IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 4 Ser.6 (April. 2020), PP 42-46
www.iosrjournals.org

Intelligent Protective Headgear

B.Thiruvaimalar Nathan [1], Durgesh Singh[2],S.Sai Sudharshan[3],Purv Roy Choudhury[4], Souvik Purakaystha[5]

[1](Assistant Professor, Department of Electronics and Communication,SRM IST, INDIA)
[2](Department of Electronics and Communication, SRM IST, INDIA)
[3](Department of Electronics and Communication, SRM IST, INDIA)
[4](Department of Electronics and Communication, SRM IST, INDIA)
[5](Department of Electronics and Communication, SRM IST, INDIA)

Abstract:*The number of bikers in our country are increasing which is also resulting in increasing of road accidents. Various setbacks are corresponding to this, most of these are due to the carelessness of not wearing the helmet while riding the bike. Furthermore, numerous passing happens because of the inadequacy of brief clinical attention required by the person who is injured. Frequently occurring incidents like these inspire us to make a system that assures the safety of the person riding the bike, as this framework will make sure that the rider is adhering to the rules and regulations. One of the conditions being that the person has to wear the headgear while riding the motorcycle and if there is any occurrence of an accident then immediate medical assistance from the hospital with the closest proximity is ensured. The proposed framework is a clever protective headgear. The module present in the headgear matches up with the module present in the motorcycle and likewise ensure that the rider is not under the influence of alcohol. An extra element of an accident location module will be introduced on to the motorbike, which will have the option to recognize mishap and will have the option to tell swiftly to police the control room about the accident and if the accident is minor, the biker can stop the message from being transmitted at the earliest by pressing the prematurely end switch. Additionally, we have incorporated a feature by which the pin has to be entered by which one can override the system in case of any malfunction.*

Key Word:*Framework, Accident, Module*

Date of Submission: 02-04-2020 Date of Acceptance: 18-04-2020

I. Introduction

Bike collisions have increased manifolds due to which there is an alarming increase in the mortality rates. These incidents have resulted in raising concerns among the citizens. In India, it is assessed that one mishap happens like clockwork. The tenants and the people who ride the bikes are amongst the lion's share to be influenced in streetcar crashes. Bike mishaps have to been appeared to have more number of case casualty in mishaps. Regardless of the wellbeing rules made by the legislature, numerous riders neglect to maintain them. The regular negligence of wearing the helmet while riding the bike has most often resulted in the rider getting lethal wounds during accidents.

In addition to the periodical checking, there needs to be a foolproof framework which must be implemented that can make sure the riders don't escape the rules that are to be followed. The most prominent reason why an accident occurs is due to intoxicated driving. Because of driving drunken, bike riders regularly get into mishaps. Practically 70% of the mishaps in our nation can be forestalled if the riders quit expending liquor before riding. The individuals associated with the mishaps should be dealt with and quickly taken to the hospital. In any case, there is a delay in dealing with the fallout of street mishaps in the nation. The police station which has the closest proximity to the location must be informed about the accident with the goal that they can be taken to the emergency clinics right away.

II. Related Works

V.KrishnaChaitanya[1] This is a report which makes riding a motorcycle safer than before. This paper deeply discusses about the concerns that arise while riding a motorcycle and thus proposes safety measures that can be implemented in headgear as well as in the motorcycle.

Manjesh N [2] This paper presents a clever protective headgear is an idea that makes cruiser riding even safer than before. This system consists of vibration sensors that are present in the headgear where the possibility of getting hit is more than that is associated with the microcontroller. When the person riding the bike meets with an accident and the headgear hits the ground the sensors send the information to the microcontroller,

at that point controller takes the GPS data from the GPS module that is present in it. At the point when the data goes below the base stress limit, GSM transmits the message to the emergency vehicle relative. Components which are present in this are alcohol sensor, gsm,gps module, microcontroller, vibration sensor and pressure sensor.

SudharsanaVijayan [3] This paper presents a framework that constantly verifies if the person is wearing the head protector and also ensure that the person is not under the influence of alcohol while he is riding the motorbike. There is a change that is used to make sure the helmet is being worn on the head. Data that is to be transmitted is coded with a radiofrequency encoder which is transmitted through the radio recurrence transmitter. The receiver at the motorbike collects the data and unravels it via radio frequency decoder. A microcontroller unit handles the amount of hand off and along these lines the start and also controlling the motor by a hand-off and a transfer interfacing circuit.

R. Prudhvi Raj [4] This proposed system has a helmet that guarantees a person riding the motorbike cannot start his motorbike until he wears it. This protective helmet substitutes the link connections for remotely turning on a motorbike, a led pointer is used for displaying the functioning of the system. This structure is a straightforward telemetry structure, which is performed with the support of weight which is applied to the inward side of the helmet when the person riding the motorbike wears it. This system uses a double pole double throw electromechanical handoff and thus there is some time lag in wearing the helmet and to turn on the circuit.

Archana D[5] This paper proposes a system that follows a framework that ensures that the engine doesn't start until the rider wears the headgear. Once the rider wears the headgear it is locked and the engine can be turned on while riding the motorbike, this system also lets rider know the speeds of the vehicles which are coming to either side of the motorbike with the help of an ultrasonic sensor and informs the person riding the bike by creating vibrations in the handlebar of the motorbike.

Sayantapadar [10] Thispaper proposes a smart helmet which identifies whether person riding the motorbike is wearing the headgear, the person has consumed liquor and also detect if there is a mishap that has taken place. The information gathered from the accelerometer and pressure sensor is transmitted to the cloud through an online application to train an SVM will help in identifying accidents precisely with which in the future the information which is gathered over the time can present with more efficiency of the incident detection. Any smartphone with the use of the Bluetooth for communication with the online application programming interface , by using the internet connection in the phone.

BhandariPrachi [11]The paper that has been proposed can automatically detect the mishap with the help of GPS, GSM and a sensor unit that is placed inside the vehicle with which it identifies the area the vehicle is present and transmits this location to the hospitals in the closest proximity with the help of the main server.

SreenithyChandran [12]The paper proposes a framework where an accelerometer is added to the helmet and the values received from it are monitored , the mishap is identified by analyzing the transmitted values by which an emergency notification is given to the contact with GPS.

III. Proposed System

Intelligent head protector assures the wellbeing of the person riding the motorbike by making it mandatory to wear the headgear, according to the government laws, and also to get immediate clinical attention if an accident occurs. A module is present in the headgear which matches up with module in the motorbike [2], [3]. The following are the working of the system:

● This ensures that the bike doesn't start unless the person who is riding the bike wears the headgear.

●It also makes sure that the person who is riding the bike hasn't consumed liquor.If the rider has consumed liquor the bike will not start.

● The mishap discovery module will be included would inform about the mishap to the nearby police station with its option to distinguish mishap. If the accident is minor,the biker can stop the message from being transmitted at the earliest by pressing the prematurely end switch. A system override switch has been installed in connection with Bluetooth facilitated with a password pin so that system override can only be done by authorized personnel.

Modules are present in:

• Protective headgear

• Motorbike.

The headgear sends data remotely to the bicycle. As indicated by the different sensor input the small scale controller will choose the activities of different squares

IV.System Module

Two portions are present in this system which are the headgear part and the bike part.

4.1 HELMET PART

The helmet part consists of a gyroscope, touch sensor (IR sensor), alcohol detector and an accident detection sensor or the vibration sensor and the RF transmitter.

IR Sensor: The infrared sensor decides if the headgear is worn by the person who is riding the bike with the help of its outputs. If the output is low it implies that he has worn the headgear. The infrared sensor has an emitter which is an InfraRed light-emitting diode which emits the light of a particular wavelength to which the detector Infrared photodiode is sensitive.

Alcohol Sensor: The alcohol sensor can detect if the person riding the bike is under the influence of liquor by measuring its concentration in riders breath and gives out the output about the alcohol levels present. In case the alcohol level is above the given limit then the motorbike does not start. [6].

Gyroscope:A gyroscope is used to measure the tilting of the helmet as well as the bike. The microcontroller, receives the value of the tilt of the headgear and if the angle of the bike is zero to the ground, then it detects that a mishap has happened. [7]

Microcontroller: The outputs of the sensors present in the headgear are transferred to the microcontroller as inputs. There is a limit set for the sensors present in all these sensors and according to these outputs, the decision is taken and further transmitted to the module on the bike through a wireless medium. [8].

Transmitter:A LoRa is used as the radio frequency transmitter to send the serial data to the receiver using the wireless medium. This operates at 434 MegaHertz frequency.

4.2 BIKE PART

The bike part consists of the following components

Receiver:A RadioFrequency receiver operating at the same frequency as the transmitter is used to receive the information over the wireless medium from the radio frequency transmitter.

Microcontroller: This is the most important part of the entire circuit. According to the data which it receives from the bike it controls the yield of outstanding parts. Given the readings of accelerometers present in the headgear and motorbike, the message would be transmitted to the police station with the closest proximity if an accident occurs by using the GSM module [9], [10].Also, given the values of the liquor sensor and InfraRed sensor, it sends a hand-off yield to the motor.

GSM Module:This global system of mobile module can accept any GSM organize administrator SIM card by which it can act as a phone with possessing novel telephone number. This modem can be connected to any microcontroller, there are various applications like SMS Control, information move, remote control, and logging can be grown without any issue. SMS can be used to send an message to the police station with closest proximity if an accident occurs [9].

The GSM module is used in combination with the GPS module to provide accurate information of the user.

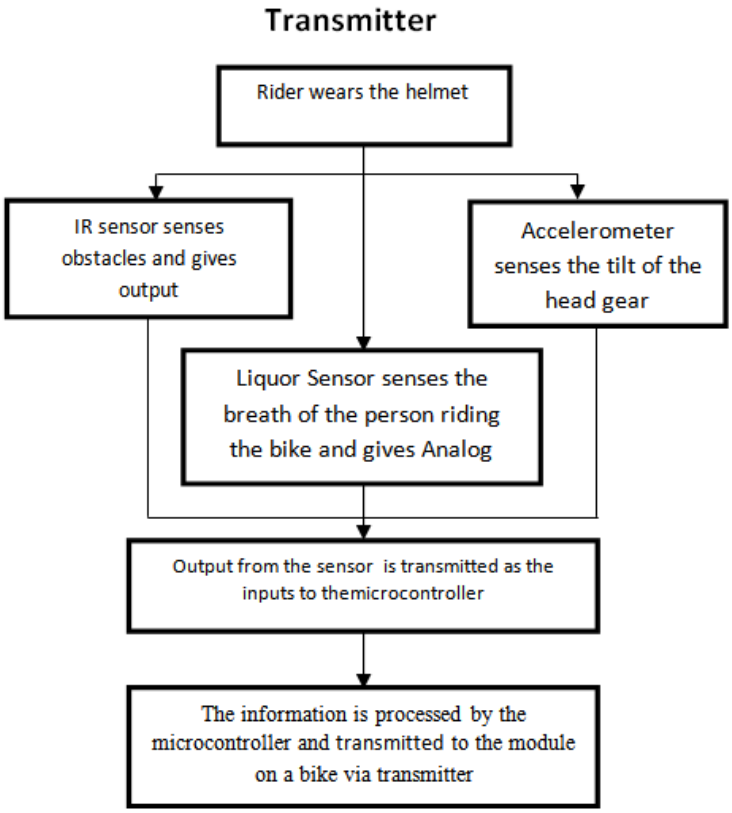
The LCD display is to display the relevant information about the system to the user.

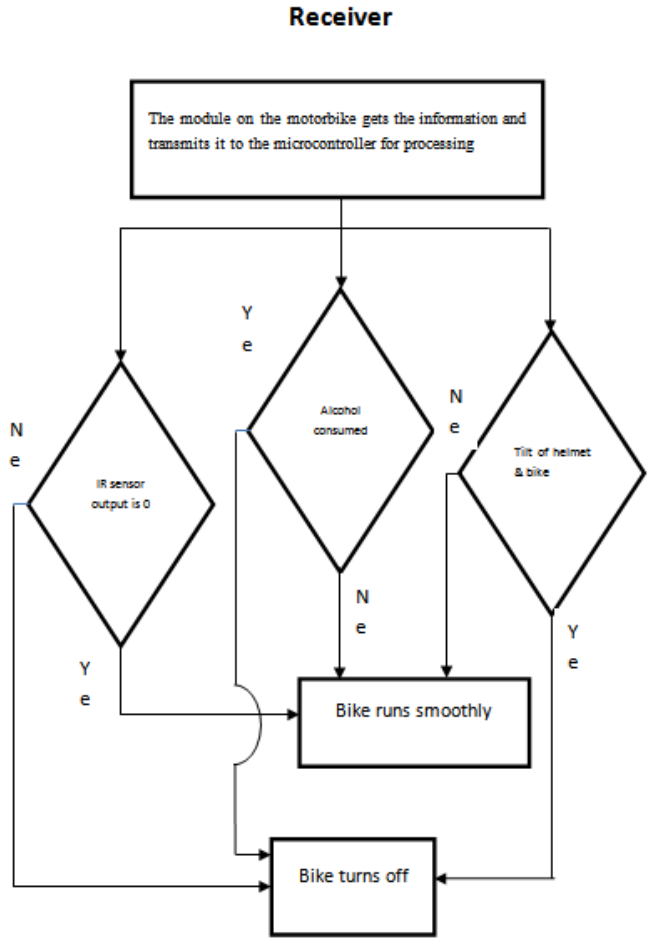
DC motor is also present in the bike section.

IOT saves the data of the sensors in the cloud for future analysis.

V. Implementation

The systems software, hardware, and the working of the intelligent protective gear are explained here. The infrared sensor recognizes an obstruction due to which a low output is given when the person who is riding the bike wears the helmet. The alcohol sensor measures the amount of alcohol present in the bikers breath. The tilt of the headgear is measured by the gyroscope sensor. The information from all the sensors is sent to the microcontroller as the input. This information is transmitted to the bike after it is processed by the microcontroller. This information is transmitted by the radio frequency module which has a radiofrequency transmitter and radio frequency receiver. if the following conditions aren't met the bike doesn't start which are, when the infrared sensor shows a high output or if the alcohol sensor shows the concentration limit to be above the limit else the bike can be started smoothly. If the helmet and bike have the tilt to be nilwith respect to the ground then it will transmit an message to the Police station with the closest proximity. An abort switch has also been provided to manually bypass the system that works in connection to the Bluetooth with a pin and a hidden switch.


Transmitter
Rider wears the helmet
IR sensor senses obstacles and gives output
Accelerometer senses the tilt of the head gear
Liquor Sensor senses the breath of the person riding the bike and gives Analog
Output from the sensor is transmitted as the inputs to themicrocontroller
The information is processed by the microcontroller and transmitted to the module on a bike via transmitter


Receiver
The module on the motorbike gets the information and transmits it to the microcontroller for processing
Alcohol consumed
IR sensor output is 0
Tilt of helmet & bike
Ye
Ne
Ne
Ye
Ne
Ye
Bike runs smoothly
Bike turns off

VI. Conclusion and Future Work

It is important for the person riding the bike to wear protective headgear and also that the person is not under the influence of liquor, the intelligent helmet makes sure that these conditions are met. If the conditions aren't met the framework will forestall the biker from beginning the bicycle. The Framework also helps in effective treatment SMS is sent to the police headquarters within the area where the mishap has occurred,which guarantees that the unfortunate casualties get legitimate and brief clinical consideration, whenever met with a mishap. In the future, Helmets can be contain airbags for the neck& shoulders, crash sensors that could inflate airbags on the bike or riding suit, and dynamic lighting that changes the colour of the helmet depending on time of day and cars behind you etc.

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