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Real Time Monitoring of Self Propelled Center Pivot Irrigation System using Microcontroller

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ABSTRACT

Agriculture is very important in everyday day life. Without agriculture we cannot satisfy our daily needs such as food. The process of developing the agriculture is very difficult as it depends on season, rainfall, water, soil, humidity etc. Rainfall is the important factor among this.

Due to the changes of the season the rainfall is not constant, due to the lack of rainfall the farming land becomes dry and the irrigation of crops is very difficult for the farmers. This is the major problem in the agriculture. To overcome this in olden days the farmers used variety of irrigation systems for better crop production. Irrigation is nothing but watering the crops in cultivating land. The irrigations such as drip irrigation, springler irrigation, surface, subsurface irrigation are commonly used in many countries.

These irrigation can perform a different characteristics and functions for a better crop production.

Drip irrigation method was used in Israel by using the tubes and pipes. The springler irrigation method was used in Australia. These two irrigation system are now commonly used in India. In this irrigation the drop of water is send to crops but the water is insufficient and crops does not grow faster.

Here we propose a new method of irrigation called center pivot irrigation system. The system is constructed in the center of farmland. It consists of sprinkler at the top and it sprinkles the water uniformly to all the crops. The crops get enough water and yield in a good manner. By using this method there is no water loss.

KEYWORDS: *Drip irrigation, Center pivot, Sprinkler, Sensor, Self propelled*

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INRODUCTION

The center pivot irrigation is a new type of irrigation invented in 1940 by the famer frank zyback for the better crop production the center pivot irrigation consist of sprinkler and it uses 0.27 to 30 gallons of water per minute it can irrigate area of about 130 acres and it contains different series of 5000 series and 8000 series.

It has two types of pivot such as short pivots and long pivots the short pivot is very high cost.

In this irrigation the water falls directly on the crops but in the traditional irrigation system the crops are shot into the air.

This results in wastage of water so we go for center pivot irrigation system in which irrigation in a circular pattern. Mostly freshwater is needed for agriculture. But it is decreasing due to the changes in the environment.

To plant a crop there are something to be considered such as type of crop to be cultivated, availability of water and soil conditions. In this irrigation system water is provided to all the crops in a uniform level. So the wastage of water is reduced and yield of the crop is increased.

LITERATURE REVIEW

GSM based Automatic Irrigation Control System for the efficient use of resources and crop planning by use in Android mobile in India**:** The objective of the project is the GSM based irrigation system may offer users the flexibility to regulate and control the operations of the irrigation system with little intervention to reduce the runoff from over watering for improvement in the crop yield.

Automatic irrigation system for sensing soil moisture content**:** The project proposes the automatic irrigation system for the sensing moisture content using pic(16F887) Microcontroller, which was automatically programmed for on and off of the motor when the soil moisture content reaches the define threshold level .since our proposed system is automatic, human involvement is totally prevented for irrigation purpose.

Impact the Automatic control system of closed circuit Rain gun irrigation system on yellow corn earth and yield: The objective of this project is the study the effect of the automatic control of closed circuit drip irrigation system as a modified irrigation system .Irrigation water was added in order to compensate for Etc and salt leaching required.

Automated Irrigation System using the solar power in Bangladesh: The main objective of the project specialize in rice field in nations depending on agriculture within the economy, such as Bangladesh. The primary concept of this gadget is to cognizance on the level of water in agricultural field because those fields lose lots of their merchandise due to floods. The sensor sends a message from the field to the person approximately the extend of water within the area.

Precision Irrigation based on Wireless Sensor Network: The objective of the project explains the different types of sensor node for monitoring and control of irrigation system.

Design of Smart Sprinkler Irrigation System: The objective of this project represent the design of smart sprinkler irrigation system using mesh capable WSN for monitoring and control of field irrigation system. This system provides accuracy by controlling the soil moisture level between the threshold.

Local weather interpolation using remote AWS data with error correction using spares WSN for automated irrigation for Indian farming: the objective is to predict real time local weather parameter of interpolation using automated weather station

Automated Irrigation System using a Wireless Sensor Network and GPRS module: The objective of the project is to implement the very efficient automated system with wireless sensor network. Remote interface was provided through GPRS module.

Smart Wireless Sensor Network for Automated Greenhouse**:** The objective of this project is the efficient automation system is vital for greenhouse management. It was designed to monitor soil moisture, temperature and humidity.

Automated Smart Irrigation System using Rasperry Pi: The objective of his project is to develop an automated sprinkler system that will help a farmer to know about his field, and the status of the plant at his home or he may be residing any part of the world.

PROPOSED APPROACH

It is composed by weather station. Many moisture sensors are placed at the middle of irrigating area to measure the amount of water in the soil. The datas are transmitted by LoRa modulation using a 4G network connection. The cloud architecture will collect, treats and store the data that are received from weather station.

The weather data is obtained by a micro weather stations which uses LoRa transmission system. It is a low cost protocol that has been chosen for its easiness of deployment. The micro weather station is based on weather sensor that contains an anemometer, a vane direction and a pluviometer.

BLOCK DIAGRAM

The block diagram of the irrigation system is given below,

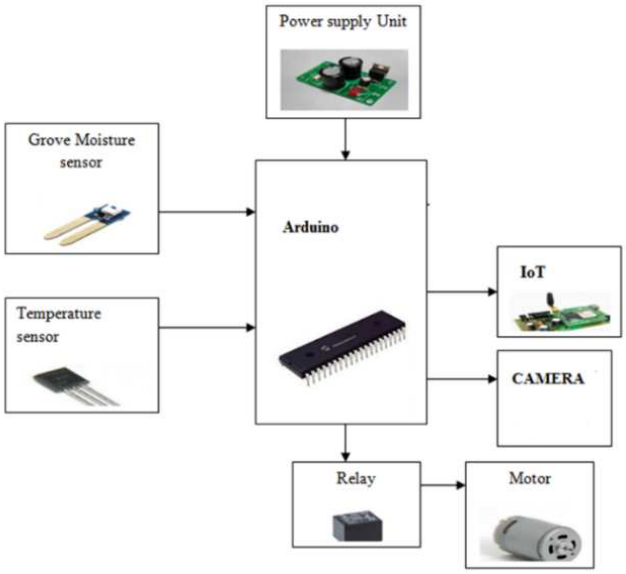

Fig1 BLOCK DIAGRAM OF IRRIGATION SYSTEM

TEMPERATURE SENSOR

As the temperature is generally considered as hot, neutral or cold, in engineering it is considered as precise, quantitative measurements of temperature. This is obtained by temperature sensors and regulators. Temperature sensors are used to measure the moisture temperature of medium. There are two kinds of temperature sensors, namely

Contact sensors

Non- contact sensors

CONTACT SENSORS-They measure the temperature of the object when there is no heat flow between them.

NONCONTACT SENSORS-They measure the thermal radiant power of the infrared or optical radiation received from known surface.

Fig 2 TEMPERATURE SENSOR

MOISTURE SENSOR

Moisture is the presence of water in the air. In agriculture, measuring the moisture is very essential for plantation protection and soil moisture monitoring. It is also used to provide the indication of moisture level in the environment.

Fig 3 MOISTURE SENSOR

SENSING PRINCIPLE

The moisture can be measured by using dry and wet bulb hygrometer, dew point hygrometer and electronic hygrometer. The electronic hygrometer employs capacitive sensing principle and resistive sensing principles.

IoT (INTERNET OF THINGS)

Two of AWS IoT sevice and provide smooth user experience coming preloaded with the firmware.

FEATURES

- The smart home IoT kit with Arduino will provide convenience.
- It can control the devices remotely in real time by controller options.
- Quick responsing technique.

ARDUINO

It is a computer hardware and software community which designs and manufactures microcontroller kits for building digital devices. The boards are available commercially in the preassembled form. Arduino provides set of digital and analog input/output (I/O) pins. They also feature serial communication interfaces for loading the programs. The microcontrollers are commonly programmed in C and C++. The Arduino project provides an integrated development environment (IDE) based. The main aim was to provide low cost and easy way to create devices that use sensors and actuators.

Fig 4 DIAGRAM OF ARDUINO

APPLICATIONS

- Industrial automation.
- Waveform generation.
- Frequency counter.
- Sensor interfaced application.
- Low power based application.

LCD

A Liquid Crystal Display is a flat panel electronic visual or video display which uses the light modulating properties of liquid crystals. It is used to display arbitrary images or fixed images which can be displayed or hidden, in form of preset words, digits and 7 segment displays as in digital clock. They are available in wider range of screen sizes than CRT and plasma displays. The LCD screen is more energy efficient and it can be disposed safely than CRT. It is an electronically modulated optical device made up of many number of segments filled with liquid crystals and arrayed in front of a light source or reflector to produce images in color or monochrome.

Fig 5 LCD DISPLAY

ADVANTAGES

- Low power consumption.
- No geometric distortion.
- Razor sharp image with no bleeding/smeering when used at native resolution.
- Emits less radiation.
- Compact light and weight.

POWER SUPPLY

The transformer steps the ac voltage down to the level of the desired dc output. A diode rectifier then provides a full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. The regulator circuit removes the ripples and remains the same dc value even input dc value changes.

Fig 6 POWER SUPPLY

OUTPUT

This system is simulated by using proteus 7 design suit software. In this the level of the soil moisture sensors will be varied from dry to wet and the microcontroller will read the value and send to the master unit for decision making. Depending on this values the LCD display will display whether the soil is wet or dry. The signal will be sent to the valve control unit to open or close the valve. The valves are represented by the Light Emitting Diode, if the valve is to be opened then the LED will switch ON, and if the valve is to be closed then the LED will switch OFF.

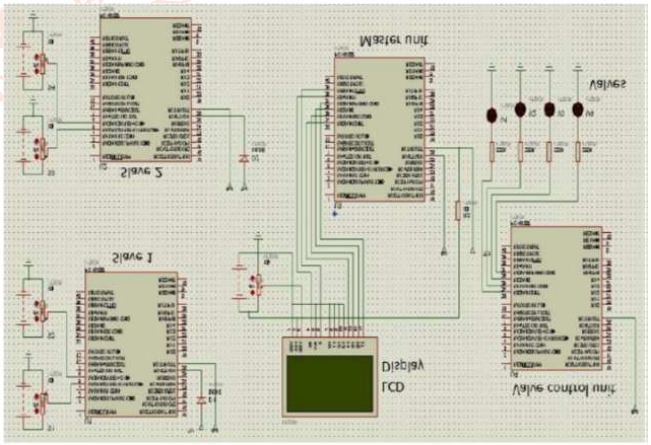

Fig 7 SIMULATION SET UP FOR AUTOMATED IRRIGATION SYSTEM

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