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AUTOMATION IN IRRIGATION BY USING ARM CONTROLLER

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ABSTRACT

This paper proposes monitoring and control system for agricultural parameters based on ARM and android to overcome the problems faced in monitoring different parameters in daily farming activities. In this paper a system is developed which consists of different sensors to monitor different agricultural parameters such as temperature, moisture, Humidity. The system is so developed that it can be visualized using a android application. The proposed system involves development of hardware as well as software to monitor and control different agricultural parameters. In addition to monitoring certain activities it can be controlled through the automatically or manually using keys. Thus the proposed system forms complete framework for agricultural operations. Once the Farmer's android phone and Robot are connected the robot will take all the instructions from user's Android phone such as Front, Back, Left, right. User can also choose the type of crop seed he wants to select. The robot will send the current environmental parameters to Phone over Bluetooth. The farmer will be advised about the type of crop, fertilizer user should select according to time of year, Sensor readings. The farmer can select an Auto /Manual Mode. The auto mode has Ploughing, Seed deployment, Water sprinkling.

Keywords: Agriculture robot, Android application, Humidity and Temperature sensor

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I. INTRODUCTION

As one of the trends of development on automation and intelligence of agricultural machinery in the 21st century, all kinds of agricultural robots have been researched and developed to implement a number of agricultural production in many countries, such as picking, harvesting, weeding, pruning, planting, grafting, agricultural classification, etc. And they gradually appear advantages in agricultural production to increase productivity, improve application accuracy and enhance handling safety. And the production efficiency is low due to seasonal usage, which indirectly increases the cost of agricultural production. In addition, the intelligence level of navigation must be improved further, especially for crops planted in rows, it is necessary to further study in order to realize navigation according to row crops by using machine vision. Though high intelligence is required for an agricultural robot to achieve best production, it is very important that its structure is simple and it is affordable and easy to manipulate and popularize, and it might have strong adaptability to meet the needs of diversity of agricultural production and variability of production object. Therefore, an agricultural robot platform, which is developed independently on the basis of the design concept of open architecture, is introduced at first. Finally, the preliminary tests were implemented in a vegetable field. For this we are developing an Application on Android platform which can be installed on to the users Mobile. After the installation the user has to enter the Farmer ID and password. The farmer ID and password are sent to the Irrigation robot. The µC will then compare the farmer ID and Password, If correct, then the user can access the Irrigation robot.

II. LITERATURE REVIEW

Before starting the paper a number of research papers were studied extensively to find if such system exists and what are the current drawbacks. The details literature review helps us to focus on the problem more effectively and develop an efficient solution.

[1] Ms. Nishigandha, Mr. Rohit V. Kadam, This paper deals with the concept of IOT assisted agriculture. In this system the sensor will sense the vital parameters of the environment. The sensors are connected to the microcontroller. This system involves connected monitoring, control of agricultural parameters using Internet of things and Android. The proposed system is not only unidirectional it is bidirectional, it means the system monitor different agriculture parameter and also it control different agricultural equipment's such as irrigation control(motor), light control, temperature control.

[2] K. Rangan, have discussed an Embedded Systems Approach to Monitor Green House. They are used an embedded system approach to monitor and control the greenhouse parameters. They are measuring humidity, temperature and light intensity by sensors and this information send to user handset using GSM.

[3] V. Vijay Hari ram, H. Vishal, Indian agriculture is diverse; ranging from impoverished farm villages to developed farms utilizing modern agricultural technologies. However, its ecosystem control technology and system is still immature, with low level of intelligence. Promoting application of modern information technology in agriculture will solve a series of problems facing by farmers. Lack of exact information and communication, leads to the loss in production. Our paper is designed to overcome these problems.

[4] XUE Jinlin, XU Liming, A vision-based row guidance method is presented to guide a robot platform which is designed independently to drive through the row crops in a field according to the design concept of open architecture. Then, the offset and heading angle of the robot platform are detected in real time to guide the platform on the basis of recognition of a crop row using machine vision. And the control scheme of the platform is proposed to carry out row guidance.

[5] Reema Aswani, Prof. Monisha Malik, Now days, due to busy routine life, people forget to water their plants. In this paper, we present a completely autonomous and a cost-effective system for watering indoor potted plants placed on an even surface. The system comprises of a mobile robot and a temperature-humidity sensing module. The paper describes the hardware architecture of the fully automated watering system which uses wireless communication between the mobile robot and the sensing module.

III. OBJECTIVES

The main objective behind the project is to help the farmer to do irrigation in an automated way. The irrigation robot is very efficient, it can do irrigation in an less water and production of crops is higher. So, the farmer can estimate the crop production depending upon environment conditions.

- To develop a ARM7 based Embedded Board from scratch.
- To design and develop a irrigation robot.
- To develop irrigation system using a robot which can plough, Seeding mechanism, and watering either automatically or manually.

IV. BLOCK DIAGRAM

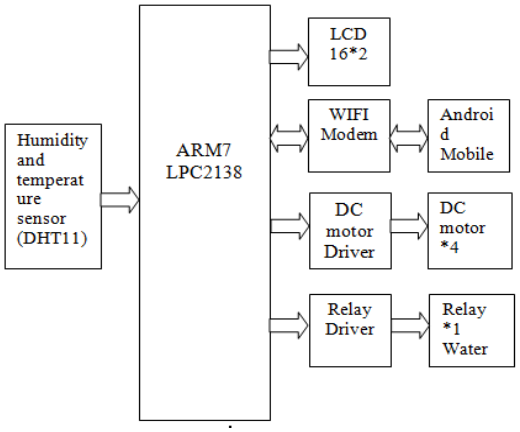

Fig. Block diagram of the system

PROPOSED WORK

Here we are proposing a agricultural autonomous Robot which will sense the conditions in real time and then decide which plantation is best suited for that particular field. For this, we are analysing the field parameters such as, Temperature, humidity, soil Moisture etc. The Robot will also have a Plough to plough the fields, and then a seed dispensing mechanism, Watering mechanism, so, in all this is a completely autonomous robot. A time-based row guidance method is presented to guide the robot platform driven along crops planted in row. And the offset and heading angle of the platform are calculated by detecting the guidance row in real time in order to guide and control the platform. Time-based row guidance is to use delay to detect and identify crop plants and then to find accurate and stable navigation information. Once the robot stops the µC will be given indication. In the microcontroller unit, c language coding is predefined, according to this coding the robot which connected to it was controlled. The µC will check the soil moisture levels of soil. If they are below the set point then the water spray is turned on. Robot which has several motors is activated by using the relays. Relays are nothing

but electromagnetic switch which ON/OFF according to the control given by the microcontroller unit. Relay will turn ON/OFF the water motor when soil moisture is less. Here the user can operate the robot in manual mode by pressing the 4 keys given on android APP. These keys are used for the movement of the buggy forward, backward, right, and left.

4.1 Hardware Used

1. Microcontroller LPC2138

- High speed and high processing power. ARM7 LPC2138 have 64 pins high performance ARM Microcontroller.
- LPC2138 have 512 kbytes flash memory and 32kbytes RAM memory. 40 I/O pins and two 32 bit timer,2 serial Ports.

2. DHT11 Sensor

- DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity.
- The component is 4-pin single row pin package
- It is a small size, low power consumption.

3. LCD Display

- LCD is used for displaying the temperature, humidity.
- It is 16*2 pins LCD display and it is interfaced with LPC 2138 microcontroller.
- Voltage : 5V, Current : 10ma.

4. Wi-Fi Module:

- The ESP8266 is interfacing Wi-Fi Tans-receiver module.
- The ESP8266 is a low-cost Wi-Fi microchip.
- This Wi-Fi module allows controller to connect to a Wi-Fi network and make simple TCP/IP connection.

V. FRAMWORK

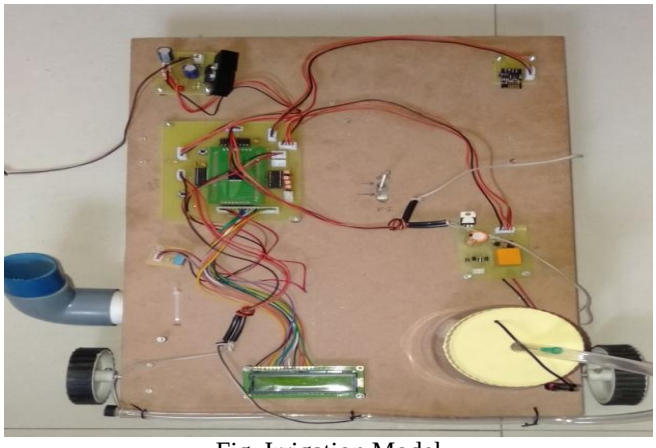

Fig. Irrigation Model

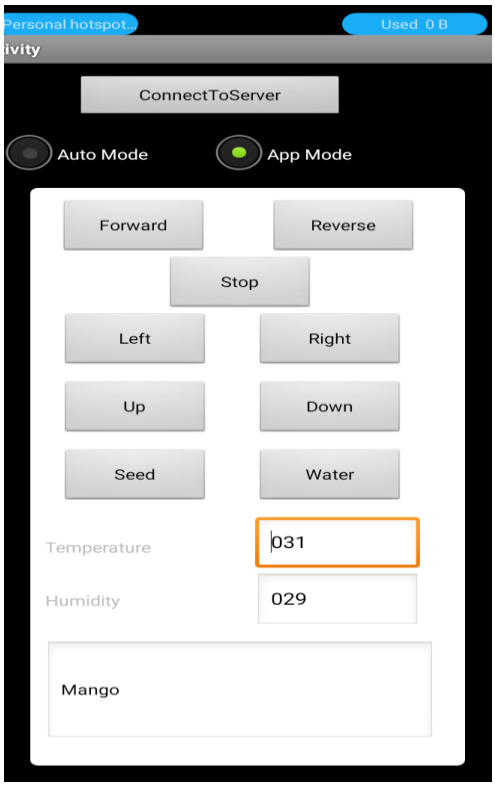

Fig. Android App Function

VI. CONCLUSION

The system had been successfully designed for monitoring the condition of the crop regularly by using robot as it continuously moves with in the field and we can see the condition of the crop in our Android APP. The automated irrigation system developed proves that the use of water can be diminished for a given amount of fresh biomass production. Besides the monetary savings in water use, the importance of the preservation of this natural resource justify the use of this kind of irrigation systems.

VII.FUTURE SCOPE

This system can be enhanced with more features adding more sensors. We can also send the data on IOT. Parents can monitor their crops development from anywhere on internet. Also, instead of WIFI based APP, farmers can be intimated by sending an SMS to the farmer's mobile phone.

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