Smart Vehicle Monitoring with Accident Detection and Prevention System

N.Shankar, B.Indurani

Abstract: ***Travelling an important necessity for human life has now turned to be dangerous. Road accidents are proportionally increasing with time. A survey conducted by Times Now says that about 2 lakhs death cases are reported due to road accidents. Moreover in the reported death cases, nearly two-thirds die due to intoxicated driving and late arrival of medical recovery. Our paper incorporates an alcohol and vibration sensor, along with GPS and GSM for providing accurate locations. When a vehicle meets with an accident, the detailed location of the vehicle is sent immediately to the concerned authorities. Furthermore the engine can automatically get locked when a boozed person drives the vehicle. Hence the system can use for Real time tracking, Accident detection and Accident prevention.***

Keywords: Accidents, alcohol sensor, GPS, GSM, engine locking

I. INTRODUCTION

Transportation has made our world accessible to anything and everything in the world. Development of transportation has been dated from our Stone Age carts to and till the space shuttles in the 20st Century [1]. The reason behind its rapid development is either encouraging business or to requirement of rapid transportation. Transportation is a great boon for the human life but some fear it is not to be transformed into a bane, due to the high speeding of vehicles and overriding Road safety measures. In our day to day life we see that the counts of accident that are occurring in the world rising the death tolls. Government Statistics tell us that 1, 40,000 death cases are reported in a year due to accidents. From statistics it is also evident that people who face accident die mainly due to delayed rescue operation [2]. Thus to overcome this problem our proposed system, tracks the vehicle location and monitors it using GPS & GSM. When a vehicle meets with an accident, the installed Vibration sensor detects it and the location of the vehicle sent to respected authorities. Alcohol Detection unit switches off the engine when a person influenced by alcohol tires to drive the vehicle [3].

II. LITERATURE SURVEY

The products available in the market are not reliable when it comes to synchronizing more than one parameter. The literature survey revealed that systems available in market has a major disadvantage, it is specifically designed for one sole purpose like Accident detection, Accident prevention or vehicle monitoring [4]. These systems on their own have many advantages but these systems, but since in cost point we have to reconsider our decision to buy these products due to their lack of multitasking ability. These systems while improving their functionalities by adding a feature to the existing system will increase the redundancies. To overcome this disadvantage we are proposing a paper which could increase the functionality and reliability such that it can monitor the vehicle along with accident detection system and accident prevention by locking the engine when the intoxicated person drives the vehicle by engine lock. Thus over proposed system is much more advantageous over the existing systems.

III. PROPOSED SYSTEM

The working module consists of sensory unit and communication unit, processing unit. The main components and their process are shown in figure 1.

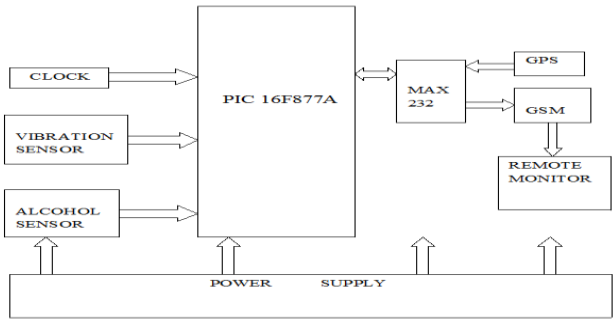

Fig 1. BLOCK DIAGRAM OF PROPOSED SYSTEM

A. Processing Unit

The PIC module is the processing unit. Here PIC 16F877A is used [5]. This microcontroller is one of the most reliable and most commonly used types of microcontroller. It is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division.

B. Sensory Unit

The sensory unit is like a skin. The sensory unit contains sensors to detect abnormalities in the system. The system uses two sensors for finding the condition of the vehicle and person. The vibration and the alcohol sensor comprise the sensory unit.

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I. Accident Sensing Unit

The accident sensing unit comprises of a vibration sensor and a relay along with an Operational Amplifier. OPAMP can be deployed as a comparator to check the minimum vibration level, however when the vibration levels go high an alert signal is sent to the microcontroller. The accident sensing unit detects the vibration of the vehicle which is amplified by the OPAMP and output signal given to the microcontroller.

II. Alcohol sensing unit

The alcohol sensing unit uses an alcohol sensor to detect the presence of alcohol in the atmosphere and covert the measured physical quantity into equivalent signal. This obtained output is sent to the microcontroller, which in turn switches the relay connected to the ignition. Therefore an intoxicated person is prevented from driving, stopping a future accident.

C. Communication Unit

The communication unit comprises of the Global Positioning System (GPS) and Global System for Mobile (GSM). The communication unit is used for transferring the data regarding the position of the vehicle and the condition of the person are all communicated via this unit.

I. Global System for Mobile Communication (GSM)

The GSM is the most commonly used for mobile communication. GSM (Global System for Mobile Communications, originally Group Special Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) [6]. In this system SIM900A is used for transferring data regarding the status of the vehicle and the person.

b) Global Positioning System (GPS)

GPS usually refers to the Global Positioning system which uses an array of satellites which circulates around the world. The GPS tracks the location of the person with respect to the satellites and calculates the latitude, longitude, altitude, time, date, etc [7]. The GPS Satellite transmits these data in the form of an array called an NMEA data. The data which we perceive is then converted into the size and the data we want.

F. Flow Chart

The algorithm is implemented in PIC microcontroller for accident detection, engine locking and normal working condition applications. The flow chart s shown in the figure 2

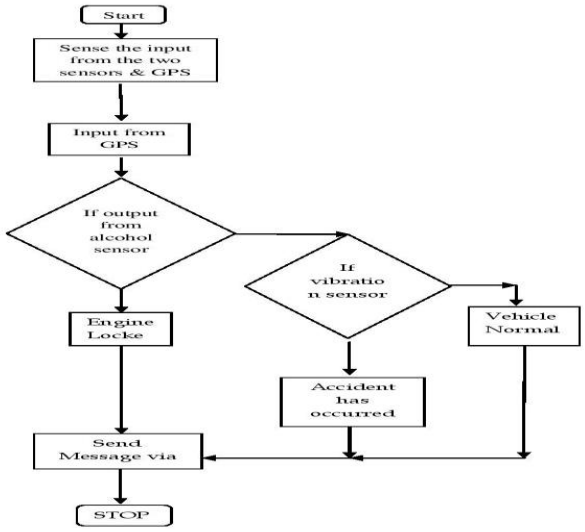

Fig 2. Flow Chart

IV. EXPERIMENTAL RESULTS

A. Normal Condition

Thus under this condition there will be no output from the sensors and under these conditions the microcontroller will send the message such as normal and the location of the vehicle. The location coordinates are found by the GPS. The messages are sent to the mobile number which is incorporated in the program. The result of normal condition is shown below in figure 3.

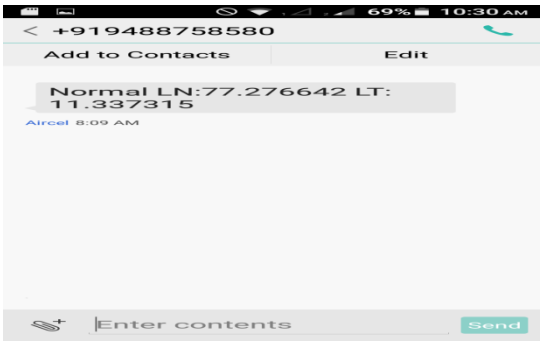

Fig 3. On Normal Condition

B. Accident Condition

Thus under this condition there will be output from the vibration sensor and under these conditions the microcontroller will send the message such as accident and the location of the vehicle. The location coordinates are found by the GPS. The messages are sent to the mobile number which is incorporated in the program. The results of accident condition are shown in the figure 4.

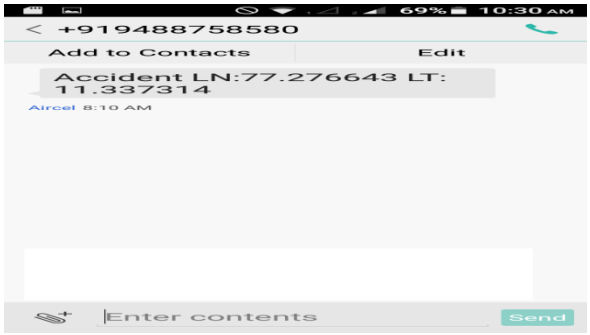

Fig 4. On Accidental Condition

C. Engine Locked Condition

Thus under this condition there will be output from the alcohol sensors and under these conditions the microcontroller will send the message such as normal and the location of the vehicle. Further the power supply to the motor will be stopped since the microcontroller will trip the relay powering it. The location coordinates are found by the GPS. The messages are sent to the mobile number which is incorporated in the program. The results of engine locked condition are shown in the figure 5.

Fig 5. On Engine Locked Condition

V. HARDWARE IMPLEMENTATION

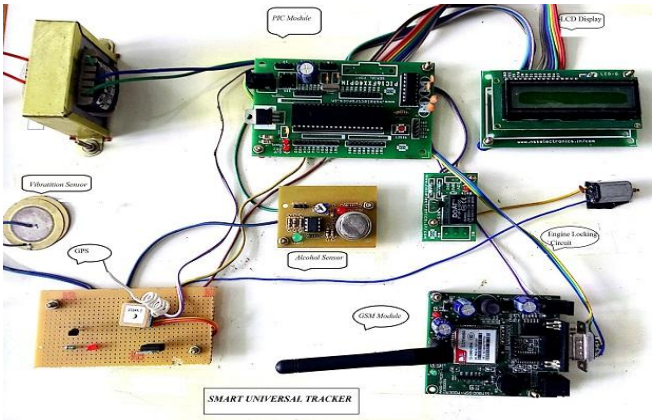

Fig 6. Experimental Setup of Smart Universal Tracker

The hardware has the following units such as power supply, PIC16F877A, Alcohol sensor, GSM Module, GPS Module, Vibration sensor, LCD Display and Engine Locking circuit. The figure 6 shows the hardware implementation of the smart vehicle tracer.

VI. CONCLUSION

The proposed system is much reliable and potentially more effective than the existing systems. Since we can track, monitor and can identify the status of the vehicle and person. Furthermore it is more effective since it prevents the intoxicated persons from driving the vehicle, it main advantage is that we can save lives using this project and further we can also track the location of the vehicle if it gets stolen.

REFERENCES

1. Accident Detection and Reporting System using GPS,GPRS and GSM Technology by Md. Syedul Amin, Jubayer Jalil & M. B. I. Reaz in 978-1-4673-1154-0/12/$31.00 ©2012 IEEE ICIEV 2012.
2. Wireless Vehicular Accident Detection and Reporting System by Rajesh Kannan Megalingam, Ramesh Nammily Nair in 978-1-4244-8102-6/10/$26.00 © 2010 IEEE, ICMET 2010
3. GPS/GSM Based Bus Tracking System (BTS) by Christeena Joseph ,A.D.Ayyappan , A.R.Aswini, B.Dhivya Bharathy in International Journal of Scientific & Engineering Research, Volume 4, Issue 12, December-2013 176 ISSN 2229-5518.
4. Real Time Vehicle Tracking System using GSM and GPS Technology- An Anti-theft Tracking System by Kunal Maurya , Mandeep Singh , Neelu Jain in ISSN 2277-1956/V1N3-1103-1107.
5. PIC Microcontroller and embedded system by Muhammad Ali mazidi, rolinmckingly and from www.microchip.com
6. GSM system for mobile communication by Michael Mouly, Marie Bernadette Paulet.
7. Introduction to GPS by means of Ahmed El Rabbany.