DESIGN A SET OF LOW COST WEB MONITORING AUTOMATIC IRRIGATION SYSTEM BASED ON RASPBERRY PI USING ZIGBEE TECHNOLOGY

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ABSTRACT – *In this paper, we proposed an embedded system 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 roles in the human life. It not only provides 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 designs 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 automatically.*

I.INTRODUCTION

India's major source of income is from agriculture sector and 70% of farmers and general people depend on the agriculture. In India most of the irrigation systems are operated manually. These outmoded techniques are replaced with semi-automated and automated techniques. The available traditional techniques are like ditch irrigation, terraced irrigation, drip irrigation, sprinkler system. The global irrigation scenario is categorized by increased demand for higher agricultural productivity, poor performance and decreased availability of water for agriculture. These problems can be appropriately rectified if we use automated system for irrigation.

A. Need of Automatic Irrigation

➢ Simple and easy to install and configure.

➢ Saving energy and resources, so that it can be utilized in proper way and amount.

➢ Farmers would be able to smear the right amount of water at the right time by automating farm or nursery irrigation.

➢ Avoiding irrigation at the wrong time of day, reduce runoff from overwatering saturated soils which will improve crop performance.

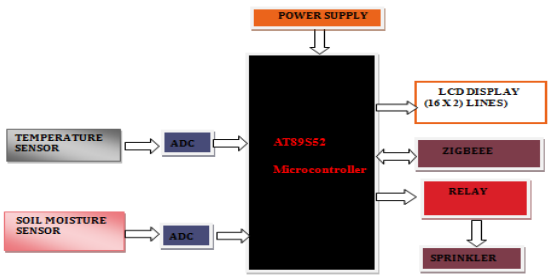
➢ Automated irrigation system uses valves to turn motor ON and OFF. Motors can be automated easily by using controllers and no need of labor to turn motor ON and OFF.

➢ It is precise method for irrigation and a valuable tool for accurate soil moisture control in highly specialized greenhouse vegetable production.

➢ It is time saving, the human error elimination in adjusting available soil moisture levels.

II. BLOCK DIAGRAM OF PROPOSED METHOD

a) Field section



b) **Field Monitoring section**

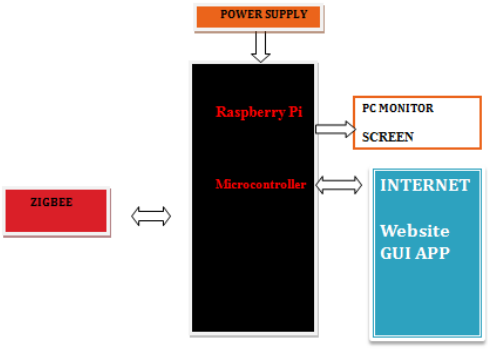


Fig 1: Block diagram of proposed system

III. EMBEDDED SYSTEM COMPONENTS

a)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.

b) **Sensors**

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. The LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 sensor thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

c) 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. 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.

The Raspberry **pi** is a mini computer which is designed in a single board with all the essential components required for running an operating system. The Raspberry pi is designed to be low cost and easy to use. The board has a micro USB port which can be used to supply 5V DC using an adaptor with rating not less than 1A. A video input port is also available with a Raspberry pi board which can be used to connect an external camera. The board can also be connected to the PC monitor using a HDMI to VGA adaptor cable.

Fig 2. Raspberry pi module

III. IMPLEMENTATION

There are 2 modes of operation:

a. Manual Mode

b. Automatic Mode

In this project, webcam is interfaced to Raspberry Pi via Wi- Fi module. Here the raspberry Pi takes snapshot wirelessly using Mobile camera. Then Rasp berry Pi will do image processing to find out the soil color samples. According to soil samples the Pi will send the information to user on the android app regarding the soil and seeds / crops which can be used on this type of soil. Furthermore, DC motor based vehicle is designed. The camera is mounted on the vehicle. The vehicle is stopped in front of a crop / plant. Soil and moisture electrodes will be inserted in soil. If electrode is not fully immersed in the soil due to any obstacle, the vehicle will move further and repeat the process unless and until the electrodes are not fully immersed. Once immersed, the moisture contents will be checked. If inadequate then water will be supplied to that particular plant. Also depending on the values of temperature and humidity sensors, the water motor will be turned on an off respectively. This process will be repeated for all the plants. The Pi will also take snapshots of the plant for intervals of few days and calculate the growth of plant using the height and width parameters. If the plant growth is adequate then Pi will continue the process for next plants. If the growth is insufficient then Pi will spray fertilizer o the plant and send an indication to user on android app. Also Android App based server is designed as part of this project. The android app will have a GUI which will show all the data to user. The modes as specified can be selected by the user on the app itself.

A conceptual system layout of distributed in-field WSN is illustrated in below Figure. The system consists of five infield sensing stations distributed across the field, an irrigation control station, and a base station. The in-field sensing stations monitor the field conditions of soil moisture, soil temperature, and air temperature, whereas a nearby weather station monitors micrometeorological information on the field, i.e., air temperature, relative humidity, precipitation, wind speed, wind direction, and solar radiation. All in-field sensory data are wirelessly transmitted to the base station. The base station processes the in-field sensory data through a user-friendly decision making program and sends control commands to the irrigation control station.

V. 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; these two systems make the irrigation fully automatic. We can monitor and control live crop parameters on Internet. 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.

VI. REFERENCES

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