

Accident Detection and Smart Rescue with Real Time Location using Image Processing

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Abstract— Accidental detection rescue system is an application intended for the use of providing assistance to the victim in case of emergency. The credibility and accessibility of this application is designed in accordance with the existing systems and improved with enhanced features and technology. With an application detecting the location of the accident and image processing classifying it as accidental or fake image the application is built to provide assistance to the end user in a systematic manner. The proposed system i.e. the Accident Detection and Rescue System (ADRS) consists of two phases; the detection phase which is used to detect type of accident based on the image captured and the notification phase, immediately after an accident has occurred, is used to send detailed information such as images, accident location, date and time of accident, etc to the emergency responder for fast recovery. ADRS will ensure that the victim of the accident is rescued within an hour of accident which is also known as Golden Hour. Malicious use of the application will be prohibited and it will be available to all users at any particular instance of time.

Keywords—Golden Hour Response, Medical Assistance, Real time location, Broadcasting, Geo-Fencing, Image Processing.

I. INTRODUCTION

Accidents in India such as road, railway, collapsing of buildings, etc kill more people as compared to epidemics. But the Central and State government do not consider it as a national crisis. The outdated traffic management and transportation system management results in 1,50,000 deaths and leave more than half a million injured, asserting the country's status among the riskiest in the world for users using roadways.

In context with the above scenario we have proposed "Accident Detection and Rescue System" which provides the user with full accessibility and full functionality as well as provides an immediate and fast response from the administrator point of view. ADRS provides the user to click the photograph of an accident and upload it on the app, so that it will notify all the nearby ambulances and hospitals. It can also categorize the image as "accidental image" or "fake image" [8], so that no one can spoof or falsely notify the nearby ambulances and hospitals. The app also uses image processing of the accident to classify immediately it as "emergency condition"; the image of the accident is taken through normal mobile cameras and the app will automatically recognize the image using machine learning as an "accident situation". The application will also detect the

current location of the image and send an alert to all the Volunteers (users) within a range of 1 km.

The application will also send a broadcast regarding the location of accident to all hospitals and ambulances within a range of 1 km, so that the life of the victim is not compromised regarding accessibility parameters. The application will ensure that the victim of the accident is rescued and his/her life is saved within an hour of accident. The integrity as well as availability of the application will be maintained. Malicious use of the application will be prohibited and it will be available to all users at any particular instance of time.

The rest of the paper is organized as follows, Section I contains the introduction of the paper, Section II contains literature survey, Section III contains our approach to solve the problem statement Section IV contains proposed system/methodology and Section V concludes research work.

II. LITRATURE SURVEY

To introduce and recognize the working and maintenance of ADRS system, a literature survey is done which is proposed by other researchers in related to medical field. Our center of interest would be using android programming, machine

learning, GPS, and firebase to automate the currently used hardware systems used in accident detection and rescue.

- **Golden Hour Response:**

The first 60 minutes after traumatic injury has been termed the “golden hour”. The definitive concept of the accidental care must be initiated within this 60-minute window has been prolonged effective, taught, and have been practiced for more than 2 to 3 decades; the belief that injury outcomes improve with a reduction in time to definitive care is a basic premise of trauma systems and emergency medical services systems. As in now, there is not enough evidence to directly support this relationship. Two studies from Quebec suggested that this increased total out of hospitals (i.e., EMS) time and was associated with increased mortality among seriously injured trauma patients, yet this finding has not been replicated in other settings. Additional studies suggesting a link between out-of-hospital time and outcome have been tempered by indirect comparisons, small samples of highly selected surgical patients, rural trauma patients with long EMS response times, and mixed samples that included patients with non-traumatic cardiac arrest [6].

- **Medical Assistance:**

The paramedic role is closely related to other healthcare positions, especially which is the most important is the emergency medical technicians part, with paramedics and technicians often having which is they have a higher and a better grade role, with more responsibility and anonymity. As a first choice, the emergency medical services provide treatment on the scene to those in need of urgent medical treatment. If it is very much necessary, they are entitled of transferring the patient to the next available and feasible point of care. This is most likely an emergency department of a hospital. Historically, ambulances only focused on the patients for care, and this always remained in the case of parts in the developing world. The term which is referred as emergency medical service (EMS) was popularized when these services began to emphasize diagnosis and treatment at the scene.

- **Existing Systems:**

Work Cited	Purpose	Description
[3]	Improving Railway Safety	Autonomous train with GPS and GSM device, developing on-board automotive driver assistant.
[2]	Identification of factors in road accidents through in-depth accident analysis	To identify the contributory factors based on the findings obtained from crash investigation and reconstruction.

[5]	GPS & GIS In Road Accident Mapping And Emergency Response Management	It works by making it easier to alert emergency contacts including first responders, family and friends. The app also displays listings of nearby hospitals and the quickest routes leading to them in an emergency.
[1]	Collision Call emergency services	The application calls emergency services immediately after you're involved in a car accident.

III. OUR APPROACH

The basis of our project is to provide assistance to the victim via application interface therefore our way of approach towards project is android developed application. ADRS provides the user to click the photograph of an accident and upload it on the app, so it will notify all the nearby ambulances and hospitals. All the hospitals and ambulances in the vicinity of 1km will be notified via a broadcast signal. The application will also send a broadcast regarding the location of accident to all hospitals and ambulances within a range of 1 km without using internet, so that the life of the victim is not compromised regarding accessibility parameters. The application will also detect the current location of the image and send an alert to all the nearby hospitals and ambulances within a range of 1 km [9]. We will be provided with assistance from the government of India as well as from other Non-Profitable Organizations. The user will be provided with an easy to use intractable interface which will discard the communication barrier between the user and the application.

IV. PROPOSED SYSTEM/METHODOLOGY

The existing means of transport are unable to handle the mass transit especially during peak hours which leads to excessive overcrowding of trains and buses. The pathetic conditions of roads, also leads to daily road accidents for those who choose to avoid trains/buses. All these are the major causes of daily casualties and fatalities. The first hour of such an emergency, often called the ‘Golden hour’ [6] is widely regarded as most critical for saving lives. The term ‘Golden hour’ coined by R. Adams Cowley who stated that “the first hour after injury will largely determine a critically injured person’s chances for survival”. According to organization working in sphere of trauma care, “if the victim can be stabilized and transported safely to a hospital in this time frame, his/her chances of survival increases significantly”. The most challenging aspect of the problem is

to make available the resources within the golden hour and to have the victim transported to the nearest medical center having adequate facilities to treat the injured. This is a public health emergency that requires immediate action. One of the most productive measures to bring down accidents is zero tolerance enforcement. Strong policing reduces the risk for vulnerable road users such as pedestrians and two-wheeler riders, who must be compelled to wear helmets. Thus we formulated “*Accident Detection and Smart Rescue with Real Time Location using Machine Learning and Image Processing*” in which the user will click the image of the victim and broadcast it, all the ambulances in the range of 1km will get notified and will provide an immediate response. Fig 1 shows the block diagram of proposed System

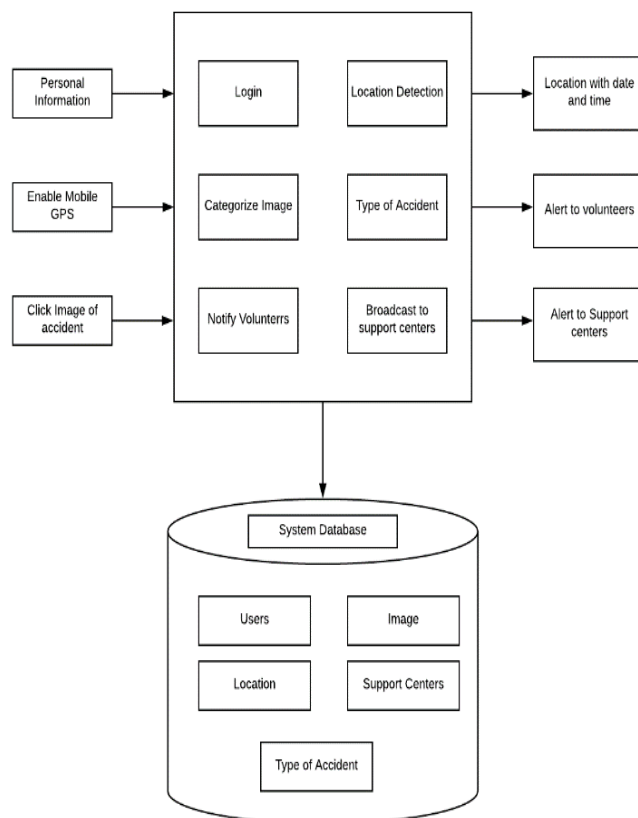


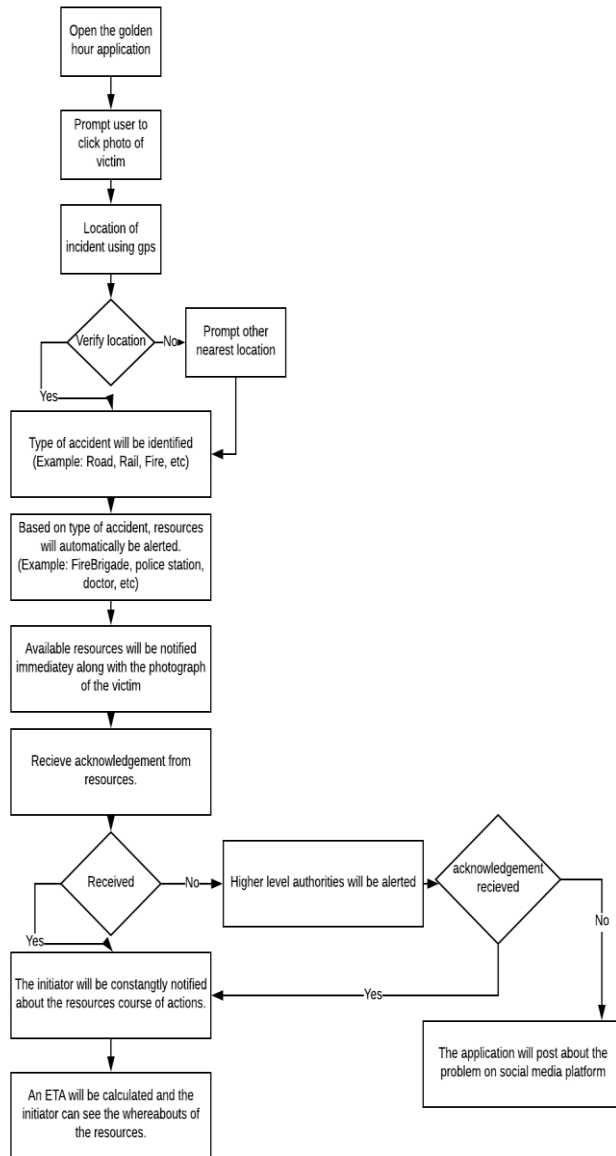
Fig 1. Block diagram for android based application for ADRS Application.

The image of the accident is taken through street cameras or normal mobile cameras and the app will automatically recognize the image using machine learning as an "accident situation". The application will also detect the current location of the image and send an alert to all the nearby hospitals and ambulances within a range of 1 km. Acknowledgement will also be sent to all the other hospitals and ambulances which were notified at the time of accident. The application will ensure that that the life of the victim is

not compromised regarding accessibility parameters. The application will ensure that the victim of the accident is rescued and his/her life is saved within an hour of accident. The integrity as well as availability of the application will be maintained. Malicious use of the application will be prohibited and it will be available to all users at any particular instance of time.

The features of the application can be briefly described as follows:

- **Personal Information:** The personal details i.e. name, Email and contact number taken by the users will be stored in the Users database.
- **Enable Mobile GPS [5]:** The user will be prompt to enable mobile GPS to check your real-time location information without connecting to a mobile device.
- **Click Image:** The user have to click photograph of accident using mobile camera and upload it.
- **Login:** The access to the various features of the application can be given only to authorized users. When registered, the users can login into the system and post any casualty. It should be kept in mind that only authentic users should be allowed to login.
- **Location Detection [7]:** Using mobile GPS the system will locate the exact location of the incident. If GPS is not enabled/ working then the system will prompt the user to add location manually. It will be done using Geo-Fencing.
- **Categorize Image [8]:** The system will categorize the image as "accidental image" or "fake image", so that no one can spoof or falsely notify the nearby ambulances and hospitals.
- **Type of Accident [10]:** From the clicked image the system will identify the type of accident i.e. Road, Fire, Building Collapse, etc. using Image processing.
- **Notify Volunteers:** The system will send an alert to all the Volunteers (users) within a range of 1 km.
- **Broadcast to support centers:** The application will also send a broadcast regarding the location of accident to all hospitals and ambulances within a range of 1 km, so that the life of the victim is not compromised regarding accessibility parameters.

Flowchart:**V. CONCLUSION**

ADRS provides the user to click the photograph of an accident and upload it on the app, so it will notify the location of the incident to all the nearby ambulances and hospitals. All the hospitals and ambulances in the vicinity will be notified via a broadcast signal. The application will

send the broadcast regarding the location of accident to all the hospitals and ambulances in the vicinity without using internet, so that the life of the victim is not compromised regardless of the accessibility parameter. With the assistance from the government and the non-governmental organizations, we will make this app free of cost for the betterment of the citizens. As we can improve the application with advance machine learning and image processing which can detect the accidental image via satellite. We are limited by resources and research in this field and future scope for this project will be detection of accidental images with the help of satellite without any human intervention, it should notify and broadcast all nearby hospitals and ambulances.

REFERENCES

- [1] IJCSMC, Vol. 4, Issue. 4, April 2015, pg.620 – 635, “Car Accident Detection and Notification System Using Smartphone”, Hamid M. Ali, Zainab S. Alwan.
- [2] IATSS , Vol 32, Issue 2, 2018, pg 58-67, “Identification of factors in road accidents through in-depth accident analysis”, Mouyid BIN ISLAM, Kunnawee Kanitpong.
- [3] International Journal of Scientific & Engineering Research, Volume 4, Issue 8, August-2013, “Improving Railway Safety with Obstacle Detection and Tracking System using GPS-GSM Model”, Nisha S.Punekar , Archana A. Raut.
- [4] Special Issue Published in International Journal of Trend in Research and Development, ISSN: 2394-9333, “Embedded Based Train Accident Prevention System”, T.Sivaranjani, R.Dhivya, S.Indhumati, K.Ramesh Aravind and P.Sethuraman.
- [5] IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 10, Issue 10 Ver. I (Oct. 2016), PP 75-86, “GPS & GIS In Road Accident Mapping And Emergency Response Management”, Evangeline Muthoni Njeru, Andrew Imwati.
- [6]Jun Okamoto Jr., Alexander Csóka Roque, Fabricio Schiavo, Bruno Massoni Sguerra, Bruno Alan Miyamoto, Filipe Assis Mourão, Thiago Yukio Alves, Andressa de Paula Suito Escola Politécnic of the University of São Paulo, Brazil, “Addressing the Golden Hour: A machine learning approach to improve emergency response time”
- [7]Location Detection using GPS: <https://www.instructables.com/id/Track-your-location-without-using-GPS-using-LAC-a/>
- [8]Image Processing:<https://medium.com/@qhutch/android-simple-and-fast-image-processing-with-renderscript-2fa8316273e1>
- [9]Nearby Resources: <https://www.androidtutorialpoint.com/intermediate/google-maps-search-nearby-displaying-nearby-places-using-google-places-api-google-maps-api-v2/>
- [10]Golden Hour Response:<https://www.thedailystar.net/opinion/golden-hour-the-lives-accident-victims-146517>