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Rssi Based Trilatertion for Outdoor Localization in Zigbee Based On Smart Helmet

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Abstract: *Reckless driving and drinking and driving are some of the most common causes of accidents. Youth riders usually ride very recklessly leading to accidents. The aim of the projects is to solve these problems. The project consists of a helmet unit (HU) and a motorbike unit(MU). The HU and MU communicate via RF using the NRF24L01 Module. The helmet unit continuously monitors the pulse rate of the rider, alcohol in the breath of the rider, and vibration intensity. The ignition system of the bike is activated only when the readings of the pulse rate sensor are cross the threshold. The motorbike unit has GPS and GSM module which send messages with the position of the rider in case of a mishap. Both units have an accelerometer for accident detection. The MU checks for approaching vehicles, rash driving, and accidents. Upon detection of alcohol in the breath of the rider or if the rider is met with an accident the ignition system of the bike is turned off, the buzzer starts beeping, the name and number of an emergency contact start flashing on the OLED screen, and a message with the location of the user is sent to the emergency numbers. If the rider is safe the rider can press the push button switch and a rider safe message will be sent. The LIDAR sensor in the motorbike unit helps in alerting the rider from vehicles approaching from behind. The motorbike unit is also fitted with IR sensors and ultrasonic sensors which detect the position of hands and legs of the rider respectively. The accelerometer fitted in the bike is capable of identifying the orientation of the bike. Upon detection of rash driving or approaching vehicles, a message is displayed on the OLED screen and the buzzers start beeping.*

Keywords—*pulse rate sensor, IR sensor, Arduino, smar*

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accidents (35.2%) which rose by 4.2% from 2017. There has also been a 7.9% increase in the number of casualties due to two-wheeler compared to 2017. Hit from back constitutes about 16.7% of accidents by collisions. 84.7% of deaths caused by accidents were comprised of people of age group 18-60 this is the working-age group. 55,336 (36.5%) of these deaths were deaths due to two-wheeler accidents. This is the highest number of death as compared to any other. 43,614 people died in 2018 due to non-wearing of helmets. Overspeeding account for 64.4% (97,588) deaths due to traffic rule violation. Even though the police are continuously working day in and day out still two-wheeler accidents are continuously increasing. This project aims on reducing accidents by making the rider drive carefully and safely. This project has all the sensors

embedded on the helmet and motorbike. The project has multiple sensors to detect accidents of bike and rider separately, rash driving, and alcohol in the breath of the rider. Also, the project is equipped with sensors to continuously monitor the position of the hands and legs of the rider. In the case of a mishap, the GPS and GSM module sends messages with the location of the rider to the emergency contact.

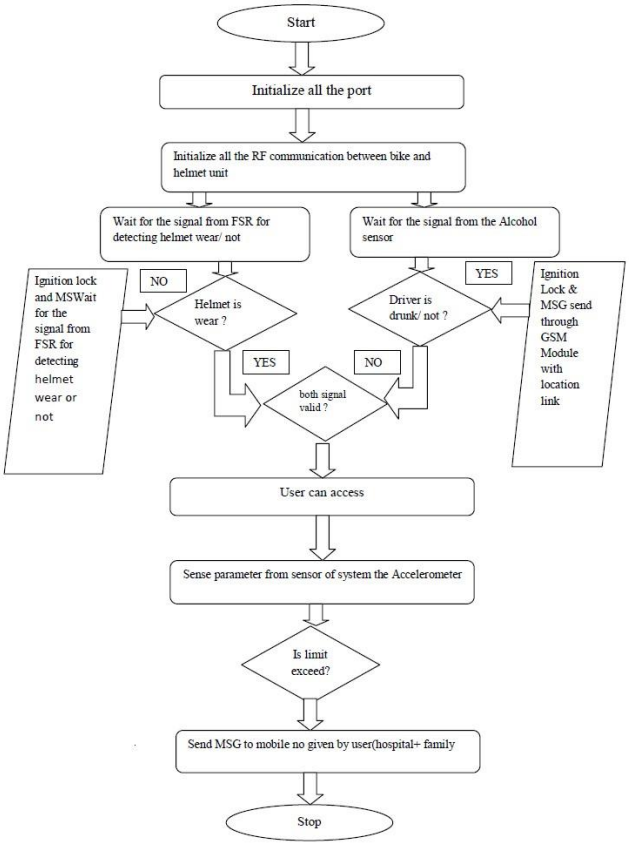
I.EXISTING SYSTEM

INTRODUCTION

In densely populated and developing nations like India, a bike proves to be the most effective mode of road transport. But, two-wheelers are also one of the most unsafe means of road transport. An accident of a rider without a helmet can lead to fatal injuries. Common causes of accidents are drinking and driving,many more.
ACCIDENTS IN INDIA – 2018[2] report published by the Ministry of Road Transport & Highways showed that the two- World's population, have comprehensive road safety laws on five key risk factors: drinking and driving, speeding, and failing to use motorcycle helmets, seat-belts and child restraints. So, to overcome from this problem this smart helmet is being introduced which helps to reduce number of accidents that takes every day and also helps to reduce death ratio.
In the existing system, we can start the bike by the using as a key and we can stop the bike when the rider doesn't wear the helmet.

II.PROPOSED SYSTEM

The project has 2 units - The Helmet unit and motorbike
There is a sensor on the handle grip and middle of
the bike which detects the position of the hands and legs of the



rider. In case the rider tries to ride in a risky position the *Figure 1: Architecture Design* alerts the rider.A separate accelerometer is fitted on both units so that independent accident detection can be done of the rider as well as the bike.

ADVANTAGES OF PROPOSED SYSTEM:
•The relay disconnects the ignition system bringing the bike to halt and the bike is deactivated for a specific time in case of multiple attempts to turn on the bike. At the same time, the SIM-900 H GSM module sends an SMS to emergency contacts along with the location of the rider. The location of the rider is detected by the

NEO 6M GPS module in the motorbike unit. The OLED screen displays the name and number of the emergency contact and name of the owner of the bike which helps people in the vicinity to help the rider. The hall effect sensor along with the bar magnet helps in monitoring the speed of the bike [8]. The hall effect sensor is placed near the front wheel of the motorbike. The digital output of the sensor goes low upon detecting a magnetic field and goes high in absence of the magnetic field. The sensor finds the rotations per minute(RPM) of the bike.

SYSTEM SPECIFICATION
Software Specification for SmartHelmet:

PROTEUS EMBEDDED C.
Hardware specification:
(Micro controller,RSSIzigbee, Relay,
MEMS, DC Fan, Gsm, Gps,Lm35).

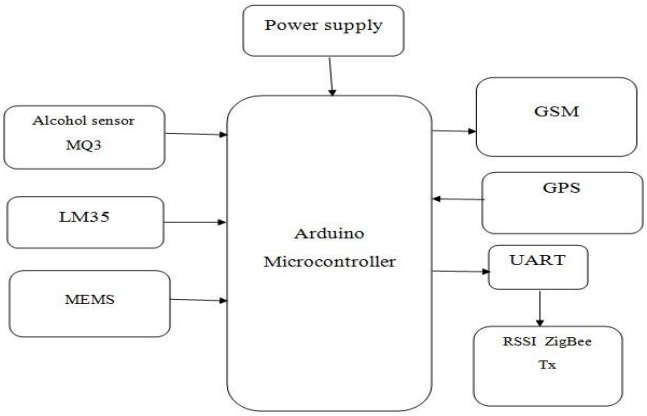


Figure 2: Data Flow Diagram

IV.RESULT

Sequence diagrams, commonly used by developers, model the interactions between objects in a single use case. They illustrate how the different parts of a system interact with each other to carry out a function, and the order in which the interactions occur when a particular use case is executed. In simpler words, a sequence diagram shows different parts of a system work in a ‘sequence’to get something done.

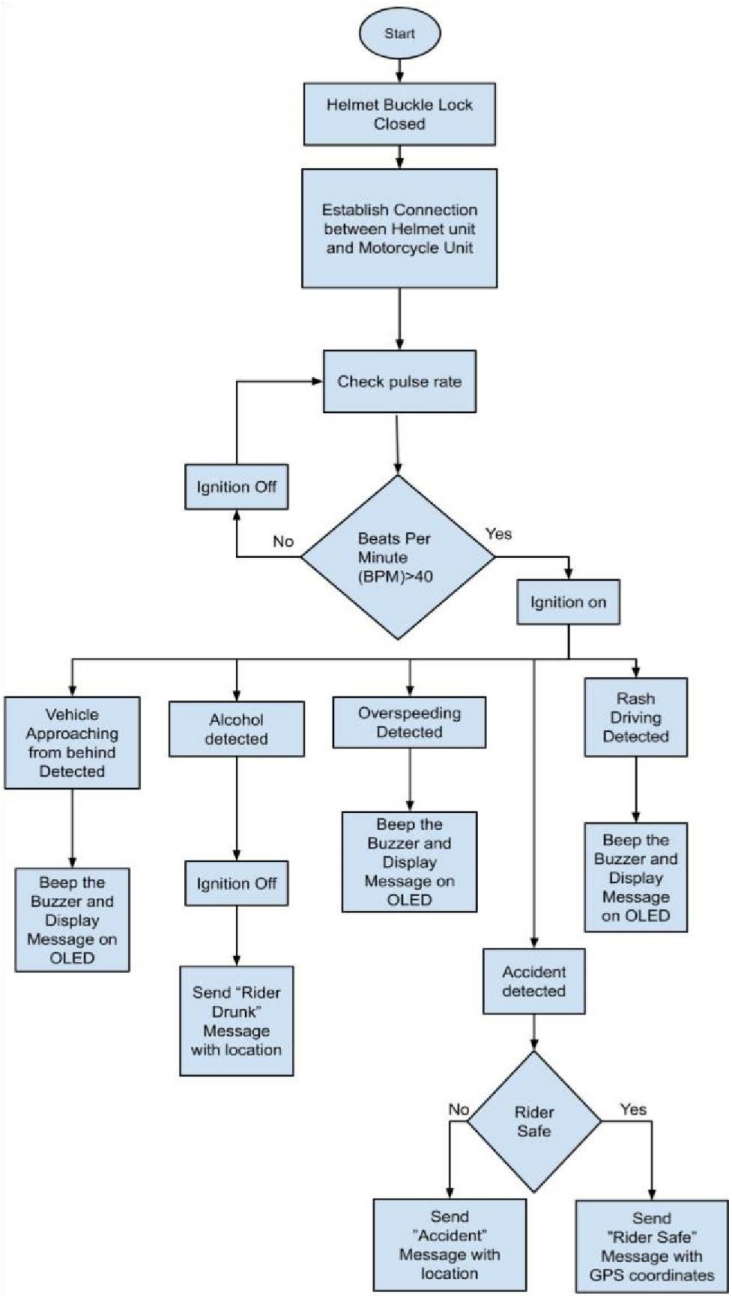


Figure: 3: Sequence Diagram

A UML use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e. use case diagram). A key concept of use case modelling is that it helps us design a system from the end user's perspective. It is an effective technique for communicating system behaviour in the user's terms by specifying all externally visible system behaviour.

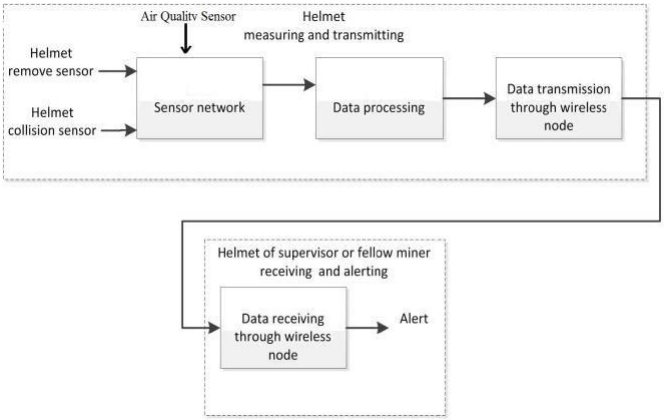


Figure 4: UML Diagram

MODULE DESCRIPTION

GSM Modem: Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz.

Alcohol Sensor: In current technology scenario, monitoring of gases produced is very important. From home appliances such as air conditioners to electric chimneys and safety systems at industries monitoring of gases is very crucial. **Gas sensors** are very important part of such systems. Small like a nose, gas sensors spontaneously react to the gas present, thus keeping the system updated about any alterations that occur in the concentration of molecules at gaseous state.

Zigbee: ZigBee is a wireless technology developed as an open global standard to address the unique needs of lowcost, low-power wireless M2M networks. The ZigBee standard operates on the IEEE 802.15.4 physicalradiospecification and operates in unlicensed bands including
2.4 GHz, 900 MHz and 868 MHz

V.CONCLUSION

A pulse rate sensor is more effective in recognizing whether the rider has worn a helmet or not. Pulse rate sensor cannot be triggered by false means as in the case of infrared sensor or microswitch. The project is low in cost but is effective. This makes it mandatory for a rider to wear a helmet. This leads to a reduction in deaths due to accidents. The system is easy to use since it does not require the user to connect to a mobile phone. OLED makes it easier to display large messages and is more compact. Making the driver aware of approaching vehicles helps in the prevention of accidents message with the location of the rider is sent to emergency contact. The location sent by the MU is accurate drunk rider helps the police in avoiding drinking and driving cases. Also, getting the location of the accident as soon as the accident occurs can help the medical team reach the location faster and save a life. The buzzer on the bike and helmet will prevent the rider from driving recklessly and overspeeding and hence promoting safety. Warning the rider to avoid risky sitting positions and rash driving reduces accidents.

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