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Smart Farming Solution Using Embedded System

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***Abstract*—**Agricultural sector is going to face enormous difficulties since it has to feed 9.6 billion people by 2050, Therefore food production must increase by 70% by 2050. One way to address this issue and increase the quality and quantity of agricultural production is using sensing technology to make farming simple and it is called as smart farming. Smart farming has a potential to deliver a more productive and sustainable production and uses more precise and resource-efficient approach.

Index Terms*—Smart Farming, Precision Farming, Embedded System Based Farming.*

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I. INTRODUCTION

Agriculture plays vital role in the development of agricultural country. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. Issues concerning agriculture have been always hindering the development of the country. The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence the project aims at making agriculture smart using automation and embedded technologies. The Highlight of the project is low budget precision agriculture, generally drones were used in precision agriculture to identify the land details and crops which can be cultivated there, a cheap alternative is to use low cost humidity and temperature sensors to identify the cultivatable crop. Normally crops are prone to disease which hinders production therefore image pattern recognition can be used to identify disease and the remedy can be provided using this system. Over usage of pesticide can destroy the minerals present in the cultivatable land to avoid this issue automatic pesticide sprayer can be used in order to regulate the amount of pesticide sprayed in land. The overall aim of this project is to provide farmers with all the basics knowledge about farming and solving all the issues that they might face during crop production.

Existing system concentrate on this problem by modernizing the current traditional methods of agriculture. Hence the project aims at making agriculture smart using automation and IOT technologies. The highlighting features of this project includes smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, bird and animal scaring, keeping vigilance, etc.

The proposed system can guess crops which can be cultivated in an agricultural land using environmental factors such as temperature, moisture content etc. This system can also identify disease in plant using pattern recognition. It also has AI bot to spray pesticide according to the need in order to safeguard the land from over usage of pesticide.

II. MODULES

A. *Crop Guesser*

Detection of crops is done using the temperature and humidity sensor which provide an accurate information about which crop can be grown.

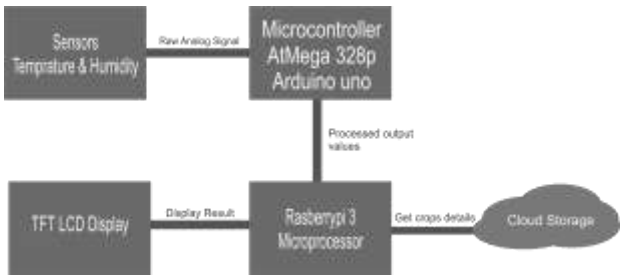

Fig. 1. Crop Guesser Module Architecture

B. *Crop Disease Identifier*

Identification of affected crops using image recognition by capturing the picture of the affected part and identify the pattern then compare those pattern with the list of all available patterns to identify disease.

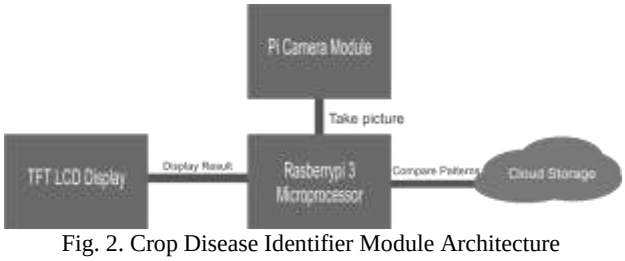

Fig. 2. Crop Disease Identifier Module Architecture

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C. *Automatic Pesticide Sprayer*

In order to overcome the over usage of pesticide servo motor is used to control the sprayer.

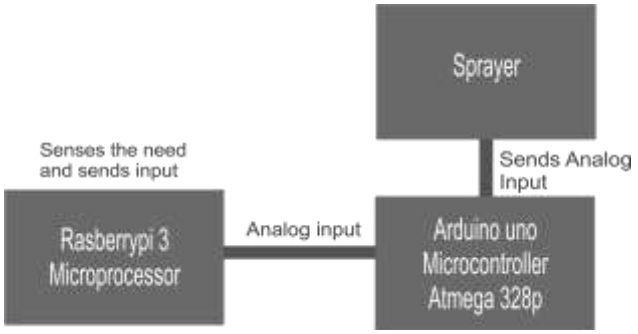

Fig. 3. Automatic Pesticide Sprayer Module Architecture

III. SOFTWARE REQUIREMENTS

- Tkinter
- Page
- Python 3.4
- MySQL
- OpenCV
- Raspbian Jessie Linux
- Python IDLE

IV. HARDWARE REQUIREMENTS

- Raspberry PI B+ 1GB RAM
- Arduino UNO (AT Mega 328p)
- TFT LCD Display 3.2 Inches
- Soil Moisture Sensor
- Temperature sensor – LM35 Thermistor
- Camera – PI Module
- Servo – Micro 9g

V. ARCHITECTURE DIAGRAM

The overall architecture diagram describes all three modules of the project. It explains the flow in which user requests are handled in this project.

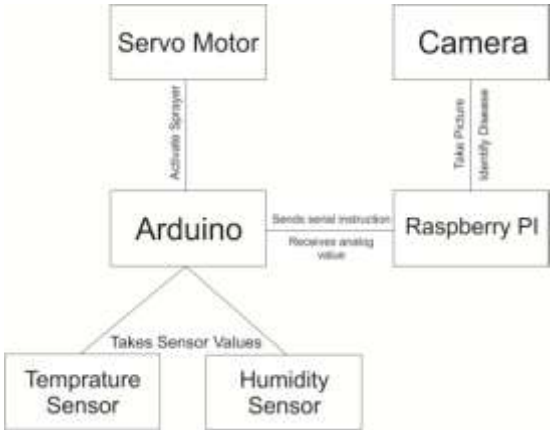

Fig. 3. Architecture Diagram

VI. IMPLEMENTATION SCREENSHOTS SAMPLES

Screenshots taken from the LCD display fitted on raspberry pi. (Note- The language found in the below screenshots is Tamil).

Fig. 5. Home Screen (Each Module in Order)

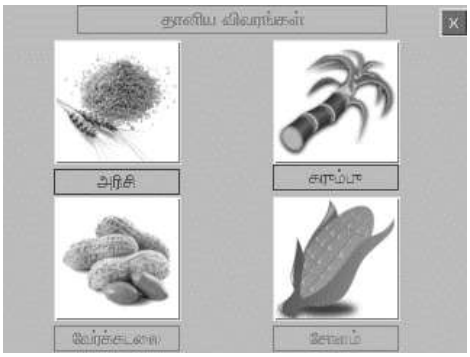

Fig. 6. Crop List Screen

Fig. 7. Camera View for disease identification

Fig. 8. Pesticide activator screen (List of various crop is provided)

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Fig. 9. Crop Detail Screen

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