Implementation Paper on IOT Based Smart Water and Fertilizer Sprinkle Irrigation System

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Abstract: Automation is becoming indispensible part of the modern life. Agriculture is a crucial sector where the automation must be involved. Present work describes a IOT based smart water and fertilizer sprinkle irrigation system which comprises of a stepper motor, inertial measurement unit (IMU), water sprinkler, soil moisture sensor and temperature sensors. The moisture and temperature sensors collect information about the water content and required level of water for the plants from the surrounding soil. This information is fed to the microcontroller. The controller then compare data input with the standard data and decides the amount of flow of water or fertilizer in the specific area. The system is designed so that it could cover specific area with specific volume of water with the help of stepper motor for the motion of nozzle and the IMU for the inertial mapping of the targeted area in the vicinity of plant. The system involves web interface using IOT. This provides ease of operation and improves connectivity towards the end user. The farmers can easily observe the condition of each plant/specific area and amount of water/liquid fertilizer being supplied to it. This system could reduce human efforts, loss of water and fertilizers and would be definitely useful for increasing the crop yield.

I. INTRODUCTION

Agriculture has been playing crucial role in our life. Irrigation, fertilizer supply and several other tasks consume human efforts. Today automation is reducing human efforts. AI is providing control and precision in the tasks. Thus it is a need of time to introduce the automation in agriculture for irrigation, for supplying fertilizers for maintaining the soil and temperature of the surrounding etc.

II. LITERATURE SURVEY:

There are lots of works related to drip irrigation [1], automated sprinklers [2] in the literature. Devika et al. used the ardiuno for automated sprinkler [3]. Udathu et al prepared the temperature sensor based automatic water sprinkler [4]. The humidity sensor based automated water sprinkler have also been observed I the literature. There are some attempts made to improve the systems by providing the GSM based connectivity. The WAN and other systems for the provision of remote control and user friendly interface. Internet of Things (IOT) offers a bridge between people and things to be linked short of any limitations happening on time, place, person, and connectivity and service [5]. Computerization is a significant tender of IOT mechanism. IOT has several applications such as energy consumption monitoring and control, the emergency medication van, automated patient monitoring etc.via consuming various types of sensors and actuators that regulates glows, hotness, and moistness.

Internet of things (IOT) is the mechanism includes numerous things connected with each other via internet. IOT has been recycled in numerous requests viz. Healthcare [6], marine quality monitoring [7], power management [8], control monitoring [9], street light controlling [10], pest management [11] industrial automation [12] and home energy management [13].

Out of the several automation systems used in the industry, IOT has been preferred because, It delivers firmest interaction between end user and the various resources connected, high speed and precise control, reduces human efforts, provides security and most of all, high efficiency.

Hence in the present work it was decided to apply the IOT for the end user interface and ease of handling of the things. The theme of present work is to implement the IOT as well as Inertial Measurement Unit (IMU).

It will provide the better connectivity between the end user and things. This will also reduce the human efforts, excessive wastage of water and will provide the water and nutrients as per the requirements of the plants.

According to the current market scenario, there are not many solutions available that solve grass irrigating problems for example, forever introduced water system frameworks or standard sorts of sprinklers, are costly, inefficient, badly arranged, and additionally has restricted scope of separation/introduction to be a decent decision for surprisingly formed gardens.

This paper [1] has proposed a system that is very basic and doesn't bring anything new to the table. It uses a system that has sensors for moisture, temperature and humidity, and uses arduino to execute its functions. It is partially automated as the user needs to keep a check on the water level of the system. This system uses a GSM module for communication.

This paper[2] proposes a method that uses multiple sensors i.e Temperature, moisture, humidity and light to make a smart irrigation system. The data is sent to a webserver for data analyzing and processing, it is stored in JSON format. The light sensor senses the light, to maximize the functioning of the plant, a light is deployed as well. They plan to use smart algorithms to optimize the system.

Kalyan et al (2011): The requirement for frameworks that make horticulture simpler and progressively supportable includes expanded inside the previous couple of years. The capacity to preserve two of the most vital assets of a rancher, water and time, has been the most recent test. A framework that gives this capacity using efficient and solid techniques, for example, remote sensor organizing, sprinkler water system, GSM, SMS advances and promptly accessible cell phone gadgets – is sure to enable the ranchers to show signs of improvement yield and on a bigger scale , help the agrarian and financial development of the nation.

III. PROPOSED SYSTEM MODULE

In this system we have several hardware like Fingerprint sensor, Smart RFID reader and tag, Arduino, ESP266, Raspberry pi. In this system Present smart automated water sprinkler (SWAS) comprises the components for two main tasks viz. plotting and liquid transporting appliance. It can remain installed at the interior portion of a PVC hose through turns fixed scheduled which ever finish on behalf of comfort of procedure. There are three modes of operation for the system viz. mapping mode, usage mode and testing mode[14]. In plotting style, a element is trolled around the boundary for a preferred area. This exploits IMU to plot the margins of several land of any outline and scope supposing that there is not any object at interior of the . The recorded facts for these spaces are stowed forever consenting of single-time mapping. In custom mode, the unit is trolled into the internal of a formerly plotted space with a standard garden tube involved. Followed by detection of their position inside detailed boundaries of the plot. Then, through a water stream valve organized by a stepper motor & an IR sensor, the system twitches leading water through a spray nozzle avoiding the overflow within noticeable margins. In challenging mode, the smart automated water sprinkler system produces a perimeter map as per the specifications provided by end user. When set and outfitted with water, the
SAWS framework can change in accordance with the best possible shower remove as the splash spout was pivoted, and in this manner abstain from watering unintended region and items.

Hardware Used

For the present work, arduino uno 328P, LM 35 temperature sensor, E-77 soil moisture sensors are utilized.

Software Used

Ardiuno is equipped with several built in commands in its library. From those the desirable commands were chosen. The system interfacing with IOT has been emphasized by using Cayney. Using the cayney dashboard, we can interface different sensors and actuators with the IOT[15].

System Architecture

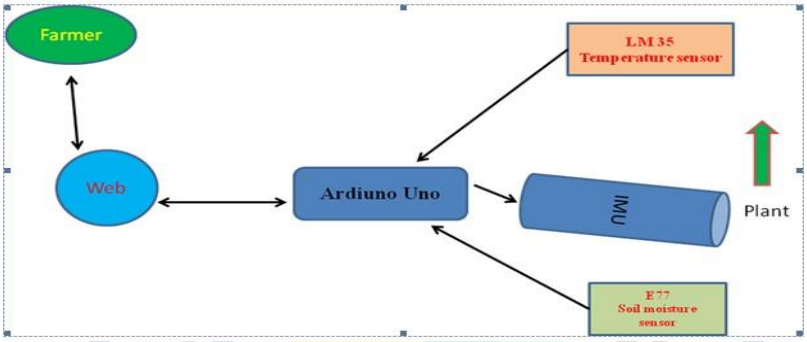

Figure 1: System Architecture

IV. Conclusion

We provide a conflict free and user friendly way to manage documents by using them digitally. Thus the system can provide AI as well as human control over the water supply. Hence it is beneficial. With the implementation of IOT the system is faster and more reliable. The user system interface, built in library of Ardiuno and the cayney software are adding the usability of this SWAS

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