of rotary electrical machines that converts the direct electrical energy into mechanical energy. It is a 12V, 100 RPM geared motors used for a robotic application.

Fig 5: DC motor

F. MEMS SENSOR The MEMS (Micro Electro Mechanical System) is used as an important enhancement feature in this project in which it is able to inform the direction of the vehicle. This is achieved with the help of Inertial Navigation Sensors that consists of a 3-axis accelerometer and 3 axis magnetometer

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which will acts a tilt compensated compass module to indicate the direction of the vehicle. So the owner can get the exact location of the vehicle through the direction indicated by the MEMS sensor using GSM technology.

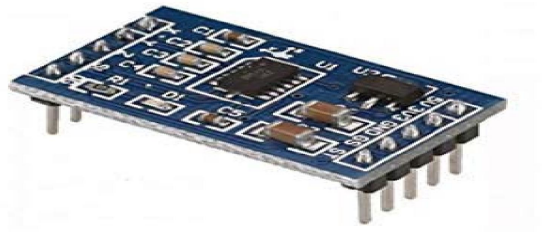

Fig 6: 3 axis MEMS sensor

G. Relay circuit The relay circuit is interfaced with Arduino controller. Depending upon the GSM command received by the relay switches the power supply which controls the speed of DC motor and finally switches off the DC motor as per the commands from the owner.

2. SOFTWARE TOOLS

The customized android-based application is used for sending the digital code via smartphone to the microcontroller which is placed inside the vehicle. This application is created using the Eclipse software.

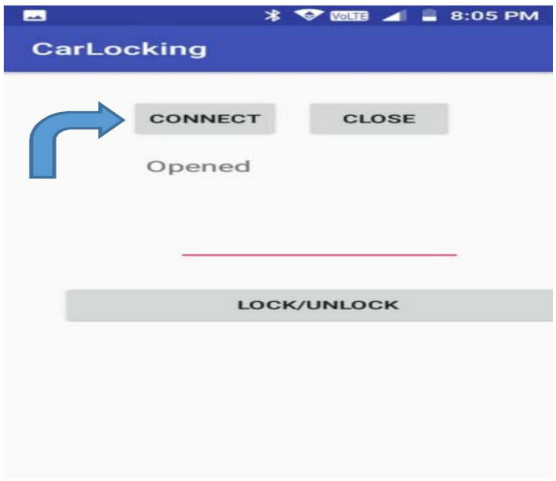

Fig 7: The snapshot of customized android application homepage

Enter the password which is sent by the owner of the car to the user in the application platform home page and then click lock/unlock button.

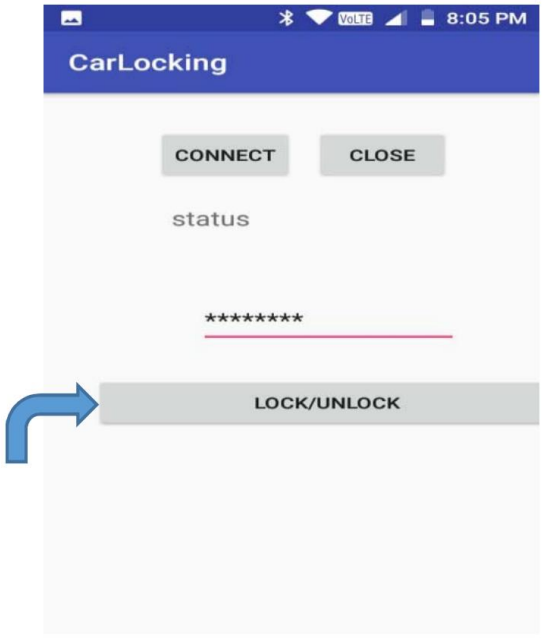

Fig 8: The snapshot of the bluetooth connectivity verification, passcode verification and vehicle lock/unlock verification in the application platform

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IV. RESULTS

In this paper, an IOT based wireless controlled smart transportation system is devised. The implementation of the devised system is successfully done. The different modules of the system functionality are integrated and tested. The snap shot of the homepage of the customized android-based application is shown in the figure 7. By pairing the bluetooth in the smartphone to the bluetooth module connected with the embedded controller the digital code is sent via smartphone to the microcontroller which is placed inside the vehicle. Then the verification on the typed passcode is achieved successfully. It is done by the commands which are sent from the user to the smart phone based application platform.

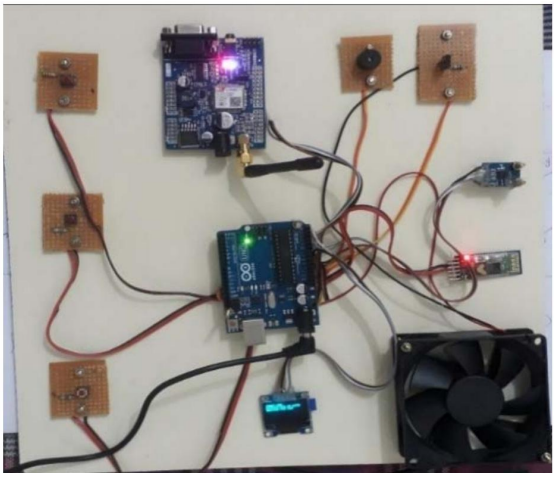

Fig 9: Project Implementation

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