

Synopsis

The project titled “**AgriSense 2.0: IoT & Solar Powered Micro-Farm**” is designed to promote sustainable agriculture by integrating renewable energy with modern technology. The main objective is to create a **low-cost automated greenhouse** that monitors soil moisture, temperature, and humidity, and performs automatic irrigation without human intervention.

The system is built using an **ESP32 microcontroller**, a **DHT22 sensor** for temperature and humidity, a **capacitive soil moisture sensor**, a **relay module**, and a **mini water pump**. A **16×2 LCD with I²C** is used to display live readings, while the system can also connect to the **Blynk IoT platform** to send data and receive remote control commands. Power is supplied by a **small solar panel with battery backup**, making the project eco-friendly and independent of conventional electricity.

The working principle is simple: the soil moisture sensor continuously checks the soil condition, and when the soil is dry, the ESP32 triggers the relay to start the pump for irrigation. At the same time, the DHT22 monitors the micro-climate inside the greenhouse, and the values are displayed locally on the LCD and remotely via IoT. This ensures optimal plant growth with minimum water wastage.

The project is unique because it combines **renewable energy, IoT, and automation** in a single model that is both cost-efficient and scalable. A basic prototype costs about **₹1,500 without solar**, while the solar-powered version costs around **₹2,000**. The model can be expanded for larger farms by dividing the field into zones, each with its own sensor set