A NOVEL APPROACH FOR AUTONOMOUS VEHICLE WITH INTELLIGENT BLACK BOX SYSTEM

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***Abstract*— The main purpose of this project is to develop a prototype of the vehicle black box system (VBBS) that can be installed into any vehicle all over the world. The VBBS can contribute to constructing safer vehicles, improving the treatment of crash victims, helping insurance companies with their vehicle crash investigations, and enhancing road status in order to decrease the death rate. Advanced step to the concept of vehicle black-box in developing a comprehensive vehicle safety system which would not only record the video and audio, but also try to prevent a possible collision by limiting the speed of the vehicle in accident-prone areas. In case of an accident, the time and location is sent through GSM to a present number for immediate rescue and treatment. Wireless black box system using GSM and GPS tracking system is developed for monitor the accident. Keeping this idea in our mind, the proposing a system where vehicle itself intimates the concern emergency service for immediate reaction in case of accident or any emergency situation. After the accident, this wireless device will send mobile phone short massage indicating the position of vehicle by GSM and GPS system to family members, nearest police station and hospitals. Recently, black-box equipped vehicles are rapidly increasing despite its low cost, because the black-box images are used as evidence for making correct decisions on vehicles accidents. The Fuel level sensor is used for find out fuel theft and fuel fulfil in parking and petrol bunk areas.**

***Index Terms*— GSM, GPS, POT, Black Box, Sensors.**

I. INTRODUCTION

The main purpose of this project is to develop a prototype of the vehicle black box system (VBBS) that can be installed into any vehicle all over the world. The VBBS can contribute to constructing safer vehicles, improving the treatment of crash victims, helping insurance companies with their vehicle crash investigations, and enhancing road status in order to decrease the death rate. Advanced step to the concept of vehicle black-box in developing a comprehensive vehicle safety system which would not only record the video and audio, but also try to prevent a possible collision by limiting the speed of the vehicle in accident-prone areas.

Wireless black box system using GSM and GPS tracking system is developed for monitor the accident. Keeping this idea in our mind, the proposing a system where vehicle itself intimates the concern emergency service for immediate reaction in case of accident or any emergency situation. After the accident, this wireless device will send mobile phone short massage indicating the position of vehicle by GSM and GPS system to family members, nearest police station and hospitals. Recently, black-box equipped vehicles are rapidly increasing despite its low cost, because the black-box images are used as evidence for making correct decisions on vehicles accidents. The Fuel level sensor is used for find out fuel theft and fuel fulfil in parking and petrol bunk areas.

In science, computing, and engineering, a black box is a device, system or object which can be viewed in terms of its input, output and transfer characteristics without any knowledge of its internal workings. Its implementation is "opaque" (black). Almost anything might be referred to as a black box: a transistor, an algorithm, or the human brain. The opposite of a black box is a system where the inner components or logic are available for inspection, which is most commonly referred to as a white box. The black box is an abstraction representing a class of concrete open systems which can be viewed solely in terms of its "stimuli inputs" and "output reactions". In other words, only the behaviour of the system will be accounted for developed black box model is a valid model when black-box testing methods ensures that, based solely on observable elements.

In cryptography to capture the notion of knowledge obtained by an algorithm through the execution of a cryptographic protocol such as a zero-knowledge proof protocol. If the output of the algorithm when interacting with the protocol can be simulated by a simulator that interacts only the algorithm, this means that the

algorithm 'cannot know' anything more than the input of the simulator. If the simulator can only interact with the algorithm in a black box way, we speak of a black box simulator.

Figure 1: Scheme of the Black Box System

Artificial intelligence (AI) is the intelligence exhibited by machines or software. It is an academic field of study which generally studies the goal of creating intelligence, whether in emulating human-like intelligence or not. Major AI researchers and textbooks define this field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.

A flight recorder is an electronic recording device placed in an aircraft for the purpose of facilitating the investigation of aviation accidents and incidents. Any type of aircraft in any condition of flight can be viewed in terms of its input parameters and output parameters, without any knowledge of its internal workings, as a black box model. The flight data recorder (FDR) is an independent device that preserves the recent history of the flight, through the recording of dozens of parameters, collected several times per second. The cockpit voice recorder (CVR) preserves the recent history of the sounds in the cockpit, including the conversation of the pilots. The two recorders give a testimony, narrating the flight history with accuracy and impartiality, to assist in an investigation.

II. OVERALL DESIGN

The Global Positioning System is a space age navigational system that can pinpoint your position anywhere on the globe, usually within a few yards or meters. This amazing technology is available to everyone, everywhere, day and night, and best of all, at no cost for use of the navigational data. GPS uses a constellation of 24 satellites in precise orbits approximately 11,000 miles above the earth. The satellites transmit data via high frequency radio waves back to Earth and, by locking onto these signals; a GPS receiver can process this data to triangulate its precise location on the globe.

GPS operates 24 hours a day, in all weather conditions, and can be used worldwide for precise navigation on land, on water and even in the air. Some of its many current applications include: boating, fishing, hunting, scouting on land or from the air, hiking, camping, biking, rafting, pack trips by horseback, hot air ballooning, general aviation, snowmobiling and skiing, search and rescue, emergency vehicle tracking, 4 wheeling, highway driving and a host of other outdoor activities where accurate positioning is required. Here the black box system is used to record the speed, steering angle & the location of the car. It will inform the user to find the car easily. Also it is used to investigate if the car met an accident. The camera module will record the driver positions. The black box with vehicle is illustrated in Figure.

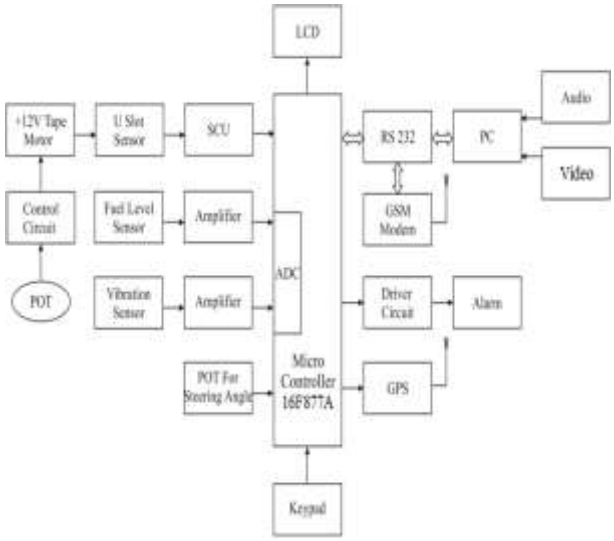

Figure 2: Block Representation of Entire Block Diagram

A. U Slot Sensor

This circuit is designed to monitor the speed of the motor. The holes type pulley is attached in the motor shaft. The pulley is rotated across the USLOT. The U SLOT consists of IR transmitter and receiver. Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. The IR sensors for receiver are used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other.

B. Fuel level Sensor

Fuel level sensor is used by can find out fuel theft and fuel fulfil in parking and petrol bunk areas. Float is the one type of transducer which is used to measure the fuel level in the tank. In the gain amplifier the variable resistor is connected in the feedback path, by adjusting the resistor we can get the desired gain. Then the final voltage is given to ADC for convert the analog signal to

digital signal. Then the corresponding digital signal is given to microcontroller in order to find the fuel level in the tank. .

C. Vibration Sensor

Vibration sensor used to identifying the accident and control the death rate using GPS and GSM module. Vibration circuit is used to sense the mechanical vibration. Piezoelectric sensors have proven to be versatile tools for the measurement of various processes. They are used for quality assurance, process control and process development in many different industries.

D. Alarm

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong.

E. RS 232 Communication

In telecommunications, RS-232 is a standard for serial binary data interconnection between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

F. GSM

GSM (Global System for Mobile communications). In case of an accident, GSM module sends to the message at time and location of present number for immediate rescue and treatment. Its ubiquity makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. GSM also pioneered a low-cost alternative to voice calls, the Short message service which is now supported on other mobile standards as well.

G. GPS

GPS is used to track the exact position of the vehicle. GPS is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where.

III. SOFTWARE DESIGN OF PROTUES WITH VEHICLE

A. Protues Software

Proteus (**PRO**cessor for **T**ext **E**asy to **US**e) is best simulation software for various designs with microcontroller. It is mainly popular because of availability of almost all microcontrollers in it. So it is a handy tool to test programs and embedded designs for electronics hobbyist. You can simulate your programming of microcontroller in Proteus 8 Simulation Software. After simulating your circuit in Proteus 8 Software you can directly make PCB design with it so it could be an all in one package for students and hobbyists.

B. Proteus Overview

Proteus is an execution driven parallel computer simulator which can simulate message passing parallel computers, shared-memory parallel computers, or systems using both communication paradigms. The simulated system can have physically or virtually addressed memory; in virtual memory systems pages can be moved between processors at any time. Stores can be nonblocking and loads can complete in or out of order with stores.

C. Simulation Library Brower

Shareware Junction periodically updates pricing and software information of Proteus PCB Design 7.10 B13508 v.13508 full version from the publisher using pad file and submits from users. The Figure 4.3 shows the software piracy is theft, Using crack, password, serial numbers, registration codes, key generators, CD key, hacks is illegal and prevent future development of Proteus PCB Design 7.10 B13508 v.13508 Edition. Download links are directly from our publisher sites.

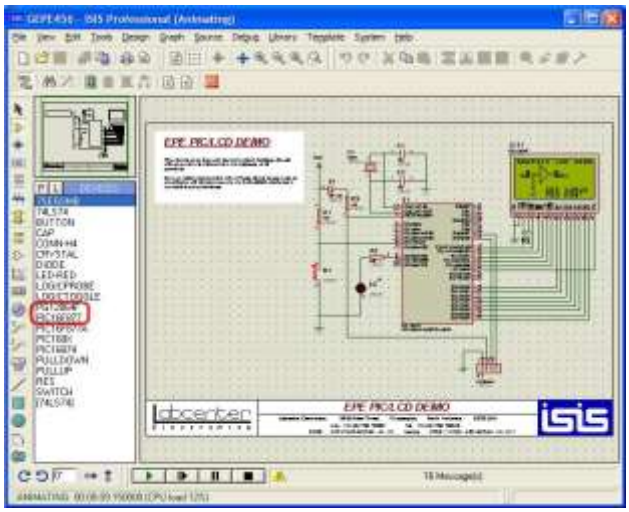

Figure 3: Simulation library brower

IV. RESULTS AND DISCUSSIONS

In this project GPS is used to monitor the vehicle position anywhere in the earth. The vehicle who wants to monitor has to have the GPS sensor. The GPS sensor consists of GPS antenna and GPS receiver. From the ignition of the car, the recorder module will record all the data's about the car & the driver. Here the angle is monitor with the help of accelerometer. The speed sensor is nothing but the u-slot sensor, it will sense the speed depend upon the potentiometer. The Figure 4 shows the speed measurement and steering angle. The acceleration control used for electronic fuel injection that is the supply a precise amount of fuel to an engine's cylinders in order to properly operate the engine at a particular moment. Proteus output of the measure the speed and steering angle.

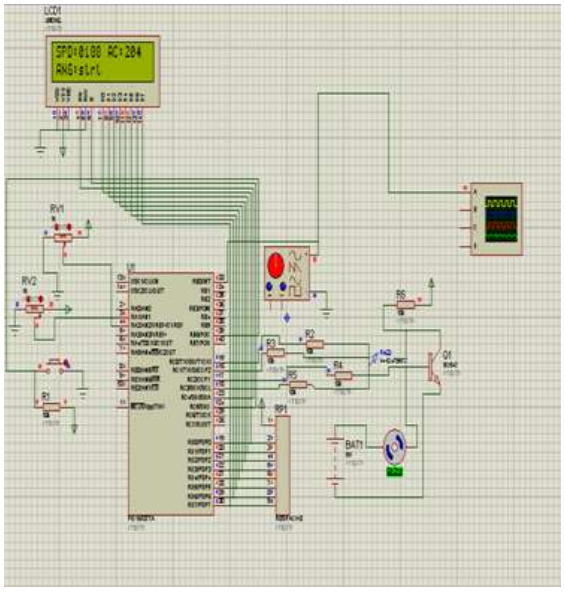

Figure 4: Simulation Result Representation

The Figure 5 shows the in case of accident the vehicle speed automatic will be reduced. This output is which side went to vehicle and acceleration control. Here the microcontroller is the flash type reprogrammable microcontroller in which we have already programmed. Now the microcontroller displays the latitude and longitude on the LCD display.

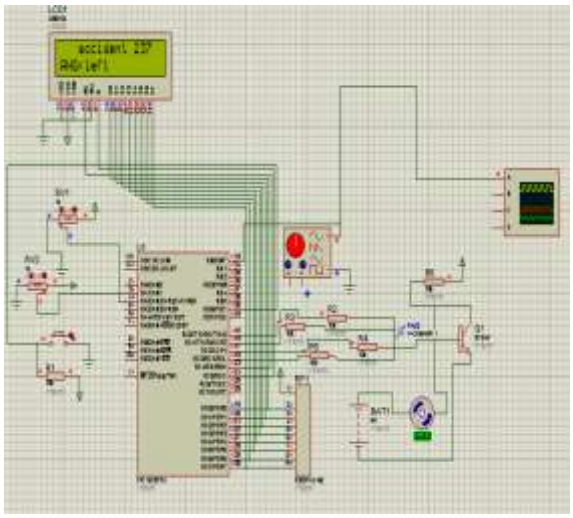

Figure 5: Simulation Output for Accident detection.

V. CONCLUTION

This paper has presented a new vision for the vehicles industry, which is the Black Box system used for vehicles. A full and detailed description was made for every part of this system. This paper has also offered a user friendly embedded program to analyse the data of the accident. The Black Box system built can be implemented in any vehicle. As soon as the driver runs the motor, this system will begin saving the events of the corresponding vehicle. The GPS and GSM modem is used to the vehicles location tracking just by sending the mobile SMS or making the call to the vehicles. A car had an accident the sensor will be activated automatic and start its surveillance mode. The black box system is used to also record audio and video inside of the vehicle.

VI. FUTURE ENHANCEMENT

RF transmitter and receiver using are vehicle automatic speed reduction and collision avoidance at school zones, college zones, and national highways.

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