

A Smart Home Agriculture System Based on Internet of Things



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- **Agriculture and safe food generation are important challenges in human life.**
- **Producing organic agriculture products has several economic, health and environmental benefits.**
- **Incorrect irrigation, fertilization and soil preparation process causes undesirable and unhealthy products and waste effort and investment.**

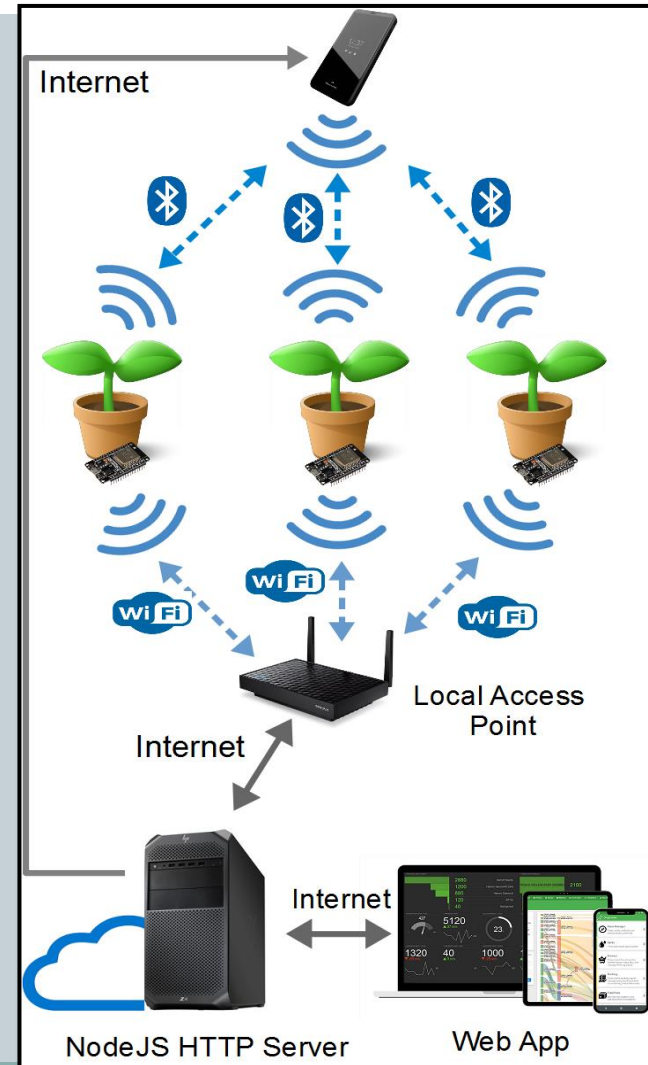
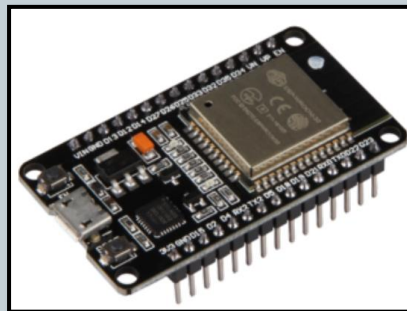
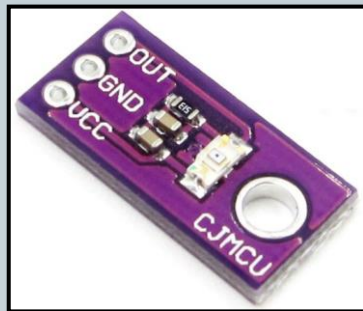
Internet of Things



- **The opportunity of using the IoT and sensors may improve the efficiency of agricultural activities.**
- **Recent advances in IoT devices help develop new farming platforms that are more healthy and have shallow environmental impacts.**
- **We proposes a new home-based agricultural system that allows people to produce agriculture products in small places.**
- **The proposed system use IoT devices and local area networks to monitor the events and quantities for producing organic and healthy products.**

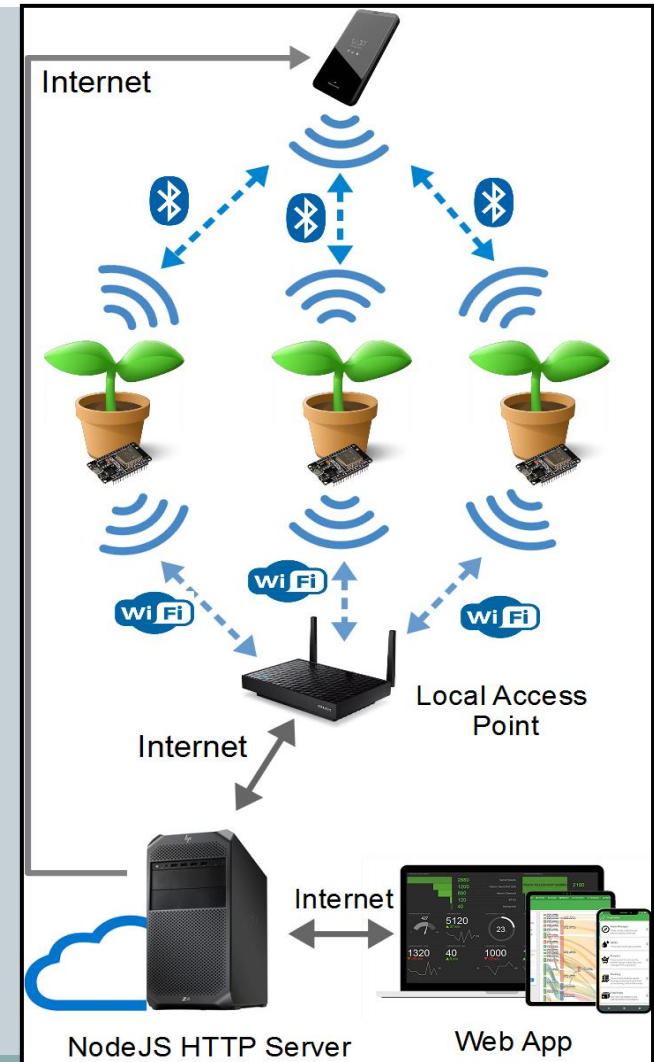
GENERAL ARCHITECTURE OF THE PROPOSED SYSTEM

- The proposed system consists of sensing and processing devices, mobile phones and server computers.
- For the sensing devices, we used ESP-32 modules, which are well-known IoT devices with both WiFi and Bluetooth (BLE) communication capabilities.



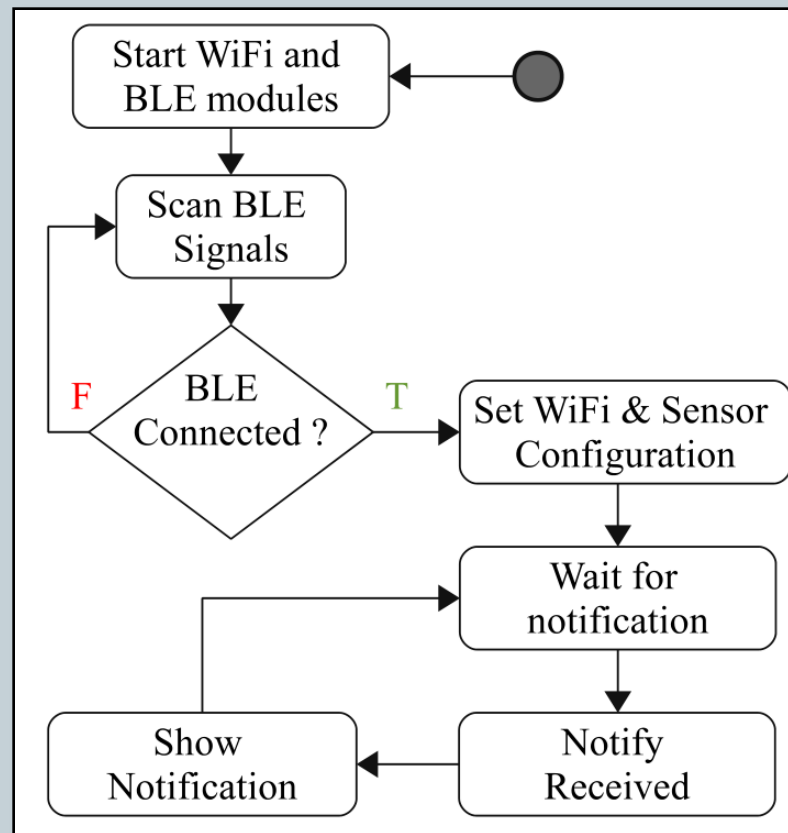
GENERAL ARCHITECTURE OF THE PROPOSED SYSTEM

- By placing the ESP-32 devices in the plant's pot, we may sense soil humidity, room temperature, room humidity, and room light.
- To configure the ESP-32 devices, user can connect to the device using a mobile phone over a BLE.
- User provides a WiFi SSID and password that allows the ESP device to send its sensed data to a web server over the Internet.
- User can find the ESP MAC address using a mobile application to register it in the webserver.
- After connecting to the WiFi network, the ESP devices start sensing data and sending them to the webserver.
- The web server also provides a web-based interface for the user to control their sensors and plants.
- The webserver sends the necessary notification and messages to the user based on the sensors' received data.



Implementation Details

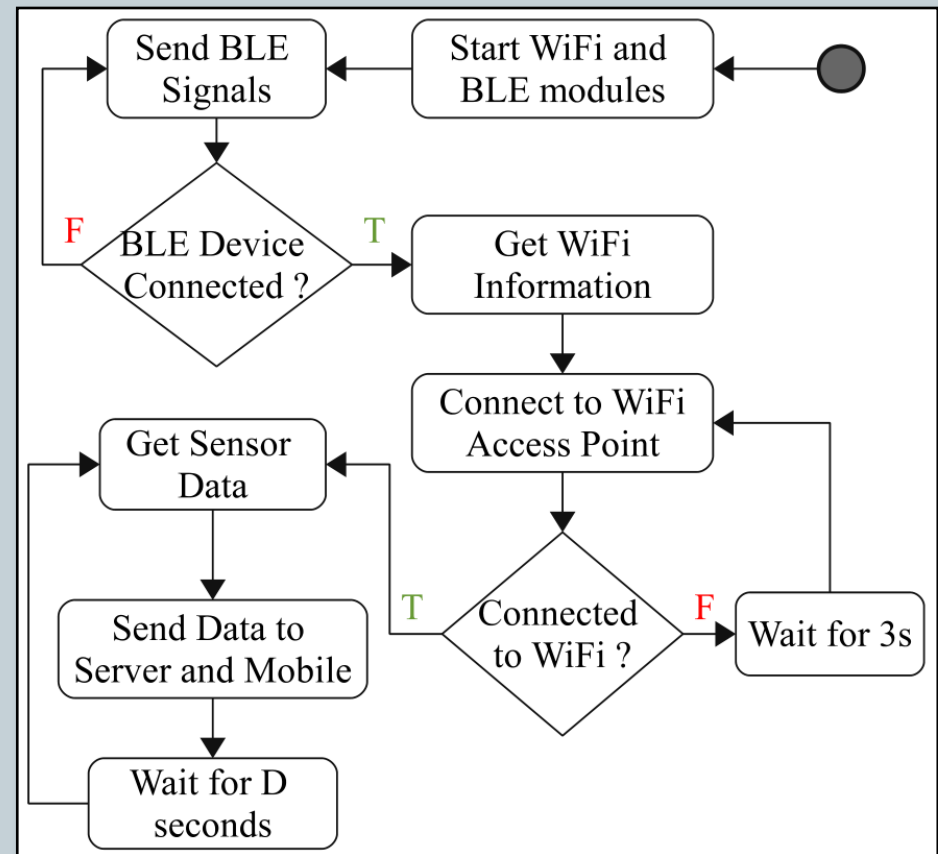
- The flow diagram of the mobile application



Implementation Details

- The flow diagram of embedded programs on ESP.

```
void loop(){  
  if(!WiFiConnected){  
    BLEScanResults foundDevices;  
    foundDevices=pBLEScan->start(2);  
    foundDevices.pair();  
  }  
  if(!WiFiConnected && wifissid!=NULL  
    && wifipass!=NULL){  
    connectWiFi();  
  }  
  if(WiFiConnected){  
    digitalWrite(LED_BUILTIN, HIGH);  
    msg=sense();  
    send_http(msg);  
    digitalWrite(LED_BUILTIN, LOW);  
  }  
  delay(3000);  
}
```



Conclusion and Future Works



- The proposed system uses ESP-32 devices and a set of connected sensors to IO pins of these devices to measure different quantities about the plants' soil and environmental conditions.
- The sensed data are sent to a web server that is running on a cloud.
- Based on the received data the web server may send notification messages to the user's mobile phone.
- As the future works, we plan to
 - automate the required actions, such as irrigation, increasing or decreasing the temperature and humidity, and increasing or decreasing the lights using appropriate actuators.
 - use a fuzzy-based system to determine the sharp limits for the sensed data and making certain decisions based on these limits.

THANK YOU



Q&A

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