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.**

1. 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.

2. 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].

3. 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 For 45/90 seconds 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.
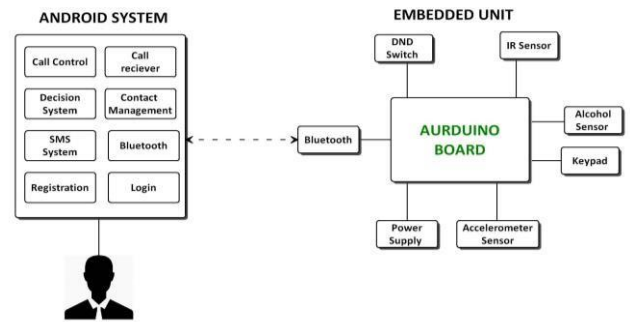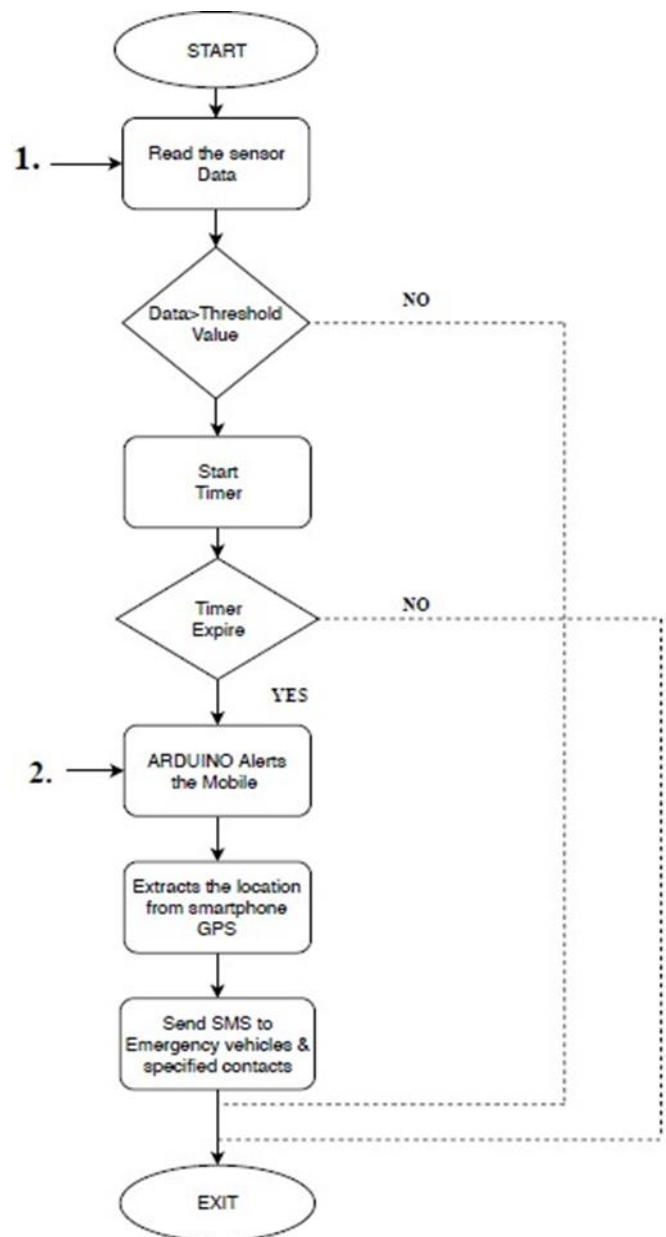

Fig -1: Block Diagram

Fig -2: Flow Chart

The application now extracts the latitude and the longitude from the smart phone GPS, 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.

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.

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.

Components required:

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.
Alcohol detection sensor.

4. 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.

REFERENCES

[1] Ravi Nandu and Kuldeep Singh, Smart Helmet for Two-Wheelers, SRM University, Department of Automobile Engineering, October 07, 2014, [1], https://www.omicsonline.org.

[2] Kodanda Ramaiah GN, Prabhakar V Hunagund and Santosh B Panjagal, Smart Helmet, Kuppam Engineering College, 20 July, 2015, [3] , https://www.omicsonline.org.

[3] Indranil Nikose, Voice Controlled Smart Helmet, Department of Mechatronics Engineering -Kongu Engineering College, 2 July-December 2018, [7], http://www.trp.org.in.

[4] Priyanka Berade, Intelligent Accident Identification and Prevention System Using GPS and GSM Modem, Department of Electronics and Telecommunication Engineering-Dr. Daulatrao Aher College of Engineering, | Feb-2018, [5], https://www.irjet.net.

[5] AsadAli, Mohamad Eid, An Automated System for Accident Detection, Division of Engineering, New York University Abu Dhabi, 2015 IEEE, [6], https://ieeexplore.ieee.org.