

# Automatic Accident Alert System using Raspberry Pi

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**Abstract**— In highly populated Countries like India, everyday people lose their lives due to accidents and poor emergency facilities. A number of the rescue teams face difficulty in reaching the injured people due to late alerts and insufficient information of the particular accident location. The appearance of the portable And Internet of Things (IOT) industries reshaped the way people communicate and brought a paradigm shift to public and personal services. This ever-evolving technology marked the start of recent era affecting the lives of individuals and various businesses. This paper express to produce an answer for such a controversy we are visiting proposed an IOT system which instantly notifies the General Public Safety Organization (PSO) headquarter whenever an accident takes place it pinpoints its geographic coordinates on the map.

**Keywords:** Internet of things, Public Safety Organization

## I. INTRODUCTION

Smartphone-based accident detection applications have each benefits and downsides relative to traditional in-vehicle accident detection systems, e.g., they're vehicle-independent, more and more pervasive, and supply wealthy information for accident analysis, together with photos and videos. Building a Smartphone-based accident detection system is tough, however, as a result of phones may be dropped (and generate false positives) and therefore the phone isn't directly connected to the vehicle. In distinction, standard in-vehicle accident detection systems seldom incur false positives as a result of they consider sensors, like accelerometers and airbag sensors that directly observe injury to the vehicle. The quantity between the prevalence of an accident and therefore the arrival of an ambulance is crucial in reducing the rate. The victims of the accident is also in associate unconscious state, and can't be expected to position a decision to the emergency services room, once an accident happens. Hence, associate in-vehicle accident detection module may be used. Further, during a country like Asian country, wherever the witnesses are expected to inform the emergency services room once an accident happens, tons of delay will happen. In India, it takes thirty seconds on a median for the Communications Officer to gather relevant info, associated 3 minutes for the Dispatchment Officer to dispatch an ambulance to the location. Further, the ambulance driver has to determine the accident location supported cues provided by the officer and sail through the significant traffic. It takes another forty eight hours once the accident to conduct a follow-up to see the impact of the care. Tons of delay arises in each and every stage because of the human component concerned. during this paper, we have a tendency to propose a system which will showing intelligence detect accidents, and dispatch and guide the closest ambulance to the accident location with bottom delay involved. Before getting in the

details of the proposed technique we have a tendency to briefly review the connected literature.

## II. LITERATURE SURVEY

An IOT Approach to Vehicle Accident Detection, coverage & Navigation One specific concern that Public Safety Organizations (PSO) should account for while participating in several activities is decreasing the impact of vehicle accidents, aiding as several possible individuals as doable and providing 24/7 on the spot rescue. The nongovernmental organization humanitarian organization is one in all the foremost noted PSOs to be present on-the-spot whenever an accident or a disaster takes place. However, a number of the rescue groups face issue in reaching the injured individuals to due late alerts and insufficient data of the precise accident location. The appearance of the mobile and internet of Things (IOT) industries reshaped the manner individuals communicate and brought a paradigm shift to public and personal services. This technology marked the start of recent era moving the lives of individuals and varied businesses. This paper conveys a wise and reliable IOT system answer that instantly notifies the PSO headquarter whenever an accident takes place and pinpoints its geographic coordination the map. Once an accident takes place, a shock sensor detects it. Then, method the sensor signal and send the geographic location together with some auxiliary data to the PSO headquarter, indicating accident prevalence. This is often a promising system expected to assist within the tedious rescuing method by coverage matter of seconds the situation of an accident, the passengers injured, blood varieties, therefore lowering death's rates. The geographical information collected from this method may be relied upon as admit table proof or indicator of road state and conditions

## III. SYSTEM ARCHITECTURE

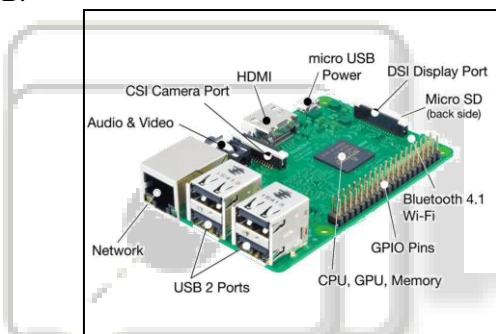
The Automatic accident alert system was created utilizing android Studio throughout the exploration and currently a User Interfaced (UI) android application program existent on an Android-based GPS empowered and a raspberrypi3 kit, which may act with varied sensors and consequently offer live info of accident occurred. The framework depends on the raspberrypi3 kit

Signal information transmission utilizing internet (GPS) correspondence as a part of the request to encourage the accident mapping tool. This framework guarantees a secure trade of data on remote correspondence. A User interface (UI) on the android empowered cell offers framework association. The Live-update operated android and RaspberryPi3 kit uses an Android-based Internet-enabled phone for its application and therefore the RaspberryPi3 kit because the microcontroller. The key elements of this technique are Android-based phones, internet module (GPS),

RaspberryPi3 kit and sensors like collision sensor, IR, Ultrasonic.

#### A. Raspberry Pi 3:

The Raspberry Pi 3 Model B features a quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz. This puts the Pi 3 roughly 50% quicker than the Pi two. Compared to the Pi 2, the RAM remains an equivalent – 1GB of LPDDR2-900 SDRAM, and therefore the graphics capabilities, provided by the Video Core IV GPU, are an equivalent as they ever were. Because the leaked FCC docs can tell you, the Pi 3 currently includes aboard 802.11n Wi-Fi and Bluetooth 4.0. Wi-Fi, wireless keyboards, and wireless mice currently work out of the box. The headlining feature of the Pi 3 is that the inbuilt Wi-Fi and Bluetooth, the whole specs for the Pi 3:SoC: Broadcom BCM2837 (roughly 50% quicker than the Pi 2); CPU: 1.2 gigahertz quad-core ARM Cortex A53 (ARMv8 Instruction Set); GPU: Broadcom Video Core IV @ 400 MHz; Memory: 1 GB LPDDR2-900 SDRAM; USB ports: 4; Network: 10/100 MBPS local area network, 802.11n Wireless local area network, Bluetooth 4.0, CSI camera port for connecting the Raspberry Pi camera, DSI show port for connecting the Raspberry Pi bit screen display, small micro SD port for loading your OS and storing information, Micro USB.

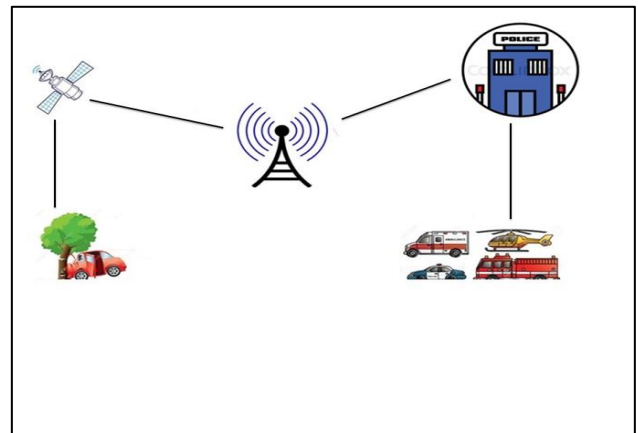


#### B. GPS Module:

GPS stands for global Positioning System and used to discover the Latitude and longitude of any location on the world, with precise UT (Universal Time coordinated). GPS module is that the main element in our vehicle tracking system project. This device receives the coordinates from the satellite for each second, with time and date. GPS module sends the info associated with the real-time position in time period, and it sends most information in NMEA format. NMEA format consists of many sentences, within which we have a tendency to solely want one sentence. This sentence starts from \$GPGGA and contains the coordinates, time and alternative helpful info. This GPGGA is remarked as world Positioning System Fix information.

##### 1) Importance of GPS in Accident mapping:

In the Accident alert system, GPS or GPS technology these days extends any than simply a tool to assist emergency services to navigate to locations. With the advancement in mobile technology and mobile apps for accident response solutions, GPS technology has absolutely reworked the mapping of vehicles with accuracy. The standard of the GPS system is extremely abundant regarding as unhealthy quality merchandise could result in false detection or the incorrect location of the accident.

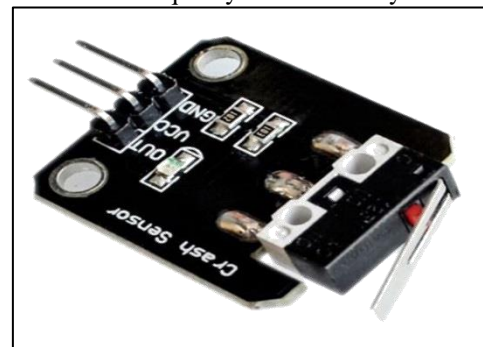


#### C. Android Based Phone

Android is a mobile OS (OS) supported the UNIX system kernel and presently developed by Google. With a interface supported direct manipulation, the OS uses touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to control onscreen objects, and a virtual keyboard. We've used the robot platform due to its immense market globally and straightforward to use user interface.

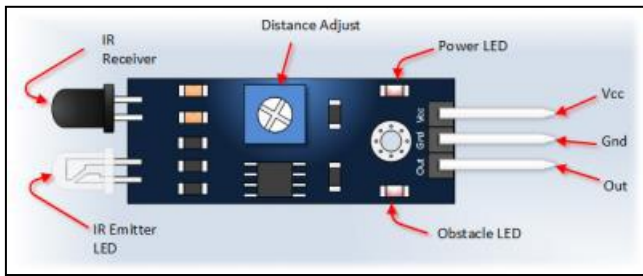
#### D. Collision Sensor

Collision sensing element will notice whether or not any collision movement or vibration happens. It'll output a low pulse signal once vibration is detected. To create the signaling additional reliable and neat, we tend to another a necessary exterior circuit to cut back the noise impact. So, traditional shaking won't cause any output. The device features a high sensitivity. You'll be able to use it to apply to your project, like automatic wake-up and power-down for battery management. Its operating voltage is 5V that makes it compatible with the quality Adriano 5V system.



#### E. IR Sensor

IR (INFRA-RED) sensor relies on lumen 358 IC that is an Operational electronic equipment acting as a comparator. The comparator compares the analog voltages of a potentiometer and therefore the voltage generated by the photodiode. IR Sensors also are employed in Contactless Digital Tachometers. A number of the other applications wherever IR Sensors are implemented are Line Follower Robots, Obstacle Avoiding Robots, Edge Avoiding Robots and many more. The two voltages are applied on the 2 terminals of the IC and correspondingly it generates a digital output on the output pin that's indicated by a Red diode.



F. Ultrasonic sensor

An ultrasonic sensor is an device that measures the distance of a target object by emitting inaudible sound waves, and converts the mirrored sound into an electrical signal. supersonic waves travel quicker than the speed of perceptible sound (i.e. supersonic sensors have 2 main components: the transmitter (which emits the sound victimization piezoelectric crystals) and also the receiver (which encounters the sound when it's travelled to and from In order to calculate the space between the sensor and the object, the sensing element measures the time it takes between the emission of the sound by the transmitter to for instance, if an individual originated an supersonic sensing element aimed toward a box and it took 0.025 seconds for the sound to make a comeback, the space between the supersonic sensor and also the box would be:  $D = 0.5 \times 0.025 \times 343$

IV. SYSTEM DESIGN

The accident alert system uses an Android-based GPS enabled phone for its application and also the Raspberry Pi3 kit as the microcontroller. A server may be a computer program or a tool that gives practicality for alternative programs or Devices, known as "clients". This design is termed the client-server model, and one overall computation is distributed across multiple processes or devices. Python used as an application development language and server that works with info to extract and process knowledge. Info is the: structured set of information that may be accessed in varied ways in which MySQL queries are fired.

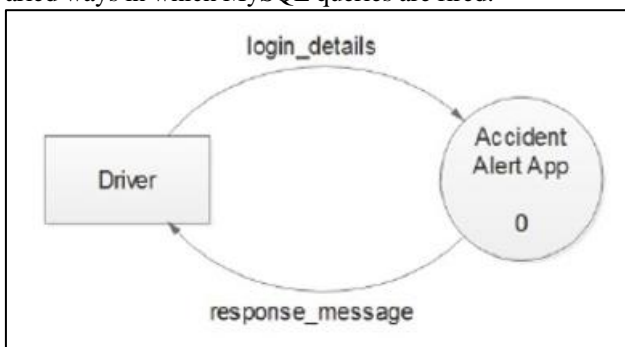


Fig. 4.1: Level 0 DFD

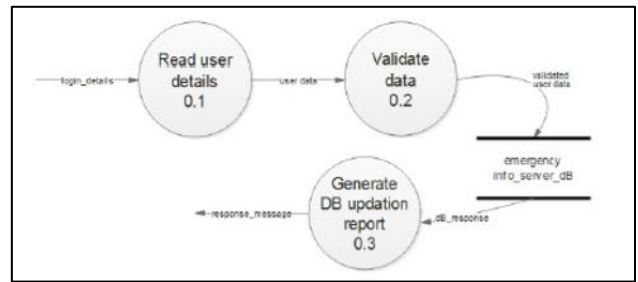


Fig. 4.2: Level 1 DFD

A. Use Case Diagram:

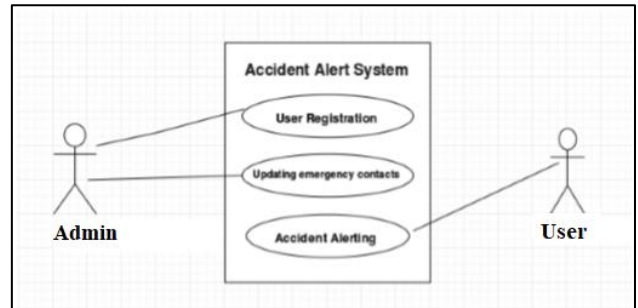


Fig. 4.3 Use Case Diagram

1) Admin:

Admin is a kind of user who has special rights, for example Add/Remove the vehicle which is enabled with accident alert system kit.

2) Receiver:

Receiver refers to the person who has an accident alert system kit enabled in his vehicle.

B. Project Flow:

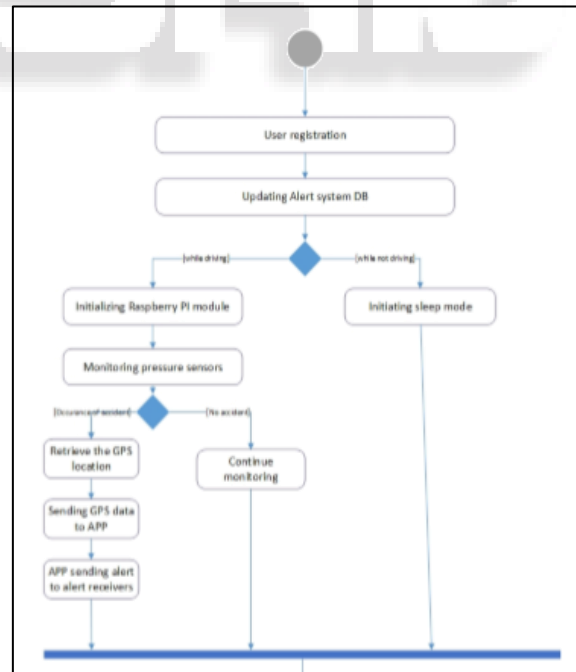


Figure 4.4: Activity Diagram

First, all the parts needed to design the project are collected and a primary concept is designed based on it. Next is the connection between the Raspberry Pi, Internet module, Sensors to be connected which are the most important part of the project. After all the connection is being done, the Raspberry Pi board needs to be programmed and the

Raspberry Pi software has to be installed. At the end, the Android-based mobile phone is used to control the Raspberry Pi

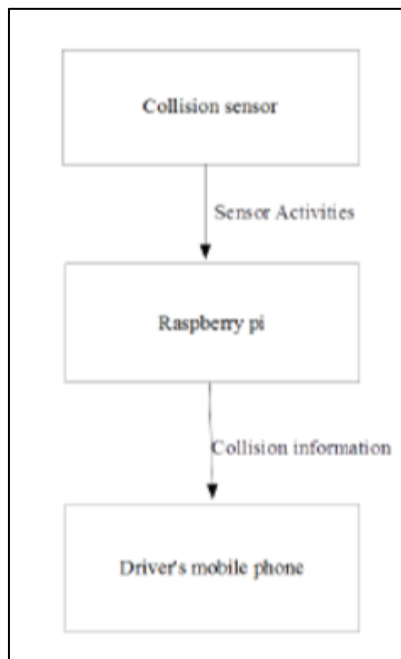


Fig. 4.5: Hardware Module Flowchart

This is the overall flowchart of the system representing the condition of the vehicle which is obtained from different sensors. Continuously the collision sensor transmitted the readings to the raspberry pi kit and this kit constantly observing the received data from the sensor after that If any collision happened then the sensor will generate the signal and kit will send the response to the user's mobile phone and from that emergency services will get notified with the proper location. The updated data obtained from the sensor is given to the server thus we get the Live Info from the server through the android application using GPS.

## V. CONCLUSION

We projected and enforced an IoT system that will facilitate the community decreasing the death rates ensuing from vehicle accidents. This resolution provided several benefits compared to traditional systems, namely, minimizing injured passengers' interaction, providing basic medical info to rescue groups, recognizing actual and correct accident locations, and facilitating the routing method. dependability check showed that the system is strong, that's accessible and serviceable particularly once the IoT device keeps sending continuous notification of crash incidence till it makes certain its reception by the headquarter (server) The presence of a server with secured login for administration workers, lets us keep an eye fixed on emergency dispatch services for multiple accidents at a similar time. It's straightforward to observe the performance of emergency services too. With the android application, navigating through the serious traffic becomes straightforward for the emergency services, as routes with less traffic are automatically advised. The main purpose of the system is to seek out the closest medical unit from the accident location. This was achieved by using some options that the GPS receiver and Google Maps are providing

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