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MOBILE INTEGRATED SMART IRRIGATION SYSTEM USING IoT

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ABSTRACT : Today's world, the scarcity and usage of water is increasing day by day, it is very much important to conserve water for the future generation. The water requirement is very much needful for irrigation system and at a same time, proper management of water is also very much important with the available sources. Therefore a smart system is essential to manage the same. These papers present a smart system developed for irrigation system using IoT (internet of things). The main purpose of this system is to periodically monitor the soil's moisture, humidity and temperature levels which are very much required for the crops, based on requirements, the water supply is pumped to the field and at the same time the farmer will receive the real time information to farmer's smart phone.

Keywords: At-mega48, Temperature Sensor, Fire Detector Sensors, 16X2 LCD, GPS module, GSM Module, IoT, Motor.

1. INTRODUCTION

India is a rich agricultural base country, 70% of the country's population is still depending on agriculture. Since agriculture is the main source, at most care and priority to be given for modern farming technologies in irrigation system to achieve higher production and at a same time system should overcome the difficulties found in traditional irrigation . In agriculture, the yield mainly depends on the properties of the soil such as humidity, moisture and temperature levels [4]. For successful irrigation water requirement is very much essential, There is always observed that the supply of power to Irrigational pump is not continues and most of the times the power supply to the irrigational pump sets are given during night times. If farmer fails to follow the schedule time then agriculture will become difficult due to non availability of water. The availability of power is not the primary reason for the yield of crops, other parameters such as humidity temperature and condition of soil will play a major role in the yield .This paper will propose a smart irrigation system with a real time monitoring and master controlling of the various parameters related to soil condition and water requirements of the field, to increase yield and also provide protection to the field using solar power system without depending on the power supply companies . This proposed work will integrate the user with the smart system to receive real time information and to take necessary action.

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2. LITERATURE REVIEW

Vaishali S[1] developed a system using Raspberry pi for the irriegation system using WSN 9wireless sensor Network). This system is a technique developed using IoT. Here the sensors are placed in the agricultural field to measure soil moisture content along with level of water available in the tank.

Kishore kumar Rout [7] in this work a a solar power Smart irrigation system using solar paanel/power. The data is collected using smart sensors and its output is given to the master collector for further action. This master controller sends data into the network layer then there exist connectivity between the controller and the user.

Sanjeev Thakur [3] in this paper the A number of parameters are monitored effectively with the help of sensors and this data is completely monitored with the user with the help of wireless field monitoring system using IoT.

Proateek Jain[4] proposed an optimized irrigation system using automatic water control for crops based on the specific irrigation activity. The level of irrigation is completely depends on the parameters related to soil condition ,water level .Here a system with optimum usage of water level is reduced and the power consumption is also reduced and optimizes the usage of water.

shwetha B saraf [8] in this work an interconnection of devices through IoT is made with unique identifier by this the interference of human and data can be transferred to the user .This work will allows the better management of available resources can be achieved .The real time data can be monitored by the user with the proper smart objects embedded with the sensors enabled interactions.

G Sushanth [9] proposed a smart irrigation system using IoT for providing information about agricultural fields condition to the user and the up action based on the inputs received In this work developed a Smart agricultural System that uses advantages of latest technologies such as IoT, wireless sensor network and ardenio for monitoring the soil conditions to improve the yielding of the effiient crops.

Arjith ghosh[10] is a an attempt made for an Automated irrigation system which enables the supervison of the soil parameters such as temperature, humidity of the agricultural field. The sensing system gives the feed back to the controller and do the necessary requirements on the timely action for efficient yield by a wireless communication between sensors and as well the controller.

3. PROPOSED SYSTEM

The proposed work mainly helps the farmer to improve the quantity of yield by proper sensing of temperature, humidity ,moisture level and required water based on the crop requirement and provides protection to the field without human intraction.By using this IoT[9] will make system more efficient ,this system mainly uses wireless sensors placed in the agricultural field to collect data with the real time values ,a master controller is embedded to receive and transmit the data the necessary controllers for timely action. Each sensor will

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send data related to temperature, soil moisture level and humidity to the processor and relay switching units using GSM module. The received data from the controller is stored in the cloud server. The cloud server will act as decision maker to take necessary action by comparing the received data with the predefined data. Once the data is processed the necessary action will be taken by the wireless sensors. The microcontroller will controls the relay switching action and sends the recent information to the user.

This architecture is designed using technology based on Adriano to provide the highest scalability for the network.This work uses the Atmega 48 microcontroller .The agricultural system mainly aims for smart water usage and to improve the crop quality and quantity. The proposed will offer maximum advantages to the user By providing real time information of the soil condition and allows smart and systematic usage of water, remote monitoring will make less human interference and the power consumed by the irrigation pump set is also reduced. The proposed system has following blocks .

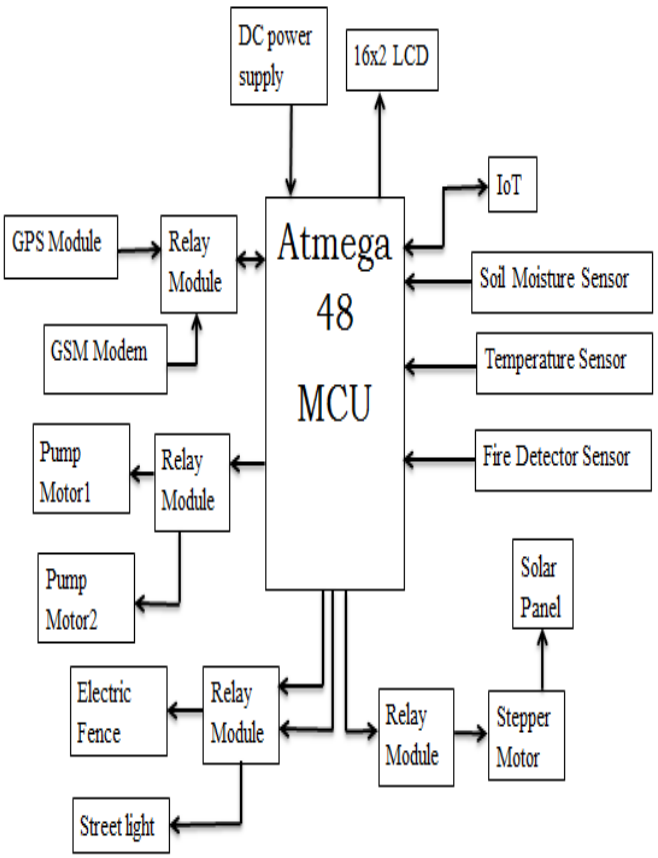

Figure 1: Block Diagram of the proposed Mobile integrated smart irrigation system using IoT

Microcontroller: - Atmega-48 is the microcontroller which used in this system because of its simplicity which acts as main controller for entire system.

Soil moisture sensor: This sensor is used to detect the availability of water in soil. Basically it consist of 2 electrodes producing electromagnetic field lines across this sensor and effected area with the help of waves which is around 3 cm .This sensors are designed to generate the

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voltage proportional to the dielectric permittivity ,it is designed mainly to measure soil resistance. If the resistance is high means moisture is less.

Smart Sensors: this sensors are embedded with the microcontroller to do the necessary sensing activity ,the sensors may be of Temperature sensors ,fire detector sensors etc

Temperature sensors: -Its main function is to sence the temperature of the soil this will send signal to microcontroller.

Fire detector sensors: -This is an highly sensitive sensors which is used to detect any accidental fire caused in the field that will be detect & this o/p of sensor is given to Microcontroller.

Relay module: it is a separate hardware device used for remote device swithing.

16x2 LCD: -This is an output display device which is connected to the microcontroller output pin to display any data.

GPS Module: -The main function of this module is to send & receive message to the smart phone. This module can send only message to the farmer's phone and also this system is integrated to the microcontroller [6] which can send signal to the fire department in case of fire accidents.

IoT: -It's a cloud server the main purpose of IoT is ,it will be always having a reference values which are preloaded based on this the inputted sent by microcontroller it will compare the parameters which is preloaded & compares the actual values and sends signal to farmers.

Motor: -Here the design made of a prototype so a DC Motors are used to pump water. (Mention motor Rating)

4. Description Of The Working Model

The above block diagram shown in the figure 1, shows the proposed system It mainly consist of sensors ,Atmega 48 microcontroller ,GSM module and relay switching units. The parameters like soils moisture, temperature humidity are set according to the crop requirements. The microcontroller makes the control action by the server resulting in control of irrigation. The received data is transferred to cloud through internet for final computing action, the master controller will receives controlling action from cloud server and transmits to the respective controllers and microcontroller will execute the necessary action. Here the cloud is responsible for decision making at the right moment .According to the type of crop ,the threshold value of soil moisture, temperature and humidity is set ,based on that condition the duration of watering can be changed.

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Figure 2: Proposed Prototype Working Model of Smart Irrigation System

The above figure 2 shows the prototype model developed for the proposed work .This model is a practical example for a proposed smart irrigation system, In this work the agricultural field is surrounded by electric fencing. The required power for the proposed system, farmhouse and electric fencing is generated by Solar Power generation. The system will power lighting to street lamps and fencing during night time and power will automatic disconnection during day time. The user can completely monitors the activity without his interference in the surrounding area.

5. CONCLUSION

The proposed work is a low cost smart irrigation system with simple design, helps in proper management of water usage with reduced power consumption providing maximum yield along with smart protection to the crop, offering maximum flexibility to the farmer's requirement without his interference.

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