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Automatic Irrigation System

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Abstract

Agriculture is the backbone of Indian Economy. Irrigation is a basic determinant factor of Agriculture and it is the most powerful constrains on the increase of agricultural production. Irrigation is affected by highly inadequate quantity and quality of water, soil and minerals which are the most essential components. Since, it is hardly available in our country, it is necessary to use a suitable method which subsequently reduces human effort and to increase the productions amidst of the consequences such as leaching of nutrients from soil and water. The main objective of this paper is to use an efficient method of irrigation using the recent trends of our growing technology. It is by using mobile apps or remote control systems which is known as Automatic Irrigation System, which will be of great use to farmers that can be used from home. In this system, the GSM receives message from the user and sends to the microcontroller through which the action is implemented. Thus, this system can be efficiently used for soil and water management through Automation.

Keywords: *Agriculture, irrigation, water, soil, minerals*

INTRODUCTION

Efficient irrigation plays a very important role in production and profitableness in agriculture. Hence, it is necessary to follow correct irrigation techniques, improved water management systems. Irrigation system is broadly classified as surface irrigation, ground water irrigation. When it comes to surface irrigation the water is taken into account because the min criterion, the water level management is to be maintained for proper agriculture. When it mismatches it leads to water work at heads and inadequacy of water at the tail ends. So, the system should be designed in such a manner to take care of correct water provides. When ground water irrigation system is taken into account equity is that the main issue. If equity lags either ground water level goes down or salinity increases that damages the soil structure. In any of the above case, if the water level exceeds the soil moisture that could leads to leach soil nutrients. This scenario can ultimately scale back yields. The remedy for this problem is to monitor the soil wet and introducing the automated irrigation system that successively reduces water usage and maximize the potency. This system is implemented by victimisation soil wet meter equipped with Bluetooth device to transmit info to the receiver. And the irrigation is done by the remote control application using smart phones for the induction motor pump. One of the common approaches of remote monitoring is by using internet connectivity and wireless sensors. This system consists of microcontroller, radio-transceiver and set of sensors and uses cellular network which use dedicated GSM modem. Thus, this system is efficient.

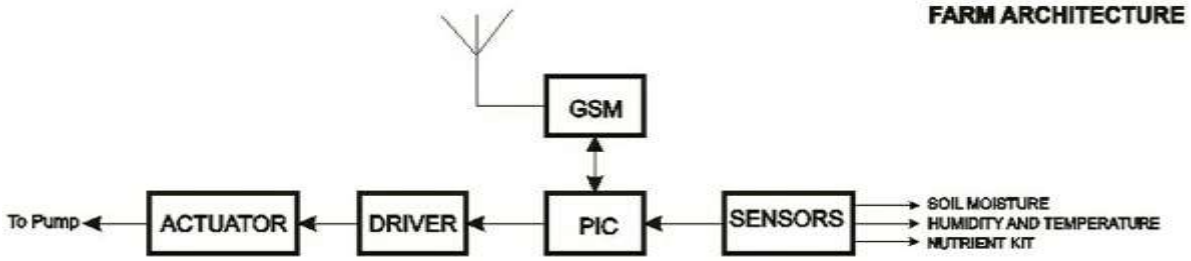

Fig. 1: *System Block Diagram.*

SENSORS USED IN THE SYSTEM

Electrochemical Sensors

Electrochemical sensors are capable of assessing abstraction variability of completely different soil chemical properties directly or indirectly. Soil fertility is usually measured victimisation either an ion selective conductor (glass or chemical compound membrane), or an ion-selective field result semiconductor device. This approach measures the potential voltage difference between sensing and reference components of the system, which relates to the concentration of specific ions (i.e., H+, K+, NO3-) Ion-selective membrane sensors offer opportunities for on-the-go soil nutrient(s) and pH scale measurements.

Soil Moisture and Temperature Sensors

There are two soil sensors namely moisture and temperature that are inserted in the root zone of plants. The YL-69 probe was selected to determine the soil moisture because of its low cost and availability. The probe measures the resistance of the water content in the soil which is inversely proportional to the moisture present in the soil. The probe was powered at 5 V using ADC port of the microcontroller. The soil temperature measurements were done using digital thermometer DS18B20. The sensor converts temperature to 9-12-bit digital word. The temperature is acquired using a read command and transmitted using 1-Wire bus protocol implemented in the microcontroller using one digital port. The sensor has ± 0.5℃ accuracy over -10℃ to +85℃ temperature range and a unique 64-bit serial number.

SENSORS CONNECTED TO DETECT MOTOR OPERATION

Temperature Sensor

The LM35 sensor is used to measure temperature connected to microcontroller. This temperature sensor which is used to measure temperature with electrical output proportional to the temperature. Two temperature sensors are used to ensure the reliability of the system. One temperature is mounted on the body of the motor and the other sensor is mounted at a suitable location to measure the ambient temperature. Whenever, temperature difference between these two sensors exceeds the specified safety limit, signal is sent to the user to switch OFF the motor.

DC Voltage Sensor

DC voltage sensors monitor input voltages ranging from 3 to 500 volts DC with a trip point accuracy of up to 1% in this application. Using electronic circuits to detect, monitor

and sense DC voltage, dc voltage sensors, monitors and voltage sensing relays can open or close the circuit when a certain pre-set over or under voltage condition occurs or the DC voltage falls outside the specified voltage level. When the voltage level decreases beyond the level, the motor gets OFF automatically and the signal is sent to the user about the problem.

WORKING

Initially the level of wet, humidity and temperature square measure label and the default worth is calculated. It is programmed in such how that if the sensor senses abnormally than the prescribed worth nominal actions can happen. Sensors are placed at their individual positions and the power is given to activate the device unit. Water level controller and pumps are aligned in such an approach that they activate only these device triggers out signal to microcontroller within the would like of water. Nutrient kit senses the nutritional facts for each month and information square measure sent to the farmer.

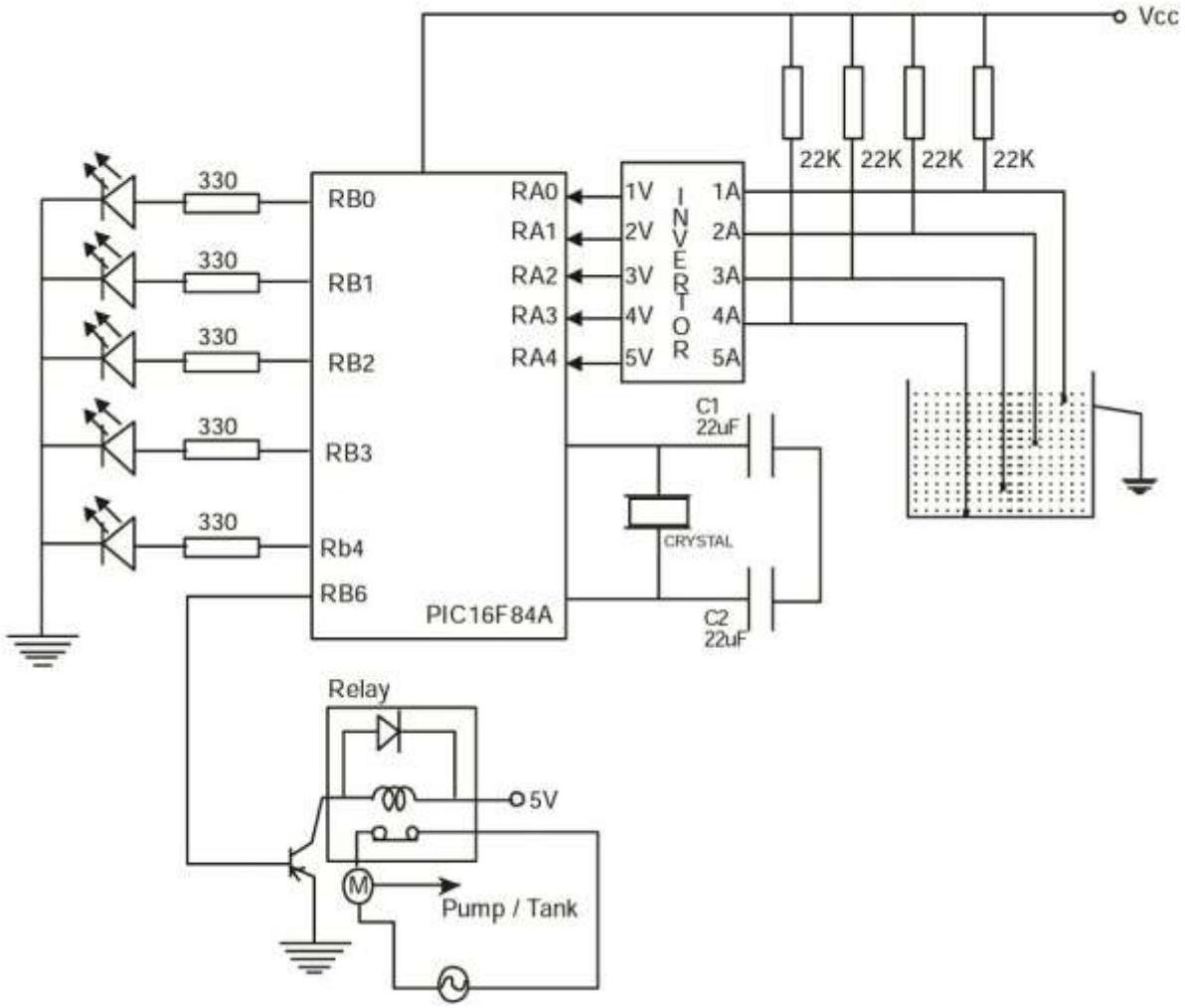

Fig. 2: *Working.*

Soil wet detector is used to live the quantity of moisture content gift in soil. Moisture detector information area unit fed to the microcontroller. When the wet content gift in the soil is dry, then water flow in an exceedingly tank starts to flow in a pipe by turn on the motor. When the wet content in the soil is high, then the water flow in an exceedingly tank stops to flow in a pipe by turn off the motor. The microcontroller controls the operation of the starter based on the data from the sensors. The same moisture content and flow level are showed in LCD display of micro-controller.

GSM MODULE

Using microcontroller system various operations can be performed like detecting temperature, voltage, humidity to control the occurrence of fault in motors due to the above mentioned parameters. If there is any change in these parameters, the corresponding sensors connected to the microcontroller indicate the user through GSM. To perform the various operations of sensing the temperature, voltage and humidity, sensors are connected to the microcontroller. The GSM modem communicates with the user mobile phone to intimate the condition obtained for the microcontroller. Using this technology, the user can receive information from regarding the status of irrigation system. Also, if there is an occurrence of faults during the irrigation, the microcontroller signals the user about the fault and the user can work for remedy. The user can control the starter using missed calls when needed or when abnormal conditions exist. This system provides remedy to the over irrigation, leaching of nutrients from the soil. It also ensures the proper management of water for irrigation.

CELL PHONE APPROACH

Based on the device conditions, the signals are sent to the microcontroller to switch ON/OFF the motor through the starter mistreatment the relays. The relay is controlled by the ports. The GSM modem communicates with the user mobile phone to intimate the condition obtained for the microcontroller. The serial port adapter works in data and AT modes and desires to be properly organized. During power ON condition, serial port adapter is initially in information mode and causation "///" characters inside three seconds, the device is moved into AT mode for configuration. If match is found, it starts data communication between microcontroller and GSM. AT commands are sent by sending text strings 'A', 'T', along with specified command strings through serial port to cell phone and are executed on receipt of carriage return. The result codes are sent by cell phone to system to indicate the status after execution of command. The missed calls are received from the user mobile to perform specific task at the time of fault occurrence. Hence in this system, if there is an occurrence of faults during the irrigation, the microcontroller signals the user about the fault and the user can switch OFF the motor and the fault is corrected. Hence, the farmer can irrigate the land using remote control application. This system provides remedy to the over irrigation, leaching of nutrients from the soil. It also ensures the proper management of water for irrigation.

CONCLUSION

Reduction in labour cost, prevention of unwanted water spillage, prevention of leach nutrients from the soil, minimization of occurrences of motor faults and intimation to the user regarding the faults and completion of task are the blessings of this method. The system proves to be a great boon to the farmers whose pump sets are settled far away

from the sector and conjointly for people who are far away from the fields engaged in another work like getting fertilizers, this system helps them to irrigate at right time. Due to the aptitude of device using mobile phones and intimation regarding any abnormal conditions, this system seems to be economical.

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