An IoT based implementation of smart helmet with smart locking system

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Abstract-Currently, accidents are a serious problem for everyone. Accidents are increasing day by day, so efforts are made to avoid them to minimize their consequences. We live in a world where the rules of the road have no importance for people and they are regularly violated. In addition, it's human nature to resist what is imposed on them. Thus, using a different perspective, we provide safety with luxurious and intelligent features using a smart helmet. Two modules one on the helmet and bike each will work in synchronization, to ensure that the biker is wearing the helmet .A radio frequency module is responsible for the wireless communication between the helmet and the bike circuit. The ALCHO-LOCK function is used to prevent drink and drive scenarios Accident detection sensor detects accidents, and this is extended by employing GSM module in our circuit, which is designed to automatically send one message to one personal contact and one concerned authority that the person has been into an accident. Then the message is sent to the relative persons and then they can take the location of the accident area and can inform to the nearby police station and to the nearby hospital about the event immediately and can provide the hospitality. With the help of finger print module only the authorized persons can use the bike and it will prevent the vehicle theft operations. The ignition is turned on only if the riders Unique code matches and he should wear the helmet.

1. INTRODUCTION

It is a well-known fact that young generation prefers bikes and motorcycle over four wheelers. A survey indicates that more than 70% of the riders avoid wearing helmet without any specific reason .Moreover speeding and drunk driving have become common issues. Due to lack of experience or focus and violation of traffic rules, result in severe accidents. So with the help of technology we made sure that traffic rules are followed, problems mentioned above are avoided and their effects are minimized. The idea of developing this work comes from our social responsibility towards society. In many accidents that occur around us, there is a huge loss of life. According to a survey, about "7500" people die on roads per year that occur due to bike accidents. There are various reasons for accidents such as not having adequate ability to drive, defective two wheelers, rash driving, "drinking and driving", etc. But the main reason was the absence of helmet on that Person which leads to immediate death due to brain damage. Therefore, it is important that there should be a facility to minimize the after effects of these accidents. However the main goal of our work is to make it mandatory for the rider to wear a helmet during the ride meanwhile providing solutions to other major issues for accidents. Therefore, this sense of moral responsibility towards society, laid the foundation for our "Smart Helmet" project. So the basic idea for the development of this project "Smart Helmet" is

taken from And detail functionality of each of hardware and software components used are, for example, the radio transceiver and the information and operation of the sensor . The main component used is microcontroller P89V51RD2. The principles of operation of the circuits and connections, etc.

2. LITERATURE SURVEY:

1. Smart Helmet Based On IoT Technology

IOT has enabled us to connect our day to day devices in a network for a sole purpose of exchange data. Today a number of countries has made it mandatory to wear helmet while riding. In this paper, I describe a helmet which is made smart using latest IOT technologies. This helmet for the comfort of riders provide various functions such as Listening to the music on the go, sending SOS messages in case of emergency, use navigation services.

2. Smart Helmets for Automatic Control of Headlamps

Intelligent Safety Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. There are many countries enforcing regulations to wear a helmet while riding. India is an example. The idea is obtained after knowing that the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. This project is designed to introduce automatic autonomous headlight technology for the safety of motorcyclist. Here, we focus on intelligent headlamps that react according to the rider's facial movement. It makes use of accelerometer and other sensors to direct small electric motors built into the headlight casing to turn the headlights accordingly.

3. IMPLEMENTATION AND ANALYSIS OF SMART HELMET

Currently, accidents are a serious problem for everyone. Accidents are increasing day by day, so efforts are made to avoid them to minimize their consequences. We live in a world where the rules of the road have no importance for people and they are regularly violated. In addition, its human nature to resist what is imposed on them. Thus, using a different perspective, we provide safety with luxurious and intelligent features using a smart helmet. Two modules one on the helmet and bike each will work in synchronization, to ensure that the biker is wearing the helmet .A radio frequency module is responsible for the wireless communication between the helmet and the bike circuit. The Piezo electric buzzer is used to detect speeding and this feature is extended by limiting the speed of

the user. The ALCHO-LOCK function is used to prevent drink and drive scenarios Accelerometer detects accidents, and this is extended by employing GSM module in our circuit, which is designed to automatically send one message to one personal contact and one concerned authority that the person has been into an accident and a fog sensor for increasing visibility in case of fog or smog are also used. Another feature known as E-HELMET allows for automatic deduction of the required amount from the users virtual wallet wirelessly preventing the rider to stop and pay for it.

4. Konnect: An Internet of Things(IoT) based Smart Helmet For Accident Detection and Notification

The objective of the smart helmet is to provide a means and apparatus for detecting and reporting accidents. Sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilised for building the system. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a cloud based service. The vehicle location is obtained by making use of the global positioning system. The system promises a reliable and quick delivery of information relating to the accident in real time and is appropriately named Konnect. Thus, by making use of the ubiquitous connectivity which is a salient feature for the smart cities, a smart helmet for accident detection is built.

5. THE HIGH SECURITY SMART HELMET USING INTERNET OF THINGS

The major goal of our project is accident detection, notification and prevention. This helmet makes rider to feel comfortable as swell as with high protection and security. This smart helmet works on raspberry pi 3controller which is WIFI based, acts as a station for the networking system. Bluetooth and raspberry pi 3 was interfaced with cloud based services. The helmet is interfaced with both vehicle and the cloud in which image can be accessed and send to the receiver. Sensors will send command to raspberry pi 3. Thus the command will be send to the receiver. A software application has been created such that it locates the exact position in terms of Google map. Cloud based services will send messages to receiver contacts in which database are recorded . Most of the accidents are due to rash driving, drunk and drive, using mobile phones while driving ,violating traffic rules and regulations. Many people lose their lives because of the late reporting of accident (ie) they could not able to track accurate GPS location of the accident area. Sometimes we cannot unable to inform about accident at the right time. The primary reason why many people get head injury is because of not wearing helmet.

3.PROPOSED SYSTEM:

A simple telemetry system is activated by a pressure that is applied inside the helmet. The technology used is IOT compliant and is absolutely the same for long-term use. Most of the attention today in helmet innovation is on things like adding an MP3 player or wireless phone or even a flash light on it. But none of these features provide additional safety for the rider and are just meant for amusement.

HELMET SECTION:

The helmet unit comprises of an alcohol sensor, helmet on detection circuit, microcontroller, and a RF module. The output signal from the comparator and the sensor lock is encoded in binary signals, which are transmitted via the RF transmitter. RF Module consists of a transmitter with a 20 meter range. It is used to transmit control signals to the bike module for implementation. Encoder HT12E is an 18pin chip which is used to encode data, before transferring it through the RF transmitter. Comparators enable all functions to work properly. Comparators have 4 inputs and 4 outputs. Its basic working principle is based on comparing voltages supplied to its positive and negative input pins comparing them and producing output. And the signal is transmitted to the bike section for turning on the bike. If alcohol is detected then the rider cannot turn on the vehicle.
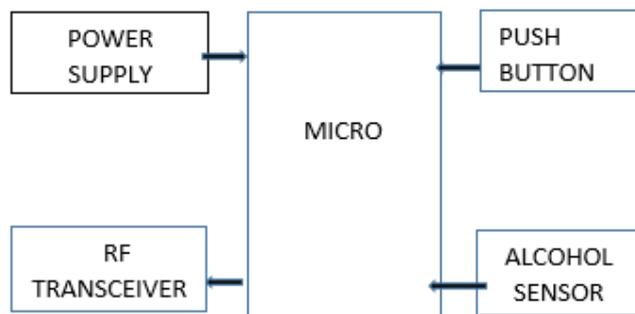
BIKE SECTION:

This section consists of a receiving part and a control signal. The receiver section is located on a bike; It consists of radio frequency receiver, decoder, microcontroller, LED as an indicator, DC motor. The RF receiver receives the encoded binary data transmitted by the RF transmitter and provides it to the decoder.
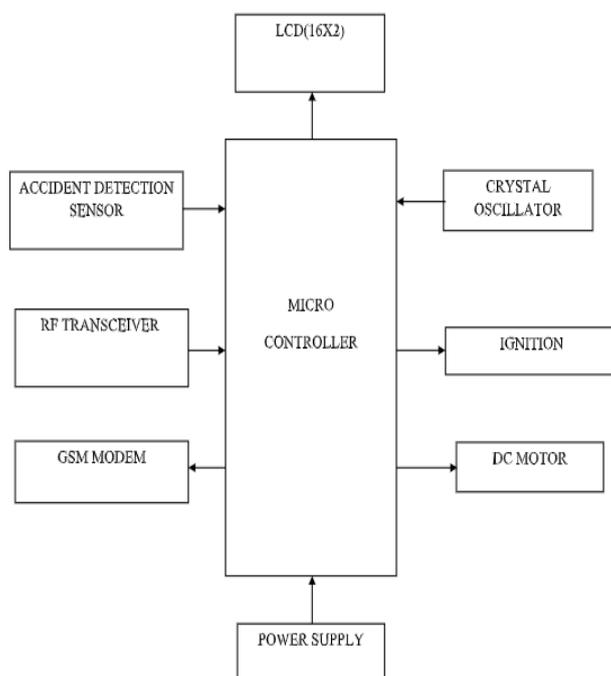
The decoder decodes the incoming digital data and provides four bits in the MCU, only if the address bit of the encoder and the decoder match. This is done to ensure the safety and security of the system. Thus matching of encoder and decoder increases the security and integrity of the system. The MCU controls the DC motor upon receiving data. If the sensor detects that the rider is wearing the helmet, then the engine is turned on and also if the MQ6 sensor detects alcohol, the module installed on the bike turns off the engine to avoid any accidents and so that the drunken person takes appropriate measures to reach his destination. Decoder HT12D decodes all incoming data and then forwards it to the microcontroller for implementation .The P89V51RD2 is a programmable microcontroller with a small instruction set. It controls the working of the module by analyzing the input data stream and then giving correct control signals. Voltage regulator 7805 is used to regulate the erratic voltage received from the power source. The 7805 voltage regulator gives a 5V output. The above components together make our helmet smart and work in synchronization to ensure a safe and comfortable experience for the user. The Bluetooth is attached to receive the fingerprint details to controller to turn ON the Ignition.

4.IMPLEMENTATION

COMPONENTS USED:

- MICRO CONTROLLER(P89V51RD2)
- LCD(16X2).
- GSM MODEM
- RF TRANSCEIEVER
- BLUETOOTH
- GPS & CAMERA FROM MOBILE
- IGNITION UNIT
- L298 DRIVER CIRCUIT
- DC MOTOR
- ALCOHOL DETECTION SENSOR
- ACCIDENT DETECTION SENSOR
- PUSH BUTTON
- POWER SUPPLY

BIKE SECTION IMPLEMENTATION
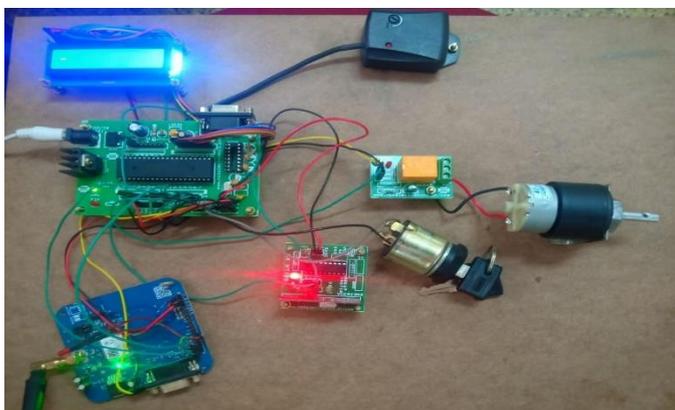
HELMET SECTION IMPLEMENTATION

- **Microcontrollers** use network interfaces to interact with other devices locally and to push the data to the IoT application for any analysis. Moreover, they are designed to support one or many network protocols like WIFI, Bluetooth, Cellular networks like 2G/3G or even RFID.
- An **ignition system** generates a spark or heats an electrode to a high temperature to ignite a fuel-air mixture in spark ignition internal combustion engines. If a rider consumes alcohol the ignition automatically stop through detecting by alcohol sensor.
- An **LCD** is an electronic display module which uses liquid crystal to produce a visible image .It display the actions performed by rider like wearing the Helmet, alcohol detected etc.
- An accident detector sensor senses when an accident occurs then sends location of vehicle to riders's contact using GSM modem.
- Dc motors are motion components that take electrical power in the form of direct current and convert it into mechanical rotation.
- **RF receiver** receives radio signals from RF transmitter in Helmet section over which vehicle starts confirming that the rider has worn the helmet.
- **Relay** is used to route signal frquencies through transmission paths between devices.
- Alcohol detection sensor in a vehicle detects if the driver is drunk or not & locks the engine so that the vehicle stops.
- An RF transmitter transmits radio signals between two devices i.e., Bike and Helmet wirelessly. The wireless communication maybe accomplished through radio-frequency communication.
- Push button in the helmet is pushed when an helmet is worn after which RF transmitter transmits the signal to RF receiver in bike section indicating that the helmet is worn.

CONCLUSION:

Smart helmet is an effective solution to many problems. Wearing the helmet and giving necessary authentication are required Conditions for the bike to start, reducing the possibilities of accidents. Even if a person takes caution sometimes accidents do occur. If an accident is occurred then the notification is sent to the sin people and then they can provide the hospitality by tracking the accident happened location using IOT, Here our engine cut off feature reduces the chances of fatalities significantly. The smart helmet acts as a virtual policeman keeping the drivers in check and making roads safer.

FUTURE ENHANCEMENT:

As a future extension of the work the smart helmet could be equipped to detect rash driving using ADXL335 of the motorist in order to keep a check on rash driving and over speed control can be avoided.

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