SENSOR SYSTEM

1. Soil analysis
2. Weather analysis

SOIL ANALYSIS-

I. **NPK Sensor-** The NPK sensor measures concentrations of Nitrogen (N), Phosphorus (P), and Potassium (K) in the soil. This data is used to assess soil fertility and guide planting decisions. Most NPK sensors operate using the Modbus RTU communication protocol over UART.

II. **pH Sensor**- The pH sensor is used to measure the acidity or alkalinity of the soil or any aqueous solution. Soil pH directly affects nutrient availability and plant health, making this sensor essential in agricultural monitoring. The sensor consists of a pH probe that develops a voltage depending on the hydrogen ion concentration (pH level) of the soil or solution.

III. **Soil Moisture Sensor**- The soil moisture sensor is used to measure the volumetric water content in soil. It provides real-time information about how wet or dry the soil is, helping in irrigation planning and crop health monitoring. The output voltage changes with soil moisture level.

WEATHER ANALYSIS-

I. **Humidity Sensor (DHT 22)**: The humidity sensor measures atmospheric moisture levels, which are important for understanding soil moisture dynamics and plant transpiration rates.

II. **Temperature Sensor (DHT 22)**: The temperature sensor monitors ambient temperature. Plants have specific temperature ranges in which they thrive. Monitoring helps ensure crops remain within optimal conditions. Accurate measurement of these parameters enables farmers to make informed decisions regarding irrigation, ventilation, pest control, and crop selection.

SPECIFICATIONS-

DHT22- Temperature and Humidity Sensor-

DHT22 details	DHT22 sensor specifications
Power	3.3 to 6 V
Output signals	Digital signals by single-bus
Sensor element	Polymer capacitor
Range	Humidity (0-100)% and temperature (–40~80) °C
Accuracy	Humidity ±2% and temperature <±0.5 °C
Sensitivity	Humidity 0.1% and Temperature 0.1 °C
Sensing Time	Two seconds
Interchangeability	Fully

CIRCUIT-