A BLACK BOX ALERT SYSTEM FOR CRASH RECOVERY AND PREDICTION USING MEMS TECHNOLOGY

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Abstract

In a critical situation many vehicles faces accident, due to this lot of person lost their lives. Some people can be saved at that time, but because of lack of information, time and place it may not be possible. Our project will provide an optimum solution to that draw back. An accelerometer can be used in a car alarm application; Dangerous driving can be detected with an accelerometer. It can be used as a crash recorder of the vehicle movements before, during and after a crash. With signals from an accelerometer, a severe accident can be recognized. According to this project when a vehicle met with an accident immediately the vehicle number and persons contact number will be transferred to police control room or a rescue team. So the police can immediately trace the location from where the message came. Then after conforming the location necessary action will be taken. In second application on an uncertain situation many of vehicle that has center locking system, Such as door locking system faces many problem due to automatic locking system. At that situation there is no way to open the lock. Our project will provide a suitable solution for this situation. This can be done by using wireless or GSM Technology.

Keywords: *MEMS accelerometer, GPS device, GSM module,, real time monitoring, Crash recorder, Center locking System, Automatic locking system.*

I. INTRODUCTION

An embedded system is a special purpose system that is used to perform one or few dedicated function. Embedded systems are made to perform few tasks only, rather than be a general-purpose computer for multiple tasks e.g. Printer etc. some others may have low or no performance requirements, allowing the system hardware to be simplified to reduce system costs. Embedded systems are not always standalone devices. Many embedded systems consist of small, computerized parts within a larger device that serves a more general purpose. For example, the Gibson Robot Guitar features an embedded system for tuning the strings, but the overall purpose of the Robot Guitar is, of course, to play music. Similarly, an embedded system serves as a subsystem of many or all the products itself. The program instructions written for embedded systems are referred to as firmware, and are stored in read-only memory or Flash memory chips. Embedded systems contain processing cores that are typically either microcontrollers or digital signal processors (DSP).

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today. Embedded systems contain processing cores that are either microcontrollers or digital signal processors (DSP). A processor

is an important unit in the embedded system hardware. It is the heart of the embedded system. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic FIREs, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics.

The car black box is a vehicle-based recorder which records video images, sound, GPS position, speed, and time. These data can be used for accurate car accident investigation and some public crimes prevention. However, there are important issues such as user privacy and a data management for a vehicle-based CCTV records. The proposed system can reduce driver privacy concerns and communication and management overheads. Our contribution is that we propose a feasible and useful scenario for public safety.

Car black box is a device to record driving history which can be used for car forensics in case of car accident or related crimes. Car black box stores video clips that could be critical clues for investigating car-related accidents or crimes. Wireless black box using MEMS accelerometer and Global Positioning System (GPS) tracking system is developed for accidental monitoring. The system consists of conjunctive components of an accelerometer, microcontroller unit, GPS device and GSM module. In the event of accident, this wireless device will send mobile phone short massage indicating the position of vehicle by GPS system to family member, emergency medical service (EMS) and nearest hospital[1].

Consider the situation when there is an accident, there is no automatic service available for assisting a driver. If any injury happened to the vehicle owner or passengers so maybe there will be loss of lives due to delay in medical help. So for this purpose, we propose a system where car itself intimates the concern emergency service for immediate reaction in case of accident or any emergency situation.

Now consider one more scenario where we are working in the bank at high floor or do a shopping in biggest mall etc. means we are away from the our vehicle and a vehicle thief is trying to thief our car IOSR Journal of Computer Science (IOSR-JCE)

which is already fitted with security system which only prompt with a sound alert which is not possible to hear at long distance.

We are trying to develop the system useful in case of above mentioned scenario. If there is an accident of vehicle, then the system will automatically activate itself but it will wait for one minute for user response. In case of user is out of danger and situation is under control then the user deactivate the system by own. In case of serious problem then the system will switch to emergency mode and send the message or call to registered mobile numbers along with the geographical position of the incident.

The coordinates send by the system will help to find out the exact position of the vehicle on globe so that the emergency services will track the vehicle and can help with minimum amount of time. Now a day's for the security purpose of a Car , manufacturers try to modify security system by implementing different technologies. Consider a condition user is far away from vehicle and theft detection siren start then user can't listen alert and he can't take any step..

We are trying to develop the system where vehicle automatically inform the user via phone call directly on user's phone and the system will automatically make a phone call on user's phone as the thief tries to thief the vehicle. User will then take necessary action to save the vehicle. In this case, other people will not be irritate because of sound created by sound siren. Another advantage of system is that the user is always reachable by vehicle security system.

Hardware Development Standards define the process and activities necessary to produce quality hardware. These are used to manage and control the process using standardized methods and procedures. Several standards, models or guide-lines exist supported by government, institutions,

etc., which propose various concepts and principles. These standards together with other special considerations for functional reasons shall be combined to establish a uniform process and activities for all hardware for a specific project. For large and/or complex development projects an overall HDP may be required to establish and identify the overall project management organizations and activities that will manage and control the overall development of hardware. The HDP (overall) shall define the overall plans and procedures necessary to develop and document the hardware in a uniform manner.

All hardware configuration item (HWCI) to be developed shall be identified by their individual HDP. Each individual HDP shall identify or include the development resources and organization, development timeline schedule and milestones, security measures, design methodologies, de sign and implementation approaches, testing methodology, certification plan, resource utilization control, programming support center facilities and potential risk areas of the specific HWCI development life cycle. Transportation systems from flight to automobiles increasingly use embedded systems New airplanes contain advanced avionics such as inertial guidance systems and GPS receivers that also have considerable safety requirements. Various electric motors brushless DC motors, induction motors and DC motors use electric/electronic motor controllers.

Automobiles, electric vehicles, and hybrid vehicles increasingly use embedded systems to maximize efficiency and reduce pollution. Other automotive safety systems include anti-lock braking system (ABS), Electronic Stability Control (ESC/ESP), traction control (TCS) and automatic four-wheel drive. Medical equipment uses embedded systems for vital signs monitoring, electronic stethoscopes for amplifying sounds, and various medical imaging for non-invasive internal inspections. Embedded systems within medical equipment are often powered by industrial computers Embedded systems are used in transportation, fire safety, safety and security, medical applications and life critical systems as these systems can be isolated from hacking and thus be more reliable. For fire safety, the systems can be designed to have greater ability to handle higher temperatures and continue to operate. In dealing with security, the embedded systems can be self-sufficient and be able to deal with cut electrical and communication systems.

A Wireless sensor networking, WSN, makes use of miniaturization made possible by advanced IC design to couple full wireless subsystems to sophisticated sensors, enabling people and companies to measure a myriad of things in the physical world and act on this Information Through (IT)monitoring and control systems.

Embedded systems range from no user interface at all dedicated only to one task to complex graphical user interfaces that resemble modern computer desktop operating systems. Simple embedded devices use buttons, LEDs, graphic or character LCDs (for example popular HD44780LCD) with a simple menu system. More sophisticated devices which use a graphical screen with touch sensing or screen-edge buttons provide flexibility while minimizing space used: the meaning of the buttons can change with the screen, and selection involves the natural behavior of pointing at what's desired. Handheld systems often have a screen with a "joystick button" for a pointing device.

Some systems provide user interface remotely with the help of a serial (e.g. RS-232, USB, I²C, etc.) or network (e.g. Ethernet) connection. This approach gives several advantages: extends the capabilities of embedded system, avoids the cost of a display, simplifies BSP, allows us to build rich user interface on the PC.

Embedded systems are designed to do some specific task, rather than be a general purpose computer for multiple tasks. Some also have real-time performance constraints that must be met, for reasons such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs. The program instructions written for embedded

systems are referred to as firmware, and are stored in read-only memory or Flash memory chips. They run with limited computer hardware resources: little memory, small or nonexistent keyboard or screen.

MEMS (micro electro-mechanical systems) technology has gone from an interesting academic exercise to an integral part of many common products. But as with most new technologies, the practical implementation of MEMS technology has taken a while to happen. The design challenges involved in designing a successful MEMS product (the ADXL2O2E) are described in this article by Harvey Weinberg from Analog Devices. In early MEMS systems a multi-chip approach with the sensing element (MEMS structure) on one chip, and the signal conditioning electronics on another chip was used. While this approach is simpler from a process standpoint,

* The overall silicon area is generally larger.

* Multichip modules require additional assembly steps.

* Yield is generally lower for multichip modules.

* Larger signals from the sensor are required to overcome the stray capacitance of the chip to chip interconnections, and stray fields necessitating a larger sensor structure.

* Larger packages are generally required to house the two-chip structure.

II. PROPOSED METHODOLOGY

Wireless black box using MEMS accelerometer and Global Positioning System (GPS) tracking system is developed for accidental monitoring. The system consists of conjunctive components of an accelerometer, microcontroller unit, GPS device and GSM module. In the event of accident, this wireless device will send mobile phone short massage indicating the position of vehicle by GPS system to family member, emergency medical service (EMS) and nearest hospital. Consider the situation when there is an accident, there is no automatic service available for assisting a driver. If any injury happened to the vehicle owner or passengers so maybe there will be loss of lives due to delay in medical help. So for this purpose, we propose a system where car itself intimates the concern emergency service for immediate reaction in case of accident or any emergency situation.

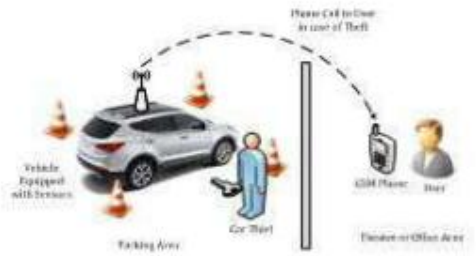

FIG. System flow Diagram

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A. Detection of car Location:

This is another advantage of the system that we can track the car location just by sending the mobile SMS or making the call. Owner car is less with GPS device so it is possible to locate the car location on Google map is very easy. Here user will send Preformatted SMS to car in response car system will use GPS device and collect the current car longitude and latitude and send back as a rely to the SMS.

B. Surveillance Car accident:

In day to day life we are facing many problems and many times we are helpless and need someone's assistance and which is not possible every time. Consider a situation we are going for long drive and suddenly we caught in critical condition it may be accident. Consider another condition if we found that our car has been stolen we can't do anything as quick action.

Once the system started in assistance mode first of all system will gather the car location using GPS device in the form of longitude and latitude. Then it records car details like car owner details, car number, car model, car speed if possible and convert this data in to formatted SMS and send this data to call center and person's relative where person need to provide contact person details manually before starting drive. Once the call center get the car status it will search for nearest hospital, ambulance service ,police station and contact then to reach at accident location to help our the person.

III. SYSTEM IMPLEMENTATION

- Pre accident detection
- Tracking of collision
- Intelligent system

3.1.Transmitter

The car black box is a vehicle-based recorder which records video images, sound, GPS position, speed, and time. These data can used for accurate car accident investigation and some public crimes prevention. However, there are important issues such as user privacy and a data management for a vehicle-based CCTV records. The proposed system can reduce driver privacy concerns and communication and management overheads. Our contribution is that we propose a feasible and useful scenario for public safety. Car black box is a device to record driving history which can be used for car forensics in case of car accident or related crimes.

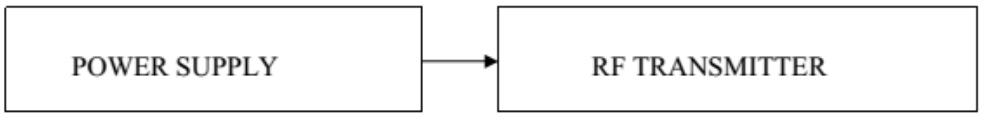

Figure: 3.1. Transmitter

3.2.Receiver circuit

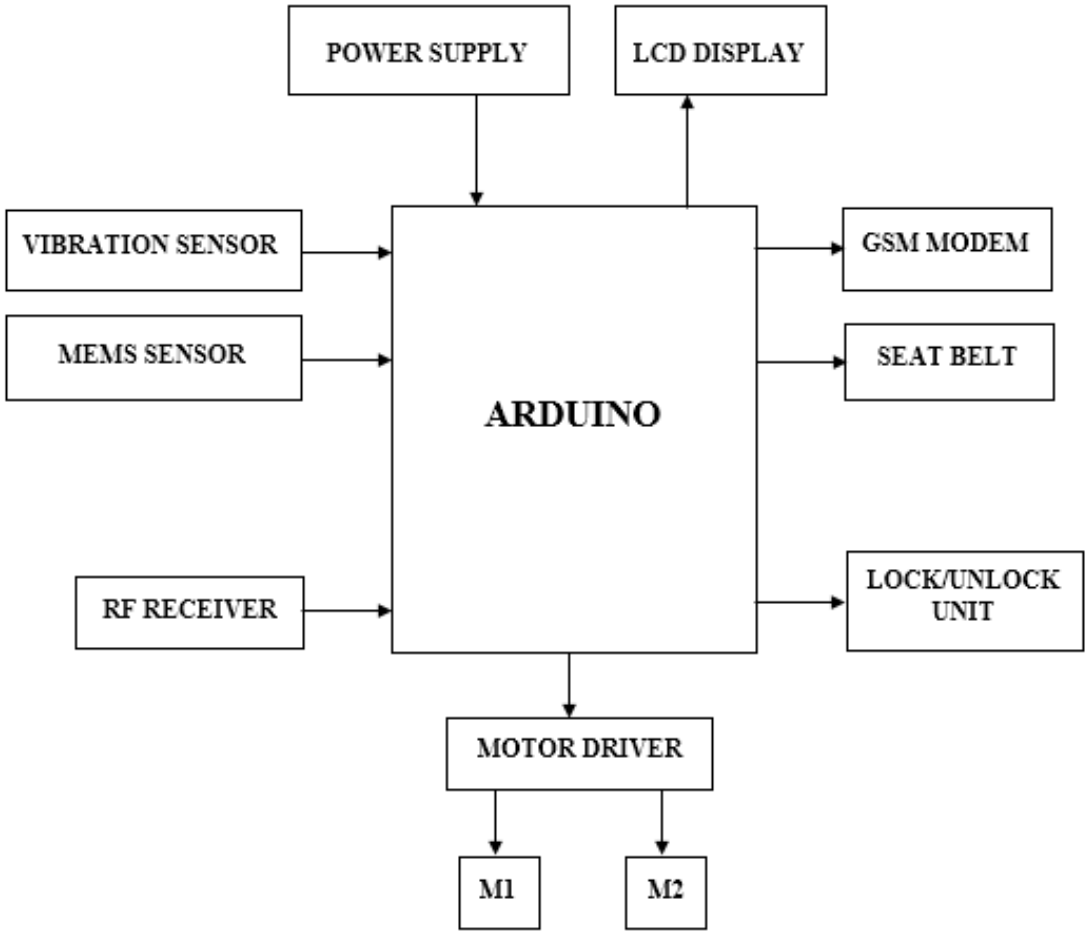

Figure: 3.2. Receiver

IV. RESULT AND DISCUSSION

Proteus is a software technology that allows creating clinical executable decision support guidelines with little effort. Once a guideline for a condition has been created, it can be executed to provide stepwise advice for any patient having that condition. This site is dedicated to the Proteus executable guidelines model, tools based on the Proteus approach and the automated guidelines created using those tools.

A software tool that allows creating and executing clinical decision support guidelines using the Proteus approach is available. Protean allows creating new guidelines or editing existing ones very easily. Much of the editing is done by dragging and dropping.

Why Proteus is Special - A Quick Overview

The Proteus guidelines are created with modular entities called Knowledge Components (KCs). Each KC represents a clinical activity and is available to the clinician as a module of executable knowledge with its own intelligence.

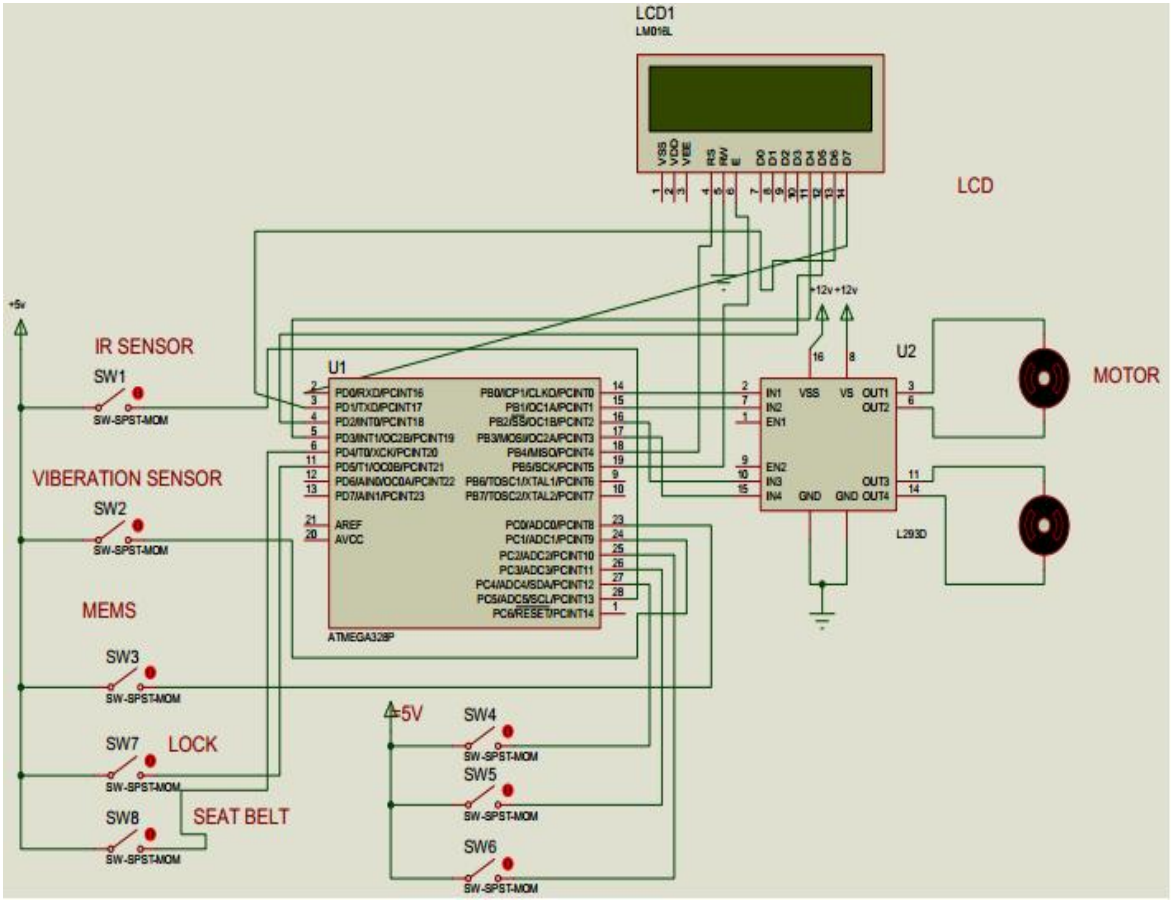

Figure 4: Output

CONCLUSION

The system that we can track the car location just by sending the mobile SMS or making the call to the car. A car had an accident the sensor will activated automatic and start its surveillance mode. This system indicates whether the seat belt is locked or unlocked. The system send the message alert for the user, if the vibration occurs.

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