IOT Based Smart Helmet

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***Abstract*— A smart helmet is a type of protective system used by the rider which makes bike driving safer than before. The main purpose of this smart helmet to provide safety to rider. This implements by using advance feature like alcohol detection, accident identification, location tracking, use as a hands-free device, solar powered, fall detection. This makes not only smart helmet but also feature of smart bike. Its compulsory to wear helmet, without helmet bike will not start. A RF Module as wireless link which able to communicate between transmitter and receiver. If rider getting drunk, then bike will not start. So, when accident occurs, it will call and SMS by GSM to register numbers with their current location by GPS module. The distinctive utility of project is fall detection, if the bike rider falls from bike, it will send message automatically.**

I. INTRODUCTION

Smart Helmet is a unique project which not only forces the rider to wear the helmet but also takes care of his/her personal protection in case of an accident. The smart helmet will have sensors for detecting whether the rider has worn the helmet or not. It also detects whether the rider consumed alcohol or not. Along with this protection, there is another feature in smart helmet which is an accident alert system using GSM. It will be able to send to send alert to family members through SMS or call along with the location of the rider. This is very useful with respect to rider's protection.

2. LITERATURE REVIEW AND OBJECTIVE

Keesari Shravya et.al [1] Proposed IoT based Smart Helmet is a cost-effective assistive technology to provide security and safety of the biker against road accidents. The proposed IoT based helmet that prevents road accident and detects alcohol consumption, and this will be able to track the biker and sends GPS coordinates periodically to pre-defined number Yamini Mandapati et. al [2] Proposed The sensor responds to various molecules in alcohol and determines if the rider is drunk. The sensor also has a potentiometer to adjust the concentration of gases. We calibrate the detector for 0.4mg/L of alcohol concentration in air and use a resistance of 200 KΩ. It has 4 pins namely GND, VCC, An out and D out. The sensor supports both analog and digital outputs. Here we use digital output of this sensor. Donuru Keerthi et.al [3] Proposed Smart Helmet using GSM & GPS Technology for Accident detection and Reporting System, International Journal of Electrical and Electronics Research Abhinav Anand, Alcoholic detection, Department of Electronics and Telecommunications, IJEETC

Mohd Khairul et.al [4] Proposed The first step of project is it initializes all the port and next step is accident detection using accelerometer. If No accident occurs, then it will go to third step. Third step is listening to Bluetooth module continuously for Data and interprets data using if conditions. Fourth step is to check weather helmet is wear V. Jayasree et.al [5] Proposed The purpose of project is to develop vehicle accident prevention by method of alcohol detector in an effort to reduce accident cases. Ninad V. Joshi et.al [6] Proposed The goal of this literature survey is to compare the several approaches and methodologies that have been published in the field of smart helmet design. Smart Helmet for Safe Driving: The use of FSR to detect whether helmet is worn by the user, MQ-3 alcohol sensor to detect whether the driver is drunk or not, vibration sensors to detect vibration and Bluetooth module for communication are the modules proposed in the work for smart helmet.

Anjali R. Askhedkar et.al [7] Proposed the system is used FSR to check whether helmet is worn or not and accordingly the bike will start, a camera is placed in the bike which will check for the helmet. They have used MQ3 i.e., alcohol sensor to check the Authorized licensed use limited to: Middlesex University. Downloaded on November 02, 2020, at 22:59:44 UTC from IEEE Xplore. Restrictions apply. Permissible

range of alcohol to start the bike and message will be sent to registered number. Malhar S. Jojare et.al [8] Proposed A module enables connectivity to the smartphone. To ensure rider safety, vibration sensors detect collision and location information can be communicated. Other features also ensure rider safety. We had proposed a basic idea of our smart helmet which incorporated the user's safety as well as the user's needs. For user safety, the impact sensor int Bluetooth module with the GPS module has been used to detect if the user comes across any accident. Texas Instruments kits are used for noise cancellation which can provide noiseless transmission between the users using module also providing the consumer a breath-taking surround-sound experience. The basic components of the helmet are Shell (Outer Layer of helmet), EPS Liner (High density foam to absorb shocks), Comfort Liner (Ensures comfort of head

Kishor Shrestha et.al [9] proposed the "Hard Hat Detection for Construction Safety Visualization". They used image processing techniques to check whether the worker is wearing the helmet or not. This system is used to detect whether the worker is wearing the hat during working. But it does not provide any safety measures to overcome in case of any emergency conditions. S. Nandhini et.al [10] proposed "IOT based Smart Helmet for ensuring Safety in Industries". This system uses sensors to monitor the workplaces. This system is particularly used for detecting safety at workplaces but not for the workers.

S.R. Deokar et.al [11] proposed "Smart Helmet for Coal Mines Safety Monitoring and Alerting" system. This system seems to be very efficient as it ensures safety for both the workers and the workplace using wireless sensor networks. It also includes fall detection, toxic gases emission from industry, etc. Shruthi et.al [12] proposed "Smart Helmet for Coal Miners using Zigbee Technology". This system devises a smart helmet using Zigbee technology for monitoring the emission of hazardous gases, abnormal temperature conditions, humidity levels etc. This system ensures safety for workers at the mining area, but this helmet is not purposely provided for the safety of the workers. Malhar S. Jojare et.al [13] proposed a limit switch for checking of helmet worn by the user or not, accelerometer sensor for keeping track of speed and if exceeding the ignition gets cut, GSM module to communicate the message. S.M Ahsanuzzaman et.al [14] proposed per vehicle mile travelled, motorcyclists are about 30 times more likely than a passenger in a car to die in a crash. And, more than half of motorcycle fatalities in 2013 were unhelmeted riders. Most motorcycle accidents that result in death are caused by a head injury. Saving a life and prevent a brain injury rider should wear a helmet. Serious injuries are greatly reduced both in severity and in frequency by the simple act of wearing a helmet.

Toufiq Ahmed et.al [15] proposed one cannot employ such big spring-mass systems inside accelerometer IC's. This is where MEMS (micro-electromechanical system) comes into play. These systems contain both mechanical and electronic components which fabricated at the scale of a micrometer and employed inside the accelerometer IC.

3. MATERIALS AND METHODS

The bike module and the helmet module are the two important modules that form the smart helmet system. A microcontroller unit is linked to switches within the helmet. The helmet is equipped with sensors such as an alcohol sensor, a vibration sensor, a Bluetooth master, and GSM and GPS receivers. An Arduino Uno, a Bluetooth slave and relay module, an IOT system, and a bike module make up the bike module.

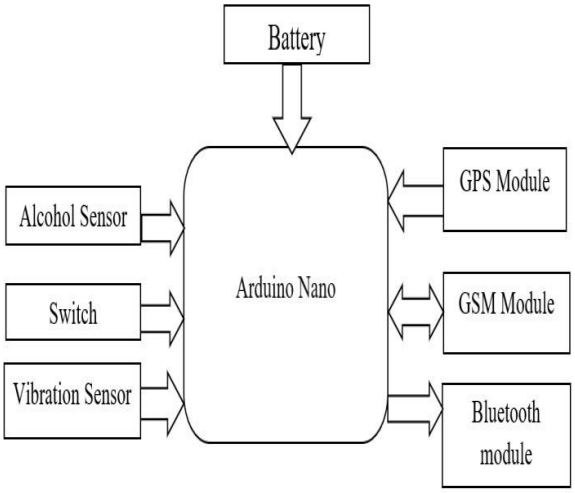


FIG.2.1 Block Diagram of Helmet

Figure 1: Schematic diagram of the Helmet

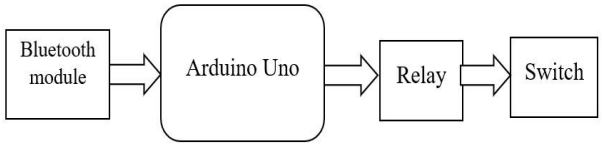


FIG.2.2 Block Diagram of Bike Unit

3.1 ARDUINO:

Fig 3.1. Arduino nano

An open-source electronics platform called Arduino is built on simple hardware and software. A motor can be started, an LED can be turned on, and something may be published online by using an Arduino board to receive inputs like light on a sensor, a finger on a button, or a tweet. Sending a set of instructions to the board's microcontroller will instruct your board what to do. You achieve this by using the Arduino Software (IDE), which is based on Processing, and the Wiring-based Arduino Programming Language. A compact Arduino board called the Nano is built around an ATmega328P or ATmega628 microcontroller. The Arduino UNO board has the same connection. A sustainable, compact, dependable, and The Nano board is an adaptable microcontroller. The Arduino (IDE), which is available for a few operating systems, is used to organise the Arduino 17 Nano. Integrated Development Environment is referred to in this sentence. The Arduino IDE and micro-USB are the tools needed to get our projects running on the Arduino Nano board. On the aforementioned laptop or desktop, the Arduino IDE programme needs to be installed. The Arduino Nano board receives the code from the computer via the mini-USB connector. The Arduino Nano board's technical specs are as follows: o The Nano board's working voltage ranges from 5V to 12V. Nano has a total of 22 input/output pins. o There are 8 analogue pins and 14 digital pins. The 14 digital pins include 6 PWM (Pulse Width Modulation) pins. The Arduino Nano's 6 PWM pins are used to translate digital signals into analogue impulses. The conversion is accomplished by changing the pulse's width. · The Arduino Nano's crystal oscillator operates at a 16MHz frequency. o The Arduino Nano is employed in a number of different fields, including robotics, embedded systems, instrumentation, automation, and control systems. o Examples of projects made with an Arduino Nano include a DIY pedometer and a QR code scanner. The Arduino Nano can also be Wi-Fi connected.

3.2 GSM Module:

FIG. 3.2. SIM800L GPRS GSM Module - Quad-Band TTL Serial Port- KG258

The SIM800L is a micro-SIM low cost GSM/GPRS Development Module. The Module supports TTL communication and hence can easily communicate with Microcontrollers without the need of additional data converters like MAX232. The module also supports antenna with IPX connector. SIM800L module can be used to make a cell, receive a call, send and receive text messages, connecting to internet through GPRS, TCP/IP, etc. Moreover, the module supports quad-band GSM/GPRS network, so it can operate globally. The SIM800L GPRS GSM Module is compact in nature and hence can be directly used on final Designs. The on-board LED indicates the connection status of the Board, when there is no signal the LED flashes quickly and when a signal is established, it flashes slowly.

3.3 GPS Module:

FIG.3.3GPS MODULE

NEO-6MV2 is a stand-alone GPS (Global Positioning System) module featuring a high-performance 50 channel U-Blix 6 positioning engine. The NEO6MV2 GPS module checks for location on Earth and provides the Latitude and Longitude of the position it is in. This is a low-cost module with a detachable antenna, which also comes with a logic level converter and a voltage regulator, which makes it compatible with both 5V and 3.3V powered boards like Arduino Uno, Mega, Pro Mini, etc. It can be used in the Navigation Systems of Smartphones and Tablets, Drones, in location-based services, etc. SPECIFICATIONS • Robust & high accuracy • Board size: 23mm*40mm • Compatible with 3.3V-5V interface • Compatible with all versions of Arduino • EEPROM to save configuration settings 20 • Separated 18X18mm GPS antenna • Support SBAS (WAAS, EGNOS, MSAS, GAGAN) • Maximum navigation update rate: 5Hz • Default baud rate: 9600bps • EEPROM with battery backup • Sensitivity: -160dBm • Supply voltage: 3.6V • Operating temperature range: -40ºC TO 85°C To power the device, you can either connect your 5V pin or 3.3V pin to VCC and connect GND. As it communicates at 9600 bps via UART TTL logic, you need to connect TX and RX pins to respective pins on your controller and get the GPS coordinates of your position.

3.4 Vibration sensor:

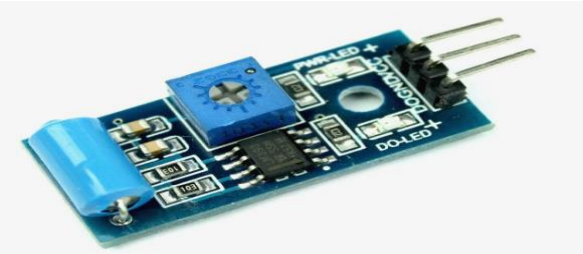


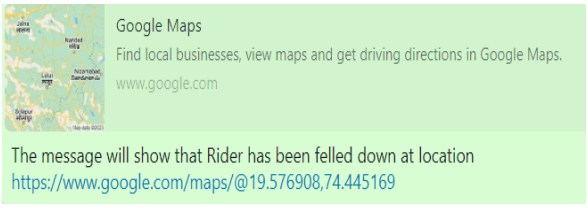
FIG.3.4 VIBRATION SENSOR

The SW420 Vibration Sensor Module is based on SW-420 Vibration Sensor, which works on the principle that when the movement or vibration occurs, the circuit will be briefly disconnected and output low. Hence the normal state of this sensor is closed. The sensitivity of the SW420 Sensor can be controlled by an onboard potentiometer and LM393 Comparator IC. 21 This is very useful in detecting Collisions, Burglary protection alarm systems, Vibration alert systems, etc. SPECIFICATIONS • SW-420 based sensor, normally closed type vibration sensor • Supply voltage: 3.3V-5V • On-board LM393 Comparator IC • The comparator output sensitivity can be changed with the help of a potentiometer. • Output form: digital switch output (0 and 1) • On-board indicator LED to show the results • Has a fixed bolt hole for convenient installation

4.RESULT

The two-wheeler Safety System developed with IoT, Smart helmet is very safe and trustworthy. The main aim of this system prevention from injuries when a person wearing this helmet meets with an accident. It avoids Drink and Drive cases. The results can detect the accident and it sends the notification to the registered contact with 90% accurate location so that the guardians will get to know the condition of the person and can able to give the proper medical treatment.

The message will shows that Rider has been felled down at location https:// www.google.com /maps/@ 19.576908,74.445169



CONCLUSION

The project's findings have shown that the bike will start if a helmet is worn. As a result, accidents will have less of an impact and bike theft will be avoided. Every system and sensor can be effectively managed by the Arduino nano, which can also put together a wireless system using a Bluetooth module to send a signal from the bike unit to the helmet unit. It also demonstrates why a wireless connection is better than a cable one.

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