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Real Time Pest Prediction and Pest Control for Crops in Agriculture based on Embedded System

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Abstract: India is the second largest producer of rice, wheat, cotton, sugarcane, fruits, vegetables and tea. In agriculture field, crop dieses effects a lot. In such scenario pest prediction & controls becomes important. By using Arduino Mega with DTH-11 sensor, humidity, moisture and temperature sensor and a machine learning algorithm, system will detects the dieses by detecting the variation in humidity, temperature and moisture. Pest will be predicted and displayed accordingly. System will work in a real time scenario i.e. system will keeps a track since crop sowed and monitors the crop's parameters like temperature, moisture and humidity with the help of RTC(Real Time Clock) which will be in connection with Arduino Mega 2560.

Keywords: Sensors, ESP32, wireless monitoring, Cloud, Mobile application.

I.INTRODUCTION

India is one of the largest country which produces agriculture products like wheat, cotton, vegetables and fruits and many more. At some extend production margin gets reduced because of the disease that crop faces and irregulation in pest spreading time period. Because, there's no exact time period familiar to farmers which they were aware of. With the use of embedded technology we can notify them while time for the pest spreading comes on the basis of track which system will keep since crop being sowed. Temperature, humidity & moisture are the three key factors which affect the crop. If favorable condition for crop maintained throughout life process of the crop then plant remains healthy and so that it produces good quality agriculture products. But practically it is difficult to maintain favorable condition for the plant. If all these three parameters not being maintained within its criteria then different dieses gradually appears on the plants as well as on its root which effects the quality of the plant and affects the crop to be produced thus less production rate results.

In such scenario we propose the system which uses real time data of parameters like temperature and humidity which are being measured from DHT-11 sensor and moisture which is being measured from moisture sensor, based on that pest prediction and pest control takes place.

II.HARDWARE COMPONENTS

1. Arduino Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 Analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Each Arduino board has its own microcontroller (11). You can assume it as the brain of your board. The main IC (integrated circuit) on the Arduino is slightly different from board to board. The microcontrollers are usually of the ATMEL Company. You must know what IC your board has before loading up a new program from the Arduino IDE. This information is available on the top of the IC. For more details about the IC construction and functions, you can refer to the data sheet.

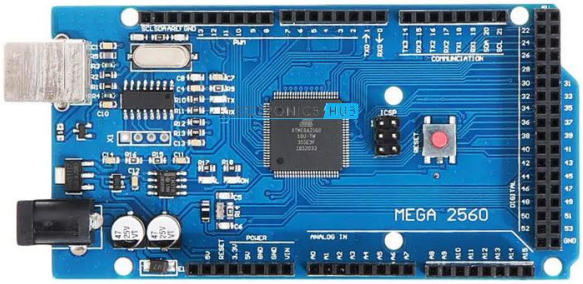

Fig (1) Arduino Mega

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2. DHT-11 Sensor

The DHT-11 is a commonly used Temperature and humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. Connect GND pin of the DHT-11 sensor with the GND pin of the Arduino Mega, VCC of DHT-11 sensor with the 5V and data pin of the DHT-11 with the pin-2 of the Arduino Mega.

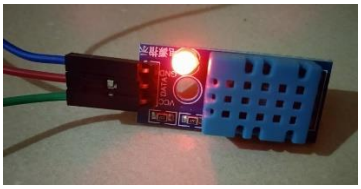

Fig (2) DHT-11 Sensor

3. Soil Sensor

The Soil Moisture Sensor uses capacitance to measure the water content of soil (by measuring the dielectric permittivity of the soil, which is a function of the water content). Simply insert this rugged sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent. Connect A0 pin of the Soil moisture sensor with the A0 pin of the Arduino Mega, D0 pin of the soil moisture sensor with the PIN7 of the Arduino, VCC of the Soil moisture sensor with the 3.3V with the Arduino and GND of the soil moisture sensor with the GND pin of the Arduino Mega.

Fig (3) Soil Moisture Sensor

III.SOFTWARE COMPONENTS

1. Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. All the sensors are connected with Arduino and their interfacing is done using IDE and in this we observed the behaviour of each sensor.

2. Proteus

Proteus is used to simulate, design and drawing of electronic circuits. By using proteus we can make two-dimensional circuits designs as well. With the use of this engineering software, we can construct and simulate different electrical and electronic circuits on our personal computers or laptops. There are numerous benefits to simulate circuits on proteus before make them practically.

IV. PROPOSED SYSTEM AND ITS WORKING

The system consists of sensors like DHT-11 and Soil Moisture Sensor. These two sensors are connected with Arduino Mega controller. DHT-11 sensor will measure the temperature and humidity of atmosphere while Soil Moisture Sensor will measure the moisture level of soil. Data measured by the sensors will send to the Arduino Mega controller, all these measured parameters acts as an input for the Arduino Mega controller. Based on inputs faded to Arduino Mega, system will predict the dieses and based on that dieses, pest will be predicted.

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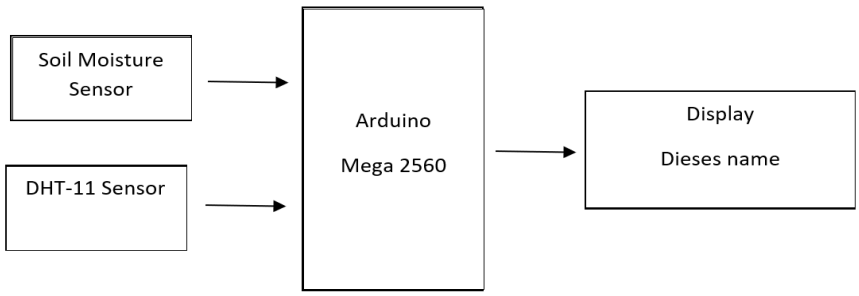

Fig (4). Block diagram of the system

V. RESULTS

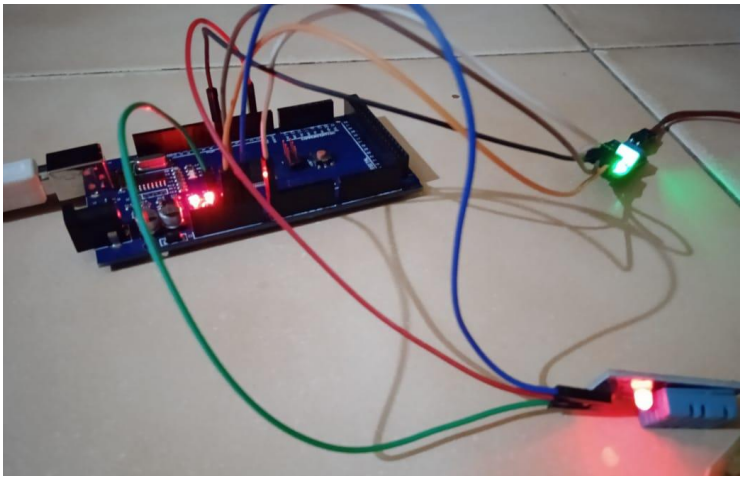

Fig (5) Connection of system

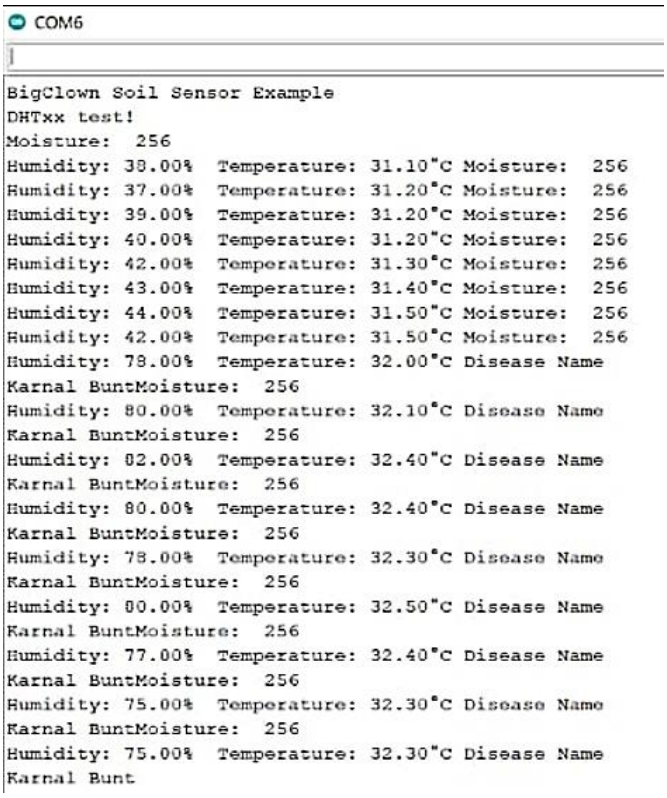

Fig (6) System output

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VI. CONCLUSION

System will measure the temperature, humidity and moisture and on the basis of that it will predicts the dieses and pest responsible for it. It will take place in real time, all the data will be monitored since crop being sowed. Predicted dieses will be displayed and temperature, humidity and moisture level of soil will also be displayed accordingly. It will predict the dieses initially when dieses starts taking place on the crop. So, farmers can take actions accordingly. Future scope of system is that we can applied dynamic scheduling options to this system and system can be work dynamically for all the crops as well.

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We are thankful to our project mentor **Prof. M.D. Khediya** for giving us opportunity to pursue and work on this Real Time Pest Prediction and Pest Control for Crops in Agriculture based on Embedded System and encourage us completing this project successfully with his proper guidance. We are also thankful to our Head of Department (I&C) **Dr. M.K. Shah** for providing all necessary facilities and guidance.

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