International Journal of Engineering & Technology, 7 (2.7) (2018) 331-334

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research Paper

Implementation of IoT based vehicle theft detection and accident monitoring system using Arduino

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Abstract

This paper presents an efficient system which detects the vehicle accident and sends intimation to the registered mobile numbers such as ambulance or vehicle owner or police etc. IOT based vehicle tracking system detect the Accidents and it sends the position of the vehicle to the specified or pre-programmed mobile number as an SMS. Not only prohibited the accidents. It also prevents the vehicle from theft. If we want opening the door of the vehicle then we need to press a button. Now the owner of the vehicle gets an SMS to grant access. The door will be opened after the authentication only. If an unknown one tries to open the door of the vehicle then you can restrict that person by using mobile. The GPS is used for tracking the vehicle in this system. If any accident detected then an alert will be given with buzzer. Now the driver can press button to stop that. If it is small accident, here the driver can stop the buzzer if the vehicle is safe with in time period. Otherwise an alert will be sent to the owner of the car. It indicates that the person in car or car in trouble.

Keywords: *Accident Detection; GPS; Mobile Unit; Theft Control; Vehicle Tracking.*

1. Introduction

In highly populated areas, the human lose their life due to improper medical services at in time. The development of foundation and technology rapidly made one‟s lives simpler. The appearance of technology has additionally increased the traffic hazards and the road accidents occur every now and again which causes immense death and loss of property as a result of the poor emergency facilities. Now a days, the navigation system plays vital role in position detecting. Each and every vehicle consists of navigation system which continuously provides the alerts about a particular vehicle. A vehicle tracking system not only depends on the navigation but also GPS and internet. The coordinates of the GPS system continuously monitors in real time and send alerts to the tracking device. Like this the position of the vehicle can be easily detectable. The messages are transmitted using cellular system.

The increasing desire of automobiles has also increased the road accidents and the traffic hazards. Life of the people is under high risk. This is due to the lack of finest emergency facilities available in our Nation.

Section II deals with Related Work. Section III focuses on the idea of proposed system. Section IV explains the results with screenshots and hardware. Section V deals with Conclusion of the system. Section VI outlines the references that were collected.

2. Related work

Manjunath A Naik et al [1] have focussed on Anti-theft vehicle Tracking System using Smartphone stated having 2 units. Those are user and In vehicle units. For this two microcontrollers are used and one GPS and GSM modules are implemented for detect- ing vehicle as well as for real time monitoring. A camera is placed in this system for capturing the images and smart phone for send- ing the email to the owner.The used GPS tracks the coordinates of geographical area and GSM is used for sending the information about the vehicle to the user. After that, vehicle tracking system implemented for sending the text message to the owner from the mobile. If the owner want to respond then he may send another text message for access with the help of his mobile to the modem of the GSM.

Kingshuk Mukherjee et al [2] contemplates the idea of vehicle tracking to the owner through a text message from his mobile phone. The implemented tracking system in this having the model of GSM and module of the GPS are interfaced along with microcontroller of ARDUINO. If the TRACK SMS received by Arduino from the person with the help of GSM which uses the GPS for tracking the current location. Next Vehicle tracking using RFID developed by considering the cyber physical as well as computing systems of ubiquitous. After that a self motivated sys- tem developed for tracking systems which having the smart vehi- cle tracking system that already used in some of the smart cities. This brought the change in transportation industry. After that Smart Vehicle tracking method online for security applications (AMOTSSA) used for big data applications. For dealing with big data, a data analytic algorithms sets for investigation the goals support. Mrinmoy Dey, Md.Asif Mahmood) stated the “Anti-theft Protection of Vehicle by GSM & GPS with Fingerprint Verifica- tion”. It is completely based on microcontroller and two way GSM module.Fingerprint module is used to verify the user access. Be- fore starting the vehicle the driver or owner need to verify the finger prints. If the fingerprint does not matched with predefined one then the SMS will be sent to owner. Then the owner of the vehicle can lock their vehicle.

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3. Proposed system

The implemented system used the microcontroller instead of FPGA. Here the operations of the microcontroller are prespecified as well as it having the fixed hardware unit. To Send the SMSs, the Node MCU and Arduino UNO are used instead of GSM. That helps for tracking the positions of the vehicle and controlling the doors of the vehicle without any delay.

3.1. Arduino UNO

The Arduino UNO used in our implemented system. ATmega328P based microcontroller is the Arduino UNO Board. It consists of 14 I/O Pins which are digital in nature. A Quartz crystal of 16 MHA and one USB connection existed in.

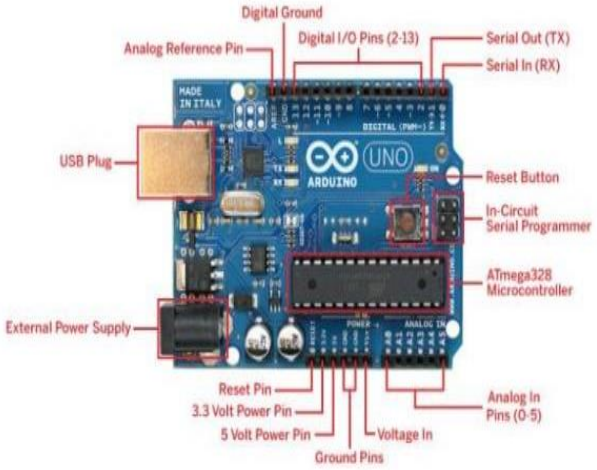


Fig. 1: Photograph of Arduino UNO.

This. The Arduino UNO having the a power jack & one ICSP header. All things which are useful for proper working of microcontroller is presented in this. We can just connect the Arduino UNO to the PC with the help of USB cable via AC to DC adapter. UNO is a Italian word choosing for spotting of the Arduino Software IDE. One of the USB Arduino boards series is Arduino Software (IDE) version 1.0 which is the recent version. NODE MCU is the IoT oen source platform.

3.2. ATmega 328

ATmega 328 created by Atmel. It is single chip microcontroller which is one of the series of megaAVR. This is the most powerful microcontroller that is used in our implement system. It receives the input from the various predefined devices and processing the request. If any accident occurs then it immediately initiates the Arduino UNO for sending the message to the particular person. It used the IOT for sending the text messages and vehicle ;location.
The Features of the ATmega 328 is described as follows.

- Having the RISC Architecture which is advanced
- 131 Instructions set
- Single Clock Cycle Execution
- 32 bit Working Registers of General Purpose



Fig. 2: IC Diagram of Atmega 328.

- Complete Static Operation
- 32Kilo Bytes of Nonvolatile Memory
- 1 Kilo Byte Flash program Memory which is Self- Programmable

3.3. Push button switch

The pushbutton switch is used here for the purpose of authentication. If we press it , the LED glows. It having of 3 wires that are connected to the board of Arduino. One is connected to the 5 volts power supply via resistor. Another one is for ground and third one is for interfacing purpose. If it is in idle state, there no association. We can know take it as LOw or 0.

3.4. GPS module

Here we used u-blox NEO-6M GPS module along with the antenna that having the EEPROM which is built in this is suitable for many of the flight controllers that are developed for wiring with module of the GPS.



Fig. 3: Picture of GPS Module.

3.4.1. Specifications of the GPS

- 3 to 5 Volts of Power Supply
- Backup battery
- Antenna of the Ceramic
- EEPROM count of one
- LED as a signal indicator
- Antenna

3.5. Accelerometer sensor

The Accelerometer sensor (ADXL335) is used in the proposed system to detect accident severity. This sensor is small in size and operates with low power. It is the 3-axis accelerometer and having the voltage conditioned signal outputs. ±3 g. Is the min Full range that can measure.

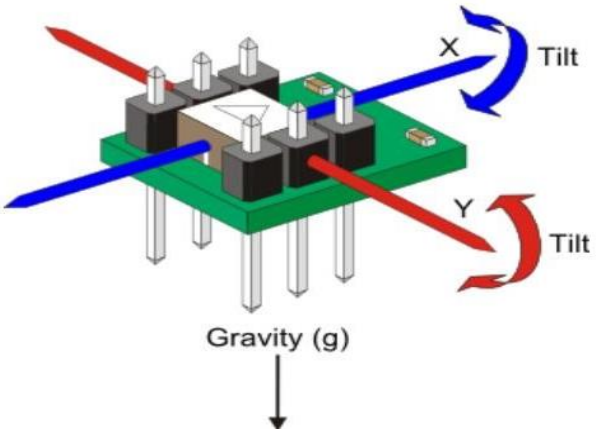


Fig. 4: 3-Axis Accelerometer Sensor Diagram.

3.6. Relay

It is a switch that is operated electrically. For controlling purpose the relay is used.
It is having the particular low power signal.

3.7. Circuit diagram of vehicle theft detection & accident monitoring

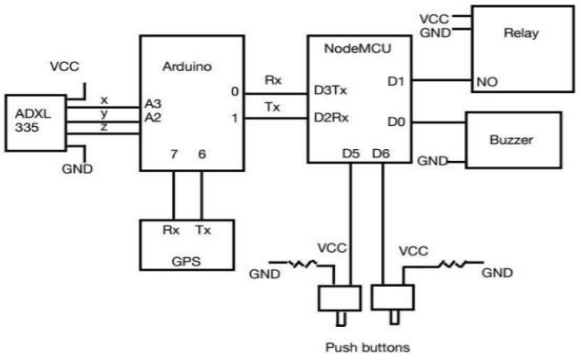


Fig. 5: Circuit Diagram of Accident Monitoring System.

The implemented system detects vehicle accident and sends mes- sage to the pre- registered numbers like ambulance, owner, police etc. Here we used the tilt detection which is accelerometer sensor for detecting the accidents. Our system also controlling the thefts. If an accident occurred the buzzer sends the signal to the regis- tered number if the driver does not press the button. If the button is not pressed within a specified time then it considered as serious acci- dent and alert will be sent. If someone try to open the door then without authentication then alert will be sent. Then by suing a spec- ified mobile app, we can lock our vehicle door.

4. Results

Detailed submission guidelines can be found on the journal web pages. All authors are responsible for understanding these guide- lines before submitting their manuscript.

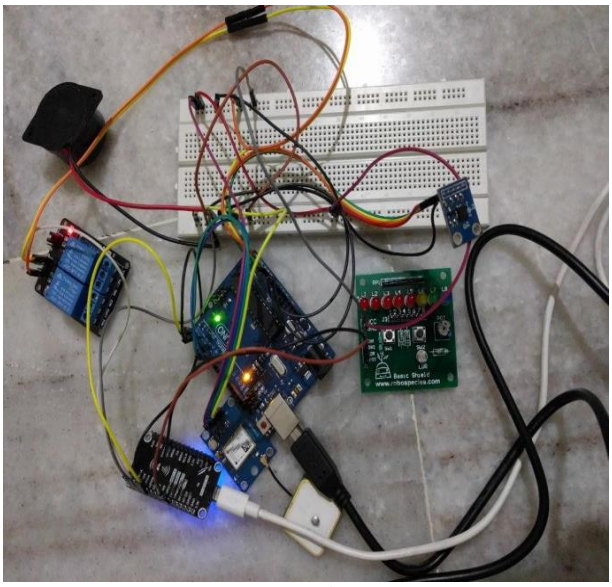


Fig. 6: Hardware Implementation of Accident Monitoring System.

Simulation results showing latitude, longitude positions and X, Y, Z axes of accelerometer sensor.

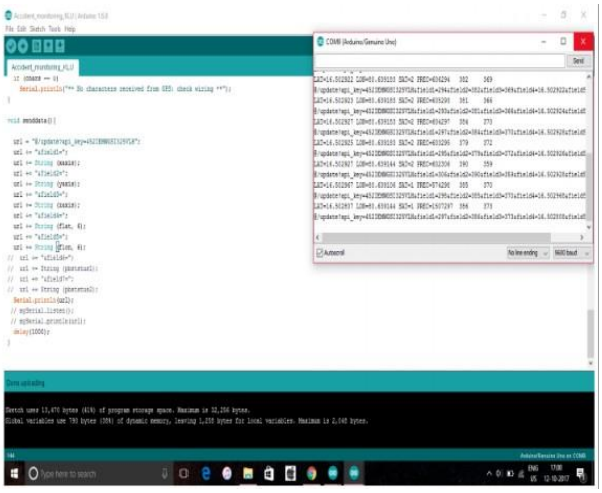


Fig. 7: Simulation Results of ADXL 335 and GPS Location Co-Ordinates Values.

5. Conclusion

The implemented IoT based vehicle tracking system detects the ve- hicle accident severity. An alert will be sent to the registered mobile numbers such as family member of vehicle owner, nearest police station and hospital also. The AXDL335 sensor is used to detect the tilt. The proposed system is useful to prevent the vehicle from thefts also. GPS technology is used in the proposed work for sending alerts to the person concerned for faster response. Then one can provide the medical facility at right time. The proposed system re- acts quickly to send the SMS. Acquired. Allow a sufficient space in the article for conclusions. Do not repeat the contents of Introduc- tion or the Abstract. Focus on the essential things of your article.

Acknowledgement

Our sincere thanks to Dr. K. Venkata Ratnam Associate Profes- sor , ECSE Department for his owing support during the paper for the productive completion of the work.
We offer my thanks to Dr. K. Raghava Rao, Head of the De- part- ment for Electronics and Computer Science Engineering for fur- nishing me with satisfactory offices, ways and means by which I could finish this paper work.

We might want to put on record the profound feeling of appreciation to the noteworthy Dr.L.S.S.Reddy, Vice Chancellor, K L Univer-sity for giving the vital offices to convey the finished up this task.
Last however not the minimum, I thank all Teaching and Non-Teaching Staff of our area of expertise and particularly my colleagues and my companions for their help in the consummation of my venture work.

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