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Development of Smart Helmet Using Iot Technology for Safety and Accident Detection

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Abstract
The aim of this paper is to determine Road accidents are increasing day by day because the riders are not using the helmet and due to consumption of alcohol. In today's world, huge numbers of people are dying on road accidents. By using smart helmet, the accidents can be detected. The main target of the project is designing a smart helmet for accident avoidance and alcohol detection. 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 have made it mandatory to wear helmet while riding. In this project we describe a helmet which is made smart using latest IOT technologies. This helmet for the comfort of riders provide various functions such sending messages in case of emergency like accidents in blynk , sending current location through GPS (latitude and longitude) and it also checks riders body temperature which most essential in this covid19 situation .In case the rider has consumed alcohol means our proposed system will turn of the vehicle (like DC motor will not turn on) and if the accident occurred means also the vehicle will not turn on. Here we are representing vehicle through DC motor. The whole proposed system will work only when the rider wear the helmet otherwise none of the functionalities will work and the vehicle also will not turn on if the rider is not wore the helmet. All these parameters will be send to the blynk server through wifi by the microcontroller and we can monitor them in the blynk app in any android phone.

Keywords: *ESP866, Alcoholic Sensor, GPS, Pressure Sensor, Tilt Sensor, IR Temperature Sensor, DC Motor.*

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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. 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 sending messages in case of emergency, use navigation services and it checks riders body temperature which most essential in this covid19 situation .In case the rider has consumed alcohol means our proposed system will not turn on the vehicle itself . This project helps user's to even more wear helmet because of its features in addition to safety purposes.

II. PROPOSED SYSTEM

The main aim our project is to design a smart helmet using IoT for riders safety.
The smart helmet provides many services like:-It will check the rider has wear the helmet or not and incase if the rider has not wear the helmet means the controller will not turn on the vehicle (DC motor).

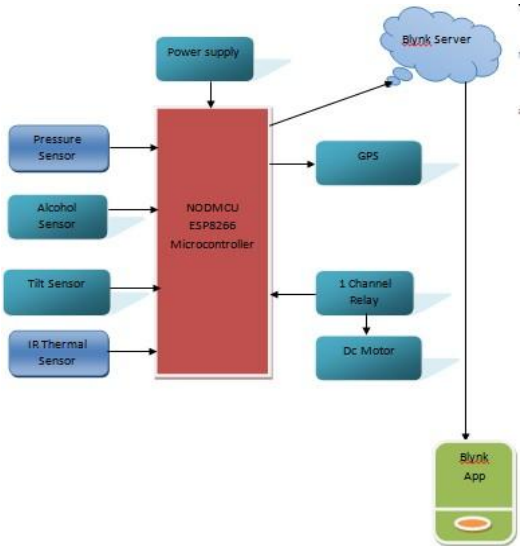
- It checks rider body temperature in order to know whether he as fever or not by checking body temperature which is very essential in this covid19 situation.
- It also checks the alcohol detection incase if rider has consumed alcohol means the controller will turn of the vehicle (DC motor).
- It has GPS which can be used for tracking vehicle and longitude and latitude values will be sending to the blynk server through wifi.

➢ In case of accidents, it will detect accidents and sends messages to the blynk server.

All the parameters like helmet weared or not , alcohol detection status , body temperature ,latitude and longitude values will monitor in the blynk app in any android phone which is configured with our system.

III. SYSTEM ARCHITECTURE

The system consists of ESP 8266, Alcoholic sensor, Pressure sensor, ESP8266 WIFI shield installed in node MCU, Tilt sensor and GPS tracker make up the device.



A. ***ESP8266 Microcontroller:***

Node MCU is an open-source based firmware and **development board** specially targeted for IOT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SOC from Espress if Systems, and hardware which is based on the ESP-12 module. The Node MCU ESP8266 development board comes with the ESP-12E module containing ESP8266 chip

B***. Pressure Sensor*** :

This Sensor will mainly use to detect pressure so the the pressure applied on this sensor it will send 1 or 0 when no pressure it send 0 or1 to the controller. This sensor can be used to know whether the person has weared the helmet or not.

C. Alcoholic Sensor:

The core system is the cube as you can see in this cross sectional view, basically, it is an Alumina tube cover by SnO2, which is tin dioxide. And between them there is an Aurum electrode, the black one. And also you can see how the wires are connected. So, why do we need them? Basically, the alumina tube and the coils are the heating system, the yellow, brown parts and the coils.

D. Tilt Sensor:

The ADXL335 is a small, thin, low power, a complete 3-axis accelerometer with signal conditioned voltage outputs. The ADXL335 Module 3-axis Analog Output Accelerometer measures acceleration with a minimum full-scale range of ±3 g**.** It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. This breakout board comes with an onboard voltage regulator and works at both 3.3V & 5V (3-5V).

E. GPS:

This GPS Receiver SKG13C With External Active Antenna is easy to use with PC or MCU. The Skylab SKG13 series is a complete gps receiver module that features super sensitivity, ultra low power and small form factor, Dual Power Source. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

F. DC Motor:

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition And therefore so is its current. The current in the rotor is switched by the commutator to also be stationary in space.

G. Blynk App (Android app):

It's a new platform that enables users to easily create interfaces for coordinating our hardware projects from an Android mobile. We can connect the blynk app to our device WIFI through ESP8266 and construct project dashboards, button positioning, and UI design once we have downloaded the app.

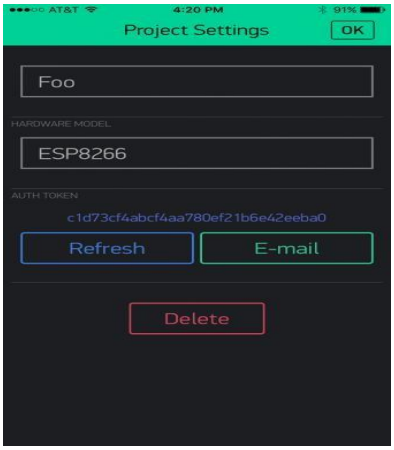
IV. METHODOLOGY

- Provide the power supply to turn on the system.
- Now none of the sensors will do the function because all our proposed system will workonly when the person wear the helmet and same data we can see in the blynk app that is configured with our system like helmet not weared.
- Now we will wear the helmet and the pressure sensor will turn on the the controller willget to know that we weared the helmet.
- Once helmet is weared the controller will turn on the vehicle (Dc motor).
- Now the system will check alcohol detection and if the rider is not consumed alcohol means it will display in the blynk app like ok ride in the alcohol detection status else thecontroller will turn of the vehicle (Dc motor) and display drunken in the blynk app.
- Now the system will check accident detection using tilt sensor in and if the accident not occurred means it will display in the blynk app like normal in the accident detection status else the controller will turn of the vehicle (Dc motor) and display accident occurred in the blynk app.
- With the help of GPS the system will send latitude and longitude values to the blynk app which helps to know the vehicle location.
- We can also check body temperature through contactless IR thermal sensor and the same data also displayed in the blynk app.
- All the data is send to the blynk server by the NODMCU Microcontroller through its inbuilt wifi and the same data we can monitor in the blynk app in android phone that is configured with our system.

V. SYSTEM IMPLEMENTATION

I CREATING A PROJECT IN BLYNK APP

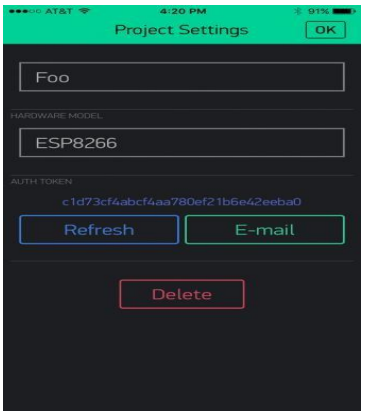
After downloading the app, create an account and log in. Welcome to Blynk!



You'll also need to install the Blynk Arduino Library, which helps generate the firmware running on your ESP8266. Download the latest release from Blynk's GitHub repo, and follow along with the directions there to install the required libraries.

Create a Blynk Project

Next, click the "Create New Project" in the app to create a new Blynk app. Give it any name you please, just make sure the "Hardware Model" is set to ESP8266.



The Auth Token is very important – you'll need to stick it into your ESP8266'sfirmware. For now, copy it down or use the "E-mail" button to send it to yourself.

Add Widgets to the Project

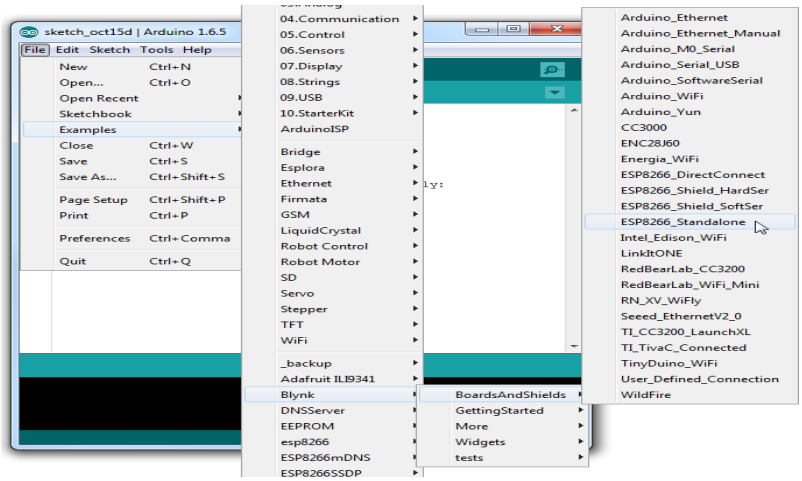
Then you'll be presented with a blank new project. To open the widget box, click in theproject window to open.

Add a **Button**, then click on it to change its settings. Buttons can toggle outputs on the ESP8266. Set the button's output to **gp5**, which is tied to an LED on the Thing Dev Board. You may also want to change the action to "Switch."

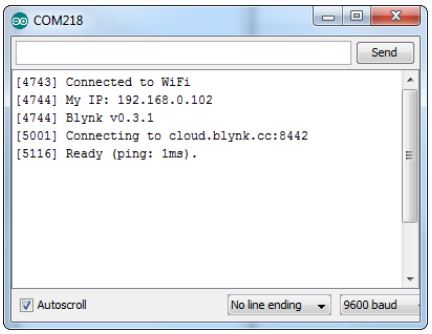
The **Auth Token** is very important – you'll need to stick it into your ESP8266's firmware. For now, copy it down or use the "E-mail" button to send it to yourself.

Upload the Blynk Firmware

Now that your Blynk project is set up, open Arduino and navigate to the **ESP8266_Standalone** example in the **File**>**Examples**>**Blynk**>**BoardsAndShields** menu.This means that the hardware you choose should be able to connect to the internet. Some of the boards, like Arduino Uno will need an Ethernet or Wi-Fi Shield to communicate, others are already Internet-enabled: like the ESP8266, Raspberri Pi with WiFi dongle, Particle Photon or SparkFun Blynk Board. But even if you don't have a shield, you can connect it over USB to your laptop or desktop (it's a bit more complicated for newbies, but we got you covered). What's cool, is that the list of hardware that works with Blynk is huge and will keep G on growing.



Before uploading, make sure to paste your **authoriazation token** into the auth[] variable.



Also make sure to **load your WiFi network settings into the Blynk.begin(auth,"ssid", "pass")** function. Then upload!

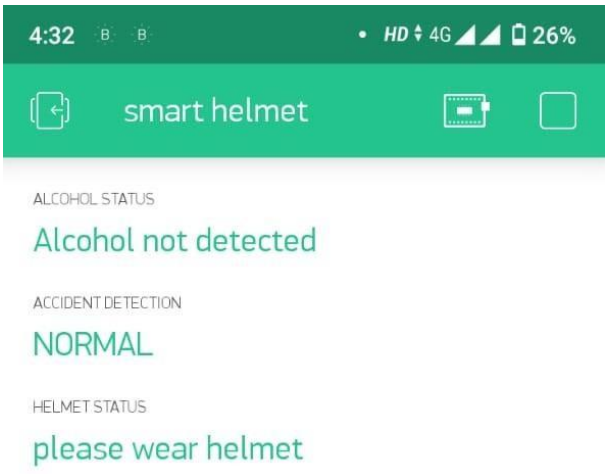
Run the Project

After the app has uploaded, open the serial monitor, setting the baud rate to 9600. Waitfor the "Ready (ping: xms)." message.

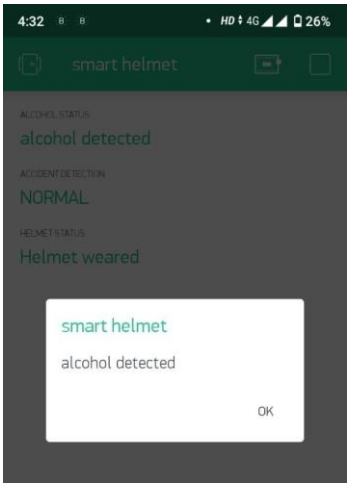
VI. RESULT

The above snapshot contains all the hardware parts such as Pressure sensor, Alcoholicsensor, Tilt sensor , Microcontroller, Dcmotor and Helmet

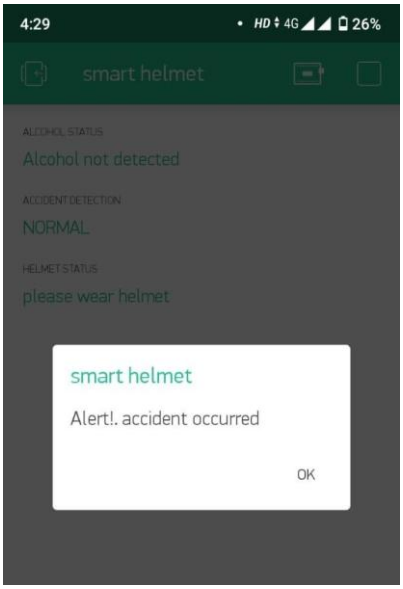
- The rider has weared the helmet or not is detected and the vehicle (Dc motor) will turn on only when the helmet is weared otherwise vehicle will not turn on.



- The rider has consumed alcohol or not is detected and in case if he has consumedmeans vehicle will not turn on else it will turn on.

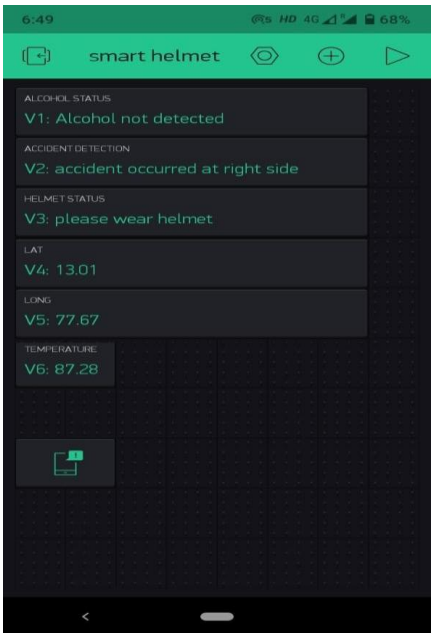


- Accident occurred or not also detected and message is sent to blynk app if accidentoccurred means and vehicle will turn off else vehicle is turned on.



- Rider body temperature also checked regularly by Contact less temperature sensor
- The vehicle location also detected using GPS which will send latitude andlongitude values.

- All the data is send to the blynk server by the NODMCU Microcontroller through itsinbuilt wifi and the same data we can monitor in the blynk app in android phone thatis configured with our system.



VII. CONCLUSION

Road accidents are increasing day by day because the riders are not using the helmet and due to consumption of alcohol. In today's world, huge numbers of people are dying on road accidents. IOT has enabled us to connect our day to day devices in a network for a sole purpose to exchange data. The main aim our project is to design a smart helmet using IoT for riders safety. This helmet for the comfort of riders provide various functions such sending messages in case of emergency like accidents in blynk , sending current location through GPS (latitude and longitude) and it also checks riders body temperature which most essential in this covid19 situation .In case the rider has consumed alcohol means our proposed system will turn of the vehicle (like DC motor will not turn on) and if the accident occurred means also the vehicle will not turn on. Here we are representing vehicle through DC motor. The whole proposed system will work only when the rider wear the helmet otherwise none of the functionalities will work and the vehicle also will not turn on if the rider is not wore the helmet. All these parameters will be send to the blynk server through wifi by the microcontroller and we can monitor them in the blynk app in any android phone.

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