SMARTBOX FOR AUTOMOBILES

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***Abstract*: Owner of a car always dream for risk less drive. Safe and secure drive is the aim of our Gaade (car in Hindi Indian language). Vehicles are vulnerable to accidents and robbery. System in which voluntarily keeps safe with other vehicles using sensors can reduce traffic congestion and accidents. Vehicle talking to its owner through SMS whenever it is controlled by any person other than owner, it will inform the owner that I am in other hands. If the situation is vehicle theft, owner can stop the engine. Computerized approach that is engine parameters, images, sensor values etc are uploaded to a distant server. Ultra sonic sensor helps to detect the presence an obstacle. We can predefine a distance with other obstacles so that whenever this predefined limit crosses, sensor informs the engine and eventually engine stops. The embedded C program for this ultrasonic sensor working is uploaded inside 0[arduino. While considering about GSM module, whenever the engine starts motion it will inform its owner that 'engine is on'. This kind of control over car will be great relief to every owner. Motor controlling, sending messages are carried out using arduino itself. Raspberry pi deals with images and sensor values. Camera fitted in front of the prototype will capture the visuals and save it inside rasp server. Temperature, pressure values are also saved there. Putty is used as an interface to run python programs these details inside rasp is saved on a website named" Thing speak" which is an open source IOT.**

INTRODUCTION

Accidents are increasing day by day. Efficiency of automobiles plays a vital role in transportation. By aiming personal as well as social security, we are trying to introduce a smart box inside automobiles. During accidents, evidences are collected from victims or witness. If there is system to collectively record the details of the accident, it will definitely helps further investigation. This led us to develop a smart box-Event Data Recorder which collect details of the engine (Oil, Temperature, and Pressure efficiency), recent images of the accident and storing these details into a centralized server. Raspberry pi and arduino are the main components of the system. The main threats behind automobiles are accidents as well as security. So the smart box which helps in accident investigation must also be efficient in security level. The presence of ultrasonic sensor helps to maintain a safe distance with other vehicles. Whenever the speed exceeds automating brake system will control the movement and thus avoid accidents. During theft, owner of the vehicle can control the engine of the car using GSM. Altogether a safe and secure driving is ensured by this smart box.

RELATED WORKS

2.1 AUTOMOBILE BLACK BOX SYSTEM FOR ACCIDENT ANALYSIS

World Health Organization (WHO) says more than a million people in the world die each year because the transportation related accidents. The black box system can play a major role to solve problem. Like flight data recorders in aircraft “Black Box” technology can now play a key role in motor vehicle crash investigation.

Black box sends an alert message to a pre stored mobile number in case of an accident. It also sends short message indicating the position of vehicle by GPS system to family member emergency medical services and nearest hospital. So that first aid can be provided as early as possible. The details of accidents are stored inside the SD card along with black box. The system has a security module which employs data encryption to secure the stored data on the SD card. To prevent falsification of the data, encryption algorithm is used.

2.2 BLACK BOX FOR VEHICLES

The system can be designed with minimum number of circuits. This can contribute to construct safer vehicles, improving the treatment for crash victims, helping insurance companies with their vehicle crash investigations, and enhancing road status in order to decrease the death rate. Mainly in all accidents evidences are collected directly from victims, but more efficient way is introduced by black box. Here whole system divided into two sections. First section many types of sensors are used, while the second section was implemented by using the python programming. This programming helps in not only recording the data but also retrieving the data from microcontroller memory to an LCD to display it, belt status lane detection and CAN failure etc are discussed under this paper. Details of vehicles status is saved inside EEPROM of the black box additional 10 seconds of events after this accident will be saved.

2.3 BLACK-BOX MODELING FOR TEMPERATURE PREDICTION IN WEATHER FORECASTING

Weather forecasting is one of the main challenges for climate researchers. Predicting the variables like temperature, wind, speed, humidity leads to ideal weather forecasting. Environmental issues can be easily solved by this concept. In this paper, a consistent features set for all of the stations and for all days in the particular time period, is taken into consideration. Real measured values of features are gathered from the weather underground website. Elastic net which is combination of L1- norm and L2-norm is used as the feature selection method.

2.4 ECHO STATE NETWORKS FOR BLACK- BOX MODELING OF INTEGRATED CIRCUITS

A black-box method for modeling the time-domain

response of integrated circuits (ICs) based on echo state networks is proposed. The number and value of the input and feedback delays required for modeling nonlinear systems with memory are detected automatically, and the training procedure is very fast and robust. The resulting models can be implemented in any hardware description language. The proposed

PROPOSED SYSTEM

Main objective of the proposed system is to vanish off the drawbacks of existing system. Highly metallic coated orange boxes are not affordable to common people. Otherwise it will be crashed during accident. So as a remedy centralized database is included to save the recorded details. The engine details, captured images, predefined distances which are stored inside black box will be uploaded frequently to a database. Hence the details can be retrieved during accident investigation. Raspberry pi and arduino are the main components of the system. GSM module –alert message will be send to owner whenever engine of the system is started. During theft, owner can control the engine by sending a stop message. Ultrasonic sensors will helps to keep a safe distance between other vehicles. Even if the speed of vehicle increases automatic brake system starts working and thereby avoids accidents.360 degree rotating camera will capture the images which can be used as evidence during accidents.GPS system is there to locate the position of vehicle during theft.

IMPLEMENTATION

4.1 MODULE DESIGN

Systems design is the solution to the creation of the new system. This phase is composed of several systems. This phase is focused on the detailed implementation of the feasible system. It emphasizes on translating design specifications to performance specification. System design has two phases of development logical and physical design.

4.2 MODULE DESCRIPTION

Hardware implementation mainly consist of sensors and microcontrollers. Coding part is done by C programming and python. Server side is completed by cloud computing. For that PHP, HTML, MySQL are used.

The three modules are

1. Hardware design
2. Coding section
3. Back end-cloud computing

4.2.1 Hardware design

Sensors are the core component in this system. Here there are pressure/oil sensors to check the change in pressure variations, temperature sensors also note the fluctuations in temperature. Hence we can eagerly avoid inside crashes or abnormal changes. Ultrasonic sensors notice the safe distance with other vehicles. This predefined distances helps to avoid accidents. Speed changes are compared with the predefined readings, if the rate is not normal braking system starts to work.

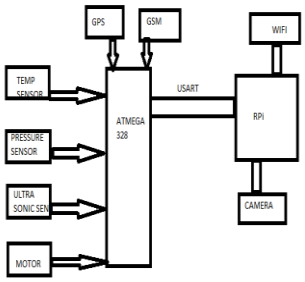

Figure 4.2.1 Block Diagram

Arduino: A microcontroller board contains, on-board power supply, USB ports to communicate with PC, and an Atmel microcontroller chip. It simplify the process of creating any control system by providing the standard board that can be programmed and connected to the system without the need to any sophisticated PCB design and implementation. It is an open source hardware, anyone can get the details of its design and modify it.

4.2.2. Coding details

Arduino coding is similar to c programming. Arduino programs can be divided in three main parts: *structure*, *values* (variables and constants), and *functions.*

4.3 UML DIAGRAM

4.3.1 Use Case Diagram

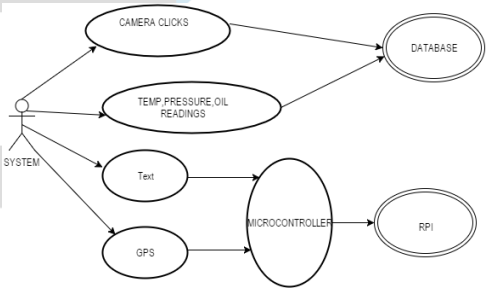

Figure 4.3.1 Use Case Diagram of the Proposed System

4.3..2 Sequence Diagram

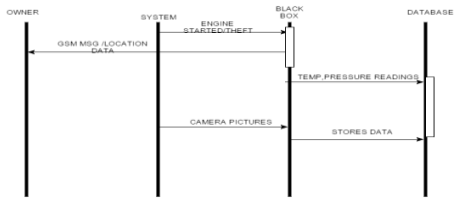

Figure 4.3.2 Sequence Diagram of the Proposed System

4.3.3 Flow Chart

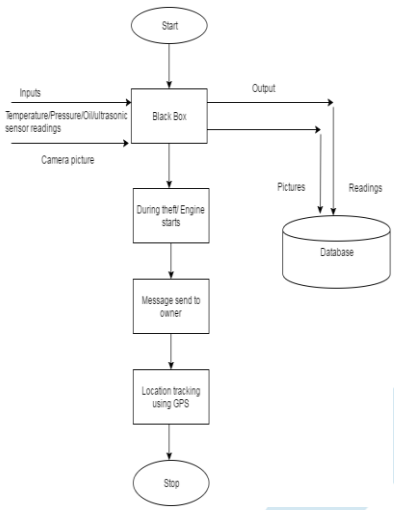

Figure 4.3.3 Flow Chart of the Proposed

TECHNOLOGY DESCRIPTION
5.1 HARDWARE SPECIFICATIONS

The hardware part consists of the components and the sensors used in the black box system. This part mainly collects the status of the sensors and temporarily stores it into the raspberry pi.

A. Sensors
1) Ultrasonic Sensor

The ultrasonic sensor is to measure the minimum distance in front of the vehicle Ultrasonic sensors work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. The HC-SR04 Ultrasonic sensor for the Raspberry Pi has four pins: ground (GND), Echo Pulse Output (ECHO), Trigger Pulse Input (TRIG), and 5V Supply (Vcc).

2) Pressure sensor

A pressure sensor measures pressure, typically of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. This pressure sensor is mainly used to find whether an accident has occurred or not.

3) Temperature sensor

This sensor is mainly used to detect the temperature of the engine of vehicle. It detects two types of temperatures one is abnormal temperature and other is engine temperature. The LM35 is a low voltage IC which uses approximately +5VDC of power.

B. Raspberry Pi

In this venture we utilize the Raspberry Pi 3 Display B. It is the third generation Raspberry Pi. This intense charge card estimated single board PC can be utilized for some applications and supersedes the first Raspberry Pi model B+ and Raspberry Pi 2 Display B. While keeping up the popular board organize the Raspberry Pi 3 model B has all the more intense processor, 10 x quicker than the original Raspberry Pi. Furthermore it includes remote LAN and Bluetooth availability making it the perfect answer for capable associated outlines. Broadcom BCM2387 chipset

C. Arduino

Arduino/Genuino Uno is a microcontroller board taking into account the ATmega328P .It has 14 computerized input/yield pins (of which 6 can be utilized as PWM yields), 6 simple information sources, a 16 MHz quartz gem, a USB association, a power jack, an ICSP header and a reset catch. It contains everything expected to bolster the microcontroller; just interface it to a PC with a USB link or power it with an air conditioner to-DC connector or battery to begin.

D. GSM (Global System for Mobile Communication)

GSM stands for Global System for Mobile Communications. It is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobilephones.A Modem is a device which modulates and demodulates signals as required to meet the communication requirements. It modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information.

5.2 SOFTWARE REQUIREMENTS

5.2.1 C PROGRAMMING LANGUAGE

C is a broadly useful, basic PC programming dialect, supporting organized programming, lexical variable extension and recursion, while a static sort framework averts numerous unintended operations. By plan, C gives develops that guide proficiently to run of the mill machine guidelines, and consequently it has discovered enduring use in applications that had in the past been coded in low level computing construct, including working frameworks, and additionally different application programming for PCs extending from supercomputers to installed frameworks.

5.2.3 CLOUD COMPUTING

Cloud computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers that may be located far from the user ranging in distance from across a city to across the world. Cloud computing relies on sharing of resources to achieve coherence and economy of scale, similar to a utility (like the electricity grid) over an electricity network.

CONCLUSION

Ultimate aim of this project is to provide security to vehicles and drivers in a user friendly manner. The proposed system is equipped with various pressure, temperature, oil sensors to check the engine status records in black box. We know mainly accidents are occurred because of uncontrolled

speed. If there is a system to control the speed according to the other vehicles that will be perfect to prevent the accidents. According to the data analysis there is no such efficient system to control speed. Smart box will undoubtedly help both police and insurance companies in reconstruction of the event before the accident. Main application of this system is if we are involved in an accident that was not caused by you on an isolated road without any witness present, the proposed system will help us to get the exact details of the incident. Actually in flight recorders the black box they created have well defined shield in order to resist temperature and pressure. The construction these guards are not economical to a common man. So while introducing this to automobiles it must be cost effective. Even though the Black box is destroyed after accident, stored data must be available .So data should be carried to a server in a periodic manner. By implementing smart box as a product transportation will be well efficient with technology as well as security.

REFERENCES

[1]. Monisha J Prasad, Arundathi S, Nayana Anil, Harshikha "**Automobile Black Box System for Accident Analysis"** International Conference on Advance in Electronics,Computer and Communications, IEEE 2014

[2]. P. Ajay Kumar Reddy, P.Dileep Kumar, K. Bhaskar reddy, E.Venkataramana, M.Chandra sekharReddy" **BLACK BOX FOR VEHICLES**" International Journal of Engineering Inventions, ISSN: 2278-7461, www.ijeijournal.com, Volume 1, Issue 7(October2014) PP: 06-12

[3]. Zahra Karevan, Siamak Mehrkanoon, lohan A.K. Suykens" **Black-box modeling for temperature prediction in weather forecasting"** Neural Networks (IJCNN), 2015 International Joint Conference on12-17 July 2015 IEEE

[4]. Marko Magerl, Student Member, IEEE, Vladimir Ceperic, Member, IEEE, and Adrijan Baric, Member, IEEE "**Echo State Networks for Black- Box Modelling of Integrated Circuits"** IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems VOL. XY, NO. Z, MONTH 2015

[5]. Diego Desani, Veronica Gil-Costa, Cesar A.C. Marcondes, Hermes Senger"**Black-box Optimization of Hadoop Parameters Using Derivative-free Optimization"**2016 24th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing

[6]. Christian Simon,In kyu Park "**Reflection removal for in-vehicle black box videos"**Computer Vision and Pattern Recognition (CVPR), 2015 IEEE Conference on7-12 June 2015

[7]. Mooseop Kim,Ki Young-Kim**"Data forgery detection for vehicle black box"** Information and Communication Technology Convergence (ICTC), 2014 International Conference on22-24 Oct. 2014

[8]. Linjun Zhang,gybor Oroz"**Black box modeling of connected vehicle networks"**American Control Conference (ACC), 2016

[9]. Ron Schneiderman "**Vehicle black box gets its own standard" Case study,**Wiley-IEEE Standards Association 2015 pages-288

[10]. Conggan Ma, Qinghe Liu, Dafang Wang"**A novel black and white box method for diagnosis and reduction of abnormal noise of hub permenant-magnet synchronous motors for electric vehicles**" IEEE Transactions on Industrial Electronics (Volume: 63, Issue: 2, Feb. 2016)