Course Name: Internet of Things Lab **Course code:** 21CSP-344

Experiment – 3.2

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Aim: Case study of Agriculture 4.0 using IoT and to develop an IoT model for the agriculture sector.

Objectives: To understand the case study of Agriculture 4.0 using IoT devices.

Components used:

- Arduino UNO
- Resistor
- Jumper wires
- Soil Moisture Sensor
- NPK Sensor
- Leaf Wetness Sensor
- Temperature
- Humidity Sensor

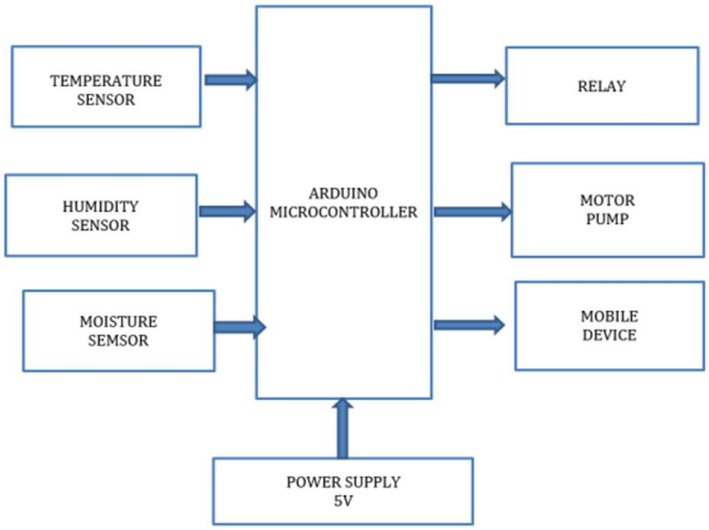
Theory:

Case Study: India is mainly an agricultural country. Agriculture is the most important occupation for the most of the Indian families. It plays vital role in the development of agricultural country. In India, agriculture contributes about16% of total GDP and 10% of total exports. Water is main resource for Agriculture. Irrigation is one method to supply water but, in some cases, there will be lot of water wastage. So, in this regard to save water and time we have proposed project titled smart irrigation system using IoT. In this proposed system we are using various sensors like temperature, humidity, soil moisture sensors which senses the various parameters of the soil and based on soil moisture value land gets automatically irrigated by ON/OFF of the motor. These sensed parameters and motor status would be displayed on user android application.

Introduction: In 2016, India's population exceeded 1.3 billion, posing a challenge in achieving a harmonious balance between optimal population growth and the overall well-being of the nation. The escalating population necessitates a corresponding increase in agricultural production. Irrigated agriculture emerges as a crucial factor in meeting this demand. In contemporary society, individuals seek the convenience of monitoring their tasks remotely through digital devices like smartphones, tablets, or laptops. The Internet of Things (IoT) facilitates this convenience by simplifying various processes. This seminar delves into the realm of "IoT-based smart irrigation systems," aiming to develop an

automated irrigation mechanism. This system activates and deactivates the pumping motor based on detected moisture content and adequate water levels, transmitting data through the IoT platform. Such an innovation addresses labor-intensive tasks and enhances control over water management systems, contributing to a more efficient and sustainable approach.

Proposed system: Various sensors, including moisture, humidity, and temperature sensors, are linked to the microcontroller, powered by 5 volts. The microcontroller conveys moisture percentage data to a relay. When moisture is below 15 percent, the motor activates automatically, sending a notification to the user's device. The Arduino-based smart irrigation system employs a block diagram, integrating three sensors connected to a controller. The sensed values from these sensors are transmitted to a mobile application, forming a comprehensive system for efficient irrigation management.



Test Result:

The Smart Irrigation System seamlessly integrates with a mobile application, offering users convenient monitoring and control over their farm field irrigation. The mobile app's interface provides direct access to sensor data via Firebase, a cloud platform serving as a bridge between hardware and a cloud database. The main menu, upon login, ensures secure access, safeguarding user-specific data. Upon successful login, another menu presents options to control the irrigation system. Users can manually turn the water pump "ON" or "OFF" or opt for the "AUTO" mode, where the pump operates based on predefined sensor values. The control option also allows users to interface with the BLYNK App, displaying sensor percentages and presenting a comprehensive report on the soil status in the farm field. This integration of the Smart Irrigation System with the mobile application enhances user accessibility and control, streamlining the entire irrigation process for efficient and informed decision-making.

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Future Scope:

IoT-based smart farming revolutionizes agriculture by optimizing resource usage, reducing waste, and boosting productivity. This technology allows growers to monitor crop fields remotely using sensors for light, humidity, temperature, soil moisture, and crop health. The automated irrigation system responds to real-time data, enabling efficient water and energy utilization. Smart farming provides farmers with the flexibility to monitor field conditions from anywhere, offering manual and automated options for responsive actions. For instance, if soil moisture decreases, sensors trigger irrigation. This approach proves significantly more efficient than traditional farming methods, offering a streamlined and technology-driven solution for modern agriculture.

Conclusion:

1) We conclude that this system is easy to implement and time, money and manpower saving solution for irrigating fields.

2) A farmer should visualize his agricultural land's moisture content from time to time and water level of source is sufficient or not. IOT based smart irrigation system displays the values of the sensors continuously in smart phone or on computer's web page and farmer can operate them anytime from and anywhere.

Learning outcomes (What I have learnt):

- Hardware used in this case study
- Implementation of IoT devices in this case study