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Automobile Black box System For Vehicle Accident Analysis

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Abstract-*In the cutting edge time of the web, all the gadgets are associated with IoT, The automobile field created with the assistance of IoT, the information gathered from the camera and sensors are to be put away in IoT for the future for purpose. The automobile Black box framework is utilized to forestall blunders in the vehicle industry. It has worked like a plane discovery framework. This framework is utilized to screen the driver's mindlessness, Therefore it is anything but difficult to discover precise explanation of the street accidents. This paper proposes to forestall the accident by observing both the vehicle and driver. Temperature and humidity sensor is utilized to screen the temperature of the vehicle and a gas sensor is utilized to screen the smoke radiated by the vehicle. Raspberry Pi3 is utilized to control these sensors, the information got from the sensors is put away on the SD card which is mounted on the Raspberry Pi3 for recovery of information after an accident. The framework utilizes an outer sensor, for example, a camera and GPS to gather video and location of information. From this present driver's behavior is checked continually and can ready to forestall future accidents utilizing information investigation.*

KEY WORDS: **Raspberry PI3, GPS, SD Card, Sensors, Web Camera**

1. INTRODUCTION

A car is the consequence of joined work of various frameworks. Every framework, however essentially free, be impacted by the impact of different frameworks connecting with it. Before talking about the cooperation of different frameworks, let us initially specify the different frameworks that are available in a vehicle. Autos and figuring advances are making another degree of information benefits in vehicles. The Automobile Black Box has capacities like an airplane black box. It is utilized to examine the reason for vehicular mishaps and forestall the death toll and property emerging from vehicle mishaps. This paper proposes a model of an Automobile Black Box System that can be introduced into vehicles. The framework means to accomplish mishap investigation by unbiased following what happens in vehicles. The framework additionally includes improvement of security by forestalling altering of the Black Box information. Consistently, more than one million individuals pass on in auto collisions overall as indicated by the World Health Organization. Separated by age car crashes are additionally the main source of death for the 15-to-29 age segment. The number of mishaps that bring about injury, however not passing, is a lot higher. In 2015 for instance. Canada saw 1,669 lethal impacts, though the number of crashes that came about in non-deadly close to home injury was 116,735 or very nearly multiple times higher. For right around four decades in any event human components, (for example, driver blunder) have been recognized as a significant reason for car crashes.

Presently there were around five lakhs street mishaps in India, which killed about 1.5 lakh individuals and harmed around five lakh individuals. India, as a signatory to the Brasília affirmation, expects to decrease street mishaps and traffic fatalities by half by 2022. The Motor Vehicles (Amendment) Bill, 2016 have been recorded for thought and entry in the present Budget Session of Parliament. It looks to deliver issues identified with street mishaps, outsider protection, and street well-being measures. Right now, present a few information on street mishaps, reasons for mishaps, and engine vehicle outsider protection.

2. LITERATURE SURVEY

The author proposed**, "Vehicle Avoidance Reaction By Two-Step Motion Flow Cluster."** This paper[1] proposes the importance of preventing road accidents using black box. Automobile manufacturers then have created a system that aims to reduce and prevent such accidents. The most popular ones include intelligent collision warning systems and intelligent braking systems. However, such systems are not able to cover every case and could even cause more accidents. Interactive accident avoidance system with Two steps movement detection is therefore a recommended method to reduce and prevent accidents with more efficiency. This study focuses on the feature of this system, which is forward movement detection and automatic obstacles' avoidance. With this, external environment will be distinguished from object movement before calculating the duration that the vehicle would possibly hit the object. This duration will then be grouped, and the clustering data will be used for vehicle control i.e. to turn left, right, or stop. Finally, to show the effectiveness of our designed approach, we have used computer simulation to show the results of our proposedmethod.

"Smart Vehicle Accident Detection And Alarming System Using a Smartphone" proposed by Adnan Bin Faiz; Ahmed Imteaj ; Mahfuzulhoq Chowdhury . This paper [2] presents Vehicle accident is the paramount thread for the people's life which causes a serious wound

or even dead. The automotive companies have made lots of progress in alleviating this thread, but still the probability of detrimental effect due to accident is not reduced. Infringement of speed is one of the elementary reasons for a vehicle accident. Therewithal, external pressure and change of tilt angle with road surface blameworthy for this mishap. As soon as the emergency service could divulge about an accident, the more the effect would be mitigated. For this purpose, we developed an Android-based application that detects an accidental situation and sends an emergency alert message to the nearest police station and health care center. This application is integrated with an external pressure sensor to extract the outward force of the vehicle body. It measures speed and change of tilt angle with GPS and accelerometer sensors respectively on Android phones. By checking conditions, this application also capable of reducing the rate of false alarm.

"Heterogeneous Face Recognition using domain-specific units" proposed by tiago de freitas pereira, andr anjos. This paper [3]proposes, The task of Heterogeneous Face Recognition consists of matching face images that are sensed in different domains, such as sketches to photographs (visual spectra images), thermal images to photographs or near-infrared images to photographs. In this work, we suggest that high level features of Deep Convolutional Neural Networks trained on visual spectra images are potentially domain-independent and can be used to encode faces sensed in different image domains. A generic framework for Heterogeneous Face Recognition is proposed by adapting Deep Convolutional Neural Networks low level features in, so-called, "Domain-Specific Units." The adaptation using Domain-Specific Units allow the learning of shallow feature detectors specific for each new image domain. Furthermore, it handles its transformation to a generic face space shared between all image domains. Experiments carried out with four different face databases cover three different image domains show substantial improvements, regarding the recognition rate, surpassing the state-of-the-art for most of them. This work is made reproducible: all the source code, scores and trained models of this approach are made.

"Security in vehicles with IoT by prioritization rules, vehicle certificates and trust management." This paper [4] presents The Internet of Vehicles (IOV) provides new opportunities for the coordination of vehicles for enhancing safety and transportation performance. Vehicles can be coordinated for avoiding collisions by communicating their positions when near to each other, in which the information flow is indexed by their geographical positions or the ones in road maps. Vehicles can also be coordinated to ameliorate traffic jams by sharing their locations and destinations. Vehicles can apply optimization algorithms to reduce the overuse of certain streets without excessively enlarging the paths. In this way, traveling time can be reduced. However, IOV also brings security challenges, such as keeping safe from virtual hijacking. In particular, vehicles should detect and isolate the hijacked vehicles ignoring their communications. The current work presents a technique for enhancing security by applying certain prioritization rules, using digital certificates, and applying trust and reputation policies for detecting hijacked vehicles. We tested the proposed approach with a novel agent-based simulator about security in IoT for vehicle-to-vehicle (V2V) communications (ABS-SecIoTV2V). The experiments focused on the scenario of avoidance of collisions with hijacked vehicles misinforming other vehicles.

"A Study Of Age and Ageing In Fingerprint Biometrics." Proposed by Javier Galbally, Rudolf Haraksim. This paper [5] proposes that individuals are not identified by something that they have, or they know, but by what they are. While such an approach entails some clear advantages, an important question remains: Is what we are today the same as what we will be tomorrow? The present paper addresses such a key problem in the fingerprint modality based on a database of over 400K impressions coming from more than 250K different fingers. The database was acquired under real operational conditions and contains fingerprints from subjects aged 0-25 years and 65-98 years. Fingerprint pairs were collected with a time difference which ranges between 0 to 7 years. Such a unique set of data has allowed us to analyze both the age and aging effects, shedding some new light into issues like fingerprint permanence and fingerprint quality.

3. PROPOSED WORK

The proposed system is used to record various driving data parameters, and the system will also monitor temperature the level of the car, and additionally, seat belt status will also be updated to the data to the controller. The Raspberry Pi is used to regulate these sensors. The data received from the sensors are stored on the SD card mounted on RPI3 for retrieval after the accident. The system uses external sensors like Camera and Global Positioning System to gather video and site data. In addition, the recorder sends an Alert message to a pre-stored mobile number via Short Message Service (SMS) within the case of occurrence of an accident. And the analysis data and the accident intimation will also be updated to the monitoring section by using the Internet of things. In addition, we are using the status switch to get the analysis data from the vehicle. When the driver presses the status switch then it will be automatically showing the number of accidents happens in the vehicle

3.1. SOFTWARE REQUIREMENTS

3.1.1 RASPBIAN OS

Raspbian is a Debian-based (32 bit) Computer Operating System for Raspberry Pi. There are several versions of Raspbian including Raspbian Buster and Raspbian Stretch.

Since 2015 it has been officially provided by the Raspberry Pi foundation as the primary operating system for the family of Raspberry Pi single-board computers. Raspbian was created by Mike Thompson and Peter Green as an independent project. The initial build was completed in June 2012. The operating system is still under active development. Raspbian is highly optimized for the Raspberry Pi line's low-performance ARM CPUs. The distribution is shipped with a copy of computer algebra program Mathematic and a version of Minecraft called Minecraft Pi as well as a lightweight version of Chromium as of the latest version.

3.1.2 PYTHON

Python language is widely used high level programming language for general purpose programming created by Guido Van Rossum and first released in 1991. An interpreted language, python has a design philosophy that emphasizes code readability (notably using whitespace indentation to delimit code blocks rather than curly brackets or keywords), and a syntax that allows programmers to express concepts in fewer lines of code than might be used in languages such as C++ or java. The language provides constructs intended to enable writing clear programs on both a large and small scale.

3.2 HARDWARE REQUIREMENT

- Raspberry Pi3
- Gas Sensor (MQ6)
- Temperature and Humidity Sensor (DHT11)
- Global Positioning System (GPS)
- Web Camera
- SD Card
- Status Switch
- Buzzer

3.3 STATUS SWITCH

The status switch is placed in the vehicle to check the condition of the vehicle, For example, The Kilometer run by the vehicle, Number of accidents occur in the vehicle, Number of successful trips and RTO information of the vehicle

Fig -1: Status Switch

3.4 IOT

The **Internet of things** (**IoT**) is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

In this system, the IoT is used to store all information about the vehicle temperature, humidity, gas. In addition, the driver's drowsiness is also stored in IoT for retrieving the information for future purposes.

4. SYSTEM ARCHITECTURE

The Fig-2 shows the architecture diagram of the proposed system. The architecture includes the temperature and humidity sensor, gas sensor, Raspberry pi, GSM, GPS and so on.

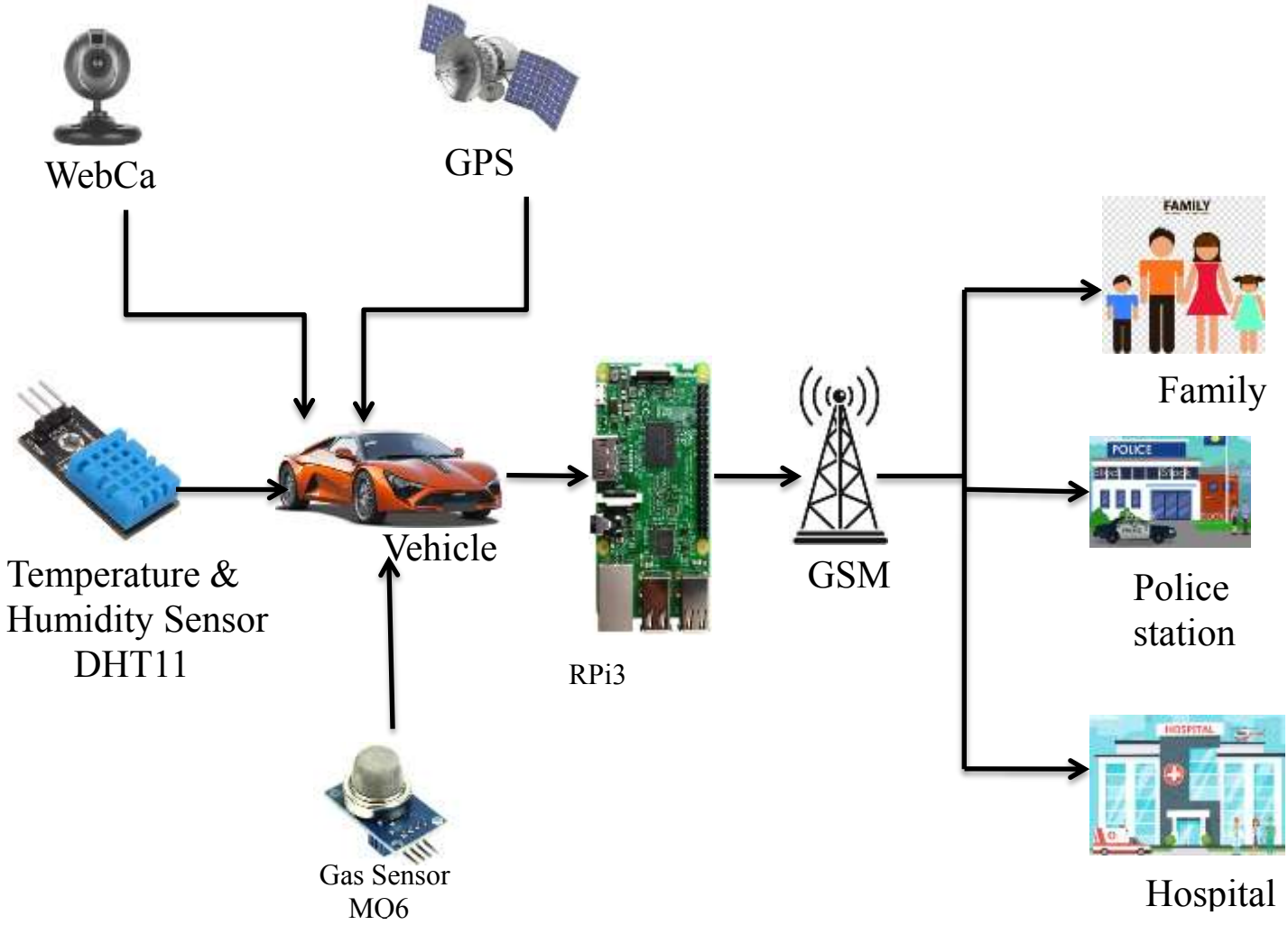

Fig-2 System Overview

4.1 TEMPERATURE & HUMIDITY SENSOR

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data.

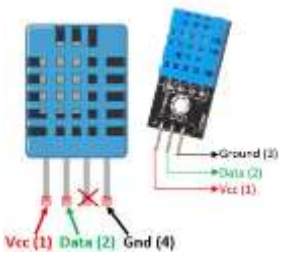

Fig-3 DHT11

4.1.1 DHT11 Specifications

Operating Voltage: 3.5V to 5.5V.

Operating current: 0.3mA (measuring) 60uA (standby)

Output: Serial data. Temperature Range: 0℃ to 50℃

4.2 GAS SENSOR (MQ6)

Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting.

Digital Output – This pin gives an output either in logical high or logical low (0 or 1) that means it displays the presence of any toxic or combustible gases near the sensor.
Analog Output – This pin gives an output continuous in voltage which varies based on the concentration of gas that is applied to the gas sensor

Fig -4 Gas Sensors(MQ6)

4.3 RASPBERRY PI3

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

4.3.1 FEATURES

- **Operating System:** Ubuntu, FreeBSD, Linux, NetBSD, OpenBSD, Plan 9, RISC OS, Windows 10 ARM64, Windows 10 IoT Core.
- **System-on-chip** is used Broadcom BCM2711
- **CPU:** 1.5 GHz 64/32-bit quad-core ARM Cortex-A72.
- **Memory**: 1, 2, or 4 GB LPDDR4-3200 RAM.
- **Storage**: MicroSD slot.
- **Graphics**: Broadcom VideoCore VI 500 MHz.
- **Power**: 5V 3A (for full power delivery to USB devices).

4.4 WEB CAMERA

Active WebCam captures images up to 30 frames per second from any video device including USB cameras, Analog cameras connected to capture card, TVboards, camcorders with FireWire (IEEE 1394) interface and from Network cameras. When the program detects motion in the monitored area, it can sound an alarm, e-mail you the captured images, and start broadcasting or record a video. The program has features to add text captions and image logos to the images, to place a date/time stamp on each video frame, and to adjust the frame rate, picture size, and quality.

4.5 GPS TRACKING DEVICE

A GPS tracking unit is a navigation device normally carried by a moving vehicle or person or animal that uses the Global Positioning System (GPS) to track the device's movements and determine its location.

5. IMPLEMENTATION OF THE SYSTEM

The Raspberry Pi3 connected with sensors namely DHT11, MQ6. The GSM modules are connected to the board for sending an emergency notification, GPS modules are used to send the location of the vehicle. The status switch is used to display driver information. A web camera is used to monitor driver inattention. Buzzer alarm awake driver in case of drowsiness. Storage Disk (SD card) acts as a temporary database to store the data. The implementation is shown in Fig-5.

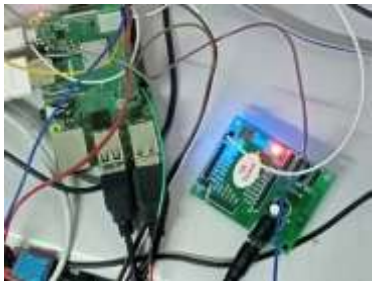

Fig -5 System Implementation

The information stored in IoT is shown in the Fig 6.

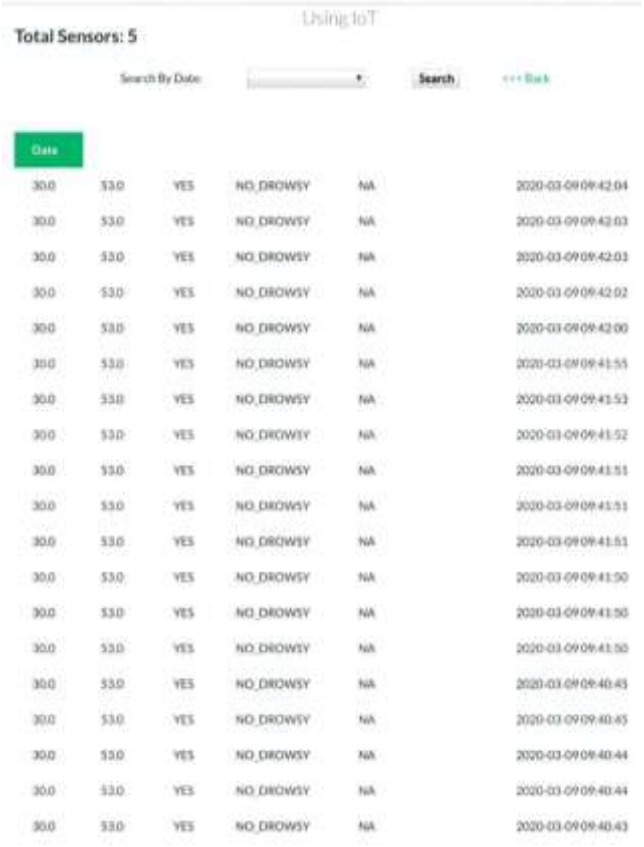

Fig-6 Data stored in IoT

6. RESULTS

The Output of our system delivers up to date updated information about the vehicle and driver to our IoT website if any alert or danger occurs to the system, It sends an alert message to the pre-stored mobile number with location and IoT server alerts the nearby recovery stations to prevent a high level of accident occurrence. These data are used to analyze the accident efficiently by the investigators.

Fig -7: Runnning module

7. CONCLUSION AND FUTURE WORK

This system is useful for preventing road accidents by monitoring both the vehicle and the driver. The data collected from the sensors are stored on IoT for retrieving the data, and the retrieved data can be used for finding the exact reason for the accident, it can be used by the police department for investigating the accident. In future work, the collected data can be useful for both insurance companies and for individuals to prove the exact reason for an accident. Therefore, rejection or acceptance of insurance is based on the collected data.

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