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GSM BASED SMART HELMET SYSTEM FOR BIKE RIDER SAFETY

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Abstract - *Road accidents come about in huge cities nearly each day. Sometimes, these accidents convince be fatal. Normally, it's cyclists and motor cyclists who are the victims of such accidents. one amongst the vital issues with bike riders is that the majority of the time they don't trouble to wear helmet that might be fatal once accidents happen. Also, reckless drivers are within the habit of drinking. below the influence of liquor, they from rash driving. a wise helmet may be a distinctive plan which mechanically checks whether or not the person is sporting the helmet and has non-alcoholic breath whereas driving and gives Associate in Nursing awake to driver once he naps on driving with the assistance of reflex sensor. GSM & GPS technology and conjointly completely different sensors like alcohol sensor, reflex sensor, IR sensor, Tilt sensor, regulation controls with RF Transmitter and Receiver are used.*

Key Words: ATMega328 controller, IR sensor, EYE Blink sensor, MQ3 sensor, Colour sensor, GSM, GPS, Accelerometer sensor.

1.INTRODUCTION

Each day, our lives emerge as greater based on 'embedded systems', virtual data era this is embedded in our environment. More than 98% of processors carried out these days are in embedded systems, and are not seen to the consumer as 'computers' withinside the everyday sense. An Embedded System is a special-motive gadget wherein the laptop is absolutely encapsulated with the aid of using or committed to the tool or gadget it controls. An embedded gadget is a single-motive laptop constructed into a bigger gadget for the functions of controlling and tracking the gadget. A specialized laptop gadget this is a part of a bigger gadget or machine. In these days' era, particularly withinside the younger generation, the rage to trip motor motorcycle is hastily growing. The middle-elegance households choose to shop for two-wheeler over four-wheeler due to their low price. As the range of two-wheelers on the street are growing, avenue mishaps also are growing day with the aid of using day. In the occasion of an accident, loss of well-timed clinical interest to the injured character may also cause death. Thus, there may be a want for a gadget which guarantees protection of rider with the aid of using implementing rider to put on helmet as in step with authorities hints and additionally help in offering the rider for a clinical help withinside the occasion of an accident. The project "GSM BASED SMART HELMET FOR BIKE RIDER's SAFETY" first-class fits to perform the subsequent objectives-

- ➢ Status of rider carrying helmet
- ➢ Alcohol content material takes a look at riders
- ➢ Eye blink detection
- ➢ Accident Detection
- ➢ Accident Location
- ➢ Speed Control of motorcycle at pace restriction zone

We will use liquid crystal display (LCD) for showing the message. We will even use GSM modem as an interface among cell and microcontroller. It will ship message to any telecellsmartphone no matter the GSM community via the modem linked to the programmable tool.

2. EXISTING SYSTEMS

A survey accomplished in India showed that there has been a complete of 1,34,513 deaths because of avenue injuries in India withinside the 12 months 2011. The quantity accelerated to 1, 42,485 withinside the 12 months 2014. Government followed few measures like helmet and alcohol checking through visitors' police however are rarely useful.

A. Helmet: Helmets try and guard the user's head through soaking up mechanical electricity and defensive towards penetration. Structure and shielding potential of helmet proven in Figure 2.1 are altered in high-electricity impacts. Besides, its electricity-absorption functionality and quantity and weight also are critical issues, for the reason that better quantity and weight growth the damage danger for the user's head and neck.

Figure 1: Helmet

B. Breath analyzer: Breath analyzer is used for Blood Alcohol Content test (BAC) however Breath analyzer do now no longer at once degree blood alcohol content material or concentration, which calls for the evaluation of a blood

sample. Instead, Breath analyzer has proven in Figure 2.2 estimate BAC in a roundabout way via way of means of measuring the quantity of alcohol in one's breath. Mainly, site visitors police use to test motive force on highway. If alcohol content material observed to be extra than 0.08 mg/L then motive force is fined.

Figure 2: Breath analyzer

2.1 Demerits of Existing System:

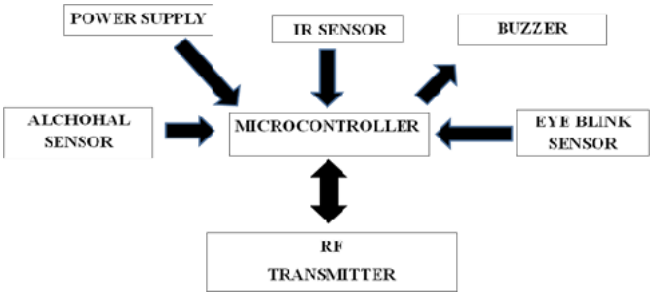
Disadvantage of contemporary era is because of negligence of rider and problem of implementation of site visitors' regulations through site visitor's police. Following is the primary drawbacks current era:

1. Rider do now no longer put on helmet in areas in which site visitors checking isn't done.
2. There is an inclination of the driving force to put on helmet best in which they expect checking may also take place, else they do now no longer put on helmet in which no checking is done.
3. The automobile may be becoming on and stolen through bypassing the ignition switch.
4. Testing alcohol content material found in blood in every person rider in a massive united states like India is sort of impossible.

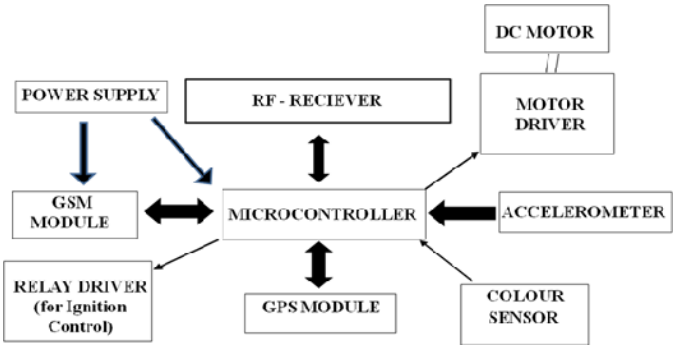
3. PROPOSED SYSTEMS

A smart helmet could be a form of protecting headgear employed by the rider that makes bike driving safer than before. the most purpose of this helmet is to supply safety for the rider. this could be enforced by mistreatment advanced options like alcohol detection, accident identification, location tracking, use as a hands-free device, fall detection. This makes it not solely a wise helmet however additionally a feature of a smart bike. it's required to wear the helmet, while not which the electrical switch cannot flip ON.

An RF Module may be used as wi-fi hyperlink for verbal exchange among transmitter and receiver. If the rider is under the influence of alcohol the ignition receives mechanically locked, and sends a message to the registered variety together along with his present-day region. In case of an accident, it'll ship a message via GSM at the side of region with the assist of GPS module. The one-of-a-kind software of assignment is fall detection; if the rider falls down from the motor motorcycle it sends a message.



(a) Helmet Unit



(b) Vehicle Unit

Figure 3: Block diagram of the Proposed System

3.1 Hardware Components:

Arduino UNO Board: In this project Arduino Uno is used as microcontroller board with the specification of AtMega328P. It is an 8-bit microcontroller. Arduino has a fourteen data transmitting/receiving pin whether they may be digital/analog pins. Out of 14 pins, 6 pins are used as PWM outputs, another six pins as analog pins, a USB connection, a Power barrel jack, an ICSP header and a reset button. Figure3 shows the Arduino Uno Board.

Figure 3: Arduino Uno Board

IR sensor: Infrared era addresses a extensive style of wi-fi applications. The principal regions are sensing and far-flung controls. In the electromagnetic spectrum, the infrared component is split into 3 regions: close to infrared location, mid infrared location and some distance infrared location. An infrared mild emitting diode (IR LED) emits mild of Infrared variety seven hundred nanometers (nm) to at least one mm. This mild isn't seen via way of means of bare eyes

however may be visible via way of means of a camera (this is why those also are utilized in night time imaginative and prescient cameras).

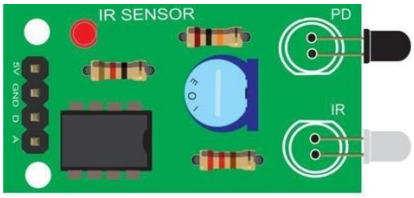


Figure 4: IR sensor

MQ3 Sensor (Alcohol sensor): MQ3 is one of the maxima normally used sensors withinside the MQ sensor series. Metal oxide sensors also are called Chemiresistors, due to the fact sensing is primarily based totally at the extrude of resistance of the sensing fabric while uncovered to alcohol. So, through putting it in an easy voltage divider network, alcohol concentrations may be detected.

Figure 5: MQ3 sensor

EYE Blink sensor: In this project EYE blink sensor is used as to test the Drowsiness of a rider. It works with the aid of using illuminating the attention and eyelid place with infrared mild, then tracking the adjustments within side the contemplated mild the use of a phototransistor and differentiator circuit.

Figure 6: EYE blink sensor

433 MHz RF Tx and Rx Module: The 433 MHz RF transmitter and receiver module is a couple of tiny RF (radiofrequency) electric modules which are used to broadcast and obtain radio indicators among devices. Figure nine depicts the transmitter module sending records from the transmitter quit and the receiver module receiving records from the reception quit.

Figure 7: 433 MHz RF Tx and Rx Module

MEMS sensor: MEMS sensor are involved in different technologies but in this project, it is used as accelerometer sensor as for accident detection. It helps as to measure different axis(tilt) to find direction, based on this tilt we can describe whether the accident is taken place or not.

They may also be used to detect seismic activity, tilt, machine vibration, dynamic distance, and speed with or without gravity.

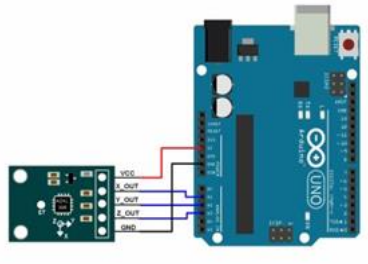


Figure 8: MEMS Sensor (Accelerometer Sensor)

Buzzer: A buzzer or beeper is an audio signaling device, which can be mechanical, electromechanical, or piezoelectric (piezo for short). Typical makes use of of buzzers and beepers encompass alarm devices, timers, and affirmation of consumer enter along with a mouse click on or keystroke.

Figure 9: Buzzer

LCD (Liquid crystal display): There are two types of LCD based dimensions: In this project we are using 16x2 LCD. A liquid crystal display (LCD) is a flat panel display or other electronically controlled optical device that uses the light modulation capabilities of liquid crystals in conjunction with polarizers. two of these lines and can represent 16 characters per line. On this LCD screen, each character is represented by a 5x7 pixel matrix.

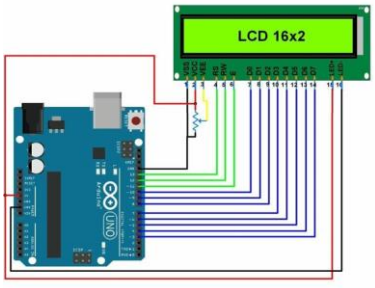


Figure 10: 16x2 LCD

GSM module:
GSM (Global System for Mobile communications) is an open, virtual mobile era used for transmitting cell voice and facts services. GSM helps voice calls and facts switch speeds of as much as 9.6 kbit/s, collectively with the transmission of SMS (Short Message Service).

Figure 11: GSM module

GPS module:
GPS stands for "GLOBAL POSITIONING SYSTEM". GPS has completely different modules, during this project used module is NEO-6M GPS. At the centre of the module may be a NEO-6M GPS chip from u-blox. The chip measures not up to the scale of a postage however packs a stunning variety of options into its very little frame. t will track up to twenty-two satellites on fifty channels and achieves the industry's highest level of sensitivity i.e., -161 decibel tracking, whereas intense solely 45mA supply current.

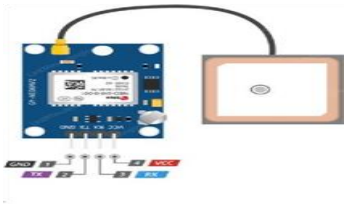


Figure 12: NEO-6M GPS module

Color sensor:
Color sensors offer greater dependable answers to complicated automation challenges. They are utilized in diverse industries together with the meals and beverage, car and production industries for functions which include detecting material, detecting color marks on parts, verifying steps withinside the production system and so on. Color sensor is used to stumble on distinctive colors, however its manly divides in RGB it way each color can divide into red, green, blue components. In this venture it's far used to stumble on color and primarily based totally on the ones color output we will manipulate the velocity of the car in velocity restrict zones.

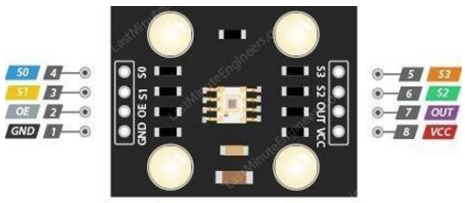


Figure 13: Color sensor

Relay driver: Relays are switch that open and shut circuits electromechanically or electronically. Relay's management one electric circuit by gap and shutting contacts in another circuit.

Figure 14: Relay

DC Motor:
A DC motor is an electrical motor that runs on DC power. In any electric motor, operation relies upon straightforward electromagnetism. it's a tool that converts current to mechanical energy. It works on the actual fact that a current carrying conductor placed in an exceedingly flux experiences a force which causes it to rotate with relevancy its original position.

Figure 15: DC motor

Motor driver:

Motor drivers are used to run the DC motors in Arduino based projects. There are different types if motor drivers but, in this project, we use a special type of motor driver called L293D. It has two enable pins to provide different voltages to motor for controlling RPM of wheel.

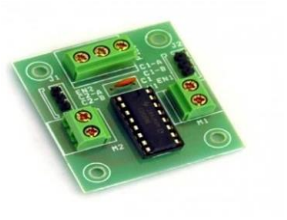


Figure 16: Motor driver

4. WORKING

The project consists of 5 parts:

1. Helmet Authentication- to ensure that the bike rider is wearing a helmet or not (using IR Sensor).
2. Alcohol Detection- to ensure that the bike rider has not consumed alcohol (using MQ3 Gas Sensor).
3. Eye Blink Detection- Rider drowsy mood detected by eye blinksensor.
4. Fall Detection- the vibrations due to static obstacles will be detected by accelerometer.
5. Color Sensor- Color sensor is used to detect the speed limit zoneboard
6. Response System- in the helmet in case of accident, to inform bike rider's family about the accident using GPS & GSM module.
7. Safety Zone Indication- to control the speed of bike at speed limit zone by using Color identification Sensor.

To feel the helmet, IR transmitter receiver pair is used. To feel the alcohol content, an alcohol sensor-MQ3 Gas sensor is used for the same. Based on tilt feel primarily based totally on accelerometer, fall detection of the automobile is known. Based on those 3 data, the microcontroller lets in the automobile to get started. If any parameter is located to be invalid, the controller will ship an vehicle mobile message through GSM module to a registered consumer. After this if the fall is detected then the region i.e., latitude & longitude of motorcycle rider could be sent to his family/buddies via GPS Module. If the whole lot is going right, then the receiver relay could be on after which the person can begin the bike.

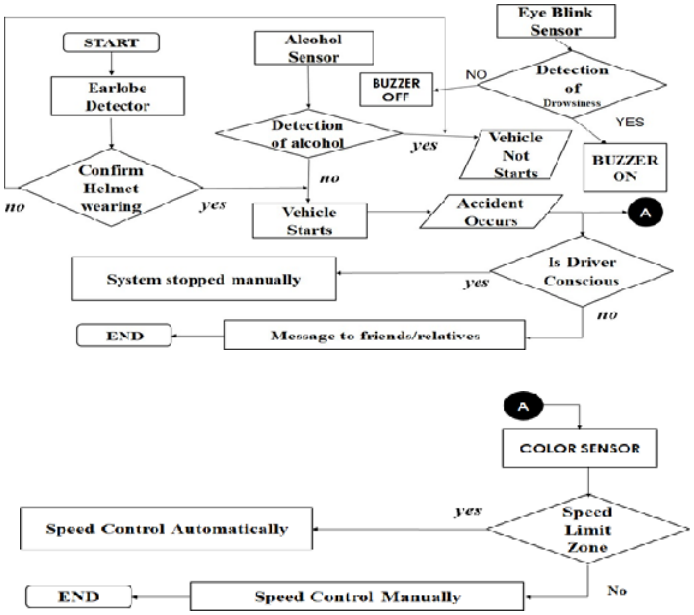


Figure 17: Flow chart of proposed system

5. ADVANTAGES

- ✓ It'll facilitate to scale back the amount of road accidents that are very frequent during a country like Bharat wherever the traffic is extremely high.
- ✓ It'll help to form awareness concerning the necessity to wear helmet throughout bike riding.
- ✓ The system will make sure that the motorcycle won't begin unless the rider is sporting a helmet and has not consumed alcohol.
- ✓ The system also will alert the bike rider if any obstacle comes to shut whereas riding the bike.
- ✓ Also, GSM technology is employed to tell the members of the family in case of associate accident.

6. RESULT

Figure 18: Working model of a Helmet unit

Figure 19: working model of a Vehicle unit

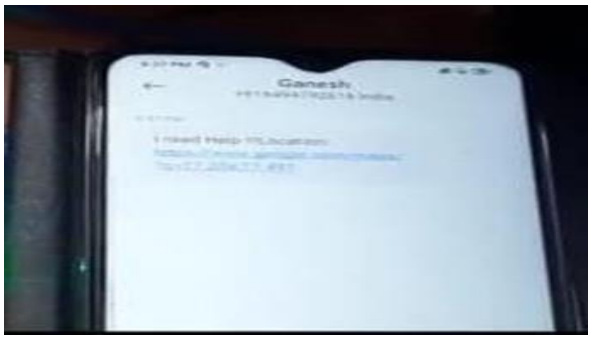


Figure 20: Display of messages send to the registered mobile number

7. CONCLUSION AND FURTURE WORK

The designed sensible helmet ensures the protection of the rider by creating it necessary to wear helmet, and conjointly ensures that the rider hasn't consumed alcohol quite the permissible limit. If any of those prime safety rules are violated, the projected system can stop the biker from beginning the bike. The system also helps in economical handling of the aftermath of accidents by causation a SMS with the situation of the biker to the police station. This ensures that the victims get correct and prompt medical attention, if he/she met with an accident.

In future if there's a large demand of this sort of helmets, we are able to manufacture the complete circuit in computer circuit board, so circuit becomes smaller and may be simply fitted into helmet. The circuit can even be power-driven by alternative energy so that it uses inexperienced energy and will no damage to environment. The versatile solar panels can fix right along surface of helmet. this sort of helmet technology will be enforced for the combat helmets employed by the troopers operating beneath extreme temperatures.

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