

Internet of Things (IoT) based Emergency Reporting and Management System using Ubidots and Firebase

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Abstract- Emergencies never come with prior intimation and in real-world scenarios, detecting such emergencies and reporting them is a real challenge. The failure to respond to an emergency may be due to several factors like traffic congestion, lack of awareness of the emergency helpline details or not being in a position to inform because of the trauma people go through during such critical times. The use of Internet of Things based emergency reporting and management system using ubidots and firebase will see a seismic shift in the way emergencies are handled specially in a country like India where traffic plays a big hurdle in providing efficient emergency management. This project contains the proposed system to overcome common problems of having manual intervention while reporting an emergency and managing it. Internet of Things (IoT) can be defined as a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Combining the technologies of both Internet of Things (IoT) and the smartphone, we have an application which during emergencies shall help at a faster rate in addition to being easy to use.

Index Terms— Ubidots, Firebase, Smartphone.

I. INTRODUCTION

Congestion is a major problem that causes delays during such critical times. Smart phone plays a pivotal role in this system [1-3]. An application is present in the smartphone with an alert button. During times of emergencies, the person has to click on the app where three options are available and the necessary option is selected. We can have different types of emergencies like medical emergencies, emergencies during fire and smoke, personal threat, natural disasters or even nuclear and chemical disasters. Once the type of emergency is specified, the nearest emergency service is utilized and a request is sent to the driver. As soon as the driver accepts this request, the fastest route to reach the place of emergency is sent along with all the traffic lights on his way to the site of emergency turning green so that delay is avoided to the maximum extent[2]. Finding the shortest and the fastest path provides a solution to traffic congestion problems especially during times of emergencies where every second counts. In case of medical emergencies, the patient's vitals like temperature, heartbeat, blood pressure etc are monitored and sent to the nearest hospital so that they are ready with all the necessary requirements to receive the patient and give him the correct treatment. Once the patient is picked up from the site of emergency, the shortest and the fastest route to reach the hospital is provided by the application also with turning of the traffic lights to green colour. The main idea behind this scheme is

to provide a smooth flow for emergency vehicles and thus minimizing the delay caused by traffic congestion.

II. RELATED WORK

A. Help Me App

This is an application that covers all kinds of personal emergency situations. It basically allows you to send a warning during times of emergency to two numbers that you need to choose initially. In the text, we can get to know from where the text was sent using GPS so the sender can be located or a last known place of the person is shown. This app also uses Ad-hoc network which works even when there is no telephone cellular network.

B. Great Call App

Great call is an application in which if a person finds himself in an emergency situation or a disaster, The can directly communicate with the representatives of the emergency service when the help button is pressed. Having a quick or instant response from an expert or a trained expert directly is the main feature of this application.

C. ELERTS app

This application allows people to quickly and conveniently report security concerns using smart phones. The report can either be a picture or a text which is automatically uploaded to the app and from the other side, the necessary action is taken against the response using Google Maps. So basically it locates the disaster place and suggests or advices the necessary people to address the issue.

D. The Wreck Check

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It is a mobile application that guides with the steps that are supposed to be taken following an accident. The application uses the device location and the scene of accident is documented using a camera. Another advantage of this application is that it guides you with the steps for claiming insurance after an accident has occurred.

E. Sahana Foss

It is an open source web collaboration tool which guides with solutions during times of disaster. This system provides the most optimum route for the rescuers in order to serve large number of people and in a short period of time cover a large area.

F.FEMA App

It is an application that helps before a disaster is going to take place by giving alerts and also after a disaster has occurred by responding to the people who share the disaster pictures by sending the necessary emergency service to them. It also gives tips on what to do before, during and after certain types of disasters.

G. Smart Rescue

Smart Rescue is an android application that lets certain people that you have selected know that you are in trouble by sending texts to the three registered contacts and voice call to the first registered contact. This application works by pressing the power button four times. If the voice call fails, it automatically answers the incoming call from any number that you get and the loudspeaker gets activated after which you can explain the situation.

III. TOOLS USED

- Smart phone: It plays a prominent role in this project as the application is present in the smartphone itself.
- Android Studio: It is the official Integrated Development Environment (IDE) for Android app development.
- ESP8266: This gives any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.
- Ubidots: Ubidots offers a platform for developers that enable them to easily capture sensor data and turn it into useful information. We can use the Ubidots platform to send data to the cloud from any Internet-enabled device.
- Firebase: It is a scalable, real time cloud data service. It is designed for building real-time, collaborative applications. Data in Firebase is standard JSON and developers can access it using a client library or the library, changes to data are synchronized in real-time rest API. When accessed through a client to clients within milliseconds.
- Google Maps API: With the Google Maps Android API, you can add maps based on Google Maps data to your

application. The API automatically handles access to Google Maps servers, data downloading, map display, and response to map gestures. You can also use API calls to add markers, polygons, and overlays to a basic map, and to change the user's view of a particular map area.

IV. IMPLEMENTATION

Android Studio is used to develop this application. To implement this proposed system, it is necessary to consider the city as a smart city, i.e., it has a good number of wireless network channels for internet. Since we have three options in the application, we will discuss each individually. The three options provided are:

- Ambulance
- Firetruck
- Police

Let us first discuss as to what happens when the ambulance option is clicked on. The flow chart shown below gives us a brief idea of the working of the Ambulance option:

A. User's part

When the Ambulance option gets triggered, firstly, the location of the user is obtained using Google's Geolocation API. The Google Maps Geolocation API returns a location and accuracy radius based on information about cell towers and WiFi nodes that the mobile client can detect, i.e. it gives us the exact location of the user without GPS. Once the location of the user is found, the ambulances in the user's vicinity are tracked using Google's Geolocation API. The Travel Time option by Google Maps allows us to calculate the displacement of the ambulances and the user. Comparing the Travel Time, the ambulance with the least travel time is alerted. Google's Geolocation API is used as it is more accurate when compared to GPS which ensures that the patient's exact location is tracked.

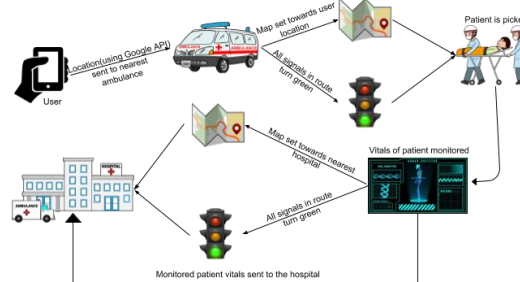


Fig.1 Medical Emergency.

B. Driver's part

When an ambulance is alerted, the driver receives the direction to commute on Google Maps. This is done by setting the user's location as the destination. All that the

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driver has to do is, follow the route shown on the map. Once the waypoint is set, all the traffic lights in route will turn green. For this to be implemented, the traffic lights must have ESP8266 which is connected to Ubidots over WiFi. After arriving at the user's location, he/she is picked up and the route to the nearest hospital is set. The hospitals can be found using the Geocoding of addresses, which need to be in the datasheet so as to find the closest hospital by comparing the travel time. As mentioned earlier, the signals in route turn green. The vitals of the patient are checked in the ambulance [4]. This data is uploaded to Ubidots, to enable monitoring of the patient and understanding his/her condition from the hospital (Fig.1).

Special Case: If the victim of an accident has lost a lot of blood or needs some organ to be replaced then a message can be broadcasted to all the blood and organ banks in the city/state using Firebase Cloud Messaging option.

Similarly, when a crime is witnessed and the help of police is required, the app sends the message to the nearest police car and help is reached following the fastest route with all the signals turning green (Fig. 2).

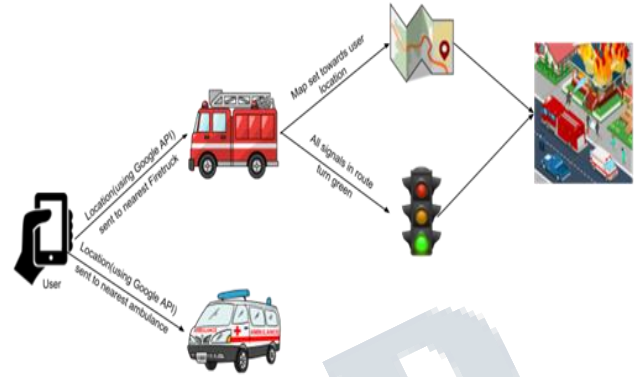


Fig.3 Fire Emergency.

V. CONCLUSIONS

As petroleum source is depleted, energy crisis encouraged researchers in the world to consider for alternative sources of energy. Moreover, using of fossil fuels may cause environmental pollution. Clean fuels, significantly fuel cells and biofuels, as new sources of energy without any pollution are suitable replacements of traditional fossil fuels. MFCs are individual kinds of FCs which use active biocatalysts such as microorganisms or enzymes to generate energy. MFCs are one of the newest technologies to produce energy from different sources of substrates. Because of the promise of sustainable energy generation from different substrates such as organic wastes, research has been intensified in this field in the last few years. MFCs have different applications based on generated power. Although MFCs are a promising technology for renewable energy production, they face several challenges, as well. For instance, they possess low levels of power density, scale-up feasibility, high cost of component materials, and large internal resistance. In the author's opinion, combinations of MFCs or MECs with other high value byproducts generating processes have a bright future in sustainable energy research.

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Fig.2 Law Enforcement Emergency.

Likewise, in the case of a fire emergency, the Firetruck option will be selected and the closest firetruck is alerted and follows the same procedure as that followed by the ambulance option to reach the user. Along with firetruck, an ambulance is also alerted to ensure if any person needs medical aid, receives it without fail (Fig. 3).

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