

## Development of Black Box Alert System for Accident Detection

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### Abstract

*Since many vehicles are more likely to collide in today's world, many lives have been lost. There may have been a window of opportunity to save lives at that time, but it was very unlikely due to a lack of knowledge, resources, and access. Thanks to our program, you will never again have to worry about addressing that problem. A car's security system would be useless without the accelerometer. Possible dangerous driving behaviors might be detected using an accelerometer-based sensor. In this experiment, we monitored the time immediately before, during, and after a collision by means of an accelerometer sensor. In the case of an accident, the authorities will be alerted with the license plate number and emergency contact information. As soon as they get the warning, authorities will know precisely where the accident happened. Once the location has been verified, we may go ahead. A lot of automobiles contain central locking systems, such door locking systems, which might cause issues when employed in a new context. If there's no key, there's no way in. This effort brings us closer to resolving the issue at hand. The use of GSM Technology is being considered for this goal.*

### 1.Introduction

The first "Black Box" was created by David Warren. His father was killed in a pioneering Australian airplane disaster in 1934. As a result, the invention of the flight-data recorder (or "black box") was highly meaningful to him. Warren's innate curiosity with in-flight recordings was reawakened by a few events that took place in the 1950s when he was working at the Aeronautical Research Laboratories in Melbourne. The de Havilland Comet made its debut in Britain in 1949, but it crashed spectacularly in 1954. It was notoriously difficult for investigators to determine the reasons and investigate the complexities of these tragedies without any form of

recording equipment from within the airplane. British authorities. Prime Former British Prime Minister and Statesman Winston Churchill once said, "The cost of solving the Comet mystery must be reckoned with

Neither money nor manpower." Around the same time, consumers could see the first tape recorders in retail stores and industry fairs. A computer designed to work inside the confines of another mechanical or electrical system, often with strict real-time processing requirements; this is what we call an embedded system. It functions as a component of a larger system, which may consist of mechanical and/or electrical components. A PC or other general-purpose computer, on the other hand, is designed to be adaptable and may be used for a variety of tasks. Many everyday items nowadays have embedded systems as their central processing units. Some examples of embedded system processors include micro controllers and digital signal processors (DSPs). When it comes to embedded systems, the central processing unit (CPU) is a must-have piece of hardware. Embedded systems rely heavily on this.

Common examples of embedded systems are digital watches and MP3 players, but traffic Fires and industrial controls are other examples. Vehicle hybrids, magnetic resonance imaging scanners, and aircraft electronics. The "black box" in an automobile stores data like the speed, location, and time of the accident. This information might lead to more thorough investigations of automobile accidents and the prevention of public misbehavior. There are, nevertheless, substantial challenges, such as preserving user privacy and handling data for CCTV footage in a moving car. The suggested solution may save drivers' administrative and communication expenses while also protecting their personal information. Our plan to guarantee citizen safety is based on fact.

## 2.Literature Survey

What went wrong and what has to be done to prevent a recurrence may be deduced from the data gathered by a modern black box. Using the now-standard black box technology, we recommend a cutting-edge safety data collecting system. By including certain new parts, our black box configuration is superior than the standard one.

In the case of an accident or crime involving a car, the "black box" stores information that may be used by automotive forensics experts to piece together what happened. The "black box" may record vital information in the event of an accident or crime while the car is in motion. Using a MEMS accelerometer, wireless data transfer, and The Global Positioning device, researchers are working on a covert tracking device. The gadget has an accelerometer, central processing unit, global positioning system, and a GSM module for cellular phone communication. In the case of an emergency, this portable wireless device may communicate with loved ones and the closest emergency medical services/hospital[1].

## 3.Methodology Block Diagram

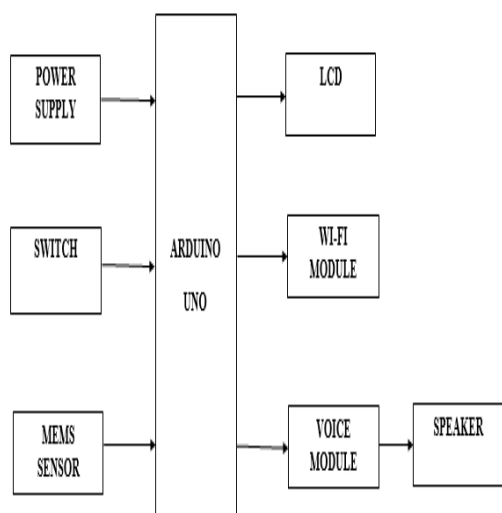


Figure 3 Block Diagram

To keep track of the instructions provided to an airplane's computers, a flight data recorder (FDR) or accident data recorder (ADR) is utilized. It's a system

for keeping tabs on and retrieving flight records. A cockpit voice recorder (CVR) is an additional kind of flight recorder that records pilot-to-ground radio communications. These two features often coexist in the same electronic gadget.

"Black Box" is a common way of shortening this concept. The FDR's data may be used to better understand topics like fuel efficiency, material decay, and potential hazards to passengers in the air. The outside of FDR was painted a heat-resistant blazing red, making it easily visible even among wreckage and disproving the "black box" notion, as they are essential to the investigation. The technology increases passengers' chances of survival in a collision if put in the aircraft's rear. It's possible that MEMS accelerometer will be utilised in crash alert systems. Important flight data from before, during, and after an accident may be recorded and saved on this device, making it a potential "crash recorder." The results of an accelerometer test might attest to the severity of a collision.

## Hardware Components

### Arduino UNO



Figure .2 Description of Arduino Uno

The Arduino/Genuine Uno micro controller board is based on the ATmega328P (data sheet). There are 14 digital I/O pins available, six of which may be used as PWM outputs, a reset button, and a USB port. It includes everything you need to start rocking immediately. The 1.0 release of the Arduino Software (IDE) was given the name "uno" since the

word means "one" in Italian. Since its debut with the Uno board and the 1.0 release of the Arduino Software (IDE), the Arduino platform has undergone various upgrades. For a complete list of all boards, both new and old, available on the Arduino platform, check out the Arduino index of boards. The Uno board was the first in a series of USB Arduino boards and serves as the platform's standard. Here you may find information on the board's warranty. Here in the Getting Started section, you'll find everything you need to know to get your board up and running, install the Arduino Software (IDE), and start playing around with code and circuits.

USB connection to a computer, or via an external AC-to-DC converter or battery, may power the CPU within.

### Power Supply

Regulated electricity is essential for the operation of every digital circuit. The purpose of this piece is to teach you how to convert the power from the wall outlet into a controlled positive supply.

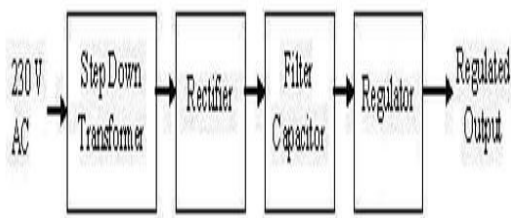


Figure 4. Regulated Power Supply

A simple block diagram of a permanently controlled power supply is seen in the figure. OK, let's proceed block by block.

### MEMS Sensor

Axis Orientation/Motion Detection Sensor



Figure 5. Motion Detection Sensor

The MMA7660FC is a 3-axis accelerometer with I2C digital output (1.5 g). It is a low-power, low-profile capacitive MEMS sensor with user-delectable sample rate and 6-bit digital output, as well as zero-gravity offset and gain error correction. The interrupt pin (INT) on the device allows it to be used for tasks such as monitoring data changes, determining the direction of a product, and identifying hand motions. The device fits into a small 3mm x 3mm x 0.9mm DFN package.

### WIFI Module ESP 8266

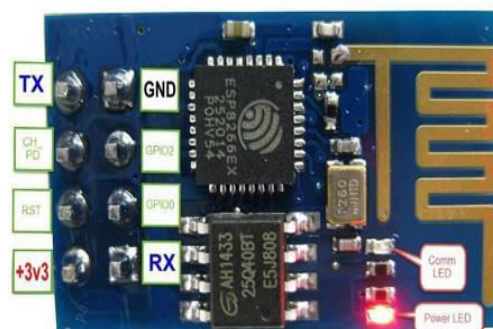


Figure 6 ESP8266 WIFI Module

The ESP8266, developed by a Shanghai-based Chinese firm, is a low-cost Wi-Fi chip that has an integrated micro controller and a full TCP/IP stack. In August of 2014, AI-Thinker released the ESP-01 module, which included the chip for the first time to Western OEMs. This handy tool allows micro controllers to set up wireless TCP/IP connections using common Hayes-style commands. There was a

severe lack of English-language resources pertaining to the chip and the instructions it processed at the time. Due to its low price and little external components, the module, chip, and software contained therein attracted the attention of many hackers, suggesting that it may one day be produced at a very low cost on a massive scale. As a result, certain paperwork written in Chinese had to be translated.

### LCD Module

The LCD Module is used to show user-interactive messages. We take a look at a two-line, 16-character LCD display that can communicate with the

### Implementation and Software Development

#### Circuit Diagram

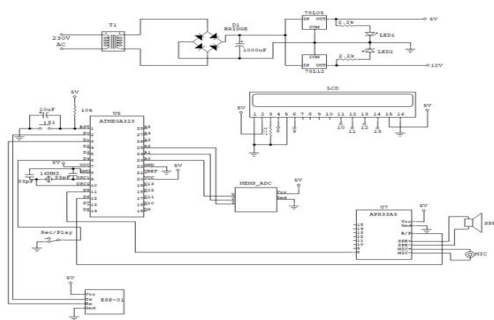


Figure 7 Circuit Diagram

A flight data recorder (FDR; often called an accident data recorder) is a device installed in aircraft electrical systems to keep a log of all orders sent to such systems. It's a device used to record information about a plane's flight. The cockpit voice recorder (CVR) is a kind of flight recorder that records cockpit communications, outside sounds (such as chats with air traffic controllers), and in-flight conversations. Sometimes a single gadget will have both functions.

### "Black Box".

The FDR stores information that may be used to investigate accidents and further investigate air safety issues, material degradation, and engine

performance. Due to the fact that they are very important to the investigation Because of its heat-resistant bright red paint and its location in the aircraft's tail section, where it is less likely to be damaged in a crash, the FDR is not as stealthy as a "black box" would indicate.

Micro electromechanical system (MEMS) accelerometer may be used in a warning application that may predict collisions. It's valuable as a crash recorder since it can record flight data before, during, and after a crash. Data from an accelerometer might be used to confirm the existence of a major crash.

### Flow Chart

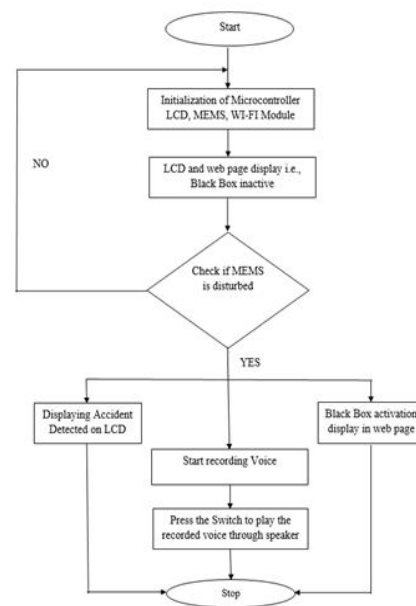


Figure 8 Flow Chart

### Software Required Equipment:

A Mac or a Linux machine is no different in this regard. Essentially any micro controller covered here may be used in lieu of an Arduino. Our shopping guide may help you choose the right USB cable to connect your computer to an Arduino-compatible micro controller.





Figure 9 A to B USB Cable

The Arduino board may be powered by connecting it to a computer through USB (or an FTDI connector if you're using an Arduino Pro). You should notice an LED with a clearly visible label. An "ON" switch activates the electrical system. This diagram reveals the physical position of the UNO's power indication LED.

#### 4.RESULTS:

When the MEMS Sensor is tampered with, the Wi-Fi module displays an alert on the LCD and the website at the same time, and the voice module begins recording audio. The playback button activates the speaker for listening. Black Box therefore completes its research successfully. After initial configuration, the following screens will appear:

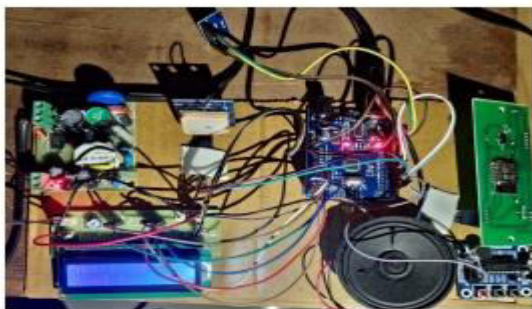
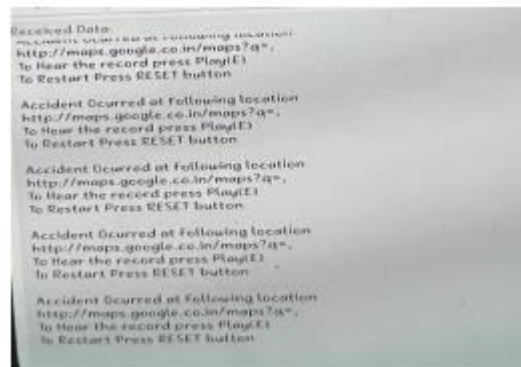


Figure 10 The initial setup



#### Advantages

- The system is fully automated and can run without any help from a human operator.
- The key benefit of this system is that it is cost-effective and trustworthy.

#### Applications

- Medical Applications.
- Applications for the Prevention of Accidents

#### Conclusion

In this paper, we trace the development of the BLACK BOX early warning system for aircraft disaster recovery and describe its intended use and implementation. The "Black Box Alert System for

Airplanes Crash Recovery" project has been a huge success both in terms of development and testing. Specifics about the many manufacturing tools that went into its creation. Every module's location was planned out with efficiency in mind. Second, the efficiency of the task was enhanced by the use of contemporary integrated circuits and emerging technologies.

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