

A SURVEY ON SMART IRRIGATION FOR HOME GARDENS

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Abstract - India is a land of agriculture. So, agriculture is a backbone of our country. Agriculture depends on monsoon. Water is provided to the plants in agriculture depending on the type of soil. Two things are important in agriculture; one is to measure moisture of the soil and second is to get information about the fertility. Irrigation is the methods that allow water to drip to plants root, this is done through the solenoid valve. Smart irrigation system helps to consume less water and time, ready to use, energy use efficiently, cost effective. In this project we use multi-sensors some of them are soil moisture, ultrasonic sensor and light sensor. Email and SMS (Short message service) is sent to the user when water is required to the plants.

Key Words: Smart Irrigation System; Raspberry Pi; Moisture Sensor; Solenoidal valve; Ultrasonic Sensor; Light Sensor

1. INTRODUCTION

Nowadays, automation system has been increased. It is because by using automation less electricity is consumed, wastage is decreased and energy is saved. Automation is known as home automation system if it is implemented at home. Green house technology was invented by many researchers with the help of automation. It is called as automation system or home watering system. Automation system is proposed to control the system and plants growth is observed with respect to moisture of the soil. The mechanism provides appropriate condition to growing of plants like herbs, floweret that creates the negative effect which is caused by the change in environment. Efficient water is used by this irrigation system. Most of the home gardens that are in the village area are not under roof that can be showed to the change in weather like superhot day or heavy rainy day. The various changes in weather may affect the growth of the plant in the mini garden. The owner will observe the garden that is growing healthily. If the home owner is away from the plant for a long time it is difficult for the owner to observe the plants. We need on system to control and monitor the plants. Smart irrigation does not mean only consuming less water. It provides water supply to the plants based on its need. In smart irrigation system monitoring the soil moisture is one of the important features. Based on this the owner can know that sufficient water is provided to the plants or not for its growth. The growth of the plant is not possible without sufficient water. we can say that the system is smart if it is monitoring continuously the condition of the plant.

2. LITERATURE REVIEW

In this work we designed and implemented vertical garden. We used microcontroller PIC18F4510 to control moisture. The garden that is grown vertically is easy for cultivation to environmental stress. Usage of vertical garden is proper irrigation to gain light to the plants. Usage of the material that is recycled and cost effective. In this work active irrigation system when sunlight and soil moisture are below a certain threshold level. In vertical garden plants are arranged in vertical plane. To grow plants inside home we can also provide artificial sunlight [1].

Irrigation at right manner with appropriate time we use auto control. Automated irrigation improves the efficiency of the system and reduces cost. Irrigation at night it saves people's efforts. It uses spay irrigation for turf. Automation meaning is without help of the person machine works based on the given instructions. There are 2 types of auto control irrigation system they are semi auto control irrigation and fully auto control irrigation. Fully auto control irrigation is to start and is to stop the water pump automatically for longer periods of time [2].

GSM module provides critical information about the system failure to owner or users. Haritha is abbreviated as Hybrid Automation Remote Irrigation Technique. The technique is for Agriculture purpose. To operate this system solar energy is needed. Solar electricity has much popularity because of less maintenance, fuel less and no pollution, green power generation. In houses rain water harvesting tank is installed. Microcontroller, Liquid crystal display panel, advanced keypad battery, solar energy panel, GSM module pump, moisture sensor, rain water tank that is for harvesting water from rain, these are the major components of irrigation controller system. The flow of water to plants can control by changing the voltage value. This is done by using dc motor electric pump. User sends SMS 'ON' when microcontroller receive message it turns on the water pump and watering will be continuously flowed at program duration [3].

System consists of a master station and slave nodes and each of which is connected with a wireless microcontroller. User can see, manage and monitor the control system via the World Wide Web the network. It saves 20% to 30% consumption of water in compared to other method. Master station use embedded logic irrigation algorithm to water the trees based on set of rules. System consist slave, master and server modules. Proposed system is based on web server-master-slave. The fuzzy logic algorithm was simulated using the MATLAB fuzzy logic toolbox. It helps to verify the proposed system [4].

From this system formers could effectively control the form anywhere at any time. This system is comfortable for farmers [5].

Internet of things (IOT) means interconnecting the various devices by the internet. Without human to human interaction data can be transferred through single identifier. Every object is connected. The cloud server stores the data for decision making. The green house systems use the Arduino technology to control the watering. The system performance and storage they use IOT communication technology and cloud server. Proposed system provides remote monitoring. It controls real-time operated sensing system of atmosphere and conditions of the soil like temperature of air, humidity level and moisture soil content of the environment [6].

To control the supplying of water and observe the growth of plant through mobile phones this is objective for the system. It represents irrigation mechanism by the network called WSN and also water pump. Database which is connected to website or server observe level of water. Data is collected in database and compared with specified values based on switched network IMS. It sends message or SMS to users make aware of water requirements to the plants. To monitor the entire system using GSM module. It consists of Raspberry Pi, Water Pump, moisture, temperature sensors. For communication we use smart phones. Plants are taken along with the water requirements at different stages. Irrigation is done at different stages of plants growth with respect to the requirement of water Blue turn technology are used. This work is based on Bluetooth. The blue turn application used here for program coding and writing programmed instructions and programmed data is sent through Bluetooth [7].

Aim of proposal system is ensure autonomous and efficient water in urban areas. Central computer sends environmental weather forecast to control monitor system resources placed at one another garden. Base station is connected to the network. Database of the server is placed at different location on the internet. Using XBee modules we test mesh network.

3. METHODOLOGY

Raspberry Pi: We have chosen it because it has low cost and it is optimum. Raspberry Pi will act as a computer. It is connected to the keyboard, monitor and mouse. It will operate in Linux.

Moisture sensor: Soil moisture sensor is also called as a hygrometer sensor. It checks the soil Moisture level. If soil is dry resistance is more and if the soil contains less water the resistance will be less.

Light sensor: The function of light sensor is to detect it is day or night and also the brightness of the nature because there is an LDR that is light dependent resistor in the system.

Ultrasonic sensor: It has a transmitter device and a receiver device. It uses sonar and it will also detect how far the object is. It is not affected by the sunlight.

Wi-Fi Adapter: Its function is to connect the raspberry pi to the WLAN. Wi-Fi adapter is a USB dongle.

Solenoidal Valve: Solenoidal valve manufactured for the purpose of low-pressure environment. This valve will allow the water to flow to the plants from the water tank.

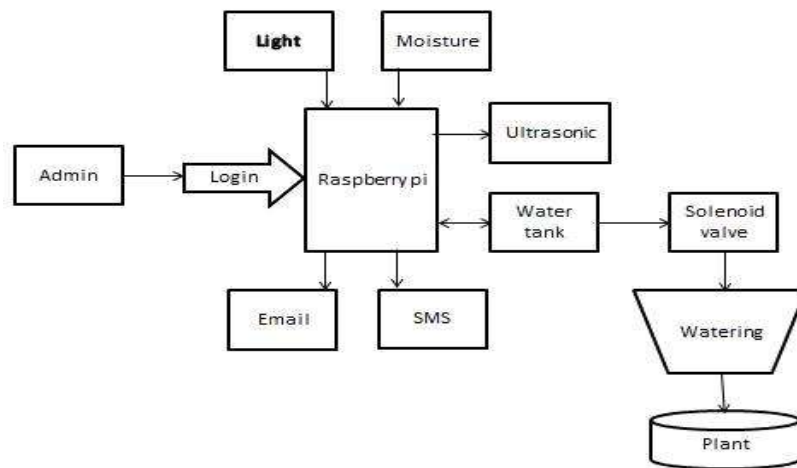


Fig 1. System Architecture

Fig1 shows system architecture and its components are explained above. Some of the advantages are given below.

- It preserves soil structure and nutrient and gardening is flexible.
- These devices can be controlled from long distance and can be used by everyone with just the knowledge of text SMS.
- Usable over several seasons with proper care.

4. RESULTS AND DISCUSSIONS

PAPER NAME	YEAR	METHODOLOGY	ADVANTAGES	DISADVANTAGES
1.Design and implementation of the Microcontroller control system for vertical garden application.	2011	micro-controller, commercial low cost soil, precision clock, zinc copper battery.	The system can actuate an artificial sunlight to let the plants grown inside the house.	The transmission of the weak signals such as the moisture and the illumination become a dominate issue.
2.Application of	2012	Automatic irrigation	Automated irrigation	Complexity increases

auto control technology in water saving garden irrigation		controller	can help to reduce management cost and efficiency	
3.Project HARITHA - An Automated Irrigation System for Home Gardens	2012	microcontroller, GSM module, LCD Panel keypad, solar panel,battery,pump, rain water harvesting system and moisture sensor	The whole unit is powered by solar enery. Due to its advantages like less maintenance, fuel free green electricity generation.	Designed system design is more expensive
4.ZigBee-Based Irrigation System for Home Gardens	2015	Slave Master Architecture	Low power consumption,Small in size, Affordable Durability .	Use of GPS sometimes may not give result due to weather Conditions
5.Smart Farm Monitoring Using Raspberry Pi And Aurdino	2015	Aurdino, Raspberry pi, Camera	Can effectively control farm anytime anywhere.	Camera places only captures the images
6.IOT Based Smart Irrigation Monitoring And Controlling System	2017	Cloud Server, Wireless sensors	As stored in cloud - data will be safe and Easy to access.	Use of cloud technology would not be easy for all the farmers.
7.Mobile Integrated Smart Irrigation Management and Monitoring System Using IOT	2017	Raspberry pi, cloud server	Data is safe by using cloud server.	Cost increases,complex to use cloud.
8.Intelligent management of urban	2017	Microcontroller , Xbee, client server	The microcontroller also checks if any	system is a complex, time consuming and

garden irrigation			parameter exceeds the critical limit of irrigation.	difficult assembly process.
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5. CONCLUSION

Smart Irrigation System for home gardening is established with Raspberry Pi. It is connected with the ultrasonic sensor, moisture sensor and light sensor and also, we also connected with the relay power module. All the sensors are being provided with proper threshold value which is measured experimentally. Raspberry pi controls the relay which will be on sometimes and sometime off. The solenoidal valve is measured by relay. The proposal system is cost effective, feasible which can be applied to the small-scale agriculture and gardens. With the help of android interface app in mobile the irrigation system can be controlled. The information is sent to the user through email and text message. By using this system, the human intervention is reduced. It consumes less water and less time.

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