An IoT based Vehicle Accident Detection, Reporting and Navigation

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Abstract:- One particular concern that Public Safety Organizations (PSO) must account for whilst engaging in many activities is decreasing the effect of vehicle accidents, aiding as many injured people as possible and providing 24/7 on the spot rescue. The Red Cross humanitarian organization is one of the most known PSOs to be present on-site whenever an accident or a disaster takes place. However, some of the rescue teams face difficulty in reaching the injured people to due late alerts and insufficient information of the specific accident location. The advent of the mobile phone and Internet of Things (IoT) industries reshaped the way people communicate and brought a paradigm shift to public and private services. This ever evolving technology marked the beginning of new era affecting the lives of people and various businesses. This paper conveys a smart and reliable IoT system solution which instantly notifies the PSO headquarter whenever an accident takes place and pinpoints its geographic coordinates on the map. When an accident takes place, it demonstrates the correct area where the accident happened and send the point of interest through Short Message Service (SMS) to Police, Ambulance, Fire Brigade, Crane, and Garages. Then, an algorithm is applied to process the sensor signal and send the geographic location along with some ancillary information to the PSO headquarter, indicating accident occurrence. This is a promising system expected to aid in the tedious rescuing process by reporting in a matter of seconds the location of an accident, the passengers injured, blood types, thus lowering death's rates. The geographical data collected from this system could be relied upon as admissible evidence or indicator of the road state and conditions.

Keywords:- Public safety organization, accident, rescue, IoT, sensor, geographical coordinates.

1. Introduction:-

According to the Association for Safe International Road Travel (ASIRT), nearly 1.3 million people die in road crashes each year, 20-50 million are injured or disabled. Road crashes cost USD $518 billion globally, costing individual countries from 1-2% of their annual GDP. Currently, Road traffic crashes rank as the 9th leading cause of death and account for 2.2% of all deaths globally. Unless action is taken, road traffic injuries are predicted to become the fifth leading cause of death by 2030. The challenges imposed to local PSOs in saving human lives resulting from vehicles accidents have become a crucial concern due to the huge aforementioned number of departed people. As far as many injured could lose their lives, and since no on-site medical assistance has been provided promptly as a result of: late accident reporting, inaccurate geographic location, and (3) lack of injured medical information, the need for automated and intelligent mobile solution tackling this burden becomes a must. The current existing solutions that provide assistance to passengers in case of vehicle accident occurrence are mainly concerned with user interaction after the incident happened. Those mobile solutions require that the injured must launch the app and request help manually and that would not be possible if he/she is under critical or serious non-vital situation. The situation becomes even worse if passengers went under unconscious state.

Our proposed solution is a smart IoT system consisting of architecture, design, and implementation. This system provides instant automated vehicle accident detection and reporting. This method is applicable for any vehicle used in transportation and mainly for cars, bikes accidents. The primary users of this solution are the public safety organizations rescue teams (like Police, Red Cross, Emergency Management Agencies, Law Enforcement Agencies, Fire Departments, Rescue Squads, and Emergency Medical Services etc...). The main contributions of this system developing a new smart IoT solution which helps the community in reducing the death rate resulting from vehicle accidents. Ensuring that no person (injured) intervention is required during or after the accident. Transmitting automatically the basic medical information needed by the rescue teams to the PSO headquarter. Collecting geographical data which can be fed to a data mining engine to extract roads conditions, and to generate descriptive statistics reports about vehicle accidents. Implementing a navigation system to find the closest rescue team to the crash.

2. Related Work:-

The early experiments with smartphone based accident detection systems are discussed as follows: -In [5], the authors develop car accident detection and notification system that combines smartphones with vehicles through a second generation of On-Board-Unit (OBD-II) interface to achieve smart vehicle modeling, offering the user new emergency services. The authors have developed an Android application that in case of accident detection sends an SMS to

a pre-specified address with relevant data about the accident and an emergency call is automatically made to the emergency services. In this system Notification of accident goes through SMS and location is send by GPS There are following NMEA output messages as GGA UTC Time, Latitude, Longitude and fixed type data GLL Latitude, Longitude, UTC time of position fix and status GSA GPS receiver operation mode, satellites used in position detection and DOP values GSV SNR, No. of GPS satellites in view satellite ID numbers, Elevation, Azimuth Out of which GGA is used in this paper. It gives Time, position and fix related data for a GPS receiver. Standard output format is as follows: $GPGGA, hhrnmss.sss, ddmm.mmmm, a, dddmm.mmmm, a, x, xx, x.x, x.x, M"" xxxx*hh. Messages are sending to the near by police station, hospital, ambulance, fire brigade, crane and garages.

SYSTEM DESIGN:-

Capture image detecting blood
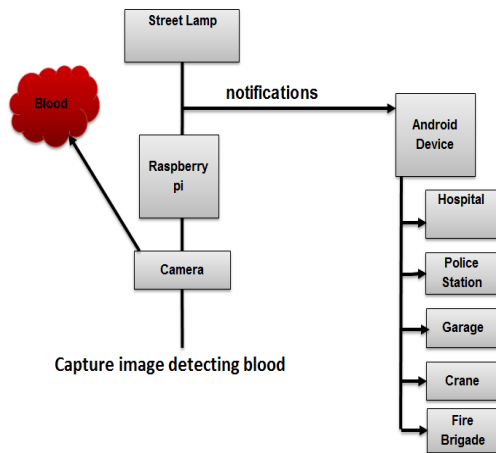
1.2 Definitions, Acronyms, and Abbreviations

A. Android device:

When Accident is happened then any person will Press the button which is located on street lamp. When he will press the button, one message automatically sending on android device of police, ambulance, fire brigade, garages which are nearby from accident location, and crane.

B. Raspberry pi:

Raspberry pi is a credit card-sized development board and it is the perfect tool for students, artists, hobbyists and hackers. It is a very versatile board with application in several areas.

C. GPS:

GPS is use to track the location of accident and Sending location to the android device.

D. GSM:

Global System for Mobile Communication Module is used as a media which is used to alert emergency facilities from anywhere by sending an SMS message. It is also highly economic and less expensive; hence GSM is preferred most for this mode of communication.

3. Goals and Objectives:-

1. The main objective of this system is to save the life of a human being by notifying that accident is happened in particular location.

2. Provides medical help to person as soon as possible.

4. Overview:-

This System will goes through one of the efficient way to provide medical help to the injured person, it also helps to police for to take action quickly. This system will be application for Police, Red Cross, Emergency Management Agencies, Law Enforcement Agencies, Fire Departments, Rescue Squads, and Emergency Medical Services etc.

Flow-Chart:
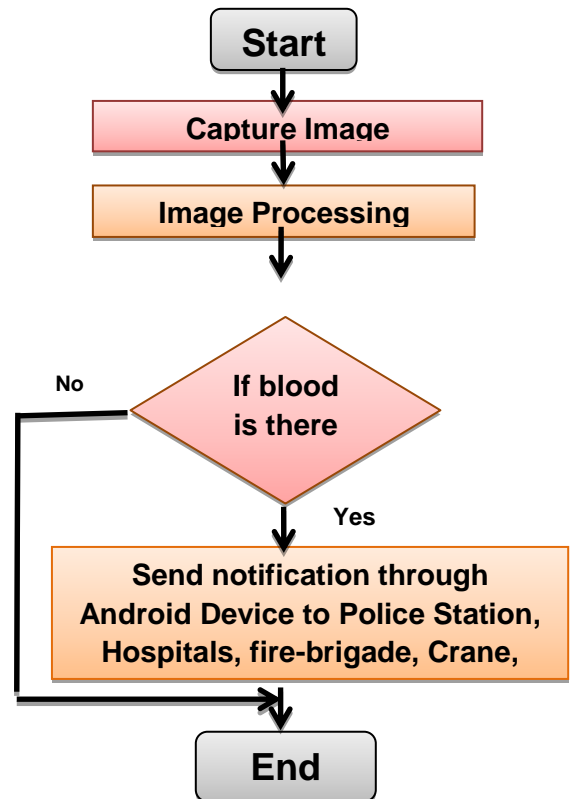
5. Product Perspective:-

I. Quick navigation of accident.

II. Provide medical help within less time.

III. Save human life by reporting and navigating the location.

IV. Isolates both GSM and GPS signal

6. Limitations:-

1. It does not work without network.

7. Conclusion and Future Scope:-

It has been realized that the smartphone based vehicle accident detection system is not an easy task to handle. It is really surrounded with many obstacles that prevent the researchers from achieving 100% accurate detection system.

8. References:-

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Prototype:-