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Smart Irrigation System Using Automated Rover

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Abstract:- In most of the domain, automation has manoeuvred industrial advances and has become predictable. But in a lesser degree, the contribution of automation to agriculture. Thus, productivity can be improved to multipliers by integrating automation in the sector of agriculture. Thus, productivity can be 'unproved to multipliers by integrating automation in the sector of agriculture. This work concentrates on automating agriculture and improve irrigation techniques. An autonomous rover is designed which moves through the agriculture land sensor in it captured images.

The rover also make use of multiple sensors to detect data from various sources and used for further processing.

I. INTRODUCTION

Now a days due to much research happening in the field of IOT, more precision based works are able to research which in term helping farmers to automate agriculture work because of its extremely interoperable,scalable, pervasive and open nature, IoT is the ideal match for precision agriculture. There are many technologies obtained from IoT, all of which offer numerous advantages including decreasing the risk of vendor lock-in, adopting machinery, and improving sensing / automation systems. Motivated by the above-mentioned advantages and potential of IoT applied in precision farming, given the non-existence of a fully reliable, well-established and standard alternative, we have constructed our Model. Agriculture is a primitive occupation of human subsistence. Agriculture's protection and growth is therefore essential. Using machine learning processes and image processing instruments, a method hs been intended in for disease identification and classification. They used Vector machine C lassifirs to support the assignment of disease classification. A rover with a camera attached to it can be used to capture the crop's present situation, which moves around the field and gathers information. Algorithms can be used to process the pictures captured by the camera and the disease can be recognized using classifiers based on which appropriate measures can be taken. Since farming has an irregular terrain, a rover must be intended in such a way that it is. When the crop has reached maximum yield, the field may be damaged by animals entry and unexpected fire. Then we must think of protecting farm land through n some alrm systems which protects the farm from intruders and fire also[16], to protect the field from fire accidents and animal and bird intrusions. So to give solutions for all above mentioned points are clustering of metods and algorithms. In which we have reduces human effort and the system is completely replaced by machines or more specifically rovers in our project.

There are many stages in implementing automated rover system which monitors irrigation using wireless technology. It has crop selection process done at initial stage which can be done automativally by expert system algorithms, crop yield monitoring also done by automated rover at regular intervals and also finally the image processing applications employed in the project helps to detect crop disease prediction.

In this work can we solve some irrigational errors problems faced by farmers and consumption of large quanities of matter.

II. LITERATURE SURVEY

K. Laksmisudha and swathi Hegde at al have used image processing and few IOT techniques to detect mineral deficiency in crop which helps to improve yield development.

Nikesh Gondchawar and at al proposed modern approaches for agriculture through Bluetooth and various technical methods.

M. K. Gayathri, J. I ayasakthi and at al have proposed certain novel image processing techniques in inventory networks for better yielding.

R. nadurkar "plan together with situation corning from rigor horticulture technique" is a paper which describes transmission sensor network.

Paparo N alajala, D. Hemanth Kumar, P. Rmaesh and Bhavana Godarvathi at al have proposed a technique to direct water through rovers in rural fields.

Joaquin Gutierrez, Juan Francisco Villa-Medina "Computerized irrigation system using a wireless sensor network and GPRS proposed investigation on wireless sensor networks on automation of rovers[6].

M. V Latte and at al proposed shading technique for efficient smart irrigation.

By this extensive research and survey its been Found that the farmers are experiencing low yield in agriculture. By using technology in the field of Agriculture we can increase the production and Man efforts can also be reduced to greater extent. Through rovers one can know the water requirement levels and fertilizer requirement levels.

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There are soil moisture identification and temperature identification sensors. Small embedded system device(ESD) which takes care of a whole irrigation @ocess. The PIC 18F4550 microcontroller application of a wireless sensor network for low-cost wireless controlled irrigation solution and real time monitoring of water content of soil. Data acqistion is performed by using solar powered wireless acqistion stations for the purpose of control of valves for irrigation.

III. SYSTEM ANALYSIS

➢ *Existing System*

As the evolution of humankind from hunters and gatherers to agrarian societies, the efforts have mainly focused on improving the plant yield and productivity by either genetic changes, cultural or husbandry, management practices, or by developing and introducing plant protection measures. Accordingly, in the last and present century, peoples have started exploring the possibilities by adopting different modern techniques in agriculture. The adoption of the precision farming methods in agriculture is one of the excellent examples. The purpose is to try and mechanise them in agriculture to prevent the crop losses due to sudden climatic changes, soil-borne diseases, pest attaches, and so on. However, many research studies have been suggested and reported that problems and challenges of agriculture could overcome by adopting the precision farming methods. At present, several countries are increasing their farming productivities by implementing the precision farming methods.

➢ *Proposed System*

The system proposes a rover controlled irrigation system where microcontroller based processors are ambedded into the rover and few sensors are situated. The sensors takes input from external source like, camera sensor capturs the image of agriculture land,crop health monitoring, sensor for detecting water level in tank, soil moisture detection sensor, fire alarms to detect in case when there is an accidental fire in lands and animal entry into system.

Our autonomous rover embedded with many sensors for above mentioned applications, able to do all sorts of implementation in different phases.

For achieving effective solutions to farming issues, our rover has field surveillance system for classification and detection of crops by capturing image of infected crops by capturing image of infected crops. Various image classifaction method are employed to detect such crop abnormalities.

Another major issue in irrigation is wastage of water. Farmers can't predict how much exact water is required for cropping. So a sensor is embedded with rover which has soil moisture detection moduke to determine which crop as to be supplied.

Sometimes soil moisture is below water level, temperature level and humidity is checked and watering of crops is done.

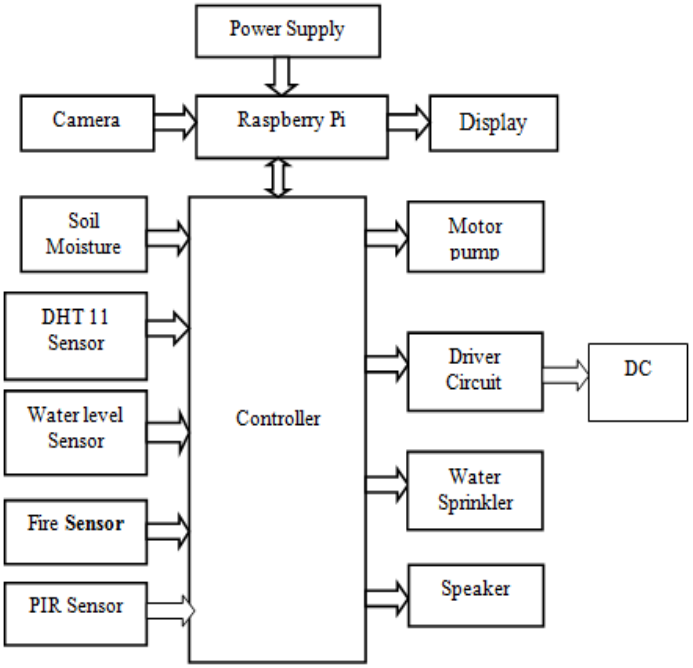

Fig 1

- *Improving the health of plants*

If any crop is having any deficiency which can be identified through algorithms of imaging applications. Through image classification and pattern recognition we can detect the crop which is affected by a disease and which is affected by a disease and which is not. It can be detected through crop image taken by rover sensors.

IV. SYSTEM REQUIREMENTS

A. Software Requirements

- Python
- OpenCV Library
- Arduino IDE
- C++

B. Hardware Requirements

- Raspberry Pi
- Microcontroller
- DHT11 Sensor
- Soil Moisture Sensor
- Water level Sensor
- PIR Sensor
- Flame Sensor
- DC Motor
- Driver Circuit LM293
- Camera
- Relay Module

➢ *DHT11 Sensor*

It is both temperature and humidity detecting sensor calibrated through digital signal output as in fig.

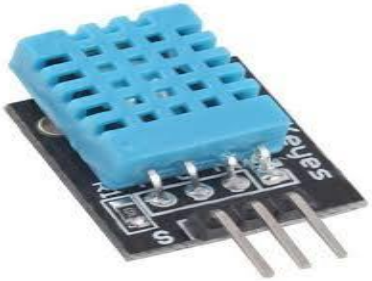

Fig 2:- DHT11 Sensors

➢ *PIR Sensor*

This is the motion detector sensor to check whether any moving object, like human, anumal has moved in and out of the range.

Fig 3:- PIR Sensor

➢ *Soil Moisture Sensor*

If any crop is having water shortage, soil moisture sensor is used to detect yhe level of deficiency. Also we can automatically water crops.

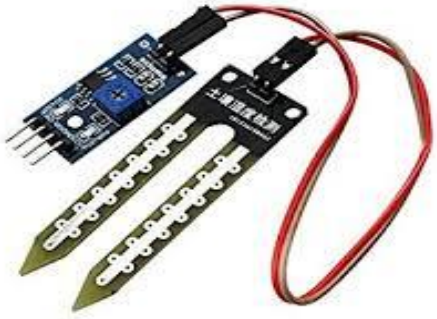

Fig 4:- Soil Moisture Sensor

➢ *Relay Module*

When few microcontroller are used with rovers, it requires an automated, electrically operated switch to turn off and on current in a device, such relay modules are used.

Fig 5:- Relay Module

➢ *Flame Sensor*

If a land is affected with fire, there will be fire detectors or flame sensors used.

Fig 6:- Flame Sensor

➢ *Water Level Sensor*

These kind of sensors are used to detect the level of liquids in soil where helps to pour water to crops.

Fig 7:- Water Level Sensor

V. SYSTEM DESIGN

System Design and Development chapter gives the mechanism of prescribing the factors , parts , integrate and facts for a structure to satisfy stated requirements and the mechanism of building along with the procedure, process, miniature and approach used to develop the system.

➢ *System Architecture*

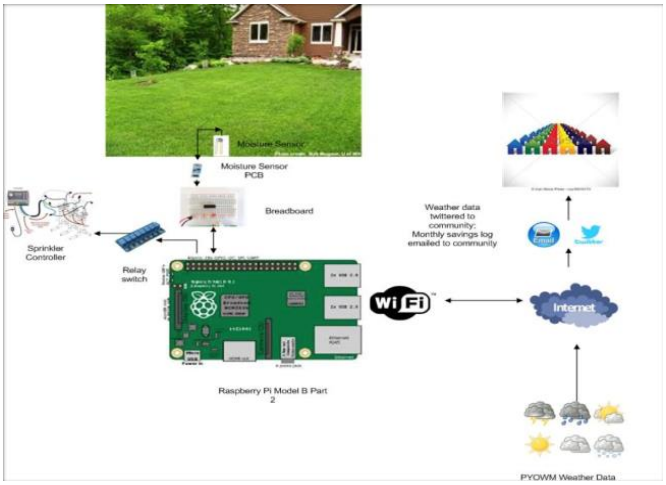

Fig 8:- System Architecture

System architecture is the Conceptual model that defines the structure, behaviour and more views of a system. As architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviour of the system.

System architecture can comprise system components, the externally visible properties of those components, the relationship (e.g. the behaviour) between them. It can provide a plans from which products can be procured, and systems developed. That will work together to implement the overall system. There have been efforts to formalize the languages to describe system architecture. In order to promote efficient plant irrigation and prevent water wastage, a module for soil moisture detection, a DTH11 module and a module for water level sensors have been merged and their values are used to determine whether or not the crop can be watered. The soil moisture is taken into consideration at first. If the soil's water level is below the plant's necessary water level, the temperature and humidity will be inspected. In the perspective that watering the plants when it is about to rain is ineffective, temperature and humidity are verified.

VI. CONCLUSION

Smart agriculture is an efficient approach which replaces human intervention in farming. As with human farming, may due to ignorance or lack of knowledge the crop yield may not be better, but by using AI techniques human effort is replaced by rovers which in tern hoping to give better crop yield.

So our work proposes a smart agriculture system which makes use of microcontrollers programmed in assembly language for rover navigation through out land and once the data is acquired though sensors, certain image processing techniques is been proposed which detects the disease in crops by capturing crop images.

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