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SMART WEED DETECTOR AND IOT BASED PLANT HEALTH MONITORING IN SMART AGRICULTURE

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Abstract: ***Agriculture is the science and art of nurturing plants and livestock. Conferring to the modern appraisal, around sixty percentage of the world residents rest on agriculture. Inadequacy of minerals in soil and syndrome leads to the dearth in plant growth. To avoid this situation, a smart technology will be more useful to maintain the growth and health of the plants. This technology will explore the minerals present in the soil and intimate the farmer about the state of the soil and it solves the problem by supplying the nourishment in correct composition depend upon the inadequacy. It also contains image processing system to find the disease precisely. It can be operated in an efficient way from home itself. Around eighty percent of the problems may be mended by using this smart technology.***

Keywords: Sensors, Chemicals, Fertilizers, Image processing, Mobile application Introduction

1. INTRODUCTION:

Generally, Agriculture is the back bone of Nation and Economy. When the land is in number of Acres and Hectares people will undergo pressure and stress due to their work and circumstances. This may ultimately lead the farmer to spend lots of money on man power. Smart intelligent Technology will be more useful for those farmers and land owners to maintain the land and crops. Deficiency of minerals in soil can be examined by that technology and intimate their condition. The weeds present among the fields can be captured by the camera and it will analyse the input. Then it reports the circumstance to the owners. This definitely will help the farmers and land owners to save their valuable time, man power, money and so on.

2.LITERATURE SURVEY:

1. Muthunoori Naresh and at al suggested an IOT model for smart agriculture thereby using sensors for spare of water and to regulate irrigation in the agricultural field

2. Karunakanth M and at al designed a pattern-based monitoring control for different type of irrigation required for the crops. The sensors have been used for gathering information and thereby readings accordingly, water has been provided to the plants and trees. The readings are also successfully moved to the Firebase using cloud environment for future reference.

3. Dr. Ananthi Sheshasaayee and et al implicated a technic of "resource provisioning" in cloud technology to reduce execution costs and delay in data transmission used in continuous and large scale organisations.

4. Waqas Riaz et al proposed a "Hydraulic structure method", to measure the flow of water in the small irrigation outlets .Due to major reporting problems of manual measurement and lack of precision in measurement, the system became completely infeasible. And as an advantage Hydraulic method is also employed in the area of instantaneous and the continuous flow measurement.

3. PROPOSED SYSTEM:

For analysing the soil in the land, we need some of the sensors, Testing kit and Chemicals. For analysing the minerals present in the soil, there are so many tests in general. By testing the soil using the proposed methods, we can determine the quantity of minerals present in the soil. Depending on the test results, we can be able to come to a solution on which fertilizers which we need to supply on what composition. Weeds are one of the major problems in agriculture lands. To solve this problem we used image processing method. This can capture the image and process the image by analysing the shape of leaves, stem, height of plant, colour of plant and fruit. If any discrepancies found, this can intimate the land lord about the weeds in land. This bot can move around the land and spot the weeds present among the fields. Then the land lord can take step against it by spraying pesticides and all.

4. METHODOLOGY:

4.1 SYSTEM DESCRIPTION:

The proposed system is divided into Programmable Microcontroller Unit, Image processing and Wireless Transmission Unit

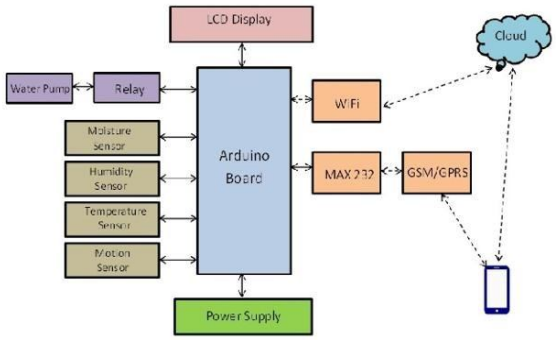

Fig 1: BLOCK DIGRAM

4.2 MAIN COMPONENTS USED:

4.2.1 SENSORS:

Fig 2: pH SENSOR

Fig 3: MOISTURE SENSOR

Some of the sensors like Moisture sensor, pH sensor are used to analyse the water content and acid – base content present in the soil. The water content in the soil differs from soil to soil, crops to crops. We need to give more importance for the moisture content. Some of the crops need acid content and some crops need base content, so we need to maintain the exact pH level in the soil. In case there is an increase in these levels, the crops may be decayed.

4.2.2 SOIL TESTING KIT

Fig 4: SOIL TEST KIT

Soil test helps us to know the fertility of our land. This method will determine the amount and type of fertilizer which should be used to obtain the maximum yield.
With this method we can solve many conundrums like Low yield because of lack of fertility, Acidic soils, Identification of suitable fertilizer mixes, Excessive fertilizer application. We must have a handle on the nutrient levels because it is very important to apply the fertilizers based on the targeted amount of yields. This will start with the macro-nutrient i.e. (N, P, K, and S) but we shouldn't forget to look at our micro-nutrients and as well to monitor their levels. For our soil, organic matter is also very essential because they are the important source of nutrients, which contributes to the water and the nutrient holding capacity of our soil. To know whether our soil is more or less acidic, pH number of soil will be way more useful. Few soil chemical tests like pH, organic matter with soil texture analysis can signify which crop will grow well on that particular soil.
Organic systems habitually have a heavy reliance on compost or humus. To dodge nutrient overloads and potential pollution, understanding of nutrient cycling with these systems is essential. If there is a sign of nutrient deficiency or less yield while the growth of the crops, then this chemical soil test's result will be a profitable and fruitful way to improve the quality of the soil, so that the

crops will proliferate. With this testing kit we can know the exact deficiency which will also intimate the quantity and type of fertilizers can be used to take care of our crops and prevents farmers from wasting money on buying unnecessary fertilizers. Unbalanced soil management leads to the loss of more than 24 billion tonnes of fertile soil by erosion, which was estimated from research on each year. With that, land degradation also affects the health and livelihood of around 1.5 billion people. Since soil restoration is very costly, difficult and a time consuming operation, we can use soil testing method for better soil management which is a hands-down route to grasp, and it is very efficient to know the application of the sufficient amount of fertilizers. Now there is a huge need for the fertile soil to produce suffice yield, which will feed the world's ever growing population. To close the world's food security issues, healthy crops from improved soil health is potentially needed. This method will help many people to have a better life. To consume healthy crops from healthy soil and to improve the health of the soil this method will be very purposeful to the farmers since it gives many valuable informations about the soil.

4.2.3 IMAGE PROCESSING

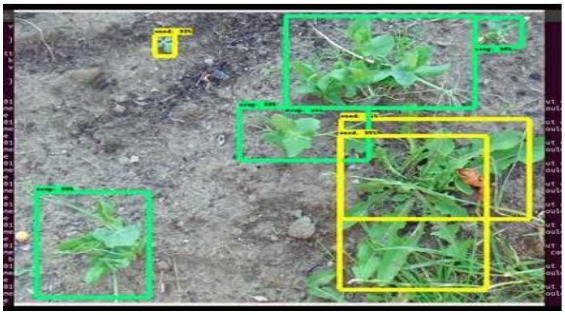

Fig 5: IMAGE PROCESSING

Image processing is used to find the weed in between the cultivated crops. Depending upon the picture captured by the camera in the moving bot, it will analyse the shape of leaves, colour, height of plant, and everything. In case any discrepancies found among them it can intimate the land lord. The bot can be moved by motion sensor, gesture control. The bot can charge itself from the solar panel. The programme can be executed by the specialised software which can programmed in the mobile app itself.

4.3 PROGRAMMABLE MICROCONTROLLER UNIT:

Block : Microcontroller
Type : ARDUINO UNO
Analog / Digital: Analog / Digital
Interface Pins : 20 Pins

Fig 6: ARDUINO UNO

Description:
Arduino is a device for seeming thriving, worthy and control a better amount of the corporeal world than our PC. This microcontroller board is based on ATmega328P microcontroller. It comprises some other components like crystal oscillator, voltage regulator, USB connection, an ICSP header and Reset button. The input and output pins can be used by providing codes like pinMode(), digitalWrite(), digitalRead(). There are 6 PWM pins are there in Arduino UNO.

4.4 WIRELESS TRANSMISSION UNIT:

4.4.1 Wi – Fi module:

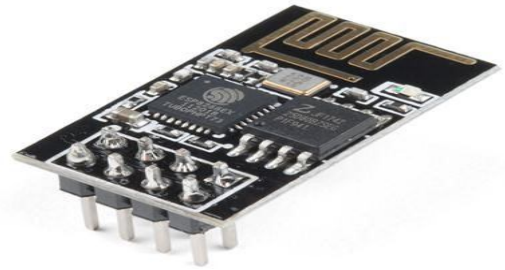

Fig 7: WI-FI MODULE

ESP8266 WIFI – MODULE to give Wi-Fi to the Arduino board to connect it with the internet to upload data's in the cloud.

4.4.2 IFTTT CLOUD

Fig 8: IFTTT CLOUD

Cloud storage is used to store the data without the use of hardware and access it wherever we want. Full form of IFTTT cloud is If This Then That. It is a freeware service. It is user friendly. It is simple and easy to use. Through this cloud we can able to monitor our data. The sensors used is sending the signal to the Arduino controller and then it will send the data to the IFTTT cloud through Wi-Fi module

ESP8266. This cloud has many features, through this we can able to see the data in the form of graph, gauge, meter, piechart etc. But it is a paid service. Once we logged in to the account we can able to use only the certain space, beyond that we need to pay for further use in the same account. Or we may use different account to login and use for freely. Once we complete our programming and finish all the requirement it will generate a new app, from this we can able to monitor our data. We need not to download or develop any android application for this separately.

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