

Smart Helmet for Accident Prevention and Safe Driving Using Wireless Sensor Network

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ABSTRACT

The main cause of death in 2 wheeler drivers is drunken driving and over speeding. The objective of this project is to design the project for provide high safety in automobiles and safety for the driver. This is done with the help of embedded and wireless technology. This is enforced by using advanced features like alcohol detection, accident identification and track the location. A system which checks the two conditions before turn on the engine of the bike. The relay does not on the engine because the two conditions are not satisfied. To track a vehicle in case of accident using vibration sensor detects the abnormal Angle of vehicle and emergency key also pressed by vehicle driver to locate vehicle and emergency message send to ambulance or parents' mobile number through GSM along with location with the help of GPS module and also emergency alarm is activated. The microcontroller continuously records all the parameters for detection of accident. The alcohol sensor is placed near to the mouth of the driver in the helmet to recognize the presence of alcohol. This project is expected to improve safety for bikers and reduce accidents.

Keywords:

Alcohol sensor, Vibration sensor, Temperature sensor, Anglesensor, GSM, Microcontroller Arduino

INTRODUCTION

To reduce developed countries, road traffic accidents were the most significant cause of injuries, ranking 11th among the primary causes of lost years of healthy life. In highway system widening of the road is not a solution to avoid traffic in such cities. The issues with state drunk driving authority systems can be solved in many ways. The most effective will follow several concepts: They will invest authority and authority in human being and organizations at all levels, local to national, because drunken driving control requires action at all levels. They will operate in the public eye, using the media to report on issues and solutions, because the ultimate resolution on priorities and resources to control drunk driving must have public support. They will not promise instant compound based on a single action but rather will take stable steps towards long-term instrument. And they will establish mechanisms for recognize and solving issues rather than attempting to apply one-size fits-all methods. Hence Road Safety becomes the major problem of concern. Therefore, it suits necessary to implement such a technique which is not easy to bypass the basic order of wearing a helmet and to keep away from drunken driving. Here we draw a system which checks the 2 conditions before turning ON the engine of the bike. Our system involved a liquid sensor and a helmet-sensing switch. A switch is used to notice whether the biker is wearing a helmet. Liquid sensor is used to detect the biker is drunk, the product is fed to the MCU. Both the switch and the liquid sensor are fitted in the helmet. If any of the 2 conditions are contravened, the engine will not turn ON. Liquid sensor MQ-3 is

used here for detecting the alcohol concentration nearby in the driver's breath. The sensor provides an analog resistive product based on the alcohol concentration. MCU is the microcontroller unit, which authority all the functions of further blocks in this system. MCU takes or read data from the sensors and controls all the functions of the total system by handle these data. Liquid sensor is attached to the MCU through a combining network circuit and the helmet-sensing switch. is straight connected to the MCU. MCU collect data from these sensors and it gives a digital data corresponding to the product of sensors to the encoder only if the 2 conditions are full filed.

IOT application-specific framework is capable in reading data stream from sensors or sensor network directly. IOT can provide an infrastructure that integrates the smart service with situational response and permit mutual communication between the smart thing or device and other people over a network. IOT based smart helmet which ensured the security rider while riding.

Helmet using GSM technology for accident detection and reporting system, the author specially developed this project to enhance the security of the bikers. during this application the project are going to be monitoring the world during which the vehicle is going to be passing. On entering any cautionary area like school, hospital, etc. The speed of the automobile is going to be controlled to a predefined limit. If the bike will tilt than the edge value will

consider that the accident occurred and thrust the GSM and GPS the message are going to be sent to the loved one or ambulance with location. If tilting of helmet is completed quite the edge level albeit the accident isn't occurred then the message will send which is inconvenient.

In this helmet section IR transmitting and IR receiver is employed for transmitting the signal to the pic microcontroller which is encoded by a special sort of encoder. The vehicle section the transmitted signal Is received and decoded by using. One part is to be implemented within the helmet section and consists of a transmitter and therefore the other part during a bike which consists of a receiver

FSR (force sensing resistor) is placed inside the helmet where the particular person touch is sensed. it's determined by the helmet unit whether it's worn or not before begin the bike. FSRs are strong polymer thick film (PTF) device whose resistance is backwards to force applied to the face of the sensor. Force sensing resistor may be a two-wire sensor with a resistance that changes on the applied force. AFSR and BLCD fan is employed for detection of the rider's head and detection of motorcycles speed respectively.

The helmet unit features a sensor module to recorder whether the helmet is worn or not, alcohol detection all connected to frequency (RF) transmitter. Rf transmitter that's placed on the helmet unit to detect whether an individual worn helmet isn't, once the person wears the helmet the signals get transmitter. Rf transmitter module may be a small PCB Sub- assembly capable of transmitting radio emission s and balanced radio wave to hold data.

The IR LED transmits the IR signal on the thing and therefore the signal is reflected back to the thing from the thing surface. The IR receiver are going to be receiving this toss back the signal from the thing.

We are using IR sensor at the mouth section of helmet for head detection. The IR sensors are used as obstacle detectors.

LED lights are indicating a danger situation with a buzzer alert three LED's already in green state showing the traditional, safe conditions but any sensor cross their limit they immediately become red. LCD or LED with tilt change capacities fitting any veil, mounted within the front of said head cap for changing over infrared pictures into electronic signals.

Raspberry Pi_3 is that the advanced version, it's high speed of the operations. This puts the pi 3 about half quicker than the pi 2. Constructed with the past model raspberry pi_2, the RAM continues as before- 1GB of LP DDR2-900 SDRAM, and video core 1V GPU. Pi 3 is that the advanced configuration.

The pi-3 now incorporates locally available 802.11n WI FI and Bluetooth 4.0. WI FI, remote consoles. Pi- 3 zero and 0 W. Hence 512MB of ram. They'll be a typical symbol on the helmet: pi camera is placed on the bike-open a python language is employed to detect the image. it's a library of programming capacities basically went for ongoing or vision open or consists in C++ and its essential interface is in C++, however regardless it holds a less complete however broad more seasoned or interface. If the quality symbol is detected then the relay is going to be closed and DC automobile, turns on. Standard symbol isn't detected, the relay will remain open DC motor doesn't start. Smart helmet motorcyclist using raspberry Pi and open CV with in future will motivate safety features for a motorcyclist.

Zig bee is employed for wireless data transmission. because the system requirements and therefore the required components are often easily made available for this project are often implemented easily. The system can also be easily expanding with zig bee wireless image transmission facility within the future.

Zig bee communication is specifically built for control and sensor network standard for wireless personal area network.

The main components or the microcontroller used that's Arduino nano. Arduino is an open-source tool for creating computer which will sense and control more of the physical world than your personal computer. The functionality of every and each hardware and software the components used are like radio transceiver is taken from information and dealing of the ultrasonic sensor.

We draw a system which to the checks the 2 conditions. One is alcohol sensor another one is helmet-

sensing switch. A switch is employed to acknowledge whether the biker is wearing a helmet. Liquid sensor is employed to distinguish the biker is drunk, the output the biker is drunk, the merchandise is fed to MCU. MCU collect data from these sensors and it gives a digital data like the output of the sensor to the encoder as long as the two conditions are full filled. Both the switch and therefore the liquid sensor are fitted within the helmet. If 2 conditions are violated, the engine won't activate. this technique will scan, whether the rider is wearing a helmet or not and if the driving force is during a drunken state. If the conditions are contravened the bike won't start.

BLOCK DIAGRAM

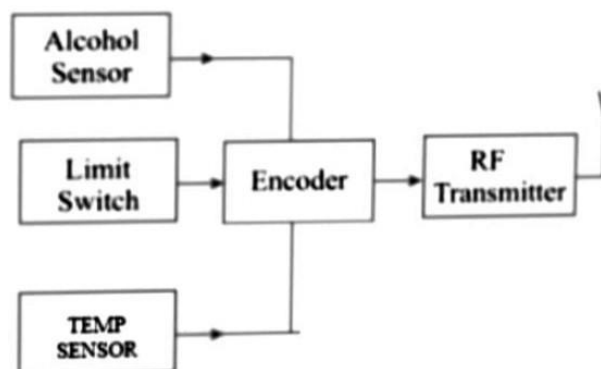


Fig.1.Helmet Part

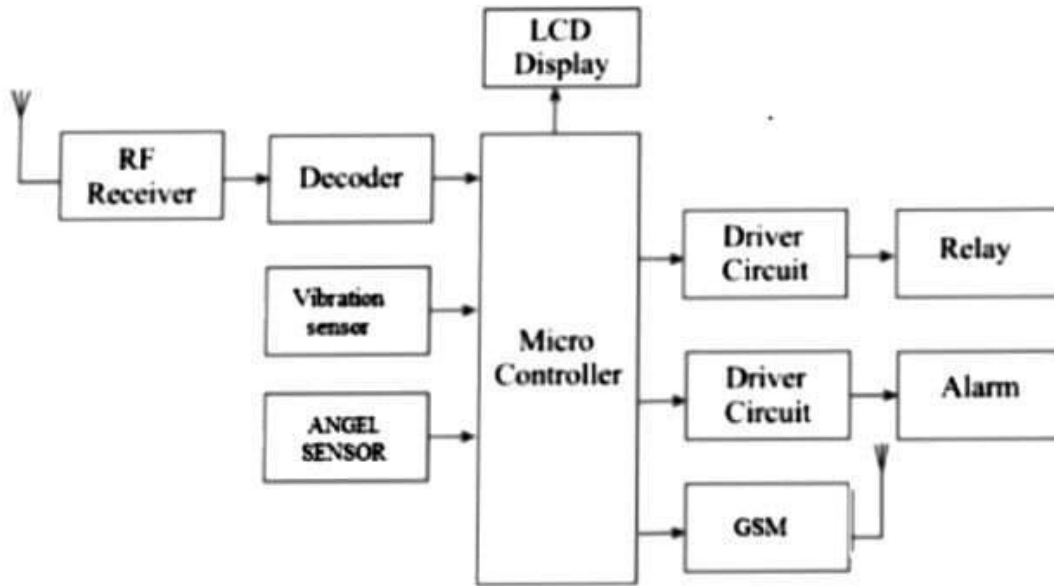


Fig.2.Bike Part

PROPOSED EXPLANATION

The main cause of death in two-wheeler drivers is drunken driving and over speeding. The objective of this project is to increase the safety for riders. There are two units one is a helmet unit another one is a vehicle unit. In a helmet unit there is a limit switch that is used to detect that the driver is wear the helmet properly or not. Temperature sensor is used to sense the temperature inside the helmet it more than 50 degree it turns on the exhaust fan and alarm is activated. hat the driver drunk means microcontroller automatically stops the vehicle by means of control the relay. Then the information is transmitting to the vehicle unit through RF transmitter. Encoder is used to encode the information. In a vehicle unit RF receiver receives this signal and give it to the decoder. After the decoder this information given to the microcontroller. Vibration sensor is used to sense the vibration when the accident occurs to track a vehicle in case of accident this sensor detects the abnormal angle of vehicle and emergency message sent to the ambulance or parents with the help of GSM based system and emergency alarm is activated.

Angle sensor can be used to sense the orientation, acceleration, vibration shock and falling then the angle sensor is used to sense up-to 90 degree, if it is increased then the microcontroller turns off the vehicle automatically in case of accident and alarm is activated.

TEMPERATURE SENSOR

Temperature sensor is used for sensing the rider temperature when he is met with an misfortune, if the temperature is high then the transfer data is checked by the authorities and enough action is taken. GPS is given to know the exact Location to know where the accident took place



Fig.3.Temperature sensor

ALCOHOL SENSOR

If the alcohol sensor detect that the driving force drunk means microcontroller automation stops the automobile by means of control the relay. Alcohol sensor will sense the extent of sensing wont to check whether. Alcohol sensor used as think oscillate material which converted to mechanical to electrical electrodes. If the rider is wearing a helmet and therefore the alcohol sensor content isn't detected the ignition of the engine starts



Fig.4.Alcohol Sensor

VIBRATION SENSOR

A piezoelectric sensor is a gadget that utilize the piezoelectric impact to quantify pressure, speed increase, strain, or power by changing them over to an electrical signal. Two fundamental gatherings of materials are utilized for piezoelectric sensors: piezoelectric pottery and single precious stone materials. The vibrationsensor range of 5V for manes 500m. It's vibration switch, digital input module and dedicated sensor expansion boards with the Arduino together. It can sense the weak vibration signals. When the accident occurs, it senses the pressure and sends it to the Arduino which successively it sends the message to the registered mobile number.



Fig.5.Vibration Sensor

ALARM

A bell or beeper might be a flagging gadget, generally electronic, commonly used in vehicles, home devices like a microwave, or game shows. It most ordinarily consists of variation of switches or sensors attached to an impact unit that determines if and which button was pressed or a preset time has lapsed, and generally illuminates a light-weight on the acceptable button or implement panel, and sounds a warning within the type of endless or intermittent buzzing or beeping sound. Initially this device was kept up an electromagnetically system which was spare like an electrical bell without the metal gong (which makes the ringing sound). AC- connected devices was to implement a circuit to form the AC current into a sound loud enough to drive a loudspeaker and hook this circuit up to an inexpensive 8-ohm speaker.



Fig.6.Alarm

GSM

GSM (Global system for mobile communication). Helmet using GSM technology for accident detection and monitoring system. In case of messages will automatically send to the family members and nearby hospital, ambulance with the helmet on RF transmitter. GSM based system and emergency alarm is activated in case of accident. GSM is a cell organization, which implies that call phone associate with it to look for calls in the prompt area.

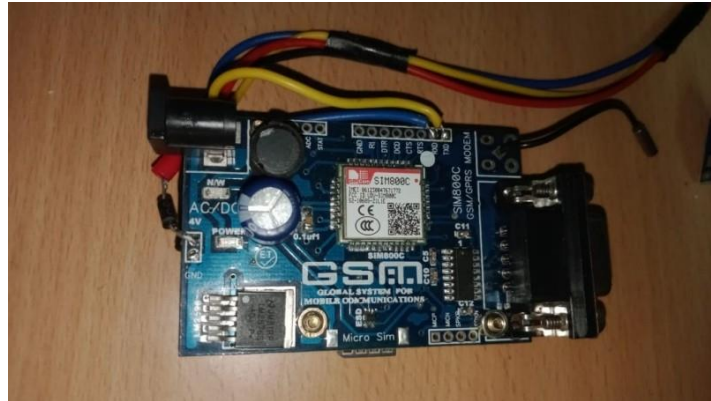


Fig.7.GSM

MICROCONTROLLER ARDUINO

Arduino is an open-source tool for manufacturing computers that can sense and authority more of the physical computing policy based, and an evolution environment for writing software for the board. Rf receivers will receive the transmitted signal form the transmitted it's given as input to the Arduino board. Microcontroller is a pic microcontroller. Microcontroller unit within the helmet gather and process the info by using frequency transmitter to the bike section. Rf receiver unit within the bike section will receive the info and a relay is placed within the bike section to re



Fig.9.LCD



Fig.8.Microcontroller Arduino

LCD

A fluid precious stone presentation (LCD) might be a flimsy, level electronic visual showcase that utilizes the daylight adjusting properties of fluid gem (LCs). LCs don't discharge light straightforwardly. They are used in a decent scope of uses including: PC screens, TV, instrument boards, airplane cockpit shows, signage, and so forth. they're common in consumer devices like video performers, gaming tools, clocks, watches, calculators, and telephones. LCDs have dislodged bar tube (CRT) shows in many applications. they're usually more compact, lightweight, portable, less costly, more reliable, and easier on the eyes. they're available during a wider range of screen sizes than CRT and plasma displays, and since they are doing not use phosphors, they can't suffer image burn-in. LCDs are more energy efficient and offer safer disposal than CRTs. Its low electric power consumption enables it to be utilized in battery-powered equipment. it's an electronically- modulated device made from any number of pixels crammed with liquid crystals and arrayed ahead of a light-weight source (backlight) or reflector to supply images in color or monochrome.

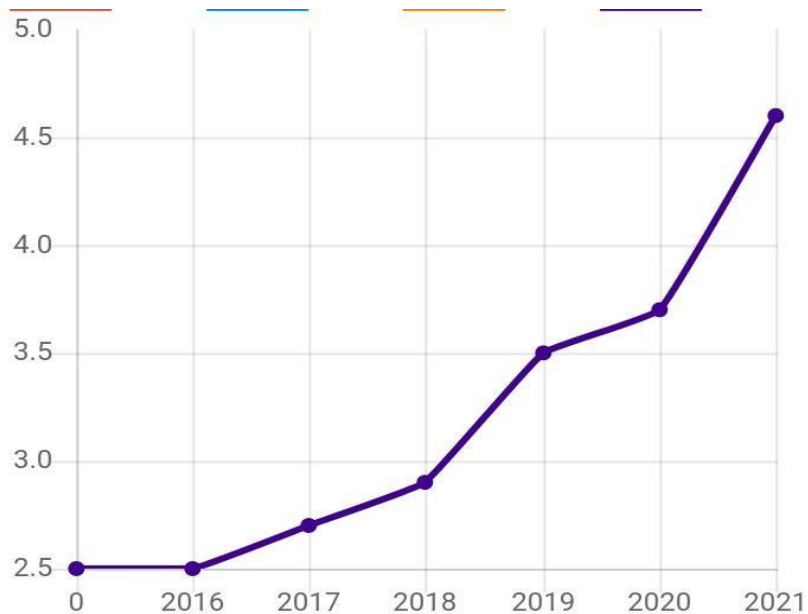
ANGLE SENSOR

An accelerometer may be a device that measures proper acceleration, the acceleration skilled relative to free fall. The angle is often wont to sense orientation, acceleration, vibration shock and falling. The angel's sensor is employed up to maximum 90° degree is increased than off the vehicle automatically just in case of accident.

The displacement is than measured to offer the acceleration. Micro mechanical accelerometer is available during a big variety of measuring range, reaching up to thousands of G's.

The creator must make a compromise between sensitivity and therefore the maximum acceleration which will be measured. Angle sensor can be used to sense the orientation, acceleration, vibration shock and falling then the angle sensor is used to sense up to 90 degree, if it is increased then the microcontroller turns off the vehicle automatically in case of accident and alarm is activated.

MODEL GRAPH



The four sensors in our helmet are controlled by Atmel microcontroller in the Arduino Uno. The board is provided with set of digital and analog input/output (I/O) pins that may be interfaced to many expansion boards and other circuits. Arduino consists of both and a piece of software. Microcontroller is a pic microcontroller the program of the language is Embedded c and we use the software is MP lab. Arduino software is used here for programming data. We already mentioned that we designing of this system includes two units the data transmission is done by utilized RF module. GSM modem is a class of wireless modem device that are used here to transmit the accidental information to the predefined number. The receiver section is bike unit, it consists of RF receiver, relay and a power supply unit. The ignition ON/OFF condition check by using relay

PROTOTYPE MODEL

In our proposed system newly added a feature like temperature sensor, angle sensor and vibration sensor

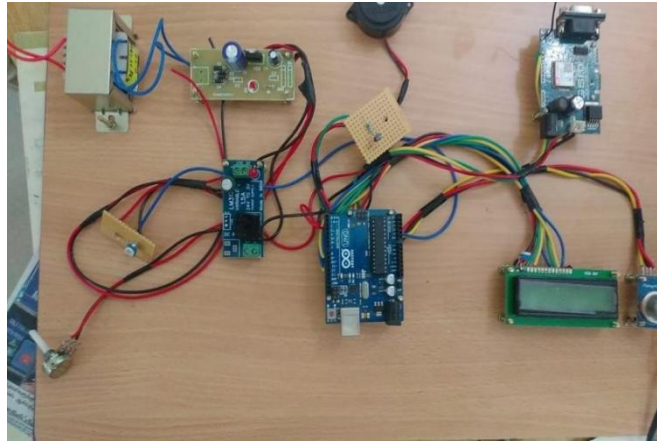


Fig.10.Prototype Model

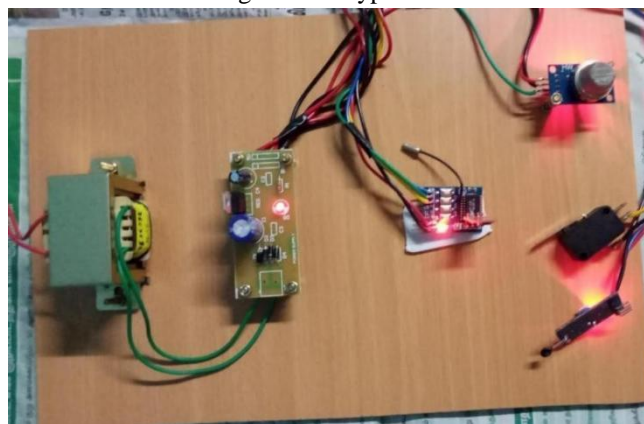


Fig.11.Helmet Part

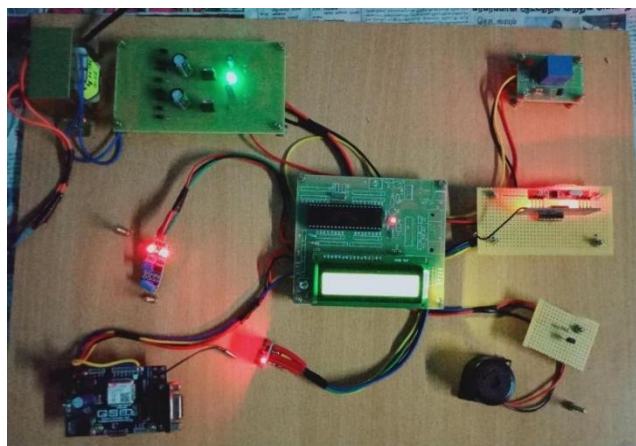


Fig.12.Bike Part

CONCLUSION

The progress in science & technology may be a non- stop process. New things and new technology are being invented. Several tedious and repetitive tasks. Though it's designed keeping in mind about the necessity for industry, it can extend for other purposes like commercial & research applications. thanks to the probability of technology (Atmel microcontroller) used this” advanced vehicle safety system HELMET AND SENSORS” is fully software controlled with less hardware circuit. The feature makes this technique is that the base for future systems. The principle of the event of science is that “nothing is impossible”. So, we shall anticipate to a bright & sophisticated world.

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