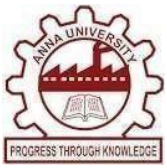


MADRAS INSTITUTE OF TECHNOLOGY

ANNA UNIVERSITY

DEPARTMENT OF INFORMATION TECHNOLOGY

IT5601 – EMBEDDED SYSTEMS & INTERNET OF THINGS

IOT ENABLED CROP RECOMMENDATION AND YIELD PREDICTION

MINI PROJECT REPORT

TEAM MEMBERS:

SHRISH R (2020506088)
DEEPAK ATHIPAN A M B (2020506021)
SANJAY G (2020506080)

IOT - ENABLED CROP RECOMMENDATION AND YIELD PREDICTION

Objective

Horticulture is the subdivision of agriculture sector which deals with the cultivation of fruits, vegetables, flowers, medicinal plants and plantation crops namely tea, coffee, pepper etc. The growth of these crops depend on the soil conditions like soil type, soil pH, NPK values, rainfall, humidity etc. The aim of this project is to develop a crop recommendation and yield prediction system by considering the above mentioned factors and implement the proposed system in real-time using IoT technology.

The investigation is restricted to the database of TN State which consists of around 20 crops. The 7 in 1 Integrated Soil Sensor is used to collect the soil details, upon which a suitable crop is recommended and an appropriate yield is calculated. A simple mobile application is designed using React Native, which can be used to interact with the system and obtain real-time recommendations.

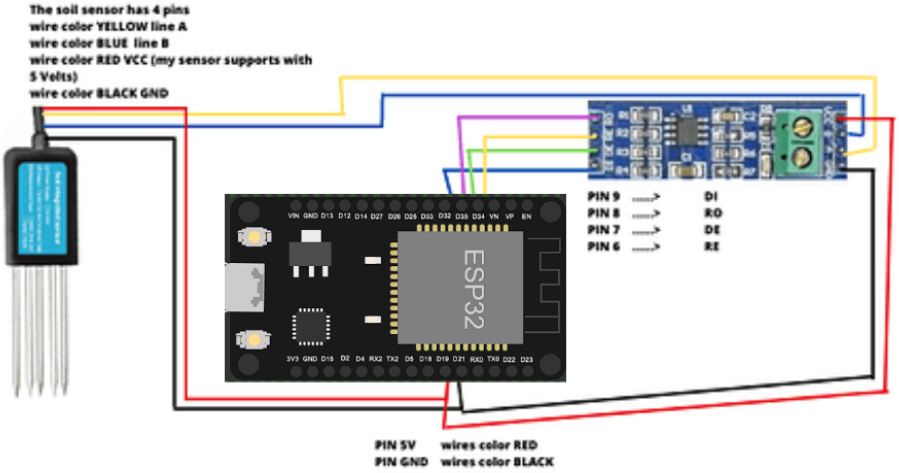
Hardware Requirements

- Node MCU
- 7 in 1 Soil Sensor
- Rs 485 Converter
- Bread Boards
- Jumper Wires
- Power Cable

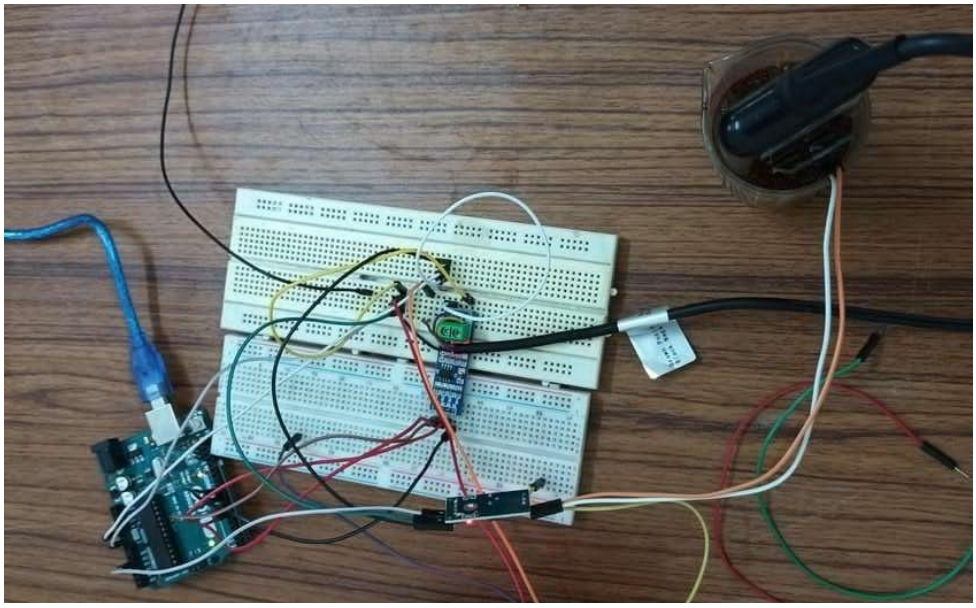
Software Requirements

- Arduino IDE
- Blynk Cloud
- React Native
- Flask
- Android Studio

Circuit Diagram



Setup Image



Working

1. **Hardware Setup:**

   The 7 in 1 soil sensor has four colored wires:

   - Connect the Brown wire to the 12V power supply to provide power to the sensor.
   - Connect the Black wire to the common GND to create a shared ground reference.
   - Connect the Blue wire to the B socket of the RS485 converter for data communication.
   - Connect the Yellow wire to the A socket of the RS485 converter for data communication.

2. **Extraction of Soil Details:**

   - A 7 in 1 soil sensor is used for getting NPK, pH, Moisture, Temperature and Humidity measurement of the soil with high accuracy, fast response speed and stable output.
   - The required parameters for the research such as NPK and pH values are sent to Blynk Cloud from the sensor using Arduino IDE

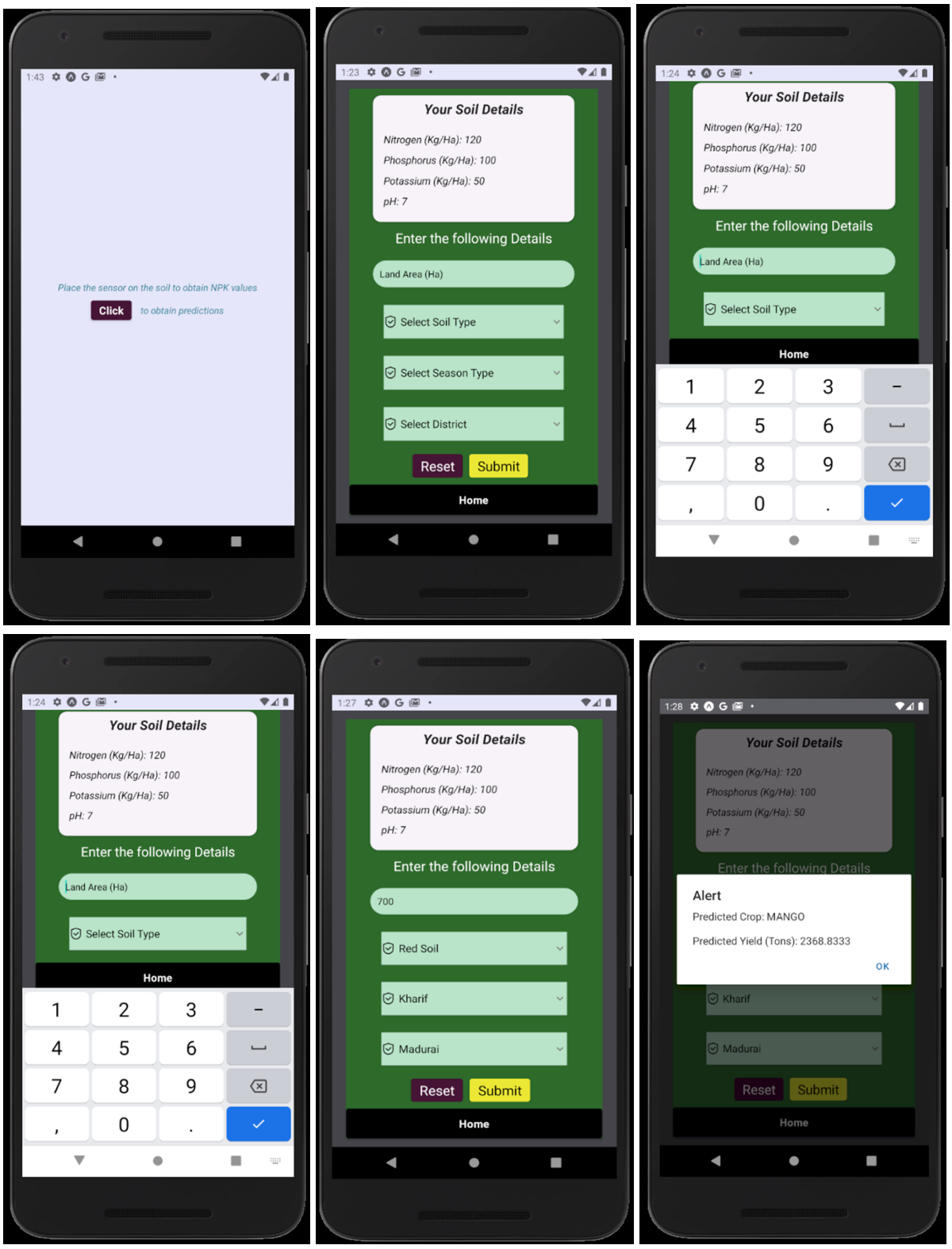
3. **Machine Learning Algorithms deployed:**

   - **Crop Recommendation:** K-Nearest Neighbour has been used. To determine the optimal k-value, an iterative loop is constructed and the mean cross-validation accuracy is computed.
   - **Yield Prediction:** In this research, three Machine Learning algorithms namely Decision Tree, Random Forest and MLR are used to predict yield.Performance of the above three algorithms are analyzed in terms of metrics namely Prediction accuracy, RMSE, and R-square error.

4. **Implementation:**

   - The sensor data is acquired and saved in the Blynk cloud before being sent to a mobile application built with React Native as front-end.
   - Farmers additionally need to enter their land area in hectares and specify their soil type, season type, and district name.
   - Upon submitting these details to the app, the details are sent to the backend server.
   - The flask server receives the soil data from the front-end application, and the pre-trained models are used to recommend a suitable crop and an approximate yield.

Real-Time Snapshots



Result

Thus, the IOT- based crop recommendation and yield prediction system has been successfully developed and executed which satisfies the above given objectives.