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SMART IRRIGATION SYSTEM

A COURSE PROJECT REPORT

18CSS302J - COMPUTER NETWORKS

Mini Project

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BONAFIDE CERTIFICATE

Certified that this mini project report titled "**Smart Irrigation System**" is the bonafide work done by Adhin Jibil (RA20110030010031), Shanthosh Sivan S (RA2011030010044), and Aditya A R (RA2011030010052) who carried out the mini project work and Laboratory exercises under my supervision for **18CSS302J- Computer Networks**. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

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1. ABSTRACT

In this work, we had proposed a smart irrigation system using Cisco packet tracer software for Indian climatic conditions. We had used different sensors, webcams, and different electronic devices for smart control and security of the farms. Different analyses for different crops are discussed so that effective use of water and resources are maintained. For each case, proper simulation is done on the software. In the later section, security-based simulations are done and discussed. With the help of the Internet, our farmers can control and monitor the farms staying away from it.

This technology can be implemented for developing a smart irrigation system, which consists of devices like a lawn sprinkler, temperature monitor, Humidity monitor, etc., to automate the watering system and remotely monitor the environmental conditions for better growth of the plants. All the devices are connected to the home gateway and can be remotely operated and monitored using a Tablet/PC/Smartphone. Simulation results show that the smart devices such as a sprinkler system and other essential devices for monitoring environmental conditions are connected to the home portal and can be successfully monitored, which helps the farmers/homeowners to grow and maintain plants with ease.

2.INTRODUCTION

The term IoT means 'Internet of Things', which was coined by Kevin Ashton in 1999. It is a budding technology that plays a major role in today's life to interconnect devices and the internet in a network, which in turn enables them to send and receive data.

There are many problems faced by the farmers or the homeowners having a lawn space for gardening and the maintenance of the plants due to the changing environmental conditions. IoT technology can help the farmers/homeowners to maintain a proper irrigation system that can be automated and remotely operated from any part of the world.

In today's busy world, if the homeowners are not present in the house to take care of the plants, this technology can help them to easily monitor the devices and thus helps to overcome the disadvantage of manual monitoring.

In this work, Smart Irrigation system consists of smart devices that automate the irrigation system that allows the homeowners to automate the lawn sprinkler/ watering system according to the level of the water shown by the water level monitor, which results in turning the water drain on or off accordingly. Smart Irrigation system provides various automating activities such as controlling the humidity levels of the plants. The humidity sensor monitors the level and turns the humidifier on or off after it reaches a certain level set according to the requirements of the owner.

The other aspects include the monitoring of environmental conditions by various sensors that are crucial for strong and verdant growth of plants, which includes Temperature monitor, Pressure monitor, Carbon dioxide detector, Carbon monoxide detector, Wind detector, and Humiture monitor. The smart devices are connected to the home gateway and can be remotely operated and monitored by using a Tablet/PC/Smartphone. It also has a motion detector alarm for animals. It uses a microcontroller to operate and alarms the owner if motion is detected near the irrigation field.

The simulation results show that smart devices are connected to the home gateway and can be remotely operated, monitored, and automated according to the requirements. Cisco Packet Tracer is a visual simulation

tool developed by Cisco that gives users the chance to make network topologies and imitates modern computer networks. It allows you to simulate routers and switches by using a simulated command-line interface.

METHODOLOGY

The design of the Smart Irrigation system has been done by using the Cisco Packet Tracer simulation software. Cisco Packet Tracer is an innovative and powerful network simulator that can be used for building a network with routers, switches, wireless, and much more. It allows to experiment with network behavior, device configuration, and building models. Smart Irrigation system design includes a tablet and home gateway used to connect to various devices like temperature monitor, lawn sprinkler, water level monitor, and other sensors. Home gateway is used to connect all the smart devices, and Tablet is used to communicate with the smart devices.

Devices used:

s.no	Devices	Function
1	Sprinklers	A sprinkler for Law
2	Water level monitor	Used for water level detection
3	Home Gateway	Provides internet access and local connection to the IoT network
4	Smart Phone	To control irrigation system that turns on the sprinklers when the set conditions are met through a smart phone

Home Gateway

To connect to the network, either a home gateway is required or a registration server. After connecting to the PC or a tablet to the home gateway, the devices can be turned on and off using the features of the home gateway.The home gateway provides internet access and wireless connectivity to the network and acts as a local connection to the IoT smart devices. The device has an internet port, four LAN ports, and multiple antennae. After connecting the home gateway to the existing network, the network settings are need to be set that are configurable by

clicking on the config tab. The IP addressing information can be seen under the internet settings tab after connecting the device to the existing network. The wireless settings need to be configured by entering the home gateway SSID and selecting WPA2-PSK PSK passphrase and a password for authentication and validation of the wireless network. The next step is to connect the IoT smart devices to the home gateway.

Automatic Sprinkler System

The automatic sprinkler system consists of a lawn sprinkler, water level monitor, water drain, and a light indicator. The water level monitor is used for water level detection. The user can set the parameters for the water level monitor according to requirements. If the level of the water goes up to the minimum required level, it turns the lawn sprinkler off and turns the water drain on automatically. Similarly, it turns the Sprinkler on if the level of water is less than the required level. The light indication is provided when the irrigation system is on to alert the users. This feature of the Automatic lawn sprinkler system eliminates the disadvantages of manual monitoring of the irrigation system. The lawn sprinkler and other devices in the system can be controlled manually too.

Components Required:

Devices	Required Number
sprinklers	4
Water level monitor	2
Home Gateway	1
Smart Phone	1

Addressing Table:

Name	Interface	IP Address	Subnet Mask	SSID
Sprinkler 1	wireless	192.168.25.107	255.255.255.0	HomeGateway
Sprinkler 2	wireless	192.168.25.1	255.255.255.0	HomeGateway
Sprinkler 3	Wireless	192.168.25.100	255.255.255.0	HomeGateway
Sprinkler 4	wireless	192.168.25.101	255.255.255.0	HomeGateway
Water level 1	Wireless	192.168.25.108	255.255.255.0	HomeGateway
Water level 2	Wireless	192.168.25.104	255.255.255.0	HomeGateway
Home Gateway(DLC 100)	Wireless	-	-	HomeGateway
Smartphone0	Wireless	192.168.25.106	255.255.255.0	HomeGateway

Procedure

Step 1: Drag all the required components (Sprinklers (IOT), Water level monitor,Home gateway, Smart phone) in the console area.

Step 2: set the password in the home gateway so click on home gateway click configuration look into the LAN details then click on wireless copy this SSID and keep then click on this passphrase and set the password.

Step 3: connect each of the component here to the home gateway first click on the launch spring club read the specifications once then click on configuration give thename i give it as sprinkler one then click on home gateway in IOT server then click on advanced I/O Configuration see whether it is connected to 'PT-IOT-NM-1W ' that is wireless then click on configuration click Wireless set the password here get connect close it now the sprinkler one will get connected to the home gateway

Step 4: similarly connect the rest of the components in the circuit to the home gateway next is sprinkler 2 next sprinkler 3 next water level 2 and the last component sprinkler 4 now you can notice that all the components here are connected to the home gateway in a wireless manner

Step 5: To set up the registration server follow:
• Desktop Tab => Browser
• Type the URL as (http://192.168.25.1), then click on Sign up
• Set your desired user name(admin) and password (admin)

Step 6: Login to the registration server using the credentials set in the previous step

Step 7: Add conditions for the IOT devices using the smart phone as the trigger.

Step 8: Test the system using the water level monitor to trigger the sprinklers.
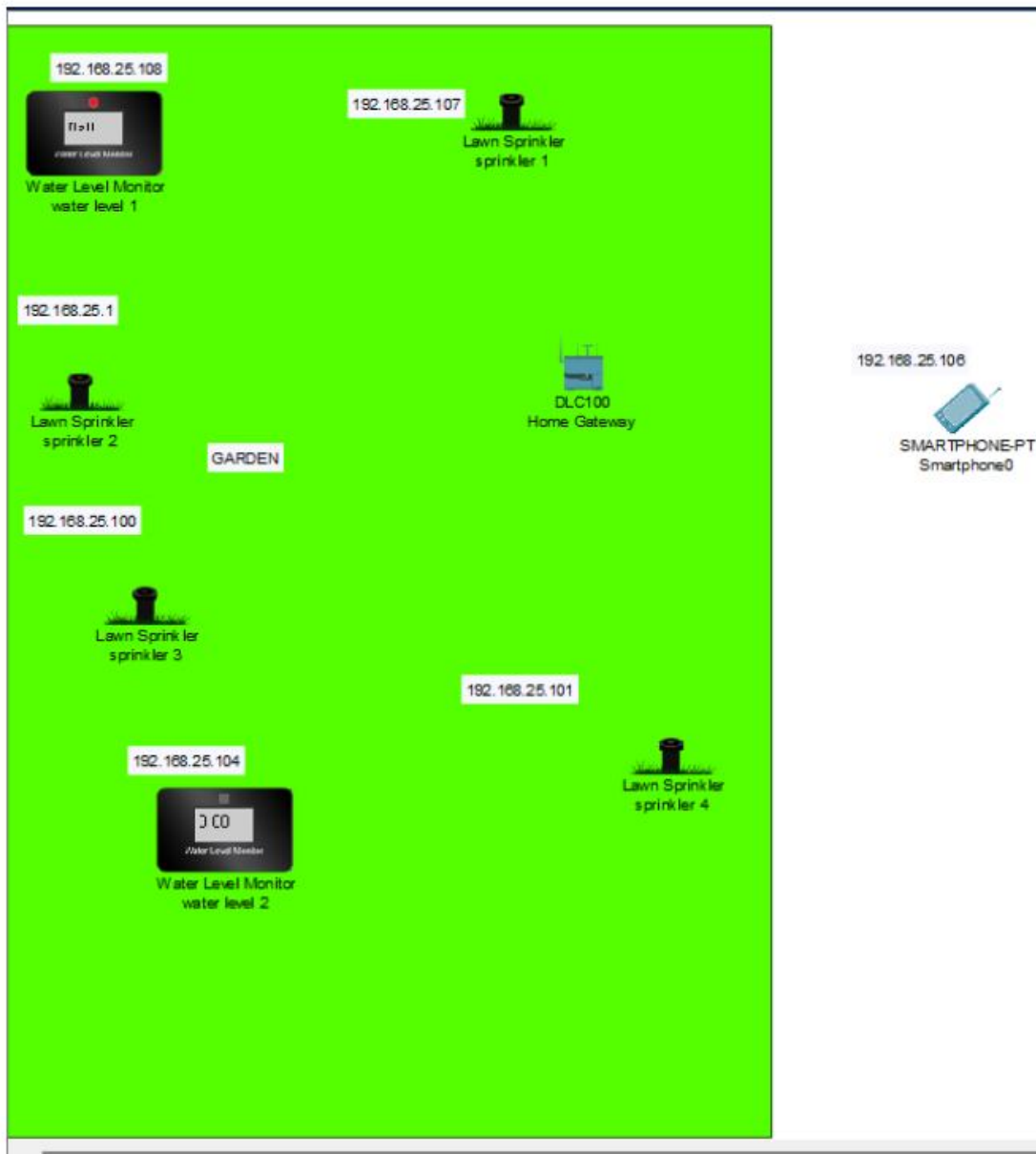
CONCLUSION AND FUTURE SCOPE

A smart irrigation system is implemented using the Cisco packet tracer.
A home gateway to register the devices and control them using a tablet.
All the IoT devices connectedto the home gateway can be monitored
manually as well as remotely by the user. The results prove that there is
an opportunity of applying this model in real life. The implementation of
the automatic irrigation system can be used to reduce the use of water.
The system can be manually monitored, it can increase the energy
efficiency and savings. It also makes it convenient for the user to access
all the devices through the smartphone. In the field of IoT, ensuring
security should be a priority. Since the IoT devices are interconnected to
each other, the network should be secured. In this system, an
Sauthentication gateway is designed that requires password to check
authenticity of the home user for security purpose. To extend this system
to be more robust and efficient in the future, modifications can be made
to make the system more secure. If abnormalities in the system are
detected, the system should send an SMS or an Email to alert the user

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