SMART IRRIGATION CONTROL AND MONITORING

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Abstract - *As the technologies like IOT and computer vision are rising but the lifestyles of farmer for irrigation is being the same. In this project a new system is being added using a single board pc like Raspberry Pi3. In this Wireless Sensor Network (WSN) is used to hold the update of the field of irrigation sensor like Temperature sensor to be aware of the temperature level, Moisture to understand the soil moisture content, Humidity to screen the rainfall, LDR for light intensity, PIR sensor if any persons enters into the fields and water level sensor to recognize the water level, Web camera is used to seize the motion in the area, camera routinely captures the images of crops/plants and if any motion is detected by the PIR sensor, web camera records the object and mail it to user, all this data is being monitor by WSN and this data is send to the server which we can capable to screen using a web page through IOT technology and also screen the hardware like Buzzer and Motor in the field.*

Keywords - *IOT, RASPBERRY PI, WSN, WEBCAM.*

I. INTRODUCTION

Water is the most fundamental contribution for upgrading agricultural yield and consequently expansion of water gadget has been a key structure in the enhancement of farming in the nation. An Automated Sprinkler irrigation technique distributes water to crops/plants via spraying it over the crops/plants like arainfall. In this thesis we will implement an automatic irrigation system that will assist farmer/people to understand about his field, and the status of his plant at his home or he may additionally be living in any place of the world. This work will helps the farmers to irrigate the farmland in a very environment friendly manner with automatic irrigation system primarily based on weather. In current years the focus of water and energy preservation has resulted in the higher use of sprinkler system. Currently the automation is one of the vital roles in the human life. It not only gives relief however additionally reduce energy, productivity and time saving. Now a day the industries are the use of an automation and control machines which are excessive in price and no longer suitable for the use of in a farm and garden field. So in this work we will plan a clever irrigation system primarily based on IoT and Raspberry pi. This challenge is a right solution if the farmers have a busy schedule, they will admire being capable to work in the field at the same time as the plant life are being watered. As a result, there is no a risk to get the plant life damaged due to dryness.

II. LITERATURE REVIEW

P.Suganya et al [1] Proposed Climate alternate and rainfall has been erratic over the previous few decades. Due to this in current era, climate-smart techniques referred to as smart agriculture is adopted by many Indian farmers. Smart agriculture is an automatic and directed information technology carried out with IOT. Yogesh.G et al [3] WSN have been developed for agricultural monitoring and controlling of the crop field. Wireless nodes developed weresuccessful of transmitting environmental measurements at scheduled intervals.The information from a network of these sensors ought to be used to vastly enhance agriculture management and environmental safety practices. The system used to be designed to monitor temperature, humidity and soil moisture. A.Anusha, D.Goutham [4]Proposed Wireless sensor networks and their application for precision agriculture is an automatic irrigation device used to enhance the use of water for agricultural crops. The system consists of wirelesssensor network that is the soil moisture sensor and temperature sensor positioned under the soil where flora roots are reached which is a distributed network. The gadget has a water level sensor which will indicate the presence of water level in tank. R.Vagulabranan et al [5] Proposed "Automatic Irrigation System on Sensing Soil Moisture Content" is supposed to create an automatic irrigation mechanism which turns the pumping motor ON and OFF on detecting the moisture content of the earth. In the area of farming, utilization of suitable means of irrigation is significant.

HARDWARE MODULES

Raspberry pi

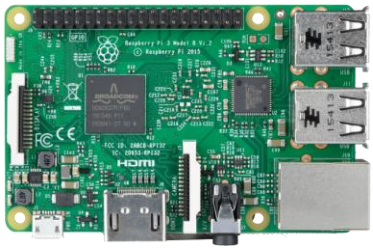


Fig: raspberry pi

A Raspberry Pi may be a thirty 5 dollar, memory card sized laptop board that once blocked into associate degree alphanumeric display and attachment of a keyboard and a mouse, it's able to complete the functions of any regular laptop will. Like a PC, it has RAM, Winchester drive (SD Card), Audio and Video ports, USB port, HDMI port, and LAN port. With the Pi, users will produce unfold sheets, word-processing, browse the web, play high definition video and far a lot of. it absolutely was designed to be a price friendly laptop for users WHO required one. Here we tend to area unit exploitation Raspberry pi three model B. it uses 1GB LPDDR RAM and integral Wi-Fi is there in comparison to earlier versions.

II. DESIGN AND IMPLEMENTATION

In this project, webcam is interfaced to Raspberry Pi through Wi- Fi module. Raspberry Pi is the heart of the system. The Raspberry Pi Model B+ comprises a wide variety of enhancements and new features. Improved power consumption, expanded connectivity and higher IO are amongst the upgrades to this powerful, small and light-weight ARM based computer. Raspberry Pi can't directly drive the relay. It has only zero volt or 3.3V. We want 12V to drive electromechanical relay. In that case we want a driver circuit. The driver circuit take the low level enter and provide the12V amplitude to drive the relay which operates at 12V so right here we use relay circuit.

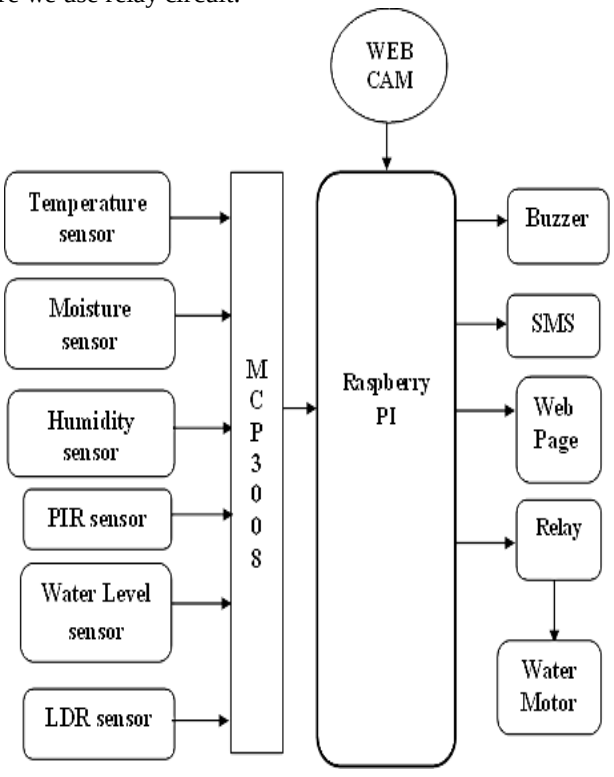


Fig: Block Diagram

In the above below block diagram Wireless Network Sensor (WSN) i.e. Temperature sensor for monitoring the atmospheric Temperature of the surroundings, Moisture sensor to know the Soil moisture content, Humidity to know if any rainfall or monitoring the atmospheric humidity content. PIR Sensor to detect the human/intruder presence and motion, LDR for light intensity and water Level sensor to know the water level.Web cam is installed to capture the image of crops in field and for intruder detection; images are captured and sent to user mail.

All these sensors are analog sensors and as our Raspberry Pi3 a single board computer which is programmed in python programming language doesn't have the inbuilt ADC so an external called MCP30008 is used to convert analog values to digital values.

Now our Raspberry Pi3 will update all the sensor values in the server accordingly and automatically on/off the buzzer and Motor according to the change in the WSN. And a webpage is programmed using HTML and PHP which is saved in the server i.e. Apache server and also SMS API is built to send SMS.

MCP3008 8 channel ADC

The MCP3008 is a 10bit 8-channel Analogue-to-digital converter (ADC). It is cheap, convenient to connect and doesn't require any extra components. It makes use of the SPI bus protocol which is supported by using the Pi's GPIO header.The explanation of how to use an MCP3008 device to grant 8 analogue inputs which you can use with a range of sensors is described. The circuit below indicates the MCP3008 to examine a temperature and light sensor.The first step is enabling the SPI interface on the Pi which is typically disabled by default. Please observe SITE article to setup SPI and set up the SPI Python wrapper. The following list suggests how the MCP3008 can be connected. It requires 4 GPIO pins on the Pi P1 Header.

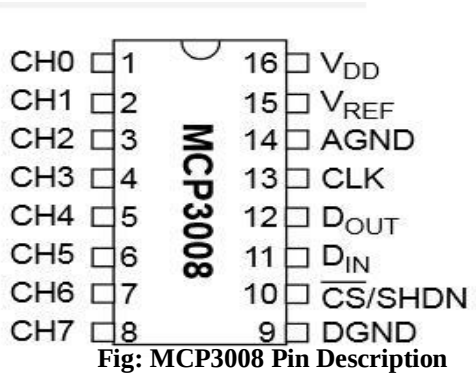


Fig: MCP3008 Pin Description

TEMPERATURE SENSOR

Temperature sensor (LM35) pin diagram is shown in below figure. As a temperature sensor, the circuit will read the temperature of the surrounding environment and relay temperature to us back in degrees Celsius. The LM35 is a low voltage IC which uses approximately +5VDC of power. The IC has just 3 pins, 2 for the power supply and one for the analog output.The output pin provides an analog voltage output that is linearly proportional to the Celsius (centigrade) temperature. Pin 2 gives an output of 1 millivolt per 0.1°C (10mV per degree).

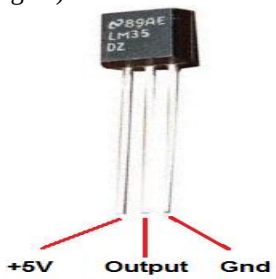
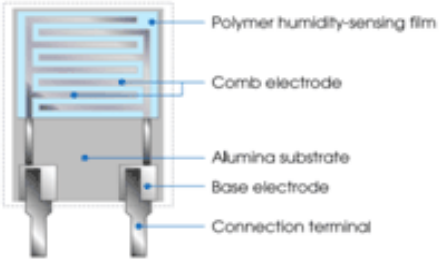


Fig: TemperatureSensor

HUMIDITY SENSOR

Humidity is defined as the amount of water present in the surrounding air. Humidity Sensor is one of the most essential devices that have been extensively in consumer, industrial, biomedical, and environmental etc.



MOISTURE SENSOR

The moisture sensor board points both analogue and digital outputs. The analogue output offers a variable voltage analyzing that permits you to estimate the moisture content material of the soil (using some maths!). The digital output offers you an easy "on" or "off" when the soil moisture content is above a certain value. The value can be set or calibrated the usage of the adjustable on board potentiometer.The module makes use of the LM393 "comparator" chipset to measure the moisture content.

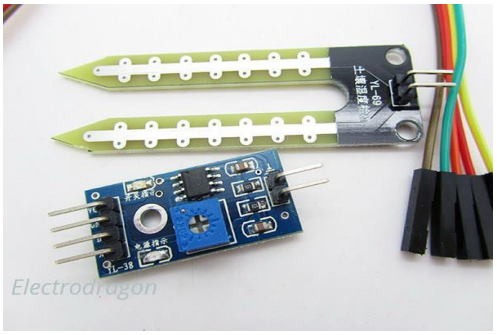


Fig: Moisture Sensor

LDR SENSOR

A light primarily based resistor works on the precept of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity (Hence resistivity) reduces when light is absorbed by means of the material.When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor substance are excited to the conduction band.

Fig: LDR Sensor

PIR SENSOR

PIR sensors permit you to sense motion, almost continually used to detect whether or not a human has moved in or out of the sensors range. They are small, inexpensive, low-power, convenient to use and do not wear out. For that purpose they are in many instances observed in home equipment and devices used in residences or businesses.

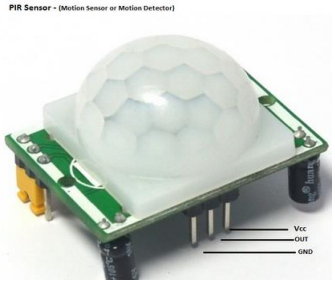


Fig:PIR Sensor

WATER LEVEL SENSOR

Water level sensor is an easy-to-use, low-priced high level/drop awareness sensor, which is received by having a series of parallel wires uncovered traces measured droplets/water quantity in order to decide the water level.

Fig:Water level Sensor

SUBMERSIBLE PUMP

Pumps that are absolutely set up underneath water. These are a single unit with a pump and electric powered motor. The most important reason is to be set up in a well but they can be set up on the bottom of a lake or

stream if positioned on their side or hooked up to a pier. No need to prime these pumps due to them already being beneath water.

Fig:Submersible Pump

III. RESULTS AND DISCUSSIONS

In this project, we successfully developed a system that can help in monitoring and controlling the irrigation system by way of analyzing environmental conditions.

The smart irrigation system proves to be a beneficial system as it automates and regulates the watering without any manual intervention.

Proposed irrigation system:

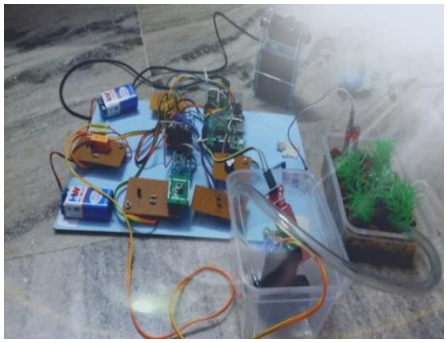


Fig: Proposed System

The circuit continuously checking the sensor values, and updates the "status" on the website.Web camera is used to captures the images of crops/plants and for intruder detection.

Fig: Web page screenshot

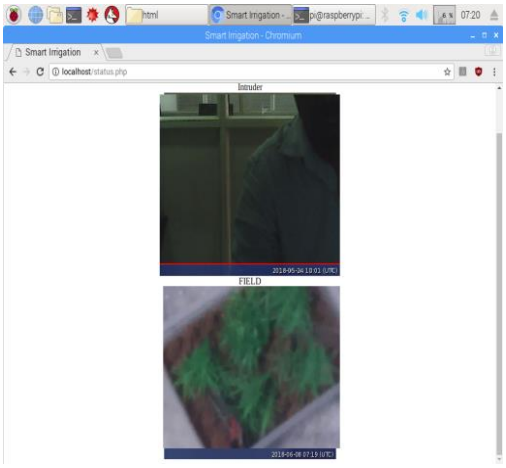


Fig: Web page screenshot

If any abnormality takes place in the field they will get a SMS and mail automatically.

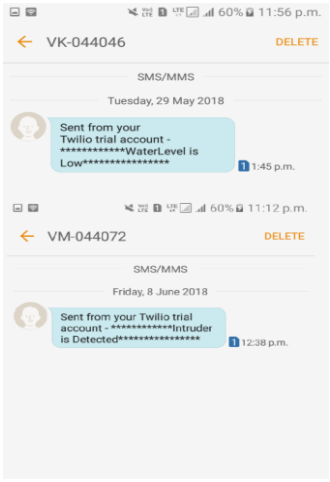


Fig: SMS screenshot

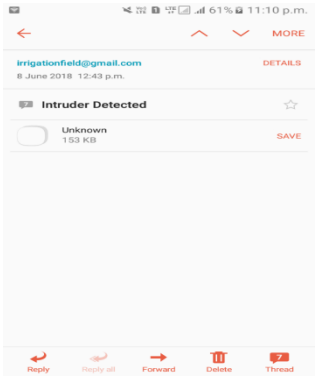


Fig: Intruder mail screenshot

IV. CONCLUSION

In the existing era, humans use a variety of irrigation methods through manual control, in which a person has to irrigate a garden/land at regular time intervals. This method looks to consume extra water and results in water wastage. Moreover in some backyard areas the place there is insufficient rainfall or watering plants, irrigation will become difficult. Hence we require an automatic device that will exactly monitor and manipulate the water requirement in the field. Installing clever irrigation system in fields/gardens saves time and ensures efficient use of water.

SCOPE AND WORK

- Our project scope can be extended by adding feature which can tell/predict the climate condition and water the plants/crops in accordance to the need. If rain is expected more, less water is provided to plant.
- Speech based alternative selection can be carried out for those who are unable to read.
- All the aspects on the system end can be developed in the regional language, which helps in convenient reading for the farmers.

V. REFERENCES

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