WIRELESS SYSTEM FOR AN ACCIDENT INDICATOR AND LOCATION DETECTION BY USING AN EMBEDDED BASED SMART SENSOR

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Abstract--- An unpredicted event which happens in our day to day life was an emergency situation which is more commonly known as an accident. Prevent the people from an accident is needed which can be by employing observant in automobile systems. This paper describes the automatic emergency calling or alarm systems based on Global Positioning System (GPS), Global System for Mobile communication (GSM) and Advanced Risc Machine (ARM) for processing and storing information. The information about the location, speed, steering wheel position are updated and stored temporarily and restored every 5 seconds. The information will send to the police, ambulance and relatives during messages while happening an accident, for the past few seconds. These make to help as quicker as possible for saving more life and worse the accident mortality as well as reduce incidents impacting time on the traffic.

Keywords– Automatic E-Call System, GSM, GPS, ARM, Sensors, EAS, AAS, RISC, GIS.

I.   INTRODUCTION

As the technology was rapidly improving, at the same time growth of the generation also linearly increasing, the use of vehicle also day by day increasing, that is why the traffic was also highly developed. Without traffic rules we can't travel from one place to another place. However, traffic accidents also happen every day because of the more population. The major accidents happens in the public sector statistics, hundreds of people lose their lives every day. As data from ministry of health shows, in 1000 accident injured, only 14.3 percent are sent to hospitals by ambulance [1].

In addition, only 40 percent of people die at the scene, and the remaining ones die on the way to hospitals or in hospitals. Mainly about 30 percent of the death is due to the absence of timely rescue. Those who are travelling at the time of mid night or forest area those who met with an accident means can't able to get a preventive actions due to an accident injured. Most of them died due to not being able to call for help immediately. The above problem will prevent by using automatic E-call.

Here we add one more component to prevent an accident and reduce the death.

II.   EXISTING METHOD

The vehicle tracking is not mainly used for accidental case. If suddenly accident occurs, the reaction of the emergency services now becomes a race between life and death [2][3]. Now the wireless technology has developed an entire world so the new way of wireless communication will minimize the death rate due to auto crashes.

This paper proposes a work for saving lives of people who met accident. Most important thing is due to the absence of timely rescue can be protected by using automatic E-call. This paper will propose a concept of preventing an accident by using an advanced accident information system using ARM processor. This paper further explained about overview of the tracking system then proposed system.

III.   OVERVIEW OF VEHICLE TRACKING SYSTEMS

Vehicle Tracking Systems was basically started for shipping industry. When large fleet of vehicles were spread out over the vast expanses of ocean, the owner corporations often found it difficult to keep track of what was happening. They required some sort of system to determine where each vehicle was at any given time and for how long it travelled [4][5]. The need of vehicle tracking in consumer's vehicle to prevent any kind of theft because police can use tracking reports to locate stolen vehicle. Initially vehicle tracking systems developed for fleet management were passive tracking system. In passive tracking system a hardware device installed in the vehicle store GPS location, speed, heading and a trigger event such as key on/off, door open/closed. When vehicle returns to a specific location device is removed and data downloaded to computer

Many vehicle systems that are in use now days are some form of Automatic Vehicle Location (AVL) .It is a concept for determining the geographic location of a vehicle and transmitting this information to a remotely located server [6][7]. The location is determined using GPS and transmission mechanism could be a satellite, terrestrial radio or cellular connection from the vehicle to a radio receiver, satellite or nearby cell tower. After capture, the tracking data can be transmitted using any choice of telemetry or wireless communications systems. GSM is the most common used service for this purpose. auto crash alert system called the e-call.

IV.   PROPOSED SYSTEM

An embedded system monitoring and detecting the vehicle by using Global positioning system and further information can send to who upload their number into the processor via GSM. This paper includes one parameter to detect the air in the wheel of the vehicle.

The proposed system structure and its operation of each module is shown as follows. The overall system block diagram was shown as
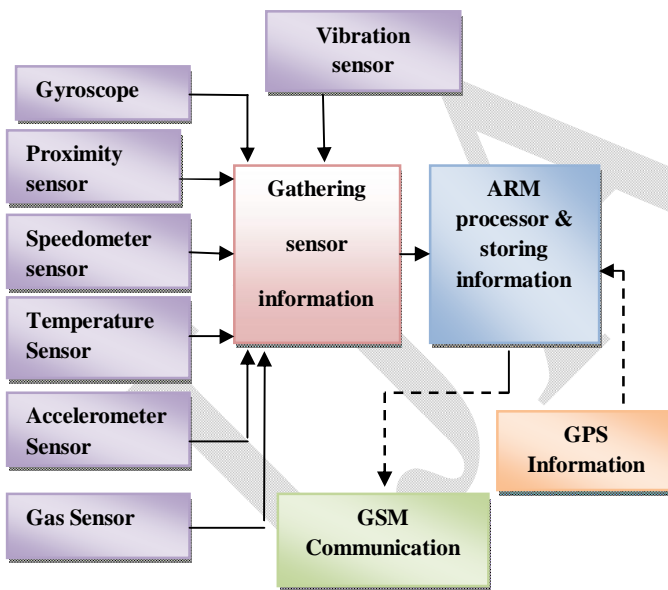

Fig 1: Overall block diagram

4.1 ARM (Advanced Risc Machine)

ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture. A RISC-based computer design approach

means ARM processors require significantly fewer transistors than typical processors in average computers. This approach reduces costs, heat and power use. RISC is Reduced Instruction Set Computer. The ARM processor incorporated with RISC. The performance of the RISC is better than CISC. It can have some advantages Smaller die sizes, development of the program within a Short period, Single clock cycle have the more clock rate during the execution [8].

4.2 Monitoring Wheel

The proximity sensor is used to sense the metal objects without any physical touch. This sensor is connected with the wheels of the automobiles, which is used to sense the rotation of the wheel. Rotation per minute (RPM) will calculated by using this sensor. Then the sensor information will send to the ARM processor. The obtained information in the form of analog signal is to be converted into digital signal by using ARM inbuilt A to D converter [9]. The digital information can be display by using LCD display.

4.3 Over speed detection

Speedometer sensor is used to control the speed of the vehicle this sensor can have certain amount of fixed value based on RPM used to monitor the wheel rotation. If the RPM value increases continuously then the level of RPM value reaches the beyond the constant value. The sensor sends the information to the processor and then further processed.The driver can limit his speed When the sensor intimate the over speed condition and prevent the accident before happens. After that the speed continuously increasing, the information will be sent to persons whose mobile number was loaded inbuilt in the processor such as parents, relatives, etc. Further, if an accident happens the information will be sent to police, ambulance through GSM technology which has been employed.

4.4 Temperature Sensor

It is used to sense the temperature. This sensor will connect with wheel of the vehicle, while running time when the temperature exceed the certain limit of the temperature it will send a signal to the receiver section. This sensor interface with the ARM processor LPC2148 and further signal processed and give an alert to the driver for overcoming the situation without any problem happen. If the temperature again increases continuously then the accident may be happen means the information will be given to the police and ambulance using GSM technology.

4.5 Accelerometer Sensor

This type of sensor measure the acceleration in   one, two, or three orthogonal axes. Most accelerometers are Micro-Electro-

Mechanical Sensors (MEMS). Two very common types utilize capacitive sensing and the piezoelectric effect to sense the displacement of the proof mass proportional to the applied acceleration. This type of sensor is working in the front of the automobiles. It is also known as impact sensor. This sensor has certain fixed threshold value, if the sensor reaches the beyond threshold value then its starts to vibrating. This sensor interface with the ARM processor so it gives an alert to the main system for its further process.

4.6 Gyroscope

Gyroscopes normally embrace a spinning wheel or disc in which the pin is free to assume any direction. This sensor is used to find the rotational motion of the steering which is fixed at center of the steering wheel.This sensor have three axis input axis, Output axis and spin axis. Rotation of this sensor which represents the output from each axis is analog voltage. This analog voltage will convert in to digital signal by using main system. Steering wheel is monitored in order to find the drivers way of handling.

4.7 Gas Sensor

This type of sensor to detect the presence of gas in the wheel of vehicle. This sensor is employed with the inside of the wheel It is used to convert the gas into electrical signal then it will given to the ARM processor. Sometimes accident will happen due to unexpected reducing the air in the front or back wheel. The people don't know about the leakage of air. The gas sensor can have certain constant pressure value when pressure of the wheel reducing the beyond the constant value, it will sent a signal to the processor then buzzer sound will indicate the low pressure in tier tubes. .

The accident information system which has different modules with its functions was explained. The overall system performs as, when an accident happens it informs about a location as latitude and longitude details by means of GPS and informed via GSM technology to the police, ambulance as messages. If an over speed and temperature variations occurs it first informs the driver to prevent it. This project also stores the details of these different module as temporarily and update for every 5 seconds. The details which stored will have details of past 5 seconds as well as ongoing 5seconds and it then update as every 5 sec. If an accident happen it store the past 10 seconds details which will be helpful to analyses and also sends information about location and some details to the police as well as ambulance, so that they can arrive earlier and save the life. Also it has an additional feature as ,when the automobiles goes beyond speed limit through GSM technology an message will be given to the parents, relatives or someone whose number and details have been inbuilt in the processor. This

project work was currently undergoing and its software simulation was determined which shows it's further success and followed by the results in next section.

V.   RESULTS

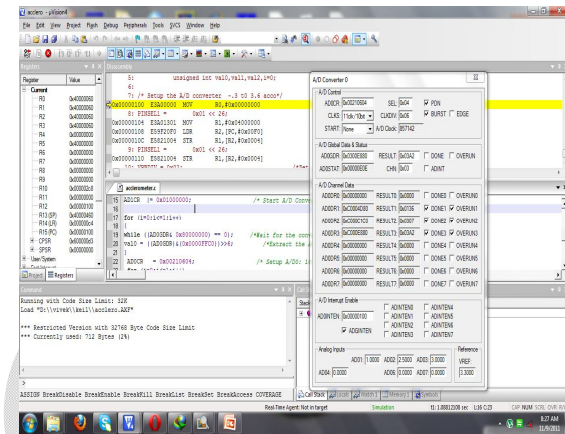The simulated result was shown as follows.
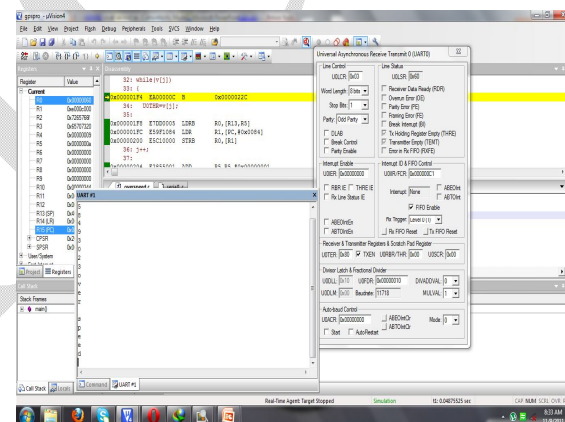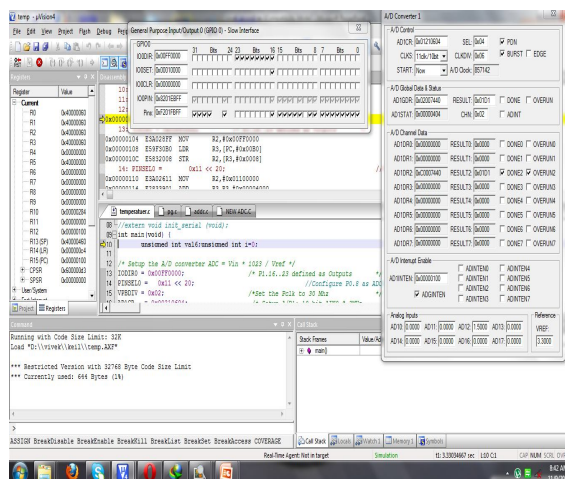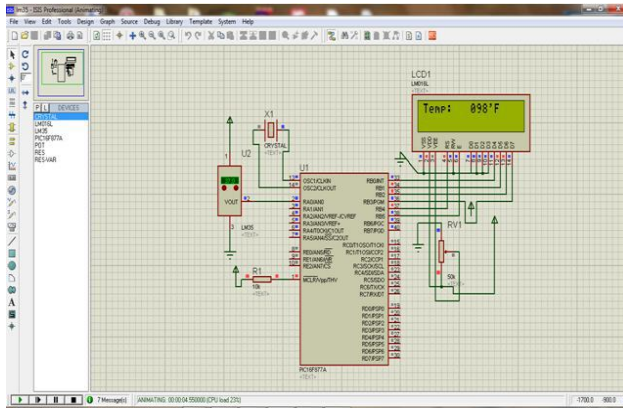

Fig 2 : Accelerometer output screen shot

Fig 3 : Over speed detection screen shot.

Fig 4 : Temperature output screen shot.

Fig 5 : Temperature is displayed on LCD

VI.   CONCLUSION

Nowadays people are driving very fast; accidents are occurring frequently, we lost our valuable life by making small mistake while driving. This world most of the people can met with an accident which happening in day by day. Even though there was much rapid increase in technology, the mortality rate was also increasing which is mainly due to lack of sufficient information given to the police and hospitals immediately after it happens. Considering if the accident happens in the any interior area such as travel in forest area, etc where no one to help and also emergency information cannot be passed to police and hospital which finally leads to death. So in order to avoid such kind of accidents and to alert the drivers and to control their vehicle speed by considering all these factor, this project was mainly designed for saving the life of the people, by preventing accident without happens by means of earlier information and also for those who met accident by immediately informing the police and ambulance by means of message which has been employed in the automobiles which brings back their life's. The simulated results are produced, whereas further hardware implementation was undergoing as my future work in my project.

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