SMART IRRIGATION SYSTEM USING RASPBERRY PI

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Abstract - *The aim of this paper is to develop a smart irrigation monitoring system using raspberry pi.Focus area will be parameters such as temperature and soil moisture. This system will be a substitute to traditional farming method .We will develop such a system that will help a farmer to know his field status in his home or he may be residing in any part of the world. It proposes a automatic irrigation system for the agricultural lands. Currently the automation is one of the important role in the human life. It not only provide comfort but also reduce energy, efficiency and time saving. Now the industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here it also design a smart irrigation technology in low cost which is usable by Indian farmers. Raspberry pi is the main heart of the whole system. An automated irrigation system was developed to optimize water use for agricultural crops. Automation allows us to control appliances autom-atically. The objectives of this paper were to control the water motor automatically, monitor the plant growth using webcam and we can also watch live streaming of farm on android mobiles by using wi-fi.*

Key Words: ***Raspberry pi, Android mobiles, wi-fi, Irrigation.***

1. INTRODUCTION

India is the largest freshwater user in the world, and the country's total water use is greater than any other continent. The agricultural sector is the biggest user of water, followed by the domestic sector and the industrial sector. Groundwater contributes to around 65% of the country's total water demand, and plays an important role in shaping the nation's economic and social development.

The requirement of building an automation system for an office or home is increasing day-by-day. Automation makes an efficient use of the electricity and water and reduces much of the wastage. smart irrigation system makes the efficient use of water[2].

This paper presents an smart irrigation system for agriculture farm with the use of devices like raspberry pi. Python programming language is used for automation purpose.

This paper contributes an efficient and fairly cheap automation irrigation system. System once installed has less maintenance cost and is easy to use[1].This paper focuses on online monitoring of agriculture field with the help of wi-fi on android mobiles and parameters such as temperature and soil moisture. It is more advantageous than the traditional agriculture techniques.

2 .SYSTEM DESIGN

The block diagram of the proposed system as shown in Fig. 1 consists of sensing unit such as Soil Moisture Sensor to measure water content of soil.

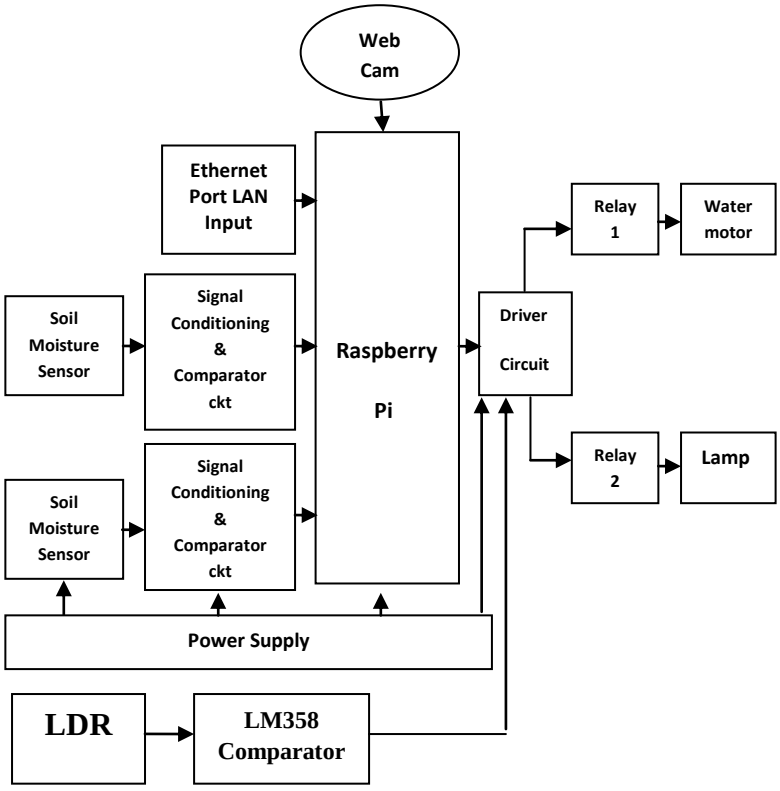

Fig 1: Proposed system design

2.1. Components Description

2.1.1. Power Supply

One of the most exciting updates/upgrades of the new Model B+ is a fancy new power supply. The power supply is what takes the micro USB port voltage and creates the 5V USB, 3.3V, 2.5Vand 1.8V core voltages. The 3.3/2.5/1.8 are for the processor and Ethernet.

2.1.2. Sensor

Sensors are the device which converts the physical parameter into the electric signal. The system consists of soil moisture sensor. The output of sensor is analog signal, the signal is converted into digital signal and then fed to the processor. The moisture sensor is used to measure the moisture content of the soil. Copper electrodes are used to sense the moisture content of soil. The conductivity between the electrodes helps to measure the moisture content level[4].

Fig 2: Soil Moisture Sensor

2.1.3. Raspberry-Pi

The Raspberry Pi is a small, powerful and lightweight ARM based computer which can do many of the things a desktop PC can do.

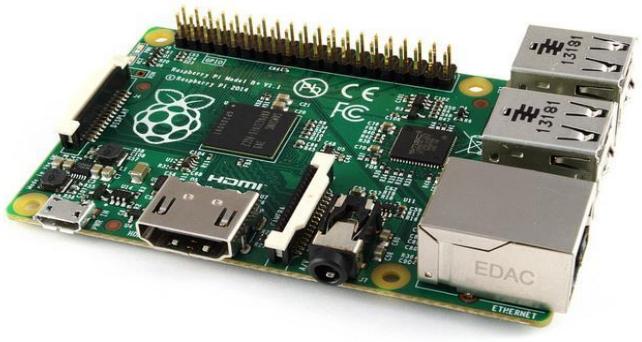

Fig 3 : Raspberry pi module

The powerful graphics capabilities and HDMI video output make it ideal for multimedia applications such as media centers and narrowcasting solutions. The Raspberry Pi is based on a Broadcom BCM2835 chip. It does not feature a built-in hard disk or solid-state drive, instead relying on an SD card for booting and long-term storage.

2.2. WORKING OF PROJECT

In this project, webcam is interfaced to Raspberry Pi via Wi-Fi module. Raspberry Pi is the heart of the system. The Raspberry Pi Model B+ incorporates a number of enhancements and new features. Improved power consumption, increased connectivity and greater IO are among the improvements to this powerful, small and lightweight ARM based computer. The Raspberry Pi cannot directly drive the relay.

It has only zero volt or 3.3 V. We need 12V to drive electromechanical relay. In that case we need a driver circuit. The driver circuit take the low level input and give the12V amplitude to drive the relay which operates at 12V .we are using here UNL 2003 for driving the relay[5].

Across the relay there are 3 connection R,Y,B so we are using here 3 relay to switch on induction motor LAN port is used for internet connectivity. Soil moisture sensor is connected to Raspberry Pi board through comparator circuit. soil moisture sensor gives a resistance variation at the output. That single is applied to the comparator and signal conditioning circuit. The signal conditioning circuit has potentiometer to decide the moisture level above which the output of comparator goes high. That digital signal is given to the raspberry pi board. If the soil moisture value is above the moisture level then the 3 phase induction motor will be off, whereas if the moisture level is low motor will be on through the relay.LDR is used for controlling light automatically, at night light will be ON automatically so that we can observe our farm at night also using mobile phone.

3. HARWARE OF PROJECT

Fig.4 shows hardware part of project. Here we will be considering connections in our project. Here Raspberry pi is the controller of the project. Webcam is interfaced to the raspberry pi. Here we have two comparator circuits which are connected to the soil moisture sensors. Relay is connected to the motor for ON/OFF of the motor.LDR is used for automatic control of light.

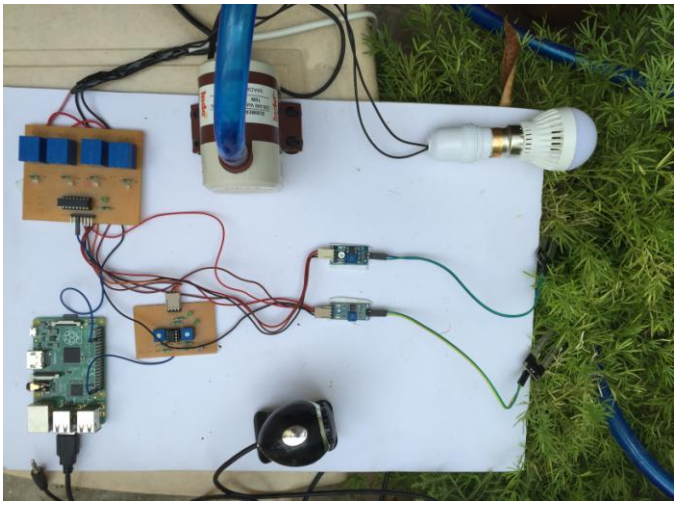

Fig 4: Hardware part of the project

4. RESULT

The following are the results obtained using web camera and sensors. Fig5 shows status of crops. Camera is interfaced with raspberry pi to capture the crop field and to observe the crops live by using wi-fi on android mobiles.

Fig 5: Image captured using mobile camera on wi-fi.

5. CONCLUSION

In this proposed system have presented the new innovative irrigation system. This system comprises the live streaming of crops using android phones and automatic motor on/off system, this two systems make the irrigation fully automatic. We can capture the live crop images on wi-fi. The entire system is monitored and controlled by the power full credit card sized microcomputer called Raspberry Pi. Pi board is powered by Linux operating system.

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