

Advancement of Smart Helmet Based on IOT Technology For Safety And Accident Detection

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Abstract- IOT has enabled us to connect our day to day devices in a network for a sole purpose to 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.

Keywords- Smart helmet, smart phone, Alert Messages

I. INTRODUCTION

Today we all talk about Internet of Things and how it is changing our lives. The Internet of Things is creating a new world, a quantifiable and measurable world where people and businesses can manage their assets in better informed ways, and can make more timely and better informed decisions about what they want or need to do. This new world brings in many practical improvements such as convenience, health and safety in our lives. Today in India there is one death every four minutes due to road accidents . Out of total road accidents, 25% accounts for two wheeler accidents . According to recent study 98.6% bikers who died didn't wear a helmet . Hence police department has made it mandatory to wear helmet while riding. Riders face many problems on the go such as unable to take calls, unable to see maps for navigation purposes etc. While having these helmets as a safety measure is a boon, we add more features to it to make it smart. Smart Helmet is an innovative way of building a helmet with latest technologies. Did you ever feel the need to listen to music or maybe send a SOS message in case of Emergency? To make the riders feel more comfortable, we designed a smart helmet. This project is built to aid people to do various task such as listen to music, navigation, receive calls and many more while they are driving. This helmet is integrated with latest Bluetooth technology through which it will get connected to the driver's smart phone. This project helps user's to even more wear helmet because of its features in addition to safety purposes.

II. COMPONENTS

HARDWARE:

- ESP8266 Wi-Fi Module
- Pressure
- Alcohol
- GPS
- Driver Circuit
- Accelerometer
- DC Motor

SOFTWARE:

- IDE
- Embedded C

III. DEFINITIONS AND ACRONYMS

ESP8266 WiFi

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

Arduino

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world.

Power supply

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computer and consumer electronics devices. Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power.

FLOW DIAGRAM

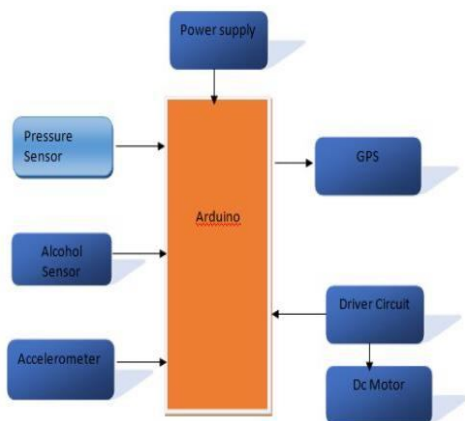
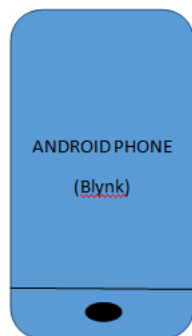


Figure 1. Flow Diagram2.2

Receiver unit:



MQ-3 Alcohol Sensor

An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor can activate at temperatures ranging from -10 to 50° C with a power supply is less than 150 Ma to 5V. The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breathalyzers.

Pressure sensor

A pressure sensor is a device for pressure measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical. Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators, piezometers and manometers, among other names.

Accelerometer

An accelerometer is a device that measures proper acceleration. Proper acceleration, being the acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system. For example, an accelerometer at rest on the surface of the Earth will measure an acceleration due to Earth’s gravity, straight upwards (by definition) of $g \approx 9.81 \text{ m/s}^2$. By contrast, accelerometers in free fall (falling toward the center of the Earth at a rate of about 9.81 m/s^2) will measure zero. Accelerometers have multiple applications in industry and science. Highly sensitive accelerometers are components of inertial navigation systems for aircraft and missiles. Accelerometers are used to detect and monitor vibration in rotating machinery. Accelerometers are used in tablet computers and digital cameras so that images on screens are always displayed upright. Accelerometers are used in drones for flight stabilisation. Coordinated accelerometers can be used to measure differences in proper acceleration, particularly gravity, over their separation in space; i.e., gradient of the gravitational field. This gravity gradiometry is useful because absolute gravity is a weak effect and depends on local density of the Earth which is quite variable.

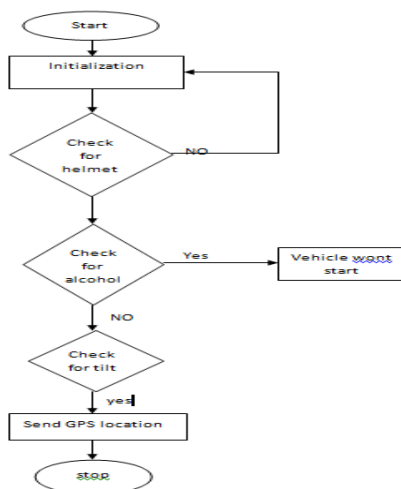
Driver Circuit

In electronics, a **driver** is an electrical circuit or other electronic component used to control another circuit or component, such as a high-power transistor, liquid crystal display (LCD), and numerous others. They are usually used to regulate current flowing through a circuit or to control other factors such as other components, some devices in the circuit. The term is often used, for example, for a specialized integrated circuit that controls high-power switches in switched-mode power converters. An amplifier can also be considered a driver for loudspeakers, or a voltage regulator that keeps an attached component operating within a broad range of input voltages.

Global Positioning System (GPS)

The Global Positioning System (GPS), originally Navstar GPS, is a satellite-based radionavigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Obstacles such as mountains and buildings block the relatively weak GPS signals. The GPS does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

Flowchart



CONSTRUCTION

We already mentioned that we divide a project in two units namely helmet and bike. In helmet unit, the force sensing resistor is placed on inside upper part of the helmet where actually head was touched with sensor surface. And alcohol sensor is placed on in front of rider’s mouth. It can sense easily. Solar panels are mounted on upper side of helmet which is in direct sunlight. And the battery and regular circuits was fixed inside the helmet. Secondary controller and RF transmitter circuit was also placed on inside the helmet, antenna are located outside the helmet[3].

Working Principle

In this system ESP8266 wifi is used. When the system is switched on, LED will be ON indicating that power is supplied to the circuit. The accelerometer is placed in the helmet such that it detects tilts of the helmet. When the rider crashes, the helmet hits the ground and the accelerometer detects the tilt that are created when the helmet hits the ground and then the microcontroller detect the accident occurrence and it will send information about the accident and location of accident using GPS modules. Alcohol sensor sense the alcoholic content whether the rider drunken or not, if he drunken bike will not start showing as alcohol detected on android app. Use of pressure sensor, gives the whether the rider wear the helmet or not. If he not wears the helmet again bike will not start and intimate to rider to wear the helmet.

APPLICATION

- It can be used in real time safety system.
- We can implement the whole circuit into small module later.
- Less power [consuming safety system.
- This safety system technology can further be enhanced in car and also by replacing the helmet with seat belt.

IV. FUTURE SCOPE

- We can implement various bioelectric sensors on the helmet to measure various activity.
- We can use small camera for the recording the drivers activity.
- It can be used for passing message from the one vehicle to another vehicle by using wireless transmitter.
- We have used solar panel for helmet power supply by using same power supply we can charge our mobile.

V. CONCLUSION

The results of the task have demonstrated that the bicycle start will begin if the cap is worn. Along these lines, it will naturally diminish the impact from mischance and it can keep away from bicycle from being stolen. Arduino LilyPad is great in controlling all the framework and the sensors. Executing the remote framework which Radio Frequency Module to send motion from cap unit to the bicycle unit. Because of this remote association is superior to wired connection.

REFERENCES

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