Automated Irrigation System Using a Wireless Sensor Network for Social Modernization of Indian Agriculture System

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Abstract - *This paper aimed in providing an automatic irrigation system wirelesses to the agriculture field which help the farmer in increasing the production with comparatively less cost. This paper has a combination of two concept embedded system and digital image processing and the result viewed through IOT which collects various environmental condition surrounding the field using wireless sensor. The wireless sensor such as moisture and temperature sensors which sense the surrounding climatic condition and send the control signal to Raspberry pi and in addition rain sensor is used to deactivate the entire system during rainy season and automated motor to supply water to the makes the usage of water for field and also by using digital image processing we are able to find whether it is the animal or person entering the field viewed in raspberry, fully programmed by python 2.7 in a saving and reliable manner and efficient manner*.

Key Words: **IOT, Motor, Temperature sensor, Moisture sensor, Digital Image Processing, Raspberry pi, Python**.

1. INTRODUCTION

Indian's population is reached beyond 1.2 billion and the population rate is increasing day by day[1] and this leads to stress on water usage. Water is important and insufficient natural resource in today's world , that is very essential for our livelihood upon the usage of water for agriculture as most of the water is been used for household, by population, industries and energy uses etc. Agriculture plays an important part in my of the farmers life, in agriculture production etc. Even used for the field for fruitful outcome, but many commits suicide the motives behind is due to lack of availability of water, and inadequate rainfalls.

According to statistics the death rate is more in India. Presently the complete work is done manual for the field production like watering the field etc, there is many more disadvantages in the existing system of agriculture some of them are like the operation is totally manual, the pressure in the usage of water is also increasing day by day, the system they use does not save any water for future use and whenever there is flood drought etc, the field gets flooded.

In this paper the above problems are solved by a automatic plant watering control system is been described in which the plant is only watered once a day with adequate amount of water to the field making the system robust and adopting its response to various climate condition. As this open sources and available online it is easily assessable by anyone. As it is open source it can be used for different crops and climate condition from anywhere, the apparatus used is focused in the Internet of Things (IOT), accordingly the IOT will grow to 26 billion units installed in 2020 showing an almost 30 %increase from 0.9billion in 2009 and it is too large to increase in ignorance in the E-lab.

Along with this the field is also being monitored by digital image processing to find out whether an animal or a Human is entering the field this helps in finding who is entering the field and it is also a sort of security for the farm people to live with any fear and happily. This system is very easy to maintain since it is wireless and even no complication in set up of the system, it is 24 hours working project.

2. LITERATURE SURVEY

Before starting the project following surveying was made on the project on different things :

Sensor based automatic irrigation System & soil PH detection using DIP April-2017 Vol:4|Issue:4

In this paper whenever there is a Change in the water content of the soil, it measures the PH property and this measured PH value is used to describe the degree change of acidity which affects the nutrient availability for the plant growth in the soil by image captured by phone camera by digital image processing concept.

Automatic irrigation system on sensing soil moisture content March 2016 Vol:3|Issue:3

Automatic irrigation system on sensing soil moisture content, in this paper an Automatic irrigation based on Arduino board and ATmega328 which collects the input signal when there is a change in the moisture content of the earth and viewed through moisture detection sensor

Temperature & moisture System based Zigbee Protocol 2015 IEEE Paper

In this paper a Zigbee WNS is built using ZICM2410 module which does the data communication and to detect the real temperature and humidity by the sensors and viewed through upper computer system.

Research paper on dripping management using wireless sensor 2012

This is a research paper on dripping management using wireless sensor in this improving the throughput and

average end to end delay of information gathered about the level of water from the agriculture field for precision agriculture WNS used for a variety data acquired environment monitoring irrigation management.

Microcontroller based Automatic Irrigation System with Moisture Sensor 2011 sector 125

In this paper a microcontroller based Automatic irrigation system with moisture sensor is prototype design of microcontroller based automated system which allows irrigation to take place in zones where adequate soil moisture is indicated.

3. METHODOLOGY

Crop growing section:

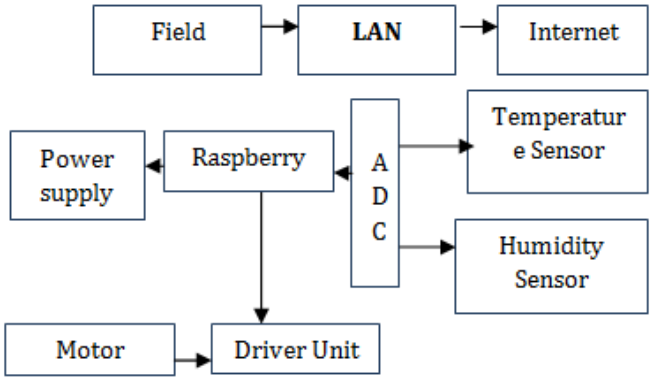

Fig-1: Block diagram of first module

Proprietor Section:

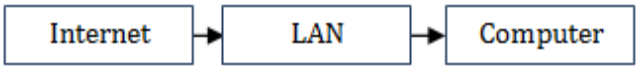

Fig-2: Block diagram of second module

Flow chart for image processing using math lab to identify whether it is animal or human being.

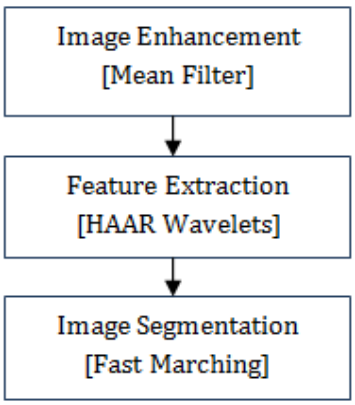

Fig-3: Block diagram of third module

In crop growing section the three sensor temperature and moisture sensor and the rain sensor is used and the power supply is given using USB cable the driver unit(relay) is used to convert the power supply to about 5v DC which is needed for the running of the motor and ADC is used for converting the analogy signal coming from temperature and moisture sensor into digital signal for the processing here raspberry pi3 is used which is the heart of this system .In the proprietor section Internet is used through LAN as the whole connection in this system is wireless and in mathlab three processes are involved to process the foot print image of the animal and human .

A brief description of the components and its contribution to the working of this system

Raspberry Pi Model B: Raspberry pi is based on the Broadcom BCM2835 System on a chip that includes an ARM1176JZF-S 700MHz processor, Video Core 4 GPU, and was originally designed with 256 megabytes of RAM and later upgraded to 512MB.the system has either SD or micro SD sockets for boot media and persistent storage. The other features of raspberry pi model b are 700 MHz clock speed 4 individual USB host ports, 10/100 base Ethernet port and HDMI audio and video output [6].

Temperature Sensor: LM35 is a precision IC Temperature sensor with its output [2] and has three pins 5v, output and ground pins .It is used to sense the temperature in the soil and send the signal to the controller in digital value.

Moisture Sensor: The moisture sensor is buried in the ground at particular depth [2], from the name itself we can say that it is used to sense the moisture in the soil.

ADC: It is used to convert the analogy signals into digital signals .this important part of the block because as the signal coming from the two sensors are analog in this case it is used converted to digital signal and give to the raspberry.

Motor: This is a5v dc component where here a relay and a step down transformer is used to convert the incoming signal to appropriate 5v dc signal and the purpose of the motor is supply the water to the field depending upon the climatic condition in the surrounding.

Mathlab: This software is used in order to compare the footprints and process it to give the output whether it is a human or an animal us been entered into the field using mathlab.

4. EXPERMENTATION & RESULT

The system is wireless, where the Raspberry is the heart of the block firstly the power supply is given and the temperature and moisture sensor is buried at the root of the soil , whenever there is a change in the climate condition it send the control signal to the raspberry and the motor runs automatically depending upon the climatic condition of the

soil and supply water to the field to maintain the soil and a Rain sensor is used which is buried at the surface of the soil when it rains the entire system is deactivated to control the level of water in the field. The whole system is viewed through IOT and a webpage has been created to view result the temperature, moisture and the activation of the rain sensor. The set up is shown in fig4.

The whole system is worked under internet connection and along with this the thing entering the field is human or animal it is done by digital image processing by Mathlab by comparing the footprints with the footprints of the animal and human and gives the result through Raspberry pi3.The programming part in Raspberry is done using python 2.7, as it an open source programming language

Fig -4: Overall view of the project

The result is viewed in a webpage that is created using HTTP and PHP programming language and the Mathlab output is seen in Raspberry itself. Here is the webpage shown in fig 5 has the temperature button, moisture button and rain button on clicking on each button the current temperature, moisture and whether rain is detected output can be viewed ,it keeps on changing according to the climatic condition.

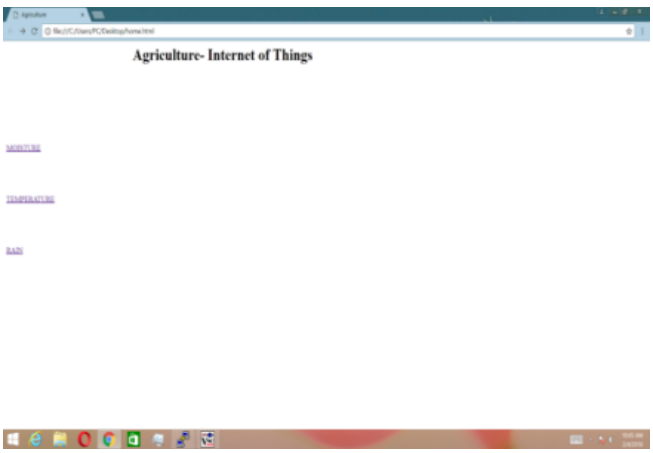

Fig-5: Webpage creation

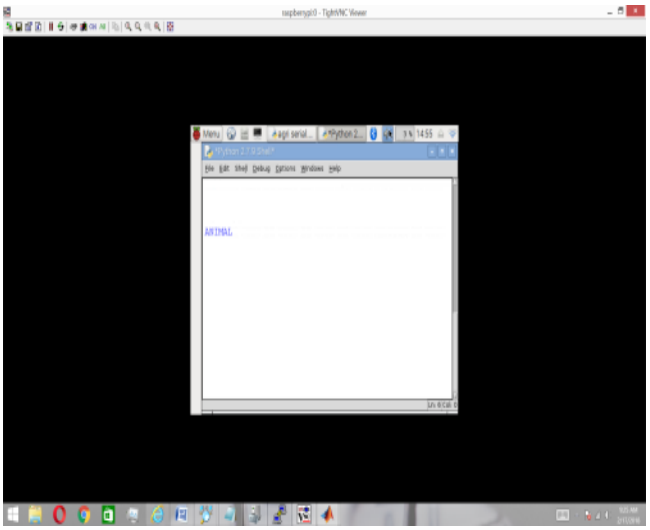

Fig-6: Mathlab Output viewed through Raspberry

5. FUTURE WORK

Now for image processing only predefined images are taken for comparing, but in future doing in real time the camera can be used to capture the footprints of the animal and human and then compare it really and all animal foot prints can be kept when using in real time.

6. CONCLUSION

Effective irrigation system is set up which is of less cost and saving of power and water for future. The whole project (hardware and software) is open source and available online allowing the reproduction of the experiment by anyone being open source; the user can adapt the code to cope with the different environmental conditions and different crops, soils that will modify the physical response produced by the watering. As irrigation is very important for agriculture and automatic irrigation system is set up raise the user's awareness to the IoT and how the internet could be used not only in the more conventional and historical uses (scientific and academic, finance and banking, social media, etc.), but also in their things, like watering their plants.

7. REFERENCES

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