IOT BASED SMART BLACK BOX SYSTEM

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Abstract: ***Automotive electronics plays a significant role in the automobile industry and provides luxurious features and more importantly addresses the safety and security concerns. The work presented in this paper aims at providing a cost-effective solution to the design and development of an event data recorder which has been basically adopted from the aviation sector considering the need and the correlated benefits. The paper presents an integrated design of the black box with the basic features of the data recorder which could be very useful for domestic vehicles and at the same time it also hosts several additional features that could assist in mitigating the number of accidents, or at bare minimum, will serve as an analysis tool to prevent future accidents by analyzing the previous accidents. The black box also provides automatic accident notification system which helps in informing the nearest hospital and the traffic authority by providing not only the coordinates of the accident but also the exact physical address for immediate medical attention which can save numerous lives every day. The black box also hosts several other features advanced web tracking anytime and from anywhere. Thus, the overall cost is highly optimized by integrating such multiple features.***

I. INTRODUCTION

In this system, we use ARDUINO MEGA (ATmega2560) microcontroller which acts as brain of the system, because the entire system program instruction stored in it. Here we have used ultrasonic sensor, gas sensor and temperature sensor to know the status of vehicle and driver like level of fuel, detection of alcohol and temperature inside the vehicle respectively. Touch sensor we use here to know the number of persons is occupied in vehicle. The crash sensor which we use here to stop the data read from the vehicle using sensors mentioned above and store to SD card as if the data keep on read and store in SD card. The GSM module we use here to inform respective person and public service

organization. All the data are updated to cloud so that the system operation is either controlled or monitored using IOT.

INTERNET OF THINGS

The **internet of things** (**IoT**) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

II. RELATED WORKS

[1] Design and Implementation of Real Time Wireless System for Vehicle Safety and Vehicle to Vehicle Communication. The proposed system aims at developing and designing a suitable system for automobile purposes using ZigBee protocols. The main problems faced in the existing system are inaccuracies in the calculation of speed, distance measurement, and slow response time, etc.

[2] Opening the Black Box: Hierarchical Sampling Optimization for Hand Pose Estimation, Hand pose estimation, formulated as an inverse problem, is typically optimized by an energy function over pose parameters using a 'black box' image generation procedure, knowing little about either the relationships between the parameters or the form of the energy function.

[3] DG2: A Faster and More Accurate Differential Grouping for Large-Scale Black-Box Optimization, Identification of variable interaction is essential for an efficient implementation of a divide-and-conquer algorithm for large-scale black-box optimization. In this paper, we propose an improved variant of the differential grouping algorithm, which has a better efficiency and grouping accuracy.

[4] Novel Black-Box Arc Model Validated by High-Voltage Circuit Breaker Testing - In this paper, we present a new black-box arc model that was validated using tests with short-line fault interruption of high-voltage circuit breakers. This new arc model shows superior performance compared with four types of existing black-box arc models. Black-box arc models are widely used to simulate current and voltage waveforms during the interruption process.

[5] Introducing Elitist Black-Box Models: When Does Elitist Behavior Weaken the Performance of Evolutionary Algorithms - Black-box complexity theory provides lower bounds for the runtime of black-box optimizers like evolutionary algorithms and other search heuristics and serves as an inspiration for the design of new genetic algorithms.

III. PROBLEM DEFINATION

3.1 SYSTEM ARCHITECTURE

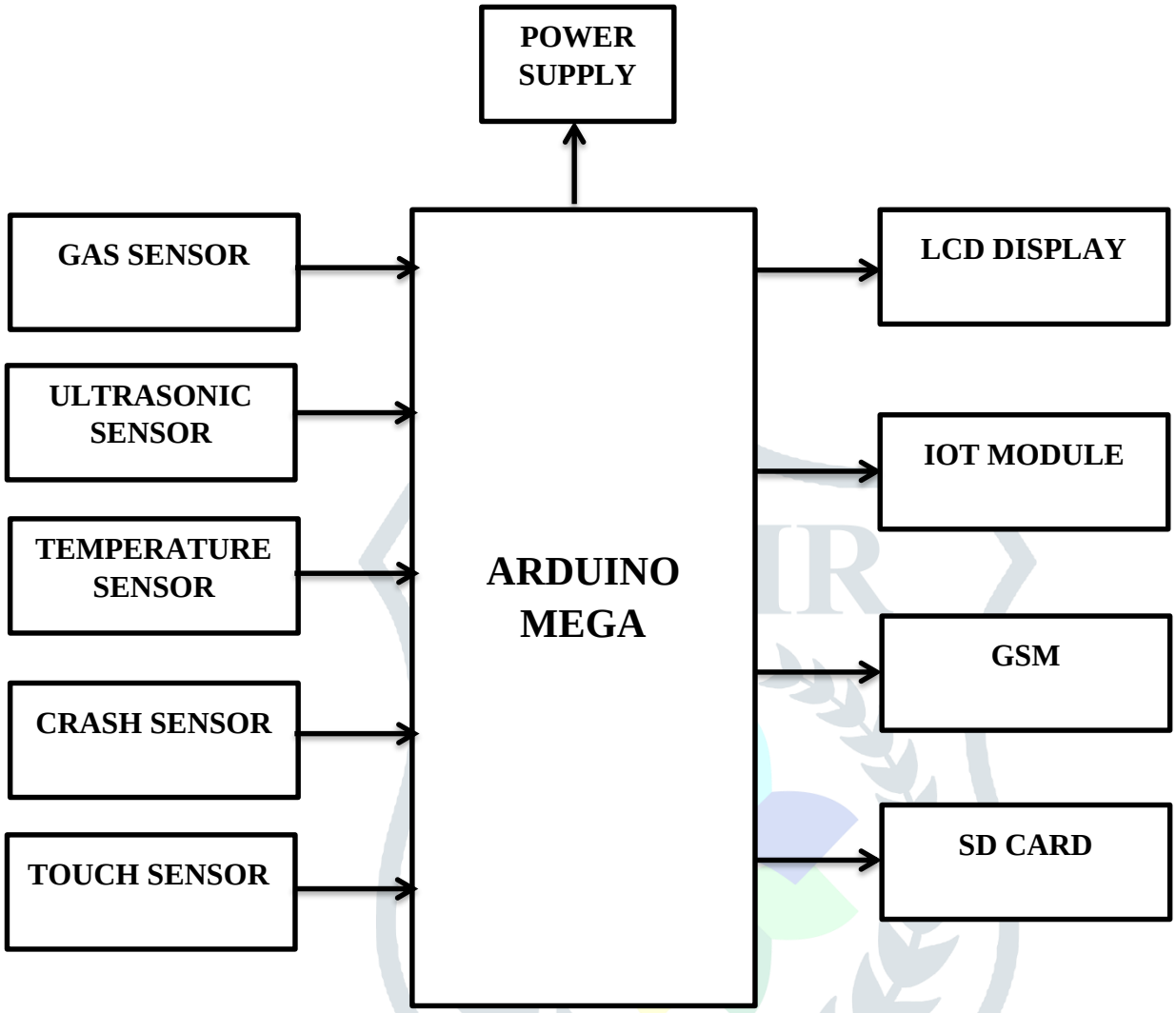

Fig. SYSTEM ARCHTECTURE

IV. PROBLEM DESCRIPTION

HARDWARE TOOLS:

- ARDUINO MEGA
- IOT MODULE
- LCD DISPLAY
- GSM
- TEMPERATURE SENSOR
- TPUCH SENSOR
- GAS SENSOR
- ULTRASONIC SENSOR
- CRASH SENSOR
- SD CARD

SOFTWARE TOOLS:

- ARDUINO
- EMBEDDED C

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

PROGRAMMING:

The Mega 2560 board can be programmed with the Arduino Software (IDE). For details, see the reference and tutorials.

The ATmega2560 on the Mega 2560 comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).

You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar; see these instructions for details.

WARNINGS:

The Mega 2560 has a resettable poly fuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

POWER:

The Mega 2560 can be powered via the USB connection or with an external power supply. The power source is selected automatically.

MEMORY:

The ATmega2560 has 256 KB of flash memory for storing code (of which 8 KB is used for the bootloader), 8 KB of SRAM and 4 KB of EEPROM (which can be read and written with the EEPROM library).

COMMUNICATION:

The Mega 2560 board has a number of facilities for communicating with a computer, another board, or other microcontrollers. The ATmega2560 provides four hardware UARTs for TTL (5V) serial communication. An ATmega16U2 (ATmega 8U2 on the revision 1 and revision 2 boards) on the board channels one of these over USB and provides a virtual com port to software on the computer (Windows machines will need a .inf file, but OSX and Linux machines will recognize the board as a COM port automatically. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the ATmega8U2/ATmega16U2 chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

INFRASTRUCTURE:

The Internet of Things will become part of the fabric of everyday life. It will become part of our overall infrastructure just like water, electricity, telephone, TV and most recently the Internet.

1. **Plug and Play Integration**

If we look at IoT-related technology available today, there is a huge heterogeneity.

2. **Infrastructure Functionality**

The infrastructure needs to support applications in finding the things required. An application may run anywhere, including on the things themselves.

3. Physical Location and Position

As the Internet of Things is strongly rooted in the physical world, the notion of physical location and position are very important, especially for finding things, but also for deriving knowledge.

4. Security and Privacy

In addition, an infrastructure needs to provide support for security and privacy functions including identification, confidentiality, integrity, non-repudiation authentication and authorization.

5. Data Management

Data management is a crucial aspect in the Internet of Things. When considering a world of objects interconnected and constantly exchanging all types of information, the volume of the generated data and the processes involved in the handling of those data become critical.

V. RESULTS

The same hardware can be used in variety of application. The operation cost of system is less & Performance efficiency are remains high. The reason for the accident is found using our black box system with ease.

VI. CONCLUSION

The analytical process started from data cleaning and processing, missing value, exploratory analysis and finally model building and evaluation.

VII. FUTURE WORK

- To automate this process by showing the result in desktop application.
- To optimize the work to implement in Artificial Intelligence environment.

VIII. REFERENCE PAPER

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