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INTERNET OF THINGS BASED SMART IRRIGATION SYSTEM

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ABSTRACT - The design and development of a smart Irrigation system in Agriculture environment in real time has been reported in this paper. The system principally uses sensors to get the status of field and update to theIoTpowered cloud and necessary parameters that are turned on or off in accordance with programme threshol d values as needed.If the conditions become unusual, the system is able to keep an eye on the status send.Throu gh a web interface, the concerned authority can keep an eye on and manage the system.This study proposes an I oT-based system that employs real-time data input.

This approach can be applied in an agricultural setting to lessen the man power in the fields which will reduce the physical presence all the time. The system will be used with ATMEGA32 processor used in the implementation of sensor module and other communication environment. Effective equipment must be used to improve water quality, monitor humidity and increase crop yields. This article describes the latest technologies in agriculture for smart water systems using Artificial Intelligence and IoT. This article presents different equipment, modern irrigation systems, various comparisons and needs. Finally, various issues, problems and future directions for smart water management research are presented. A prototype model is developed and tested with high accuracy result.

Keywords: Irrigation, ATMEGA32 processer, IOT.

I. INTRODUCTION

Up to 70% of all water resources are used in agriculture, which is also the primary source of food and the bigges t user of fresh water [1].This large proportion of water usage helps to explain why experts are becoming more in terested in the prospect of using less water for irrigation.

A number of ideas have been developed around this, one of which is "sustainable irrigation," which focuses on conserving water resources by implementing sensible regulations that reduce water use [2].

In most fields, there are multiple plant species present, and each variety has varying water requirements.Farmers frequently overirrigate their fields, pumping more water than is necessary, resulting in decreased yield as well a s water and energy loss.hand, the use of Internet of Things technology has grown significantly in recent years, and as a result, there have been more and more devices connected to the Internet as a result of the need to[4] collect data from these devices for various Internet of Things applications

It is estimated that the number of connected devices will reach 25.1 billion by 2025 [5]. In the field of irrigation, IoT offers various applications to monitor crop growth and support irrigation decisions, making it a logical choice for smart water management applications [6]. Currently, despite the spread of IoT, there are still some challenges that prevent the widespread use of IoT for precision irrigation, such as the need to [7].In this study, a proposal for a smart irrigation system based on the Internet of Things was presented, through which the appropriate amount of irrigation can be controlled, as well as the appropriate irrigation time, the considering weather conditions of the crop and soil [8].In this study, a proposal for a smart irrigation system based on the Internet of Things was presented, through which the appropriate amount of irrigation can be controlled, as well as the appropriate irrigation time, considering the weather conditions of the crop and soil [9].

Although there are many studies or proposed systems in this field, however, there are problems in representing these proposed systems, most notably: (1) Adopting fixed boundary values at which the irrigation decision is taken, which cannot be changed easily or at any time according to the supervisor of the irrigation process. (2) The amount of irrigation is fixed for all crops/plants without taking into account the existence of a difference in the amount of water required for each,[10]

The amount of irrigation is fixed - non-dynamic - for a single crop/plant without taking into account the difference in other factors affecting the soil, such as (soil temperature, air humidity, air temperature) and their impact on determining the appropriate amount based on those variable values [11]. Accordingly, this study attempts to overcome these problems by proposing a new irrigation architecture based on the Internet of Things, as well as some other additional features that increase the efficiency of irrigation management [12].

II. LITERATURE SURVEY

Few research papers have been studied and it was observed that few sensors used to monitor the data such as temperature, soil moisture, water level, humidity and PH sensors, NPK sensors it has been collected information to server. After the research in agriculture field, researchers found that the yield of agriculture goes on decreasing day by day. We use of technology in the field of agriculture plays important role to increasing the production as well as reducing extra man power, water requirements. A fully automation accessing of irrigation motor where Prototype includes number of sensors node placed in different directions of farm field. Each sensor is integrated with a wireless networking device and data received. ATMEGA32 processor used in the irrigation system and determined irrigation amount based on distributed soil water measurements.

1. Soil moisture, Temperature, Humidity, Gas Soil moisture is the water stored in the soil and is affected by precipitation, temperature, soil characteristics and more. As moisture availability decline, the normal function and growth of plants are disrupt and crop yields are reduced. As climate changes, moisture availability is becoming more variable. Since moisture is critical and water weather prediction and numerous sensitivity studies investigating the impacts of soil moisture initialisation. Plants need four things to survive: light, water, soil and air. However, to raise healthy plants, the most important element is the effect of water Respiration in plants The ATMEGA32 processor can be programmed to analyse some signals from sensors such as moisture,

temperature and humidity PH and NPK. A pump is used to pump the water to fertilize and water the plants. This research work enhance to help the small-scale areas cultivators will be increased the yield of crops then will increase government economy. Automating farm or nursery irrigation permits farmers to use the correct quality of water at the correct time. Additionally farmer's mistreatment automation instrumentation is able to scale back runoff from over watering saturated soils, avoid irrigating at the incorrect time in a day. They lack in an exceeding featured mobile application developed for users with acceptable user interface. It solely permits the user to observe and maintain the wetness level remotely in no matter of time. The process of water leaving the leaves through evaporation via the stomach on the underside of the leaves.

A humidity sensor senses, measures and reports both moisture and air temperature. The ratio of moisture in the air to the Highest amount of moisture at a particular air temperature is called relative humidity. Relative humidity becomes an important factor when looking for comfort. Humidity Sensors work by detecting changes that alter electrical currents or temperature in the air.

Soil temperature appears to be more critical than air temperature when irrigating during mid-summer. Irrigation water gets warm, but it's okay when the water is cold. There are two reason for this, colder water holds more dissolved oxygen and colder temperature keeps demand for oxygen relatively low. 2 Temperature, Moisture, ph value of soil, Humidity Soil pH is used to indicate the acidity of soil, and is ameasure of the concentration of hydrogen ions(H+) in the soil solution. pH is measured from 1(acidic)to14 (alkaine, with 7 being neutral and is measured on a negative logarithmic scale. The lower pH , higher the acidity. Most plants are favoured by a pH between 5.5 and 8.3.Moisture, Temperature, PH content The pH of irrigation water should usually be within the range of 5.5 to 6.5 enhance the solubility of most micronutrients and avoids a steady increase in the pH of the growing medium. This pH range also optimize the solubility of nutrients in concentrated fertilizer stock solution. Moisture is a presence of a liquid, especially water, often in trace amounts. Small amount is water may be found in the air and in foods.

Water scarcity has been a big issue for agriculture. This proposed idea is beneficial to the farmers to irrigate the farms efficiently using an automated irrigation system based on soil temperature, moisture and pH. There is increased pressure on existing water requirements globally. The productivity of the irrigation system.

III. EXISTING SYSTEM

Primary investigation is administered under the subsequent stages, like Understanding the existing approaches, Understanding the wants, developing an abstract for the system. Soil moisture sensor, temperature and humidity sensors placed at roots of a plant and the data is given to android app. The value of soil moisture is given to micro controller to control water quantity. Temperature, humidity and soil moisture values are displayed on the app in user's device. Smart Irrigation System on Sensing Soil Moisture, intension is to create an automated irrigation process which turns the water motor ON and OFF on detecting moisture percent of the earth. Smart irrigation system developed for the irrigational use of agriculture, which is placed at the remote location and required water provides for plantation when the moisture of the soil gets low than the set-point value. This smart irrigation system made use of GSM to control the system which may cost more. A wireless application of drip irrigation automation supported by soil moisture sensors in this smart irrigation is carried out using soil moisture values. But this IOT smart system displays temperature and humidity values.

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IV. PROPOSED SYSTEM

The project's proposal is to use an ATMEGA32 CPU to create a smart irrigation system that is internet-based.Parameters like soil moisture and temperature will be the main focus.
This approach will take the place of traditional farming methods.We plan to create a system that will enable far mers, whether they live nearby or elsewhere in the world, to stay informed about the condition of their fields.It s uggests irrigating the agricultural lands automatically.At the moment, automation plays a significant role in hum an existence.Along with comfort, it also saves time, energy, and improves efficiency.These days, companies use automation and control equipment that is expensive and unsuitable for use.Advantages Of The Proposed SystemThe proposed system provides real time information on the field irrigation. And how much water is supplied to crop based on actual requirement of the crop. And to what extent the fertilizer we need for agriculture have reached there. And this shows us through automation and thus save our fertilizer and also saves the water required.

V. SYSTEM ARCHITECTURE

This archetype monitors the amount of soil humidity and temperature. A predetermine range of soil moisture and temperature is set, and can be varied with soil type or crop type In case the moisture or temperature of the soil diverges from the specified range, the watering system is turned on/off.

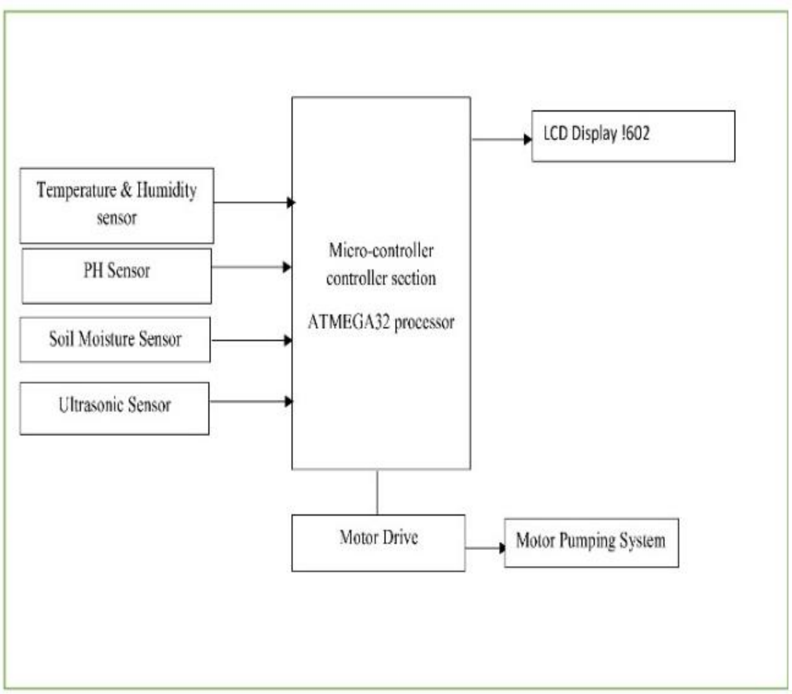

Figure 1. System Architecture

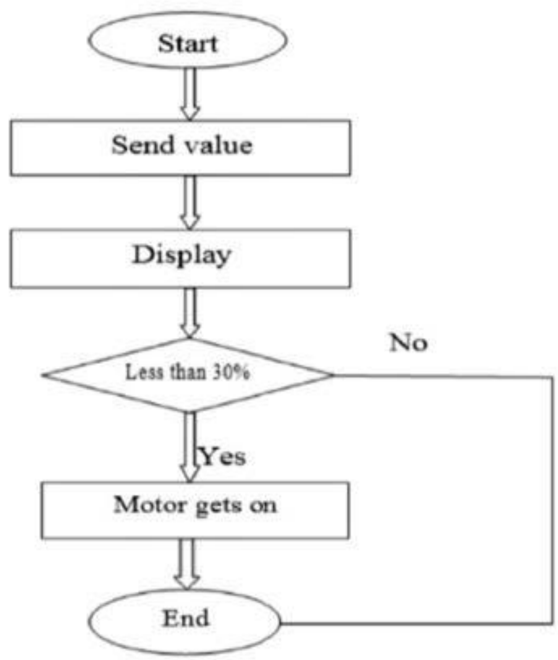

Figure 2. Algorithm to Handle Water Pump

In case of dry soil and high soil temperature, it will activate the irrigation system, pumping water for watering the plants.

The block diagram of smart irrigation system is characterized in Fig1. It consists of a microcontroller (ATmega32) which is the brain of the system. The water pump and the servo motor are coupled with the output pins. If the sensors depart from the per-ordinated range, the controller turns on pump. The servo motor is used to control the angular point of the pipe, which ensures equal diffusion of water to the soil The moisture and humidity sensor sends the data to the controller unit.

There the received data from moisture, temperature and humidity sensor units are being sent to the online database in the form of double and integer data. The Controller has its own inbuilt Wi-Fi module which can be connected to the mobile Wi-Fi, after this, all the data is sent to the Mongo DB database. And also, the motor pump gets the signal from the controller, if the moisture level is less then the motor is automatically on and after some seconds of delay, also like that if the soil moisture level is more than sufficient than the pump is being off. Similarly, the data is being updated in the database

VI. SYSTEM PERFORMANCE AND EVALUATION

This project is implemented using ATmega32 Processor and sensor are connected using jump cable the entire system is observed and controlled by ATMEGA M32 processor. Basic DC motor are used for automatic water supply. Establishment of connection with about the use of sensor network which collects the data from different types of sensors and using ATMEGA32 and all these parameters can also be monitored using LCD display. Controlling of motor can be done autonomously based on the need.

Step1: Initialize sensors and collect the data from sensors and store information in micro controller.
Step2: Compare sensor data with predefined threshold limits.
Step3: Store the data in web server for future research purpose.
Step4: Develop statistical model based on the data received through sensors placed at farm for improving smart farming.
Step5: Switch on/off the devices when there is need autonomously using sensor data.

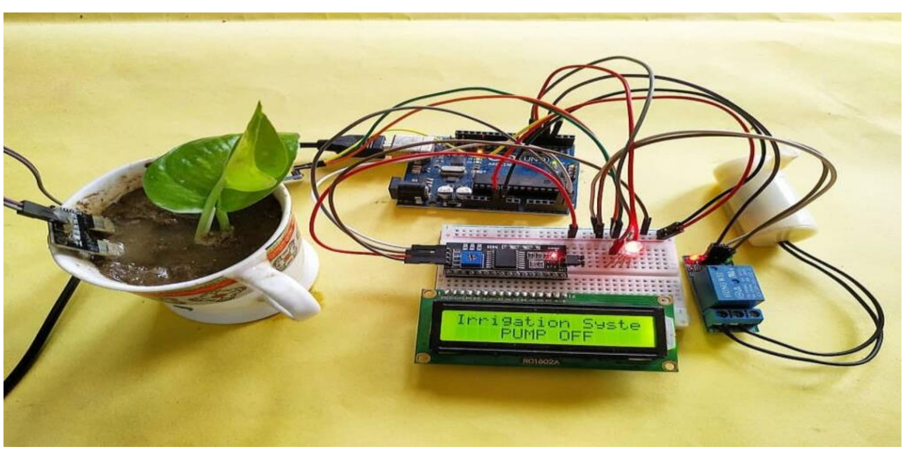

Figure 3. Prototype of the proposed system

Power supply is provided. To Sensor values are displayed in monitor by using ATMEGA32 Processor operating system. For Connection establishment is provided by using java coding. Here Motor automatically ON and OFF based on Soil values

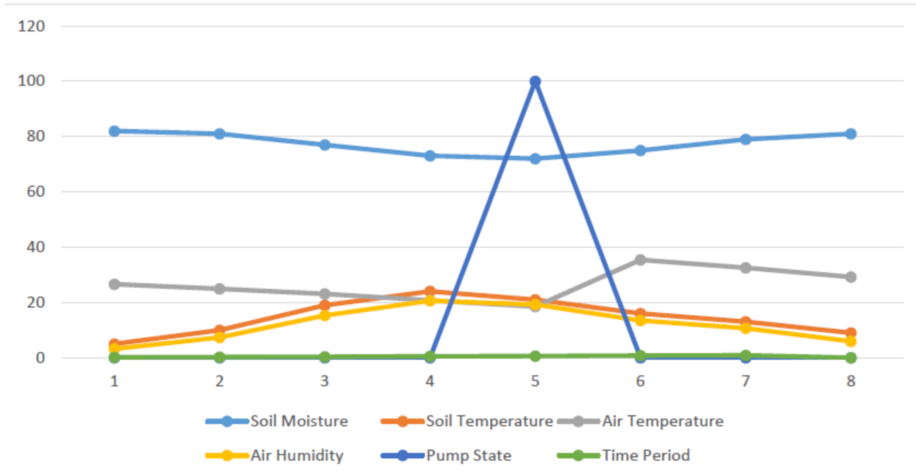

Figure 4. The relationship between reading sensors and determining the appropriate amount of irrigation MSM

Here the Sensor values are evaluated and displayed in system monitor using Arduino OS. The motor automatically will be ON based on readings.Here the Sensor values are evaluated and displayed in systemmonitor using ATMEGA32 OS. The motor automatically will be OFF based on readings.

VII. CONCLUSION

The suggested methodology in this work determines the ideal amount of irrigation by utilising sensors for soil te mperature, moisture content, and ambient temperature and humidity.This study made a number of innovations, one of which was the use of a dynamic component—that is, a changeable threshold valuein irrigation decision-making.Depending on the type of plant and its needs, it could change.Similarly, the right amount of irrigation d epends on how soil temperature, air temperature, humidity, and soil moisture relate to one another.
These variables determine the value at which soil irrigation will cease, and an automated or manual watering m ode can be selected. In the future, it is planned to add rain and water level sensors, as well as an option to select the appropriate irrigation plan based on available quantity, such as basic, medium, or full irrigation, depending on how much water is in the tank and how much is needed. In addition, artificial intelligence and deep learning will be adopted to make irrigation decisions based on data entered into the system during training.

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