

Smart Farm Report Using IoT Technology

Introduction

With the growing demand for food and the scarcity of agricultural resources, improving productivity through technology has become essential. Smart farms leveraging IoT (Internet of Things) technology represent a revolution in agriculture, enabling real-time data collection and analysis for efficient and sustainable resource management.

Definition of a Smart Farm

A smart farm is an integrated agricultural system that uses IoT technology to control agricultural processes such as irrigation, fertilization, lighting, and environmental monitoring, contributing to increased productivity and reduced waste.

Tools and Components Used

1. **Arduino:** A main controller to receive and process data from sensors.
2. **ESP:** A communication module for sending data from the Arduino to a mobile application.
3. **4 Relays:** To control the operation of devices.
4. **LEDs and Indicators:** To monitor the system status.
5. **Solar Panel:** For generating electricity from sunlight.
6. **2 Water Pumps:** To pump water for irrigation.
7. **4 Batteries:** For energy storage.
8. **Buzzers:** For alerting in emergency situations.
9. **2 Buck Converters:** To step down voltage to suitable levels for components.
10. **2 Switches:** For manual control.
11. **2 DHT11 Sensors:** For measuring temperature and humidity.
12. **4 Soil Moisture Sensors:** For measuring soil moisture levels.
13. **LCD Screen with I2C Module:** For displaying data such as temperature, humidity, and system status.
14. **Heater Bulb:** To maintain the temperature in cold environments.
15. **Flame Sensor:** To detect fires.
16. **5 LDR Sensors:** To measure light intensity.
17. **MQ2 Sensor:** To detect harmful gases or smoke.

18. **Wires:** For connecting components.
19. **3 Breadboards:** For organizing connections.
20. **2 Fans:** To regulate environmental temperature.
21. **TP4056 Charging Module with USB Micro:** For charging batteries.
22. **LED Strips:** For additional lighting.

System Functionality

1. **Data Collection:**
Sensors for soil moisture, temperature, gas, and light intensity collect data from the agricultural environment.
2. **Data Processing:**
The data is received and processed by the Arduino to determine the necessary actions.
3. **Data Transmission:**
The Arduino sends data to the ESP module, which transmits it to a mobile application via Wi-Fi.
4. **Data Display:**
Data is displayed on an LCD screen on-site and on the mobile application, enabling remote monitoring of the farm's status.
5. **Executing Actions:**
Pumps, fans, heaters, and lights operate based on analysis and user commands.

Benefits

- **Increased Productivity:** Optimized farming processes and reduced waste.
- **Resource Efficiency:** Precise use of water and energy.
- **Flexible Management:** Remote monitoring and control of operations via a mobile application.

Challenges

- High implementation costs.
- The need for technical skills to manage the system.
- Regular maintenance of components.

Conclusion

The smart farm using IoT technology offers an innovative and sustainable solution for improving agriculture and increasing efficiency. By integrating devices like Arduino and ESP, data collection, processing, and display on a mobile application can be achieved, making farming smarter and more effective.

Supervisor Dr.
Dr. Abeer Tawakkol
Dr. Ehab Hani Abdelhay
Eng.Ahmed Ramadan

IOT-based smart greenhouse

By lena's team

Participating students...		degree
1	Lena Mohamed El-Behery	
2	Ahmed Ayman El-sayed El-helaly	
3	Mohamed Shawky Mahmoud El-Bayoumy	
4	Mostafa Amr Najah Ahmed	
5	Mohamad Ahmad Abu El-Naja	
6	Ziad Nasser Salah El-Mestakawi	
7	Kenzi Mohamed Hamdy	
8	Shahd Alhusseiny El-sayed Atia	
9	Hazem Sabry Salah	
10	Mahmoud Mostafa El-Sayed Mostafa	
11	Mohamed Shokry Abdul-hamid	
12	Mohamed Sameh Mohawd	
13	Waleed Hussein Kamal Hussein	