



SMART CITY USING CISCO PACKET TRACER

AIM: The main goal of a smart city is to optimize city functions and promote economic growth while also improving the quality of life for citizens by using smart technologies.

PROBLEM STATEMENT:

When you hear the term “Smart Cities,” you might picture popular sci-fi films like *Blade Runner* or *Minority Report*. While rapid technological advancements have yet to give us commercial flying cars, we’re able to access dozens of transportation methods with our smartphones – all while gaining access to those phones using facial scanning and authentication technology. We’re living in a reality that was once the imagination of talented screenwriters.

Challenge #1: Infrastructure

Smart Cities utilize sensor technology to gather and analyze information in an effort to improve the quality of life for residents. Sensors collect data on everything from rush hour stats to crime rates to overall air quality.

Major metropolitan areas are already challenged with replacing decades-old infrastructure, such as underground wiring, steam pipes, and transportation tunnels, as well as installing high-speed internet. Broadband wireless service is increasing, but there are still areas in major cities where access is limited.

Funding for new infrastructure projects is limited and approval processes can take years. Installing new sensors and other improvements cause temporary – though still frustrating – problems for people living in these cities.

Challenge #2: Security and Hackers



Smart Cities are investing more money and resources into security, while tech companies are creating solutions with new built-in mechanisms to protect against hacking and cyber-crimes. With blockchain being the topic *du jour* in the tech industry, many developers are looking for ways to incorporate these encryption techniques to increase security in new applications.

Challenge #3: Privacy Concerns

In any major city, there's a balance between quality of life and invasion of privacy. While everyone wants to enjoy a more convenient, peaceful, and healthy environment, nobody wants to feel like they are constantly being monitored by "Big Brother."

Cameras installed on every street corner may help deter crime, but they can also install fear and paranoia in law-abiding citizens. Another valid concern is the amount of data being collected from all the smart sensors residents come into contact with each day.

Challenge #4: Educating & Engaging the Community

For a Smart City to truly exist and thrive, it needs "smart" citizens who are engaged and actively taking advantage of new technologies. With any new city-wide tech project, part of the implementation process must involve educating the community on its benefits. This can be done through a series of in-person town hall-style meetings and email campaigns with voter registration, as well as an online education platform that keeps citizens engaged and up-to-date

Challenge #5: Being Socially Inclusive

It's vital that Smart City planning involves the consideration of all groups of people, not just the affluent and technologically advanced. Technology should always be working to bring people together, rather than divide them further based on income or education levels. Thinking of these communities, in conjunction with the other problems addressed in this article, will promote the overall success of a solution beyond the realm



SCOPE OF THE SOLUTION:

Connected public transport:

The system revolutionized the city's bus transit system. It did this by installing GSM and GPRS devices on vehicles, that transmits real-time data to dispatch center software ,which then relays that information to electronic displays at bus stops and online portals. This resulted in more efficient public transport, cutting waiting times, and boosting reliability.

Traffic monitoring:

Managing traffic flow is one of the biggest challenges for smart cities. Thanks to IOT there are a number of practical solutions .These sensors transmit real-time traffic updates to a traffic management platform, which adjusts the timing of traffic signals to optimize traffic flow.

Video Surveillance :

Smart video surveillance is not a new concept . In fact , smart surveillance cameras have been around for a long time ,and they are commonly use to police the world's roads and highways. "ALPS(Automatic License Plate Recognition) cameras are mostly used by law enforcement to identify stolen cars ,for traffic to control purposes, to collect tolls, and to deter crime in general."

Connected streetlights:

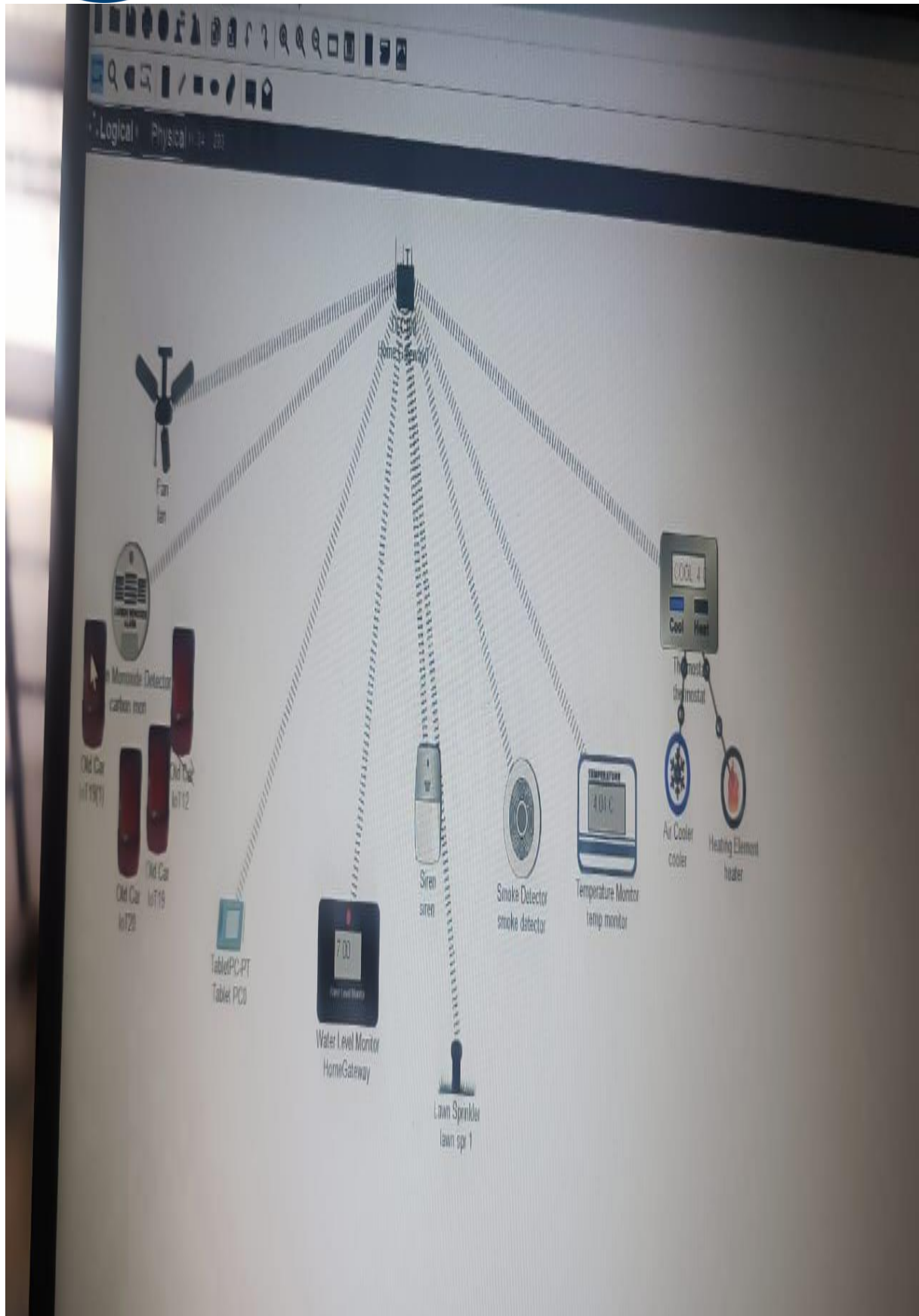
Connected streetlights and lighting solutions are a very popular way to boost the productivity of a smart city. The key benefits of smart lighting include a reduction of energy and maintenance costs, increased public safety, safer traffic , and measurable environmental impact.

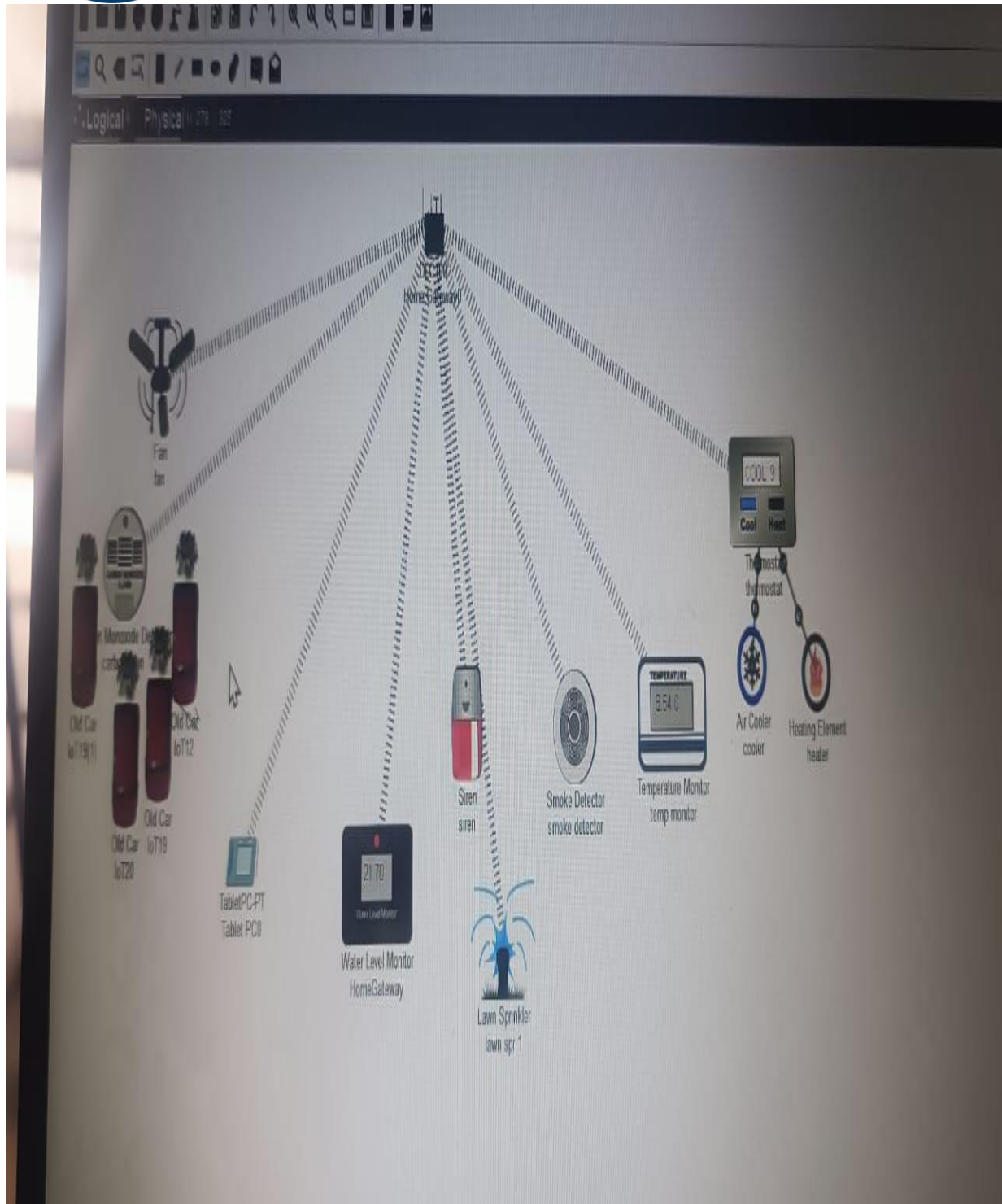


Components Required:

- a. Home gateway(DLC100) and Switch(2960-24TT)
- b. Temperature Sensor and Temperature Monitor
- c. Single Board Computer (SBC-PT)
- d. Door and Window
- e. Fan and Heater
- f. Portable music player and Bluetooth Speaker
- g. LCD
- h. smart phone









Experimental Analysis: In this project we explain the replication environment of the recommended IoT network and the study of the network representation instance like data packets in a network. Packet tracer used for the experiment authorize us to recognize the packets proceed in the pattern IoT network and inspect what occurs to the packet. Cisco packet tracer permit us to sight the network instances of data packet transmit and received from one gadget to another in the IoT network and study what occurs when a packet is diminish. The estimation of the network production is to perspective the data packets transmit and received by the IoT gadgets.

A. Network Implementation Using Cisco Packet Tracer :

We started the designing phase of the recommended IoT network by using cisco packet tracer which contains the numerous IoT devices for study. In the experimental setup, many smart IoT devices are placed unpredictably in the IoT environment with different sensors that are arranged with IP addresses to concatenate via a wireless home gateway. The home gateway arranged with a IPv4 address and attached to the mediator IoT server through the switch using copper straight wires. A smart phone is configured to associated to the home gateway.

B. Smart Home :

Smart home introduce a convenient home set up. In smart home we considering appliances and devices can be automatically controlled remotely from anywhere with an internet connecting using mobile or other network device.

- **Working:** First of all, let us take home gateway, home gateway is Wireless connected to multiple devices like mobile, temperature monitor, portable music player and Bluetooth speaker. Next we take a switch and SBC-PT board which is connected through straight copper wire. Now the switch is connected to the door and window through a copper wire. After that, the SBC-PT board is connected to the temperature sensor, cooler, heating element and LCD via the IoT cable. The temperature sensor senses the temperature. If the temperature drops below 15°C, the heating element will turn on, and it will display on the LCD that the heater is on. If the temperature is equal to 15°C then the LCD shows the normal temperature and the temperature is greater than 15°C then the fan is on and it will display on the LCD that the fan on.

C. Smart Garden

A smart garden is an environmental monitoring system that automatically waters the plant-based data received by the water-level

Smart Grid:

Smart grid systems have the possibilities to mark today's grid challenges, including rising electrically demand. A smart grid is an electrical grid with automation communication system that can monitor the flow of electricity from the points of generation to the points of consumption and control the flow of electricity in real time to reduce the load to the next generation



Components Required:

Water level monitor

Lawn sprinkler

Smart phone

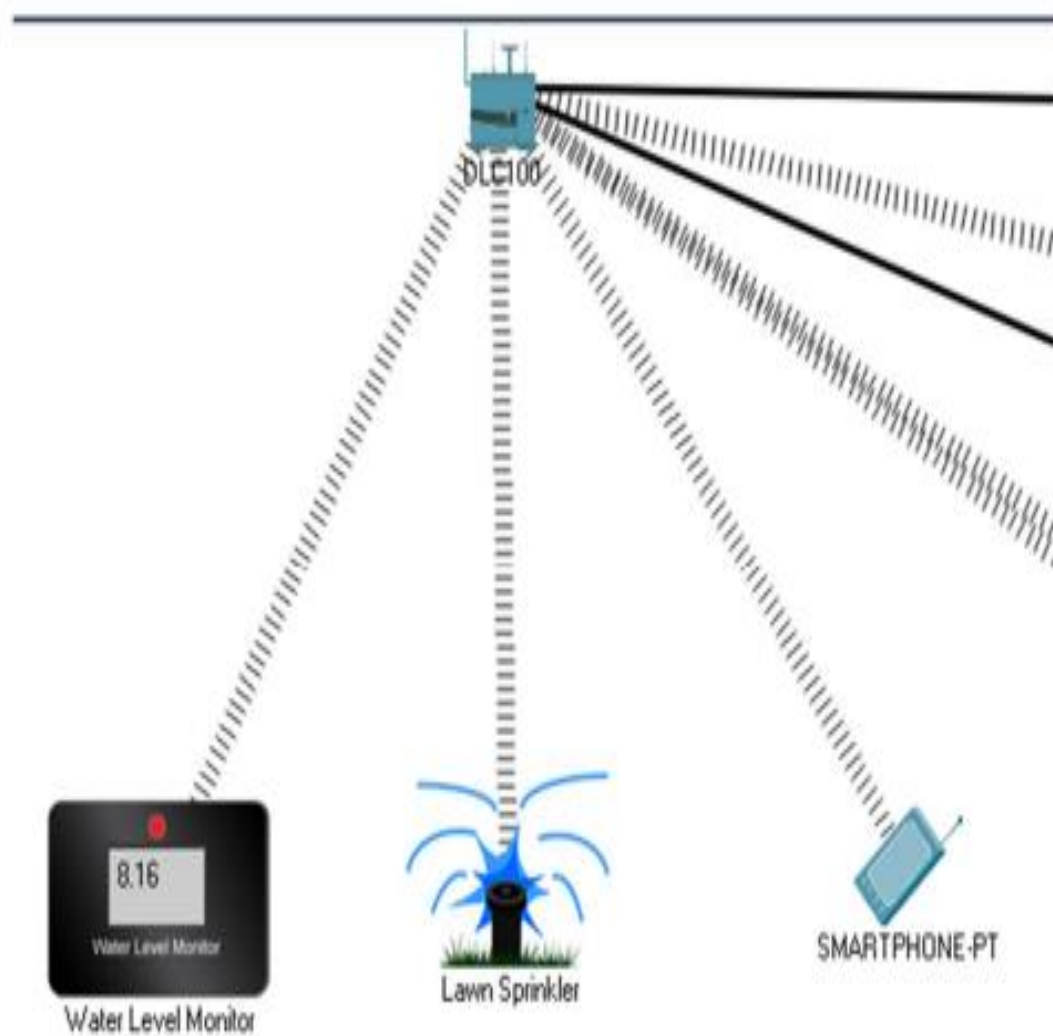


Fig. 4 Smart garden



- **Working:** In this smart garden, we carry a water level monitoring device, mobile phone and lawn sprinkler all devices are wireless connected to the home gateway. The home gateway provides the IP address which is 192.168.25.1. Now set lawn sprinkler to DHCP and Home Gateway. This will show the same IP address that the Home Gateway provides, similarly set water level monitor on DHCP and Home Gateway. This will show the same IP address that the Home Gateway provides. Now go inside the desktop in the mobile phone and open the web browser now enter IP address (192.168.25.1) and set admin username, password it will show connected devices. Now set the water level position if the water level goes below 10cm the lawn sprinkler will draw out the water and if the water level is above 10cm the lawn sprinkler will not drain the water.





D. Smart Parking System

Smart parking system play a very significant role in the smart city. Smart parking systems are starting to offer solutions for urban cities. This is a system allows real - time data to be obtained about parking availability both outside and inside and regarding traffic and road condition .Through the smart parking various vehicles arrival and departure could track for different parking lots spread in the city.

Components Required:

Server
Laptop
Switch
Solar panel
Power meter
LED
Batter

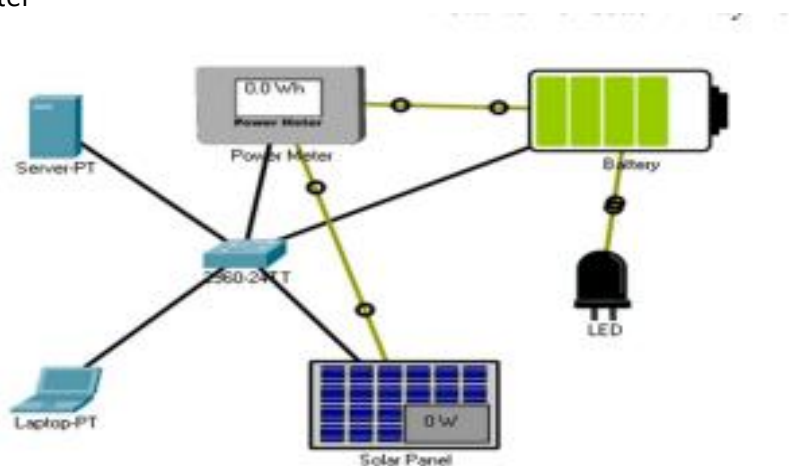


Fig.5 Smart grid

Working: In smart grid system we take some electronic devices. The switch is connected to 5 devices via a straight copper wire. These 5 devices are Battery, Solar Panel, Power Meter, Laptop, Server. The electricity meter is also connected to the solar panel and battery through an IoT cable. And the battery is connected to the LED via IoT cable. First, we take the server. Now, click on the service icon to open Registration Server and VM Management. As a result, go to the configuration icon and turn on Gateway/IP4 DHCP which provides an IP address(192.168.25.1). Now Solar Panel, Battery and Power Meter are set to Gateway/IPv4 over DHCP and Server Address (192.168.25.1), Username (Admin) Password (Admin) is set in Remote Server to connect to Server. Connected devices will appear on the server desktop on the web browse



Components Required:

SMART GATE
RFID CARD READER
RFID CARD
SERVER and Switch
MCU-PT BOARD
METAL SENSOR

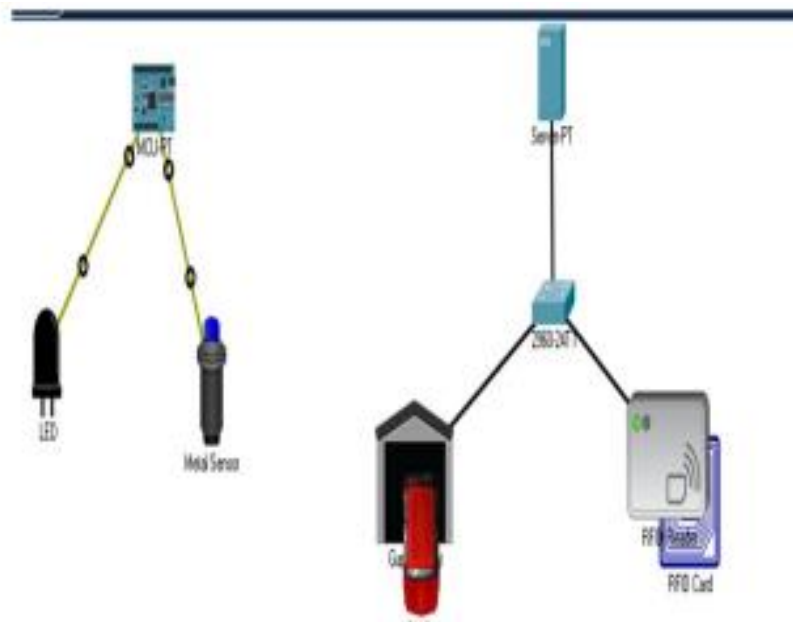


Fig.6 Smart Parking System (When there is vehicle at gate) Gate open

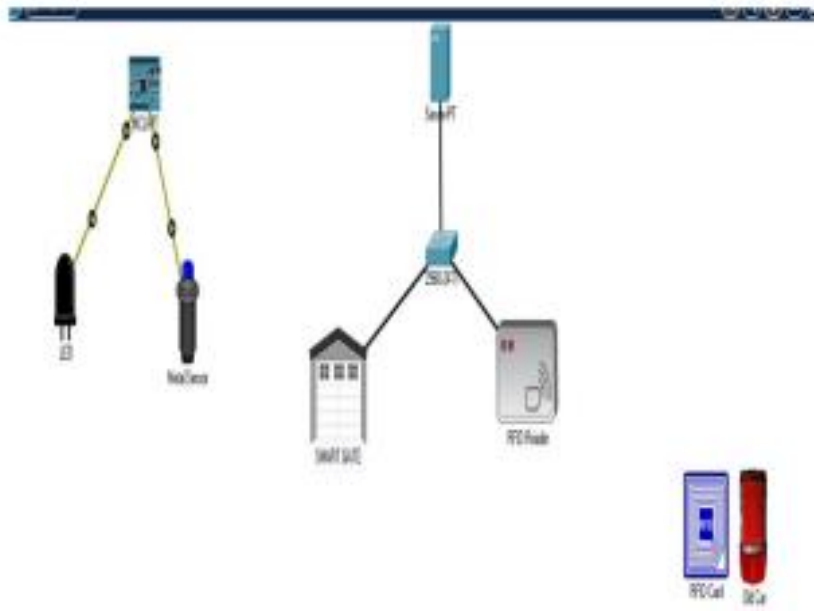


Fig.6 Smart Parking System (When there is no vehicle at gate)

Working: First, we take the server. Now, click on the service icon to open Registration Server and VM Management. Consequently, go to the configuration icon and turn on gateway/ip4 DHCP. The server is connected to the switch(2960-24TT) via copper wire. The switch is also connected via copper wire to the main door and the RFID card reader. Now, the main gate and The RFID card reader sets up the Gateway/IPv4 over DHCP and sets up the server address (169.254.217.48), username (admin) Password (admin) in the remote server to connect to the server. RFID card is a unique id card it is used to identify the car, when the car has a valid RFID card it will enter it in the smart parking area. After checking the validity user ID, the gate will open When the valid ID was punched by the user, was about invalid ID users. If any invalid id was scan in the RFID reader, the reader would detect the invalidity of the ID and the gate would not open. The Microcontroller (MCU-PT) is then connected to the metal sensor and LED bulb by the IoT custom cable. The programming code will be written in the MCU-PT the code will execute and the metal sensor will detect the car's metal body and the LED will glow.

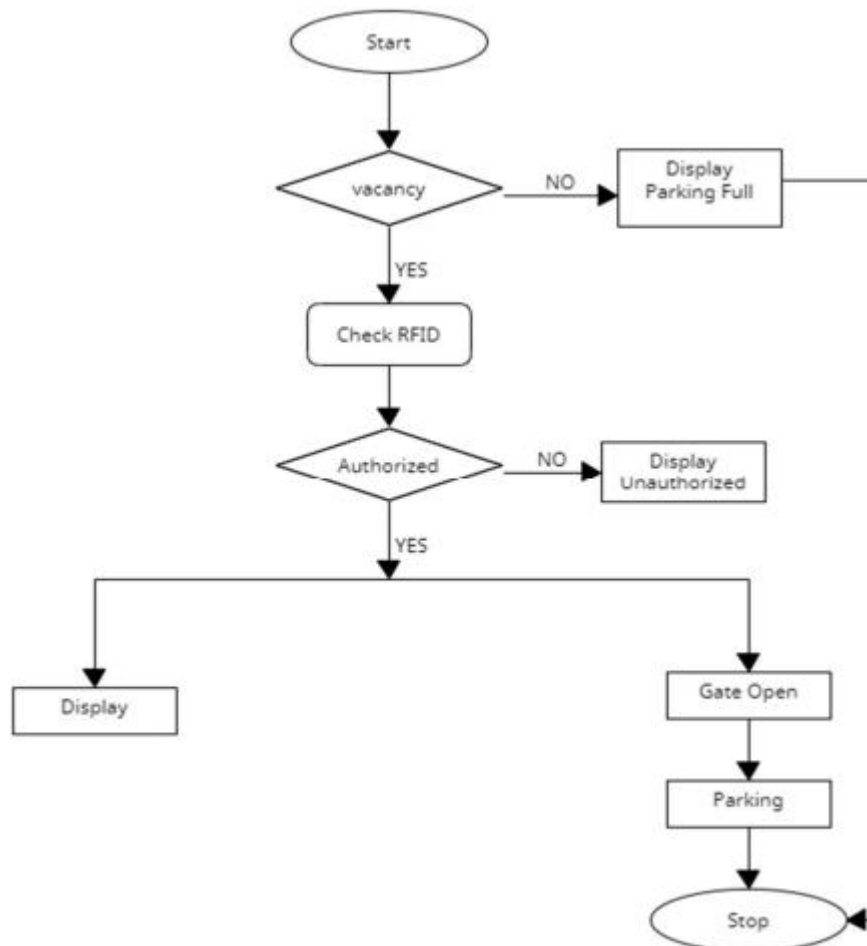


Fig.7 Flow Chart of Smart Parking System

Conclusion:

IOT is not only connected with the vast technology but it is more interconnected to the widespread community framework. The agenda of the smart city will be the temperature, it will automatically measure the temperature according to the environment in the smart home. In the smart garden according to the water level monitor, water will be come out by the lawn sprinkler. The aim of this research paper is to develop a modern city through which the life of the people becomes easy. This paper focused on smart home, smart parking system, smart grid and smart garden. To



recognize the principle of organization, some of the constituents of smart city are express in detail. In the future, some of the provocation and possibilities supply direction for the research work.

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