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SWU Smart Mask

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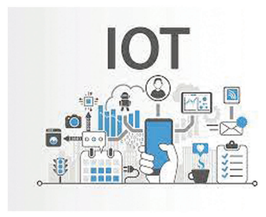
Bachelor of Science Program in Computer Scienece

Abstract

Today, we face air pollution like high PM 2.5 and infectious diseases via respiratory droplets or airborne routes. Wearing a face-mask is a part of a comprehensive strategy of protecting us from pollution, transmission, and infection. This article presents a development of an IoT-enabled face-mask named SWU Smart Mask. The mask works together with the mobile application via Bluetooth. The mobile phone will vibrate to warn users when they are going to a high PM 2.5 area. The application can get breath temperature and humidity from the mask to detect mask-wearing. This smart mask must be useful to protect users from air pollution and infectious diseases.

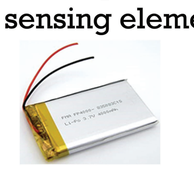
Related Knowledge

IoT : Internet of Things
The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.



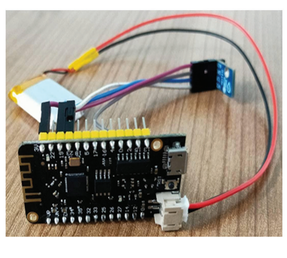
ESP32 LOLIN32 Lite
The LOLIN32 Lite is a low-budget ESP32 board that, like other ESP32 boards, has a 32-bit dual core microcontroller that runs at 240MHz, has 4MB of flash storage, and can be programmed in a range of languages, including microPython, LUA, and Arduino. It can be powered via micro USB or lithium polymer batteries with a 500mA max charging current. A set of matching headers are included, that can be soldered to the board, for mounting on a breadboard.

High-Precision Digital Temperature and Humidity Sensor
The AHT10, a new generation of temperature and humidity sensors, sets a new standard in size and intelligence. The sensor outputs a calibrated digital signal in standard I2C format. The AHT10 is equipped with a newly designed ASIC-specific chip, an improved MEMS semiconductor capacitive humidity sensing element and a standard on-chip temperature sensing element.



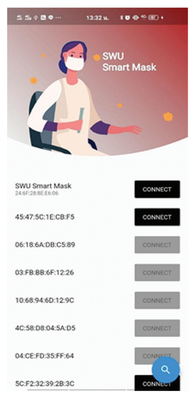
Battery lithium
Battery lithium 3.7 350 mAh can be used continuously for 4 hours and charging 1-2 hours

Result



ESP32 LOLIN32 Lite can be used with Arduino IDE for connect and order AHT10 that using Battery

Icon of application SWU smart mask



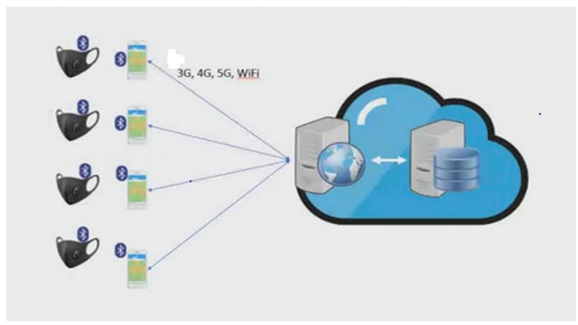
Searching Bluetooth that name “SWU Smart Mask”

when connect Bluetooth

click button to show value of PM2.5 from API

when user wearing a mask,text and color will change.

Work Process



Swu smart mask will have a box that contain esp32,aht10 and battery. ESP32 will connect with AHT10 and Battery. AHT10 will check that user is wearing a mask by humidity and temperature from a breath of user. ESP32 will send value of humidity and temperature to application by bluetooth. Application will search bluetooth of ESP32 that name SWU smart mask. When connect Bluetooth successful,user can push a button to check PM2.5 and location that call from API. Application will alert when user forgot to wear a mask in a place that value of PM2.5 are too high.

Conclusion

From the implementation of the project in the part of the mask installed with IoT devices, it was found that the sensors Can be used, by use power from Battery lithium that can be used continuously for 4 hours and charging 1-2 hours.In the application, you can check whether the user is wearing a mask or not. By the values found that the user wears Wearing a mask is estimated at temperatures above 27 degrees up to 35 degrees and humidity above 75% up to 100% if the dust value exceeds the standard and the user does not wear a mask. The app will vibrate to alert via the mobile phone. Therefore, the application itself Can display PM 2.5 dust values and the location with the dust measurement station closest to the user, extracted from World's Air Pollution API.

References

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Elias Mansour, Rotem Vishinkin, Stéphane Rihet , Walaa Saliba, Falk Fish, Patrice Sarfati, Hossam Haick (2018 , November 12) Measurement of temperature and relative humidity in exhaled breath. Retrieved June 4, 2020, from https://www.sciencedirect.com/science/article/abs/pii/S0925400519315709

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