Agriculture based on Robot using Raspberry Pi

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***Abstract*:- The purpose of this paper is to provide a complete irrigation solution to the farmer with use of internet of things (IoT). To create a cost effective automated irrigation system to reduce water's waste is a challenge. It is important to measure different parameters to calculate the efficient quantity of water for plants. The proposed system is composed of different types of low cost and low power consumption sensors. For example- soil moisture sensor, temperature sensor. Setup of Raspberry Pi with sensors is used to control opening of the irrigation valve. Smart phone is used for a remote monitoring. The all sensors are interfacing into the raspberry pi. The soil moisture sensor is used for measure the soil moisture level. The moisture level value is also send to the person mobile using webpage. The PH sensor is used for measure the PH value. The water pump is used for the moisture level is decreases the water pump is automatically sprayed. The motor is used for robot movement. The camera is used for detect the leaf diseases by using raspberry pi.**

Keywords: Automated Irrigation, IoT, Raspberry pi, Reduced Water Waste System.

1. INTRODUCTION

1.1 GENERAL

In India, even today, traditional farming practices are used. Farming is heavily dependent on natural factors. Along with this massive manpower is used for farming task. Due to hard working in farming, most farmers' children prefer to select other career options [1]. This has made it necessary to increase productivity from the shrinking farmlands which will able to feed the billion plus people of India in the future. Precision agriculture will provide a solution to do it. Precision agriculture (PA) is nothing but an approach to farming that uses information technology to ensure that the crops and soil receive exactly what they need for optimum health and productivity [2].

1.2 OBJECTIVE

In agriculture field, the low profitable crops with high maintenance and time consuming problems can be solved using robots. Farmers are affected by using harmful fertilizers in hand, so robots are used her to escape farmer from this. A credit-card sized processor Raspberry pi is used to develop robot to give better performance. Programming language python has been coded in raspberry pi to make necessary actions. The parameter (moisture, temperature, pH, and camera) are monitored by the robot and send message to the farmer to take necessary action [3]. According to the message the former will take the necessary steps for irrigation control. Robot will be navigated in the field and check for water level, temperature, leaf color, moisture etc. The soil moisture sensor is used to measure the moisture level and display in LCD using Lora communication. The camera is used to detect the leaf disease using image processing techniques and the camera is programmed has open CV by using python language [4]. The pH sensor is used to measure the pH level in the water. Finally the motor is used for movement like forward, back ward, left and right directions by using motor driver (L293D). The motor is controlled by using micro controller.

1.3 EXISTING SYSTEM

Horticulture is the foundation of our Nation. In long time past days agriculturists used to figure the ripeness of soil and influenced presumptions to develop the various kind of product. They didn't think about the dampness, level of water and especially climate condition which horrible an agriculturist more. They utilize pesticides in view of a few suspicions which made lead a genuine impact to the yield if the supposition isn't right. The profitability relies upon the last phase of the harvest on which agriculturist depends.

1.4 LITERATURE SURVEY

- **IOT for precision Agriculture application,** Manish kumar Dholu , Mrs. K. A. Ghodinde in 2018.

Internet is experiencing a very explosive growth nowadays with the amount of the devices connecting to it. Earlier we had only personal computers (PCs) and Mobile handset connected to internet but now with Internet of Things i.e. IoT concept of connecting things with internet, millions of device are connecting with it.

- **A Model for Smart irrigation Using IoT,** Pr Dweepayan Mishra **,** Arzeena Khan, Rajeev Tiwari, Shuchi Upadhay of. K. A. Patil, Prof. N. R. Kale in 2016.

Mostly irrigation is done by tradition methods of stream flows from one end to other. Such supply may leave varied moisture levels in filed. The administration of the water system can be enhanced utilizing programmed watering framework setup is connected with cloud framework and the data acquisition is done.

- **Remote Sensing and Controlling of Greenhouse Parameters based on IoT,** Pallavi S., Jayashree D., Mallapur, Kirankumar Y. Bendigeri in 2017.

IoT is a revolutionary technology that represents the future of communication & computing. These days IoT is used in every field like smart homes, smart traffic control smart cities etc. The area of implementation of IoT is vast and can be implemented in every field.

This paper is about the implementation of IoT in Agriculture. IoT helps in better crop management , better resource management, cost efficient agriculture, improved

quality and quantity , crop monitoring and field monitoring etc. can be done.

- **A Low Power IoT Network for Smart irrigation,** Soumil Heble, Ajay Kumar, K.V.V Durga Prasad, Soumya Samirana in 2018.

Low-cost and low-power are the key factors to make any IoT network useful and acceptable to the farmers. In this paper, we have proposed a low-power, low-cost IoT network for smart agriculture. For monitoring the soil moisture content, we have used an in-house developed sensor. In the proposed network, the IITH mote is used as a sink and sensor node which provides low-power communication.

1.5 PROPOSED SYSTEM

The all sensors are interfacing into the raspberry pi. The soil moisture sensor is used for measure the soil moisture level and display in LCD using Lora communication. The moisture level value is also send to the person mobile using webpage. The PH sensor is used for measure the PH value. The motor is used for robot movement. The camera is used for detect the leaf diseases by using raspberry pi.

2. RASPBERRY PI

Raspberry Pi is a small single-board Computer developed in UK by Raspberry Pi foundation to promote the teaching of computer science in schools and in developing countries. Original model become far more popular than anticipated sealing outside of its target market, for uses such as robots.

2.1 FEATURES

- CPU speed ranges from 700 MHz to 1.2 GHz.
- On board Memory (RAM) ranges from 256 MB to 1 GB.
- USB slot differs from 1 slot to USB slots.
- HDMI, composite video output and 3.5mm phone jack.
- Low level output is provided by GPIO pins which support common. protocols like I2C (inter-integrated circuit).
- Ethernet 8 Position 8 Contact (8P8C).

3. PYTHON

Python is an interpreted high-level programming language for programming Python offers multiple options for developing GUI (Graphical User Interface). Out of all the GUI methods, tk inter is most commonly used method. It is a standard Python interface to the Tk GUI toolkit shipped with Python. Python with tk inter outputs the fastest and easiest way to create the GUI applications [5]. Creating a GUI using tk inter is an easy task.

3.1 Python Features

- **Easy-to-learn:** Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly.
- **Easy-to-read:** Python code is more clearly defined and visible to the eyes.
- **Easy-to-maintain:** Python's source code is fairly easy-to-maintain.
- **A broad standard library:** Python's bulk of the library is very portable and cross-platform compatible on UNIX, Windows, and Macintosh.
- **Interactive Mode:** Python has support for an interactive mode which allows interactive testing and debugging of snippets of code.
- **Portable:** Python can run on a wide variety of hardware platforms and has the same interface on all platforms.
- **Extendable:** You can add low-level modules to the Python interpreter. These modules enable programmers to add to or customize their tools to be more efficient.
- **Databases:** Python provides interfaces to all major commercial databases.
- **GUI Programming:** Python supports GUI applications that can be created and ported to many system calls, libraries, and windows systems, such as Windows MFC, Macintosh, and the X Window system of Unix.
- **Scalable:** Python provides a better structure and support for large programs than shell scripting.

4. BLOCK DIAGARM

The block diagram of the paper is quite simple which has few basic components but it is quite efficient producing results as required

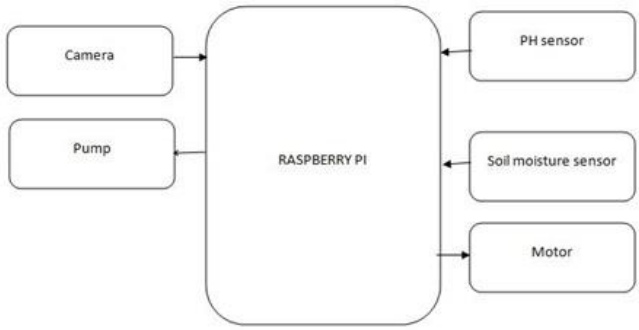

Fig.1 Block Diagram of Raspberry pi

5. WORKING PRINCIPLE

In agricultural field, the low profitable crops with high maintenance and time consuming problems can be solved using robots. Farmers are affected by using harmful fertilizers in hand, so robots are used here to escape farmers from this method. In this paper, a credit-card sized processor raspberry Pi is used to develop robot to give better performance. Programming language Python has been coded in Raspberry Pi to make necessary actions. The parameters (moisture, color, temperature) are monitored by the robot (using sensor) and send message (using GSM technology) to the farmer to take necessary action. According to the message the farmer will act for irrigation control. Robot will be navigated in the field and check for water level, temperature, leaf color, moisture. The navigation is done using sharp sensor. According to the color of the leaf the robot will spray on it.

If water level is low in the field then using GSM technology the message will be send to the other GSM number to switch on the motor will be switched on

automatically . Other parameter will be notified with respective sensors and message will be triggered to the farmer. Results: Accordingly the farmer will act and this show how easily the farmer can concentrate on other farms or other works with outing facing a loss in this particular field. Conclusion is Raspberry Pi is used for high performance and Image processing can be used which cannot be done in Arduino board.

If proper care is not taken in this area then it causes serious effects on plants and due to which respective product quality or productivity is affected. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops , and at very early stage itself it detect the symptoms of disease means when they appear on plant leaves. This paper presents an algorithm for image segmentation technique Used for automatic detection as well as classification of plant leaf disease and survey on different disease classification technique that can be used for plant disease detection.

Plant diseases have turned into a dilemma as it can cause significant reduction in both quality and quantity of agriculture products. Automatic detection of plant disease is an essential research topic as it may prove benefit in monitoring large fields of crops, and thus automatically detect the symptoms of disease as soon as they appear on plant leaves. The developed processing scheme consist of four main steps, first a color transformation structure for the input RGB image is created , then the green pixels are masked and removed using specific threshold value followed by segmentation process, the texture statistics are computed for the useful segments, finally the extracted features are passed through the classifier.

6. CONCLUSION

We conclude that, it is easier to operate the bot. Hence the battery can be recharged easily and it can be used at any time. The features such as pH control, soil moisture sensor, camera and pump has been customized and integrated in a single compact bot. Then any abnormal condition occurs it's will be detected through buzzer beep. The camera is used for detect the leaves if it is good or abnormal leaf. If leaf is affected by any disease that will be detected by the camera and inform to famer which type of disease is affected in the leaf then the farmer has to take necessary action. If water level is low in the field then using GSM technology the message will be send to the other GSM number to switch ON/OFF the motor by automatically. Other parameter will be notified with respective sensors and message will be triggered to the farmer.

7. APPLICATION AND FUTURE SCOPE

Computer vision which goes beyond image processing helps to obtain relevant information from images and make decisions based on that information. In other words, computer vision is making the computer see as human's works. Basic steps for a typical computer vision application as follows.

a. Image acquisition
b. Image manipulation
c. Obtaining relevant information and Decision making

8. REFERENCES

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