RESEARCH ARTICLE

Iot Implementation for Preventing Two-Wheeler Accident Detection with Call Control

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Abstract: The system is to build a safety system, which is integrated with the smart system and intelligent bike to reduce the probability of two-wheeler accidents and drunk, and drive cases. Alcohol sensors detect the alcoholic content in the rider's breath. When the rider is on the bike if there is alcohol content found in rider's breath, the bike remains off. The bike will not start until the rider blows the air and if there is no alcoholic content present stating that rider did not consume alcohol.
When the rider crashes, bike hits the ground and sensors detect the motion, tilt of bike, and report the occurrence of an accident and sends information of the location of accident to the family members of the rider and the emergency contact numbers.

***Key Words*:intelligent, integrated, sensors, mobile application, safety system.**

I. INTRODUCTION

Accident rates are on a rise across the world and commuters on two-wheelers often have it worse for them as compared to others. Bike accidents lead to the majority of deaths in India and often times there is a delay in the victim getting medical attention, which puts his life in danger. In order to prevent this from happening the smart intelligent accident detection System is devised which automatically intimates the hospitals nearby saving time and reducing the probability of death.

In addition, in this age of smart devices, the two-wheeler commuters seem to have been forgotten. This is a major area of concern, as majority of these accidents are fatal. Safety is one of the most important aspects in everyone's life. Every person hopes to reach home safely. Despite of having all the safety rules while riding, many of the riders fail to follow them, this leads to road accidents, and there are very less chances of survival.

The accidents are fatal due to the common negligence and lack of medical attention needed by the injured person in time. Another major cause for the accidents is the drunk and drive cases and over speeding. Hence, our objective is to develop a two-wheeler safety system, which aims for accident prevention, detection and reporting, and to reduce the probability of two-wheeler accidents and the probability of drunk and drive cases. This system uses various technologies developed along the years like GPS, GPRS, and Android device to serve as a tool to reduce the count for number of deaths due to road accidents.

II. LITERATURE SURVEY

Ravi and Kuldeep focused upon prevention of casualties by ensuring the safety in their work [1]. They developed a system such that in the case of the drunken, the ignition in the combustion chamber would not occur. The system is directly connected to the two-wheeler ignition system by electronics. The system has the main components as stated – a proximity sensor, alcohol sensor, accelerometer, and a keypad.

At the receiver end, on the two-wheeler, a microcontroller controls the ignition. The ignition system is incorporated with a diode acting as cut off and on region connector. Upon the reception of the signal from the system, the microcontroller takes care of the ignition starting the vehicle. While the idea of this system is noble and very much the need of the hour, the implementation would be completely infeasible because of the ignition system has to be tampered with, in every single model of every single two-wheeler manufacturer for this idea to come to function [1].

Kodanda Ramaiah focused on cooling the inside of a helmet [3] using a thermoelectric cooler working on solar energy Bluetooth headset inside the helmet to handle calls ensuring that the rider is wearing a helmet while on a trip

GPS and GSM modules to send the precise location of the rider in case of an accident.
On the other hand, consists of GSM, GPS, vibration sensor, RF Receiver, and microcontroller. The RF Transmitter sends the trigger signals about the status of switches to the bike module. When the RF receiver receives an alert signal from the helmet module, the same is sent to the controller to take necessary actions. The vibration sensor along with the GSM and GPS modules works with the micro controller to send alerts regarding an accident to the specified contacts and emergency vehicles/hospitals proposed a smart helmet [3].

Indranil Nikose proposed the smart system [7], which detects an accident using an accelerometer sensor, GPS and GSM modules, and prevention of accidents by the detection of alcohol levels of the rider using an alcohol sensor. The working of accident detection is simple. When the bike hits the ground, the accelerometer sensors note this data and send it to a CMOS 8-bit microcontroller.

The controller then extracts the longitude and latitude of the location using the GPS module and initiates a timer counting to 10 minutes. If the rider does not start riding in those 10 minutes, then the controller sends the location details as an SMS to the ambulance and parents. The alcohol is detected using an alcohol sensor, which measures the amount of alcohol present in the surrounding environment. When the alcohol level crosses a predefined value, it triggers off an alarm, notifying the makers. While the accident detection feature in this system is feasible, the alcohol detection system does nothing on detection and hence is not very useful [7].

Priyanka C focused on Accident Prevention [5] and Detection proposed on a smart bike. If there is, alcohol content found in rider's breath, the bike remains off. The bike will not start until the rider wears the helmet and there is no alcoholic content present stating that rider did not consume alcohol. When the rider crashes, and hits the ground and sensors detect the motion, tilts of bike, reports the occurrence of an accident, and sends information of the location of accident to the family members of the rider and the emergency contact numbers [5].

Asad Ali, Mohamad Eid [6] proposed a Automatic Smart Accident Detection (ASAD) is an auto-detection unit system that immediately notifies an Emergency Contact through a text message. When an instant change in acceleration, rotation and an impact force in an end of the vehicle is detected by the system, detailing the location and time of the accident. The system involves the use of fuzzy logic as a decision support built into the Smartphone application that analyses the incoming data from the sensors and makes a decision based on a set of rules. The simulated results show a 98.67% accuracy of the system [6].

III. PROBLEM STATEMENT

All over the world, most of the road accidents happen due to drunken driving and rash driving. The main concept of this work is to prevent the road accident so we are using smart intelligent detection system.

DISADVANTAGES OF EXISTING SYSTEM

- Accidents, specifically in remote and/or low profile areas often go unnoticed.
- In these cases, it may take hours for Medical attention to arrive, which many times leads to a death.
- In addition, the public often moves away from helping a victim on the streets due to the laws.

IV. OBJECTIVE

Creating an intelligent accident detection system, which detects accidents and informs specific people via SMS with location and speed of the bike before the accident occurs with the help of GPS & GSM based tracking system, thus aiding ambulance to reach the correct location.

Providing convenience with directions during the commutation by pushing signals to the intelligent accident detection system and preventing distraction by Calls/SMS while on the ride.

The readings from the sensor are fed into the Arduino board. When the reading exceeds a threshold value, a timer is set off to ensure that the impact is not a false alarm. Once the timer runs out, the Arduino send alerts to the mobile application with the details of the reading.
In case, if the key is lost we can unlock the vehicle through a password-based keypad followed by an alcohol test.

V.METHODLOGY

The sensors are attached to a bike running on a battery. To unlock the key slot the driver needs to blow on the alcohol sensor; if not drunk the key insertion slot is unlocked Vibration sensors (accelerometer) are installed on the module in areas most probable to have an impact, to detect an accident.

The readings from the sensor are fed into the Arduino board. When the reading exceeds a threshold value, a timer is set off to ensure that the impact is not a false alarm. Once the timer runs out, the Arduino send alerts to the mobile application with the details of the reading.

The application now extracts the latitude and the longitude from the smart phone's GPS and sends this data to emergency vehicles/hospitals in the vicinity and specified contacts over an SMS alerting them about an accident. The Relatives of the victim are informed regarding the accident and the victim is admitted to the hospital. It makes use of all the standard frameworks and uses Google's 'GoogleMapsAPIv2 for Android' as an add-on for Google's mapping services.

In case if the key is lost we can unlock the vehicle through a password based keypad followed by an alcohol test. Simple Embedded C is used to program the Arduino board. An Android application should be already installed on the driver's android smart phone, which uses the GPS of the Smartphone to acquire the current location and then uses the internet to send the notification along with the GPS details.

A. PROPOSED SYTEM

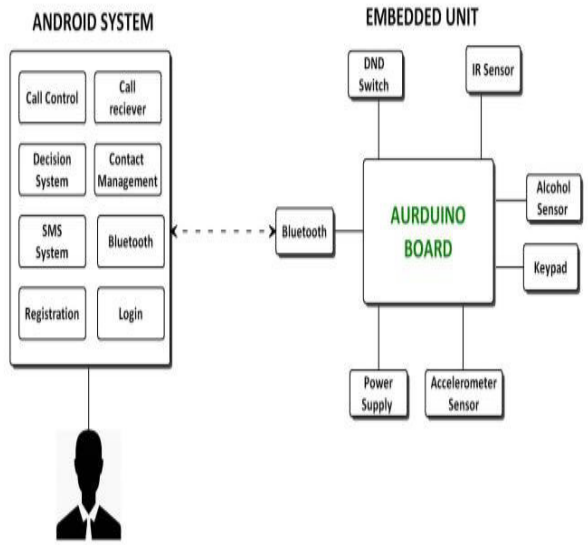

Fig 1: Proposed System

B. SEQUENCE DIAGRAM

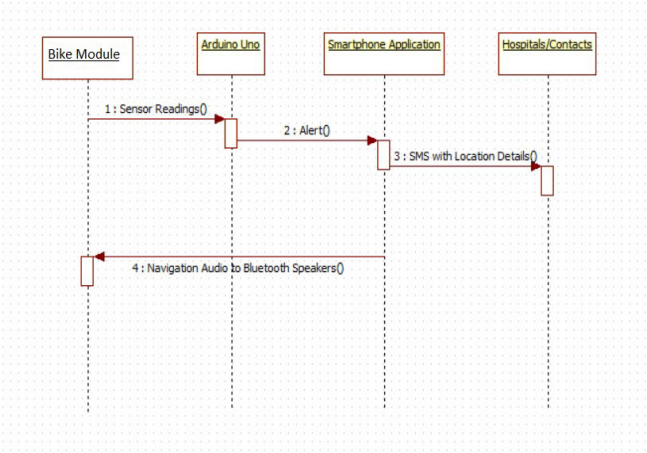

Fig 2: SEQUENCE DIAGRAM

C. CIRCUITRY ARCHITECTURE

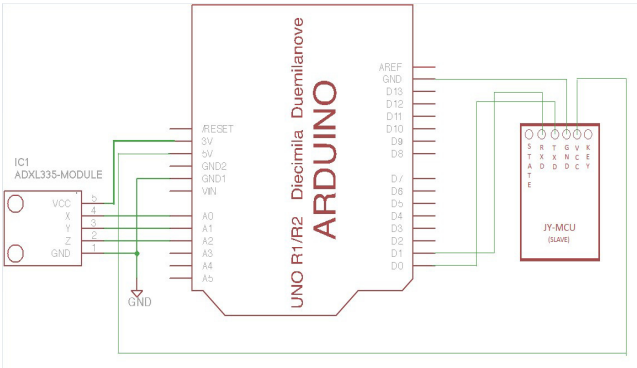

Fig 3: Circuitry Architecture

Arduino is an open-source hardware platform that is being used by people around the globe for building electronics projects. It is an integrated platform which contains both a physical programmable circuit otherwise known as microcontroller and a software (or IDE) that you can run on your computer to write and upload the code onto the physical board

Arduino Board is quite popular among many people who want to get started with electronics, and unlike other embedded system boards Arduino does not require any additional hardware to upload the code (generally known as programmer). The Arduino Program can be written and

uploaded using the Arduino IDE that needs just an USB cable to connect.Arduino is preferred by most of the aspiring engineers.

D. Flow Chart

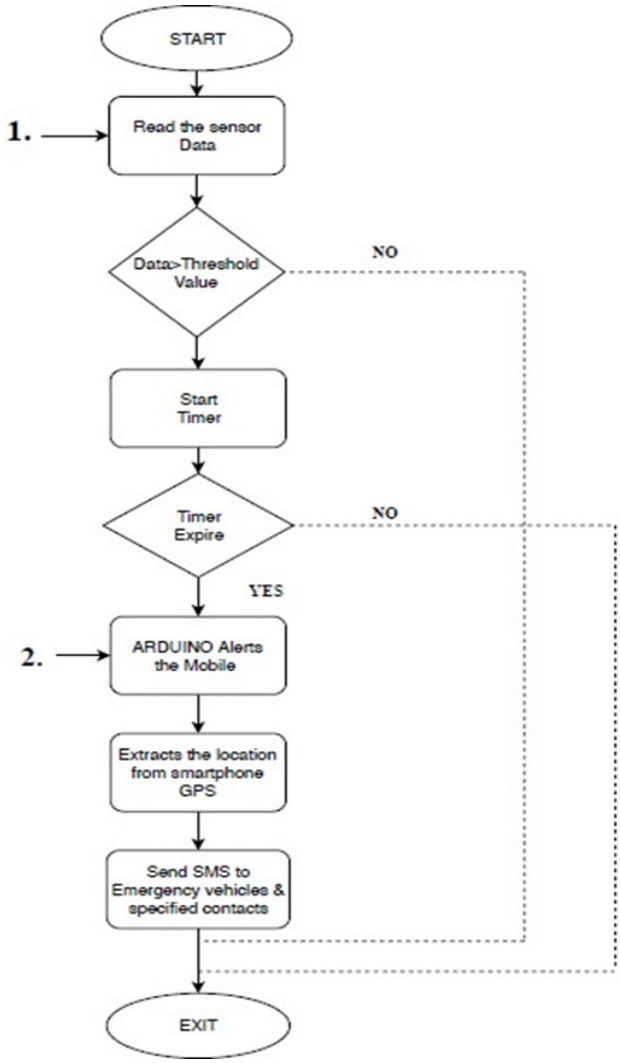

Fig 4: Flow Chart

1. IR sensors reads the data from Bluetooth (through android phones) and Arduino receives data. By which it decides whether the person is met with the accident or not.

2. Arduino alerts the mobile, which uses gps service to track the exact location of the accident person.

E. DATAFLOW DIAGRAM

The DFD is also called as bubble chart. It is simple graphical formalism that can be used to represent a system in terms of input data to system, various processing carried out on this data, and the output data is generated by this system.

It is one of the most important modelling tools. It is used to model the system components. These components are the systems process, the data used by the process, an external entity that interacts with the system and the information flows in the system. DFD shows how the information moves through the system and how it is modified by series of transformations that are applied as data moves from input to output. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.

1. LEVEL 0 DFD

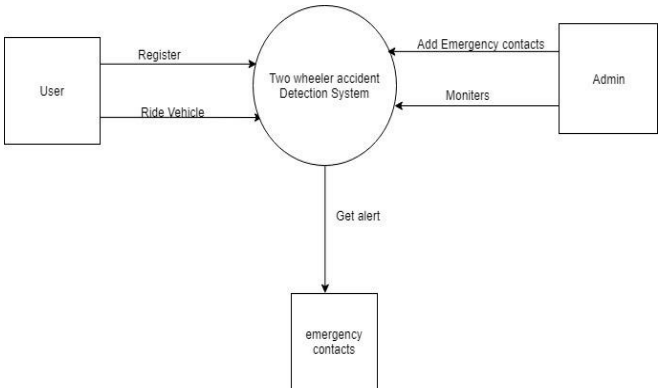

Fig 5: LEVEL 0 DFD

Initially the user has to register into the android device before operating the vehicle. Once registered the person has to blow the air onto the alcohol sensor device. The device checks the presence of alcohol of the rider then starts the vehicle. Admin adds the emergency contacts to the system and monitor's if accident occurs alert message with the location of the accident is sent to emergency contacts

2. LEVEL 1 DFD

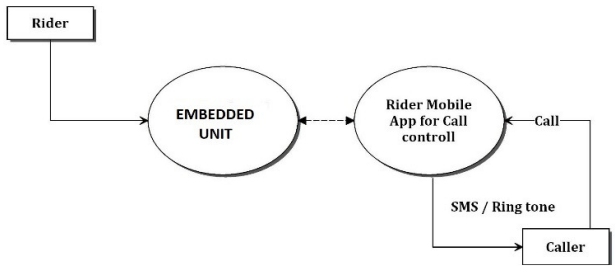

Fig 6: LEVEL 1 DFD

Here based on speed of the vehicle call should be able to connect or disconnect. If the speed of the vehicle is <=20 call can be connected, if it in >=40 call should be disconnected

3. LEVEL 2 DFD

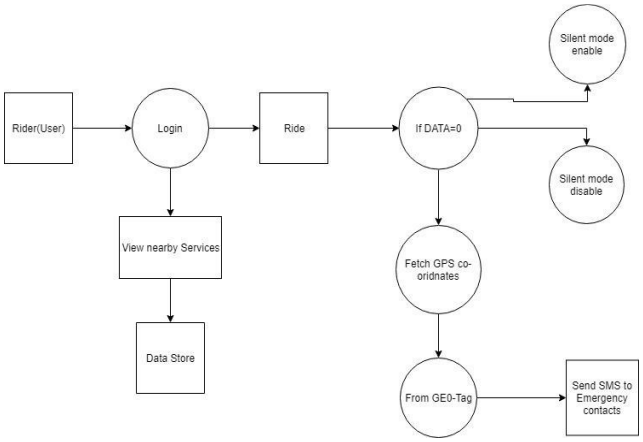

Fig 7: LEVEL 2 DFD

The rider logins into the android device before operating the vehicle. Once registered the person has to blow the air onto the alcohol sensor device. The device checks the presence of alcohol of the rider then starts the vehicle.

Admin adds the emergency contacts to the system and monitor's if accident occurs alert message with the location of the accident is sent to emergency contacts. When a rider is met with an accident it tracks the exact location and sends the alert message based on the services provided. If the threshold value exceeds based on the latitude and longitude co-ordinates by the help of geo tag it alerts the consent person by sending sms.

F. SYSTEM ARCHITECTURE

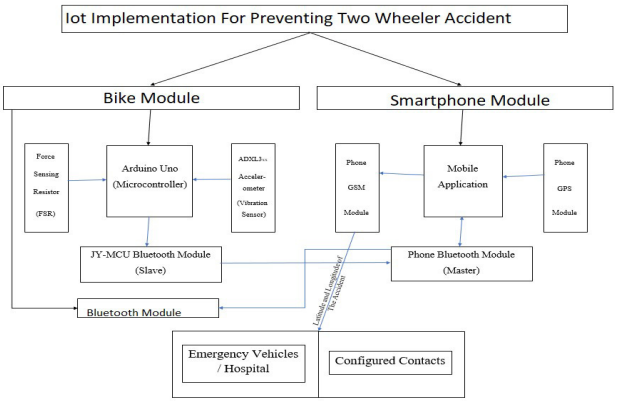

Fig 8: System Architecture

The proposed system contains two phases:

- Bike module
- Smartphone module

In the bike module, the main component (Arduino Uno) is responsible in linking many devices like Bluetooth, alcohol sensor, keypad etc. The bike module detects accident through its accelerometer sensor and sends signal to the hardware Bluetooth device which in turn sends the data to connected mobile application.

Whereas in the smartphone, the mobile application is responsible for controlling the gps location, connecting to the accident detection system by using mobiles Bluetooth in order to connect with the bike module.

VI. REQUIREMENTS

Hardware requirements

- Arduino UNO
- IR Sensor
- Accelerometer sensor
- Keypad
- Alcohol sensor
- DND Switch , Relay

Software requirements

- Arduino IDE 1.8.5
- Android ATK Bundle
- JDK 1.7

Arduino Uno: The Arduino UNO is an open-source microcontroller board based on the Microchip

ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

LCD Display: LCD (**liquid crystal display**) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology.

JY-MCU Bluetooth Module: is an easy to use Bluetooth SPP **(Serial Port Protocol)** module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication

ADXL3xx accelerometer: An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force. It measures acceleration in g unit.

RELAY: A relay is an electrically operated switch that can be turned on or off, letting the current go through or not, and can be controlled with low voltages, like the 5V provided by the Arduino pins. Controlling a relay module with the Arduino is as simple as controlling any other output

VII. RESULTS AND SNAPSHOTS

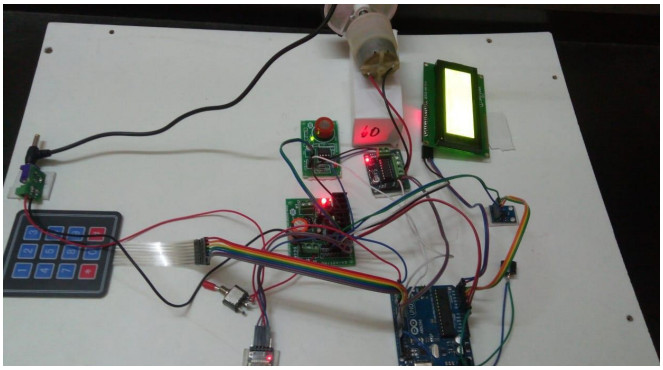

Fig 9: Picture of the Bike module

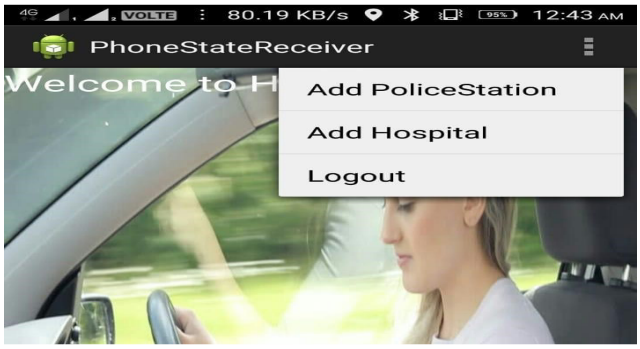

Fig 10: Welcome page of the Android module

Fig 11: Adding Details of Police station and hospital

Fig 12: View Details of Hospital

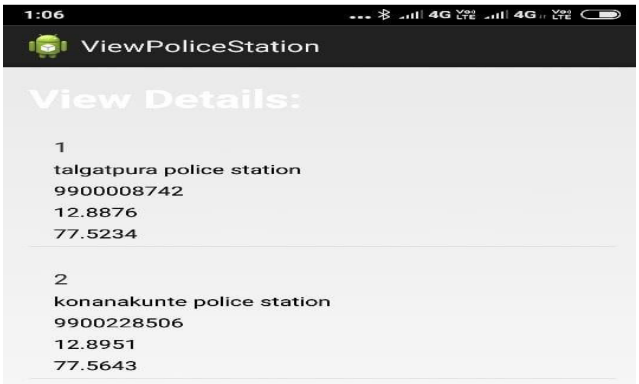

Fig 13: View Details of Hospital and Police station

Fig 14: Message for turning on the Bluetooth

Fig 15: Entering the password

Fig 16: Entering the correct password

Fig 17: Entering the wrong password

Fig 18: Detection of an Alcohol

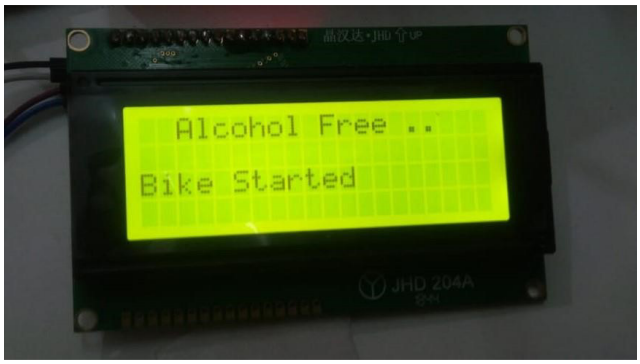

Fig 19: Alcohol Free

Fig 20: Monitoring speed when it is in 20 km/hr

Fig 21: Monitoring speed when it is in 40 km/hr

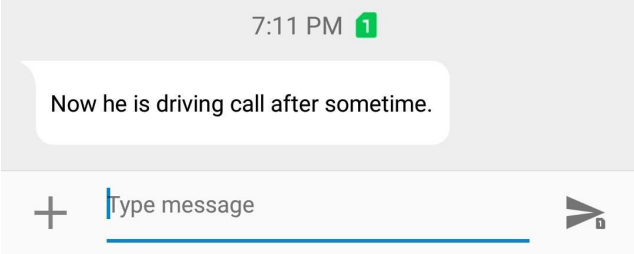

Fig 22: Message sent when speed is in 40 km/hr

Fig 23: Alert Signal when accident occurs

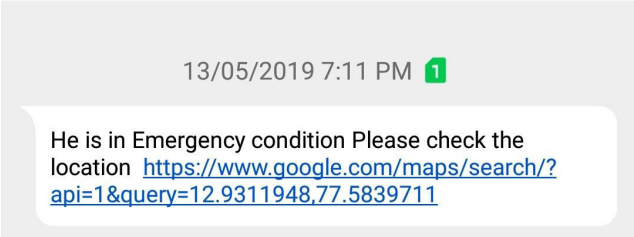

Fig 24: Message sent to nearest emergency contacts

Fig 25: Knowing that the rider is safe

VII. CONCLUSION

The system is to build a safety system, which is integrated with the smart system and intelligent bike to reduce the probability of two-wheeler accidents and drunk, and drive cases. Alcohol sensors detect the alcoholic content in the rider's breath. When the rider is on the bike if there is

alcohol content found in rider's breath, the bike remains off. The bike will not start until the rider blows the air and if there is no alcoholic content present stating that rider did not consume alcohol. When the rider crashes, bike hits the ground and sensors detect the motion, tilt of bike, and report the occurrence of an accident and sends information of the location of accident to the family members of the rider and the emergency contact numbers.

This project presents vehicle accident detection and alert system with SMS to the user defined mobile numbers. Arduino is the heart of the system, which helps in transferring the message to different devices in the system. This accident detection system can track geographical information automatically and sends an alert SMS regarding accident. Accelerometer Sensors will be activated when the accident occurs and the information is transferred to the registered number through Bluetooth module. Using GPS the location can be sent through tracking system to cover the geographical coordinates over the area. Experimental work has been carried out carefully. This made the project more user-friendly and reliable. The proposed method is verified to be highly beneficial for the automotive industry.

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