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Automated real-time detection and reporting accidents using IoT based helmet

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ABSTRACT

In recent days, road accidents are occurred as regular habits by mainly using motorbikes. The goal of this project is proposed to prevent, detect and report the accidents to the respective authorities. This may reduce the severe accidents and as well as may save the lives of people. We propose the solution, where the helmet itself initiates a communication to report the accident using person's phone. Our design consists of Arduino Microcontroller, transmitter and receivers, and sensors. By using RF transmitter and indicator, indicates that the person is wearing helmet, if it doesn't indicate which means the person doesn't wear helmet. Only then the bike gets started. So, this will be initial prevention in this design. If the severe accident occurs, Pressure sensor in helmet detects the pressure limit, then python code executes and triggers the alert message using cloud authentication. Mobile application catches the trigger and obtain the device's location and send the alert message to nearby hospitals, relations. There will also be a buzzer sound to alert the nearby people to draw attention, even if it is unable to send alert message. If there is a mild accident and no injury, there will be reset button to cancel the sending of alert message using secret PIN.

Keywords—*Accident Reporting, Accident Prevention, Energency Alerts*

1. INTRODUCTION

1.1 GENERAL

In every aspect of our life safety and security are the major important areas. Now-a-days the scenario that we come across in many cases of human deaths and severe injuries to people is because of two-wheeler road accidents. And it is a crucial issue that requires everybody's attention, for every four minutes there is one death being reported in India. As per World Health Organization (WHO) we have identified that 40% of the deaths and 70% of severe injuries can be reduced if bike rider wears the helmet. 1 Indian road accident safety report Now a day's wearing helmet is compulsory for every two-wheeler rider and also it is equally important for the other people like pillion riders too to wear the helmet, but the discomfort or inconvenience caused due to wearing conventional helmet makes the rider to avoid using the helmet and finally it leads to death of the rider. In spite of the fact that helmets are being available to everybody, people are just not wearing them and the main reason behind it is that the conventional helmets are generating so much unconditional temperatures inside it which makes inconvenience to the person. Currently in the existing system, when the person met with an accident, we are not in a position to ensure the immediate first aid treatment; due to this late medication the person may die. With the help of proposed system in this paper, it triggers an automatic alert message to the concerned person or to the ambulance in case of any emergency situation like an accident. The alert message consists of the details such as location of the accident and time of accident, which will help to speed up the first aid service to the casualty. The Internet of Things (IoT) can provide an infrastructure which integrates the smart services with situational responses, and also allows mutual communication between smart things or devices and people over a network. So, we have come up with this idea of IoT based smart helmet which ensures the safety of the rider while riding. The idea of proposing this system has mainly come from the social responsibility towards the society. The proposed system allows the rider to start a bike only on wearing the helmet. [6], [11] & [19] This system will not allow driver to ride if he had consumed alcohol.[8]& [14] This system identifies the bike accidents with accuracy and gives information to the nearby hospital and relatives of the rider who met with an accident. It also tracks the location details of the rider and alcohol consumption of the rider and will be stored in the cloud/server

2. SYSTEM ANALYSIS

2.1 Existing System

The methodology used in existing system is that the accident can only be detected after wearing the helmet. If the person doesn't wear it, accidents cannot be detected. So, this will be the major disadvantage of that project. After wearing the helmet, detecting the occurrence of accident by using different sensors. This sensor sends signals to the Arduino Microcontroller, which then executes the code for obtaining the location and registered mobile number. Using GPRS and GSM technology embedded in the vehicle, identifies the location and transmits the alert message to the registered mobile number, nearest hospital. But in this project there is no prevention of accidents. The existing model pose multiple issues which we attempt to reduce significantly by reducing hardware dependency and tedious methods of communication and make it cost effective.

2.2 Proposed System

In our proposed system, Prevention of accidents and reducing the usage of embedded GPRS and GSM technology takes place. Prevention develops in the process of allowing the person to drive his/her bike only after wearing the helmet. RF Transmitter and indicator indicates whether the person wears the helmet or not, by transmitting signal to RF Receiver. If RF Receiver receives the signal as 'true' then the bike gets started, If the signal received is 'false' then bike doesn't get started. Now detection and reporting of accidents performed. By using Pressure sensors embedded in helmet detects the pressure limit occurred on helmet. If the pressure limit exceeds, python code executes the trigger program. Now application developed in person's mobile catches the trigger and generates and sends the alert message to the registered mobile number and to the nearby hospital. By using the mobile application in this project reduces the cost consumption which means this project will be "Cost Efficient". If there is any problem in sending the alert message then there will be a 'buzzer', which draws attention to the nearby people.

2.3 Feasibility Study

A feasibility study is carried out to select the best system that meets performance requirements. The main aim of the feasibility study activity is to determine that it would be financially and technically feasible to develop the product.

2.3.1 TECHNICAL FEASIBILITY

This is concerned with specifying the software will successfully satisfy the user requirement. Open source and business-friendly and it is truly cross platform, easily deployed and highly extensible.

2.3.2 ECONOMIC FEASIBILITY

Economic analysis is the most frequently used technique for evaluating the effectiveness of a proposed system. The enhancement of the existing system doesn't incur any kind of drastic increase in the expenses. Python is open source and readily available for all users. Since the project is run in Python and Juypter notebook hence is cost efficient.

3. ARCHITECTURE

3.1 System Architecture

System architecture is the conceptual model that defines the structure, behaviour, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system.

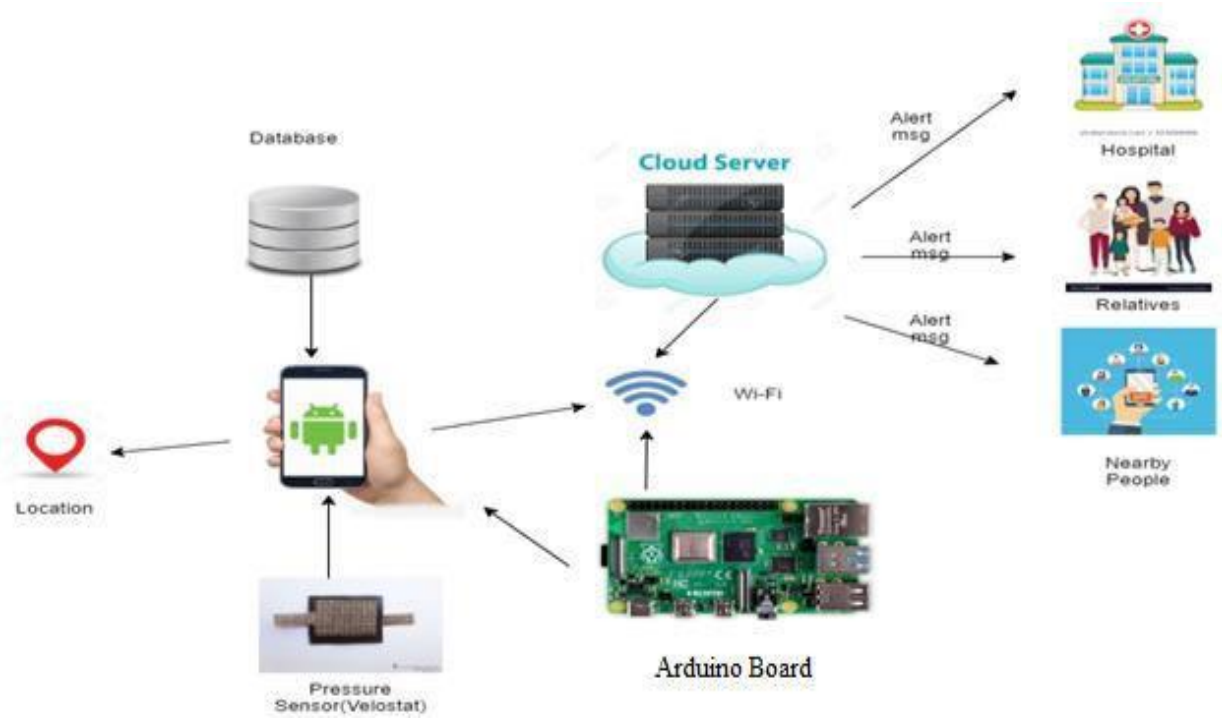

Fig 3.1: System Architecture

3.2 Usecase Diagram

This Diagram represents the Use case system of this project,

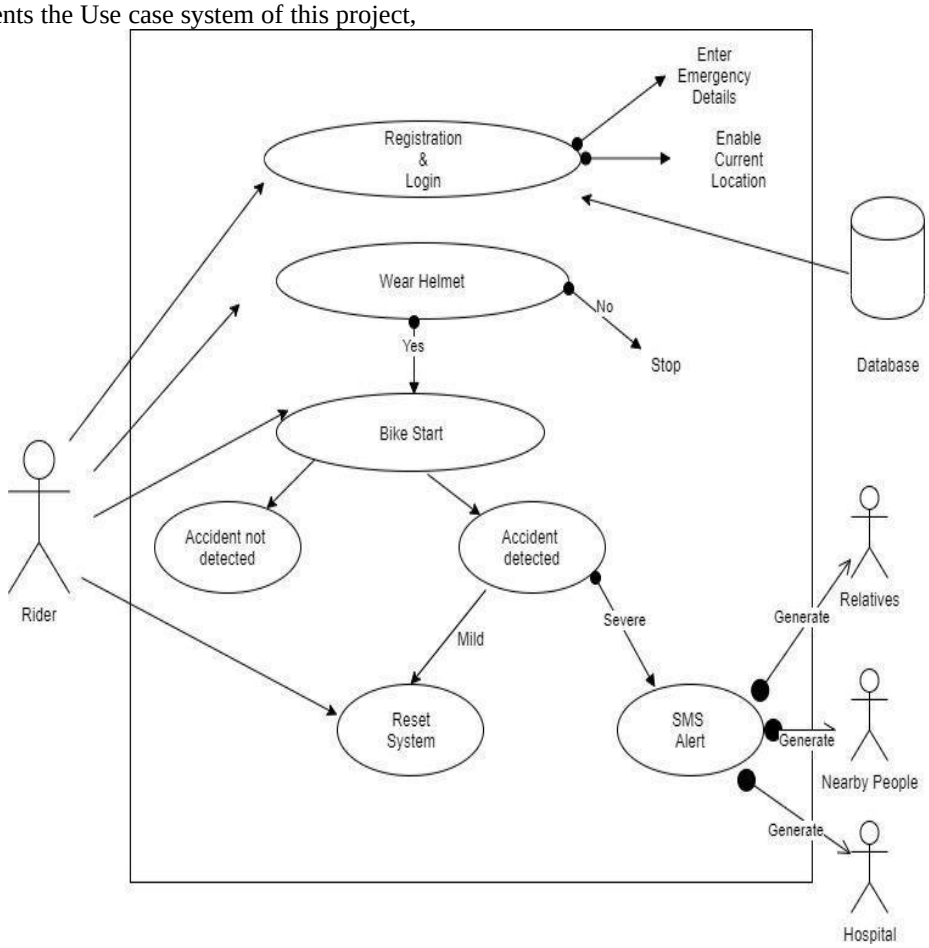

Fig 3.2: Use case Diagram

3.3 Activity Diagram

This Diagram represents the Activity of this system.

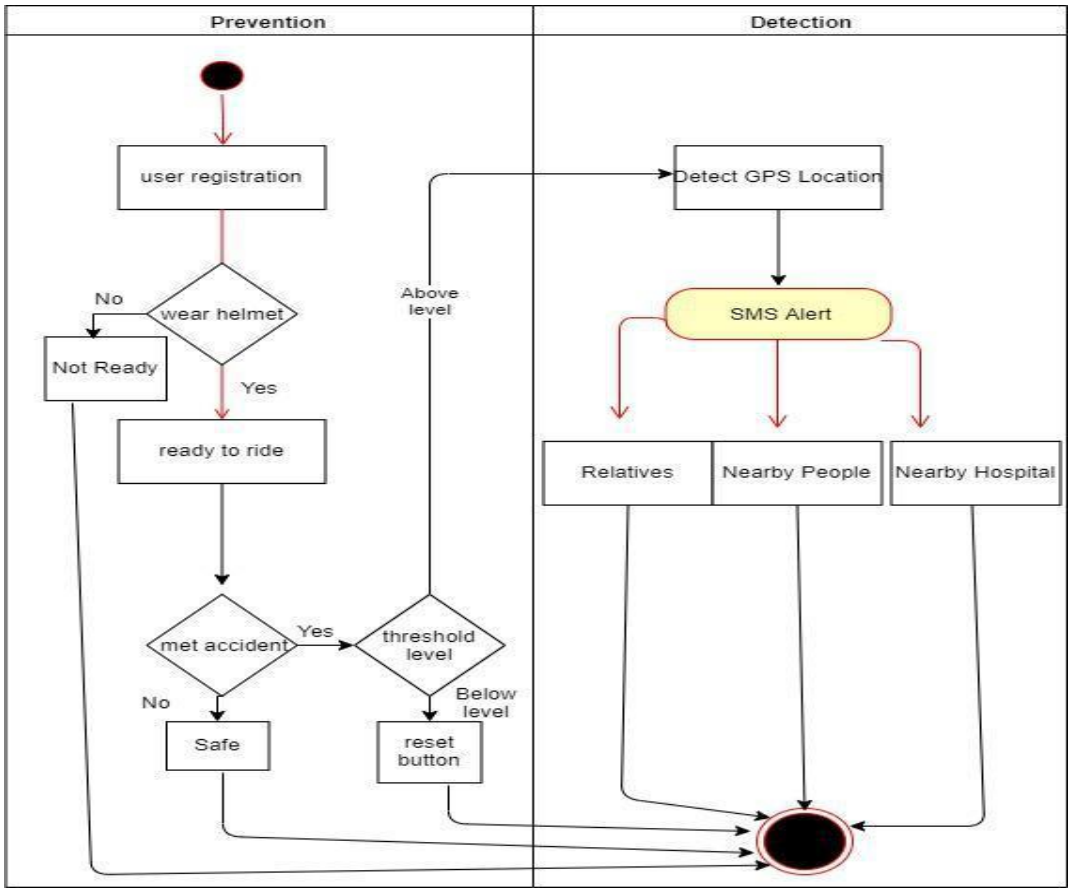

Fig 3.3: Activity Diagram

4. EXPERIMENTAL RESULTS

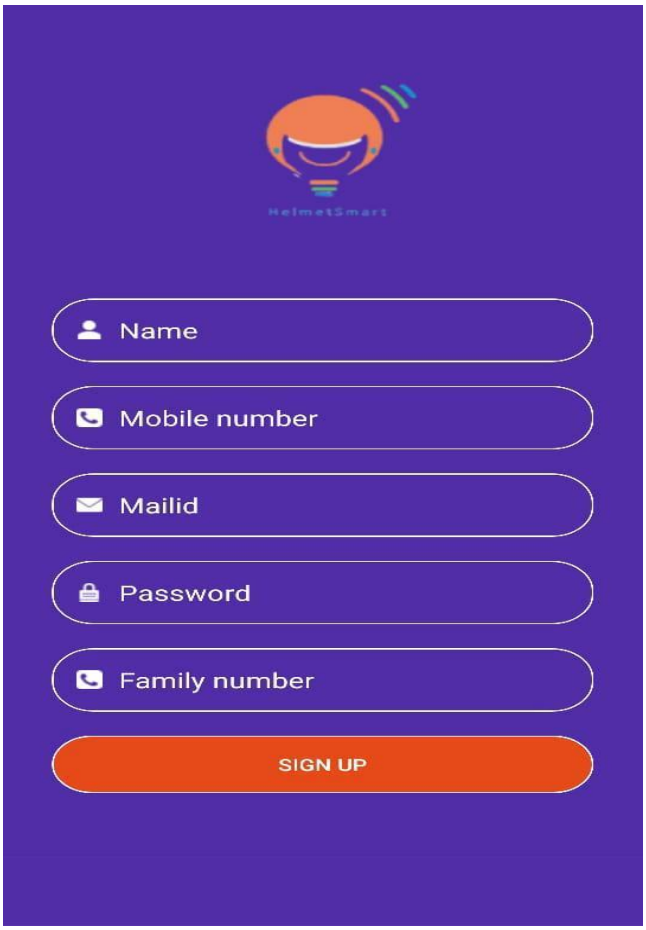

Fig 4.1: Register Screen

Fig 4.1 shows the register screen of the application that we built. It is required for us to fill up all the details that are asked in the register screen. It asks the basic details to contact you about your account and when you are finished up with the filling of details you can click the button sign up to finish the sign- in process.

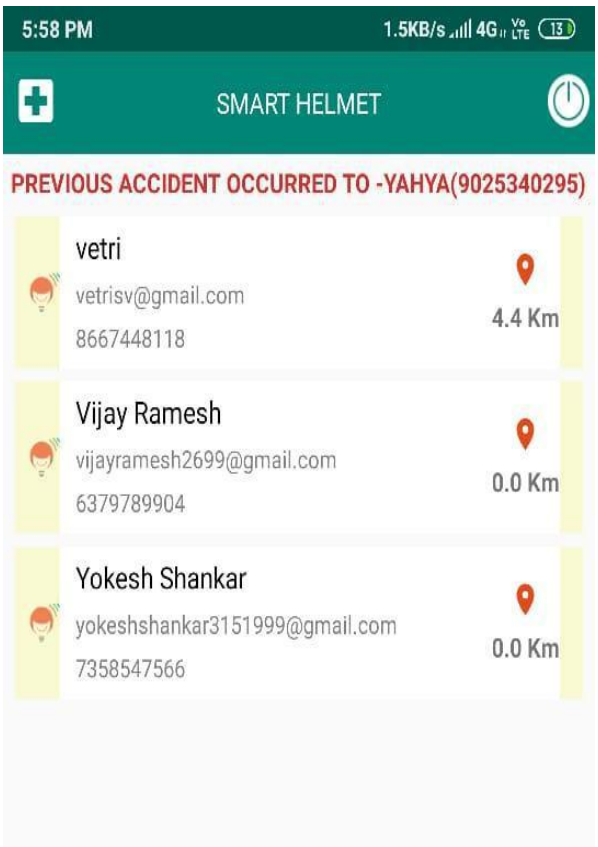

Fig 4.2 Register Successfully

Fig 4.2 shows the screen after you have registered successfully. In this tab you will find the information about the accidents that occurred in and around the place.

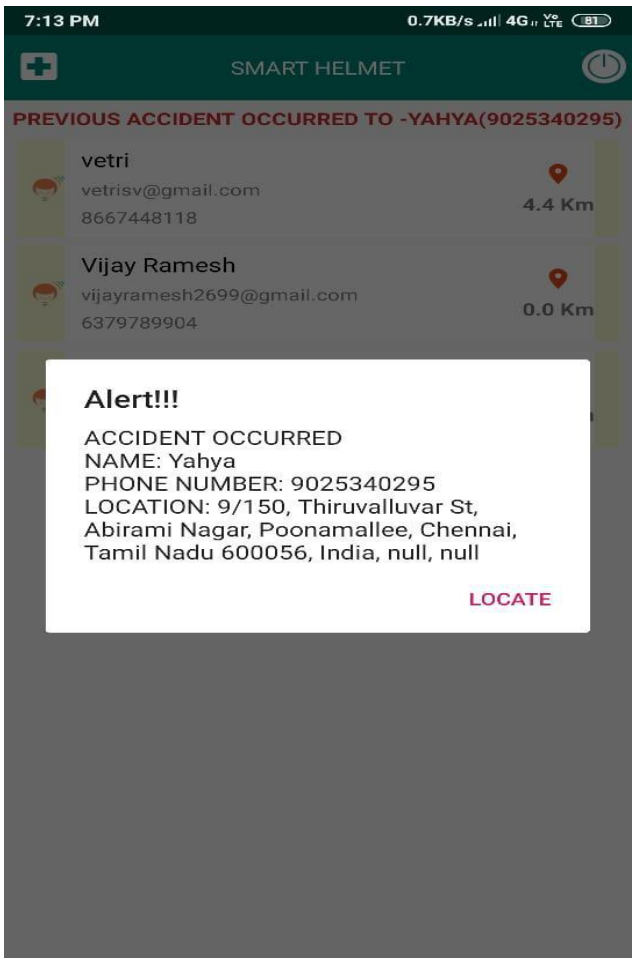

Fig 4.3 : Accident Detected

Fig 4.3 shows the screen when an accident is detected and it will provide you with an alert and provide you with the location of where it happened so that you can check with it and confirm.

Prevention develops in the process of allowing the person to drive his/her bike only after wearing the helmet. RF Transmitter and indicator indicates whether the person wears the helmet or not, by transmitting signal to RF Receiver. If RF Receiver receives the signal as 'true' then the bike get started, If the signal received is 'false' then bike doesn't get started. Now detection and reporting of accidents performed. By using Pressure sensors embedded in helmet detects the pressure limit occurred on helmet. If the pressure limit exceeds, python code executes the trigger program. Now application developed in person's mobile catches the trigger and generates and sends the alert message to the registered mobile number and to the nearby hospital. If there is any problem in sending the alert message then there will be a 'buzzer', which draws attention to the nearby people.

5. CONCLUSION

Currently we are in the process of finding an appropriate design for the helmet. The proposed helmet should accommodate all the needed facilities in a compact manner. In parallel, the selection of microcontroller and sensors are being taken care. The proposed design will give a solution in terms of cost effective and updated technology front for all kinds of helmets. The aim is to target the two wheelers segment and then bi cycle users with lighter version. This costeffective solution can be integrated with engine start and other needed safety aspects.

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