

# Blackbox for on-road vehicles

Saket Joshi, Vedant Gadewar, Shourya Goswami, Shubham Pal, Pratik Nikhare

Guided by : PROF. S.S CHIWANDE

Department of Electronics and Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India

## ABSTRACT

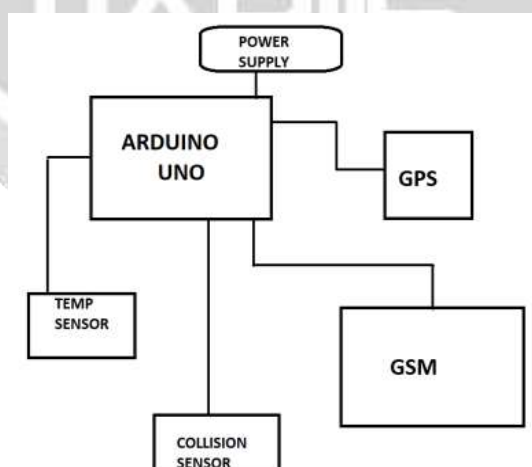
*This paper presents the study of wireless device Black box used for detecting crashes of on-road vehicles. BlackBox will send and store the important information. It is constructed in such a way that when a crash happens, the device sends a particular location to the registered mobile no, so that the help could reach on time. Mainly used in all the automobiles industries as their Safety feature.*

*The master component we use is Arduino UNO that controls all the other modules and sensors. The GPS and GSM modules are used to obtain location data and send that data to a registered mobile number. Some of the sensors we use are, Temperature sensor (DTH11), a switch etc.*

**Keywords:** Safety, Road accidents, Sensors, Global positioning system, Used in automobiles.

## 1.INTRODUCTION

The project is regarding 'Black-Box for On-Road Vehicles'. From this project we hope to achieve a wireless device that can be installed in any vehicle all over the world. This device will contain a range of small circuits. Wireless Black-Box is basically a device that will collect all the parameters regarding vehicular accidents, which will also be stored and sent to concerned authorities over a text message. The parameters include Latitude, Longitude, temperature etc. For collecting the information we use various types of sensors like temperature, GPS. This information will be stored in a SD card for further information regarding the crash. After the crash is detected by the switch the built-in system will send an emergency message to the registered numbers. The GPS module will take the exact latitude and longitude of the crash and the GSM module will send the information via a text message. All the parameters which are sensed by the system will send the signal to Arduino UNO.



**Fig-1:**Block Diagram

**1.1 Power Supply :** A power supply is used in electrical devices to supply electric power to an electrical load. The power supply converts electric current from a source to the required value of voltage, current, and frequency by the load.

**1.2 GPS :** The Global Positioning System (GPS) is a satellite based navigation system that gives location and time information in all conditions irrespective of the weather, it can give accurate location of objects anywhere on or near the Earth where there is a clear line of sight to four or more GPS satellites.

**1.3 Arduino UNO :** The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller which is developed by Arduino.cc. The board is equipped with the sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

**1.4 Temperature Sensor (DHT11) :** DHT11 is a low-cost digital sensor which is used for sensing the temperature and humidity. This sensor can be easily interfaced with any microcontroller such as Arduino, Raspberry pi, etc. DHT11 sensor is used to measure the temperature and humidity instantaneously.

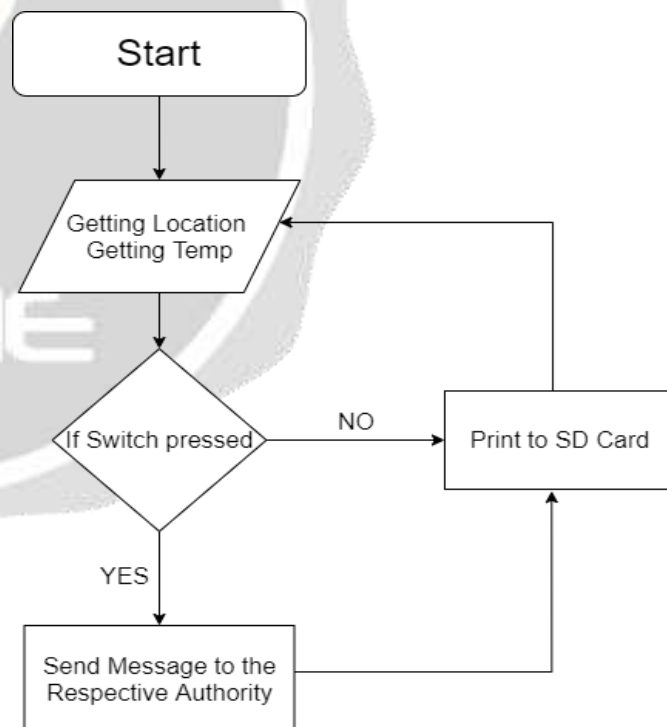
**1.5 GSM :** The Global System for Mobile Communication is a standard which is developed by European Telecommunications Standard Institute to describe the protocols for second-generation digital cellular networks used by mobile devices such as mobiles phones and tablets.

**1.6 Collision Sensor :** Collision Sensor is also called an impact sensor. It is a piece of electronic safety equipment that detects an impact through vibrations. Collision sensors are used in industrial settings, in cars for the collision detection purpose.

## 2. METHODOLOGY

The device is used to reduce the number of deaths caused due to medical services not reaching on time after the accidents so to overcome this situation this wireless device is made. It will also be useful for the concerned authorities to know the cause of accidents. This wireless device has been used in Aeroplanes for recording purposes before an accident, we try to bring this technology to ON-Road Vehicles. It will have a number of sensors attached to Arduino UNO which will store the data and send information to registered mobile numbers. After Collision is detected, sensors will get activated which in turn triggers all the other modules to store and send information.

When we power on the system Arduino and other attached components get turned on. First we get the location by the GPS module, and the Temp of the inside of the vehicle. Then we use Accident detector to check whether the accident has occurred or not. If YES then we send the message to the respective authority and save the data in the local SD card. If NO then we save the DATA in the SD card and then we check the location and temp again and the loop continues.



2: Flow Chart

### 3.LITERATURE REVIEW

Nowadays, the number of accidents is rapidly increasing in the crowded cities as well as on the highways. So we have constructed a wireless device which can track the vehicle and send the location on the registered number. The functions of this automobile Black Box is much similar to an aeroplane Black Box. It is used to analyze the cause of vehicular accidents and prevent the loss of life and property due to vehicle accidents. This paper proposes a model of an Automobile Black Box system that can be implemented into vehicles. The system also involves the improvement of the security by preventing the damage by the Black Box data. An Event Data Recorder(EDR) is the device which is used to record the movement parameter of a vehicle mainly used for the accidents analysis purposes and for the safety measures. In some vehicles Video Event Data Recorder(VEDR) is used. A Video Events Data Recorder(VEDR) is a device that records the video in a vehicle to create the records of accidents. This research will be continued in the near future by researching new features such as data compression, security, low energy and more safety measures.

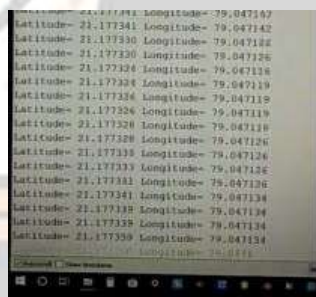
### 4.RESULTS

As per the methodology this project gives the following outputs

- (a) The collision of a vehicle is sensed by Switches.
- (b) The information regarding the crash is collected by Arduino.
- (c) The information is sent to emergency authorities over a text message.
- (d) The information is also saved physically for further investigation.



**Fig-3: Program output in Serial Monitor**



**Fig-4: Location data displayed by GPS**

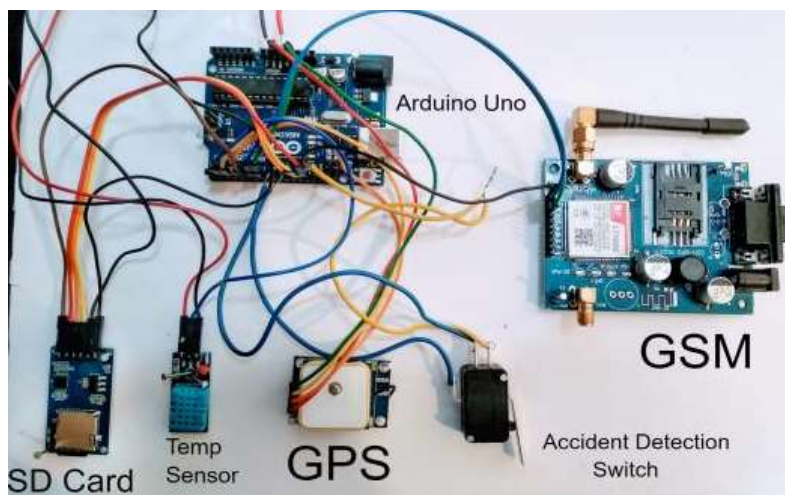
In **fig 3**, the code is executed on the computer and its output is visible on the serial monitor. We can see in this picture that it is now communicating with the GSM to send the message to the respective authority.

In **fig 4**, the code for GPS ran to get the exact location of the Car. GPS constantly searches for the location and we write the location on to the SD card to store it. In this picture we can see the GPS working.

### 5.CONCLUSIONS

The paper proposed a project which can be useful in saving many lives. The use of all the sensors and arduino helps to keep the cost of the project minimum while still achieving the result. The Arduino acts as the brain of this device, it gathers information and sends it to registered numbers in a timely manner. We used the Arduino programming language with TinyGPS++ library to successfully implement the working.

This device will allow us to reduce time wasted between calling an emergency number and crash by doing that automatically.



**Fig-5:** BlackBox setup using Arduino

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## Authors:



**Sujata S. Chiwande** pursued M.Tech in Electronics Engg. from Y.C.C.E, Nagpur in 2010. She is Currently working as Asst. Prof. in Electronics & Telecommunication department, in Yeshwantrao Chavan college of Engineering, Nagpur. She has 15 years of teaching experience. Her research of Interest includes Low Power VLSI Design. Published number of papers in various reputed international Journals & conferences.



	<p><b>Shourya A. Goswami</b> is currently pursuing B.E in Electronic and telecommunication from Y.C.C.E, Nagpur.</p>
	<p><b>Vedant N. Gadewar</b> is currently pursuing B.E in Electronics and telecommunications from Yeshwantrao chavan college of engineering, Nagpur.</p>
	<p><b>Saket M. Joshi</b> is currently finishing his final year of B.E in Electronics and telecommunications from Yeshwantrao chavan college of engineering, Nagpur.</p>
	<p><b>Pratik H. Nikhare</b> is currently pursuing B. E in Electronics and Telecommunication from Yeshwantrao Chavan College of Engineering, Nagpur.</p>
	<p><b>Shubham J. Pal</b> is currently pursuing B.E in Electronics and telecommunications from Yeshwantrao Chavan College of Engineering, Nagpur.</p>