



Smart Office

Research Project Submitted to the department of (Electrical Engineering) in partial Fulfilment of the requirements for the degree of BSc. in (Electrical Engineering C/C)

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Abstract:-

IoT is one of the most important technologies of everyday life, and it will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive.

The internet of things (IoT) enables the inter-networking of physical devices. This means that devices and software are used to automate many systems with little or no human interaction. Such systems depend on the collection of data. The data is then used for monitoring, controlling and transferring information to other devices via the internet. This allows specific actions to be automatically activated whenever certain situations arise. Now apply the same concept to the entire office and all the devices present. That is a smart office powered by IoT. Instead of manually going up to the device and taking action, those actions can be taken at the press of a button. These days, most smart IoT office automation devices allow you to control them via mobile or personal computer. We configure these IOT devices by using cisco packet tracer, Cisco Systems is an IT and networking brand that specializes in switches, routers, cybersecurity, and IoT.

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Chapter one

1.1 Introduction:-

The internet of things helps people live and work smarter, as well as gain complete control over their lives. IoT is essential to business. IoT provides businesses with a real-time look into how their systems really work, delivering insights into everything from the performance of machines to supply chain and logistics operations. A smart office refers to a convenient office setup where appliances and devices can be automatically controlled remotely from anywhere with an internet connection using a mobile or other networked device. Devices in a smart office are interconnected through the internet, allowing the user to control functions such as security, temperature, lighting, and Smart access controls. With smart technology, offices can be more efficient than ever before, allowing the automation of menial tasks so that the staff has more time to work on worthwhile projects. There are numerous ways to take advantage of smart office technology. Smart workplaces require smart devices to handle smart employees. The technological developments in the world today have resulted in executing numerous changes in the work culture. These changes help the companies to drive their working atmosphere towards a more stable and developing scenario. One recent technological development, which is for sure making motivational changes in the working environment is the adoption of IOT systems. Several devices fall under the category of IoT technology, namely smart mobile, smart camera, smart appliances, smart sensors and a lot more. The most significant field in which this technology has proven its utmost efficiency is constructing a smart office. In a smart IoT office, numerous devices are connected with each other so that all processes can be automated in order to gain momentum. IOT is a powerful technology, which can transform an office into a smart office. It can make an office a magic place where different objects can interact with each other and make working easier for everyone. Given below are some smart applications of IOT to help which illustrate how this technology can convert offices into smart offices. Packet tracer IoT smart office with the proliferation of technology, it becomes difficult to complete tasks manually as it consumes more time. However, to mitigate this issue, the implementation of Internet of Things is

primarily done. This is because it unleashes several opportunities in order to make workspace even smarter . IoT devices are amalgamated with smartphones, beacons and even sensors so that data can be taken as an input and appropriate output can be provided. Such IoT based applications and devices predominantly help to control, manage and monitor business operations effectively.



One of the most predominant network simulators is Cisco Packet Tracer as it can be used to design and simulate a network based on the requirements of organizations. This tool is best for implementing a smart office network for organization as a diverse range of IoT devices are also provided by this tool. For instance, smart doors, temperature sensors, smart fans, music systems and all sorts of automated devices are available within Cisco Packet Tracer which can be used for simulating the network. There are several more features of simulating a smart office network with Cisco packet tracer. This includes the checking of connectivity (local and remote connections), behavior of devices can be analyzed and actions can be set. The internet of things connects billions of devices to the internet and involves the use of billions of data points, all of which need to be secured. Due to its expanded attack surface, IoT Security and IoT privacy are cited as major concerns. Security and Privacy: Data integrity, unique identification, and encryption are

considered core challenges for IoT, as much of the data being acquired and communicated contain personal information. Additionally, data ownership, legal and liability issues have to be addressed accordingly. Finally, energy efficient encryption and data protection technologies have to be considered. Major objectives for IoT are the creation of smart environments/spaces and self-aware things. In this Section we consolidate application domains and challenges will drive the evolution of IoT systems. The trend of having ever more objects included in the IT data flows and ever more connected devices, moving toward mobile and decentralized computing is evident. The Internet of things has become a new Era in this day and age. There is a need to have a solution to guarantee privacy and the security of the customers in order to have a widespread adoption of any object identification system. The security has been done as an add-on feature in most cases, and the feeling that the public acceptance for the internet of things will happen only when the strong security solutions are in place.



Chapter 2

2.1 Methodology:-

we use IOT devices in our work to interconnect between devices, therefore every device has its own IP address.

An IP address is a unique address that identifies a device on the internet or a local network. IP stands for "Internet Protocol," which is the set of rules governing the format of data sent via the internet or local network.

In essence, IP addresses are the identifier that allows information to be sent between devices on a network: they contain location information and make devices accessible for communication. The internet needs a way to differentiate between different computers, routers, and websites. IP addresses provide a way of doing so and form an essential part of how the internet works.



Most IP addresses are purely numerical, but as internet usage grows, letters have been added to some addresses.

There are two different types of IP addresses: static, and dynamic.

A static IP address is one that was manually created so we used for small networks, as opposed to having been assigned. A static address also does not change, whereas a dynamic IP address has been assigned by a Dynamic Host Configuration Protocol (DHCP) server and is subject to change. Dynamic IP addresses are the most common type of internet protocol addresses we used for large corporations. Dynamic IP addresses are only active for a certain amount of time, after which they expire. The computer will either automatically request a new lease, or the computer may receive a new IP address. Since there are limitations to static IP, some administrators seek to use dynamic IP instead.

A wireless router is a device that enables wireless network packet forwarding and routing, and serves as an access point in a local area network. It works much like a wired router but replaces wires with wireless radio signals to communicate within and to external network environments. It can function as a switch and as an Internet router and access point.

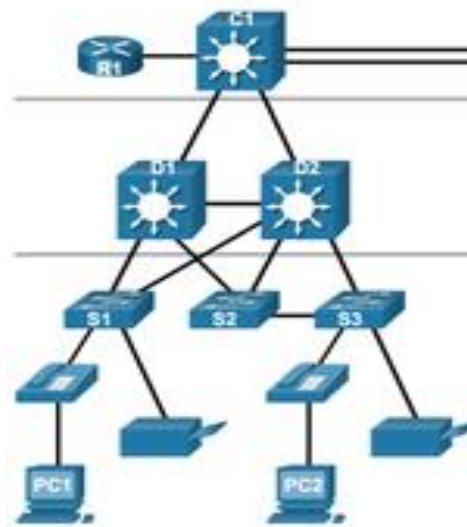


A switch is a device in a computer network that connects other devices together. Multiple data cables are plugged into a switch to enable communication between different networked devices. Switches manage the flow of data across a network by transmitting a received network packet only to the one or more devices for which the packet is intended. Each networked device connected to a switch can be identified by its network address, allowing the switch to direct the flow of traffic maximizing the security and efficiency of the network.

Switched Networks

Role of Switched Networks :

- Switching technologies are crucial to network design.
- Switching allows traffic to be sent only where it is needed in most cases, using fast methods.
- A switched LAN:
 - Allows more flexibility.
 - Allows more traffic management .
 - Supports quality of service, additional security, wireless, IP telephony, and mobility services.



Types of Switches:-

- I. Fixed Configurations Switches: Features and options are limited to those that originally come with the switch.



- II. Modular Platform: The chassis accepts line cards that contain the ports.



- III. Stackable Configuration Switches: connected by a special case cable, effectively operate as one large switch.



Chapter 3

3.1 Problem statement:-

It is very important that IoT to be secure in a way that is both technically and economically appropriate.

Security by design is an approach to software and hardware development where security is built in from the beginning, and not as a late addition after a hacking incident. These Internet of Things devices, since they're all connected to the Internet, are vulnerable to remote hacking. Also, most of these objects were designed with no security built into their system, making them easy targets for security breaches.



Types of cyber security: every business wants to have an advantage when it comes to securing the system and information . So the systems should contain strong security features that should keep the organization's data secure.

1) Network Security

It implements hardware and software device of a system, to secure its computer network from unauthorized entry, intruders, attacks, disruption, and misuse. Network security helps an organization protect its data from internal and external threats.



2) Information or data security

Implementation of a strong data mechanism to maintain the integrity and privacy of data, both in storage and in transit i.e. (in transformation).



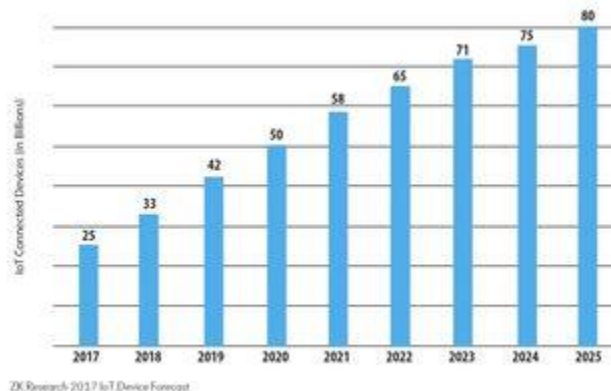
3) Identity management

It determines the level of access that each individual has within an organization.



3.2 Four Major Challenges when Managing IoT data:

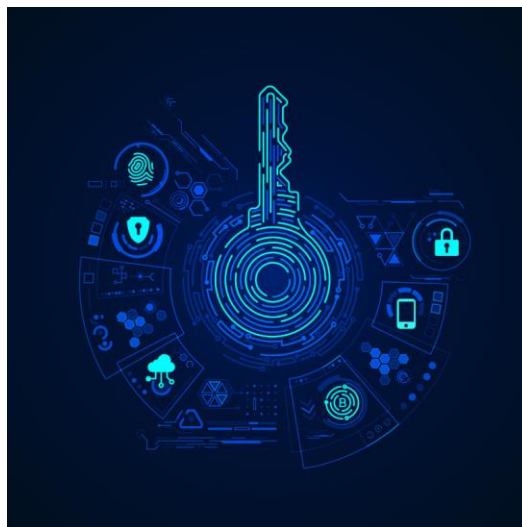
1-Connectivity – connectivity is an important requirement of the IOT infrastructure . things of IOT should be connected to the IOT infrastructure . anyone , anywhere, anytime can connectivity should be guaranteed at all times without connection nothing makes sense.



2-Scalability – the number of element connected to the IOT zone is increasing day by day. Hence an IOT setup should be capable of handling the massive expansion the data generated as an outcome is enormous and it should be handled appropriately.



3- Safety – there is a danger of the sensitive personal details of the users getting compromised when all his devices are connected to the internet this can cause a loss to the user Hence data security is the major challenge besides the equipment involved is huge IOT networks may also be at the risk therefore equipment safety is also critical.



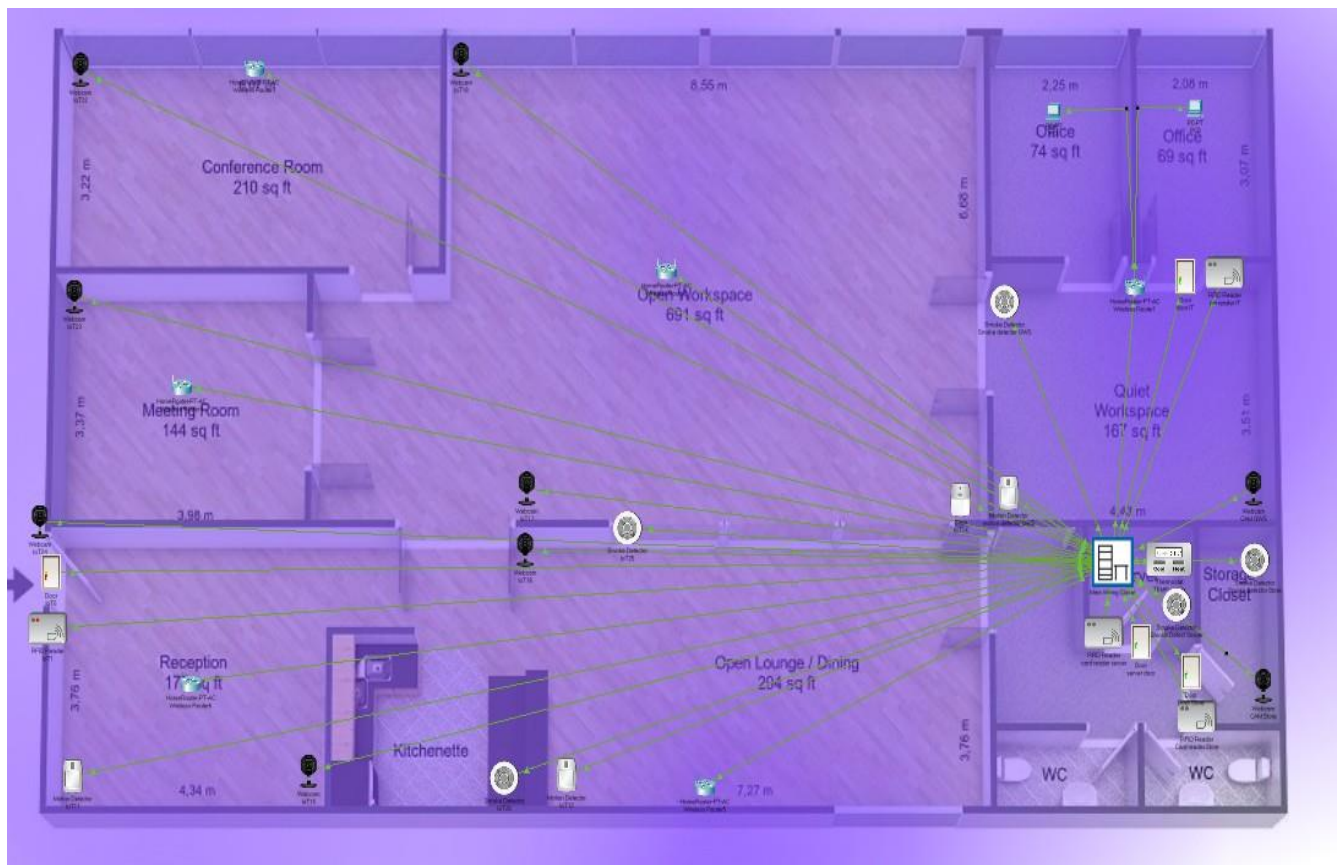
4-Intelligence and Identity – the extraction of knowledge from the generated data is very important for example a sensor generates data but that data will only be useful if it is interpreted properly Each IOT device has a unique identity this identification is helpful in tracking the equipment and at times for querying its status.



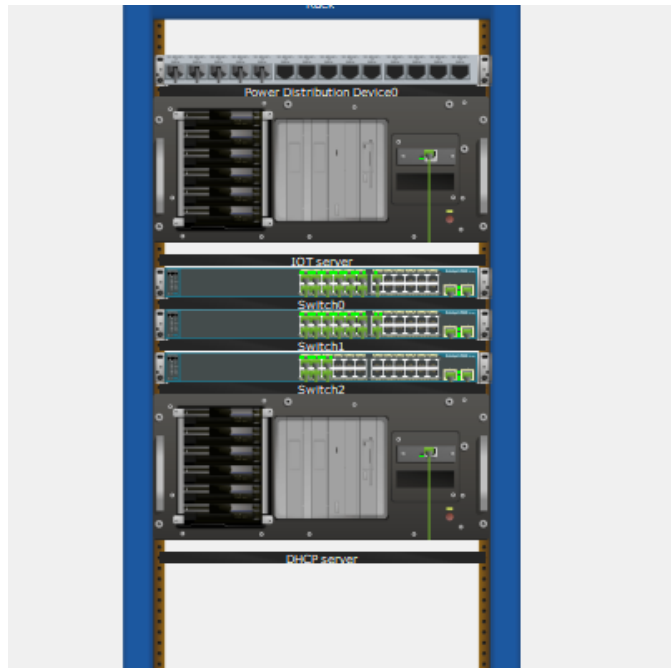
Chapter Four

4.1 Configuration:-

- ❖ We have chosen this map because it contains everything that we need for our project, for example it contains a conference, a meeting , a reception , a control, and a storage room in addition to a workplace.
- ❖ We've distributed the appropriate devices in the office in order to accomplish a secure, reliable, safe, and a trusted environment in the office.
- ❖ The devices include the camera, the motion detection device, the smart door, and the smoke detector... Etc, We have connected these devices to switches.



- ❖ We've used 2 servers DHCP and IOT. We've assigned the IP address 192.168.100.1 while assigning an IP address 192.168.100.10 for IOT serve.
- ❖ The DHCP server is used for the distribution of IP addresses and whereas IOT is used to control and put conditions for the devices.
- ❖ We have used 3 switch devices:-
two switch devices to be connected with IOT devices. And the other switch device is connected to wireless router which is an access point.

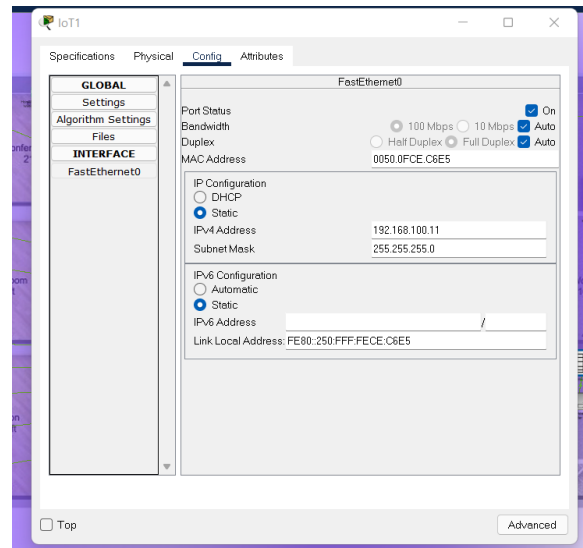


- ❖ Then we'd assign IP Addresses to these IOT devices, we have 2 types of IP addresses which are static and dynamic.
- ❖ Steps for the assignment of IP addresses.
1-Static

*click on the device.

*configure static ipv4.

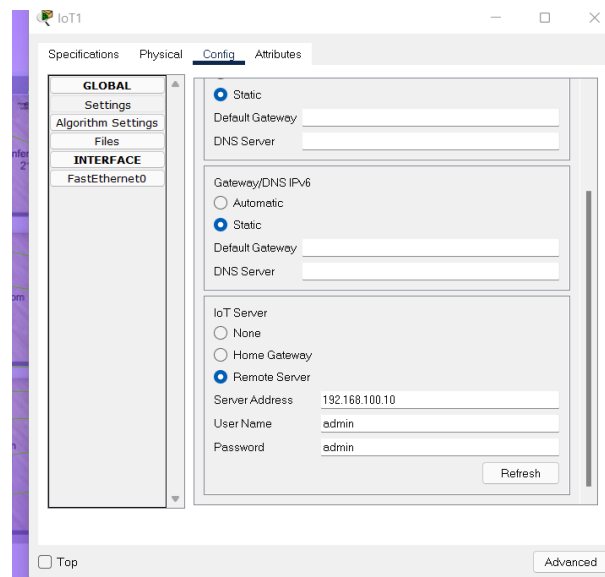
* start assigning from 192.168.100.11



* choose remote server.

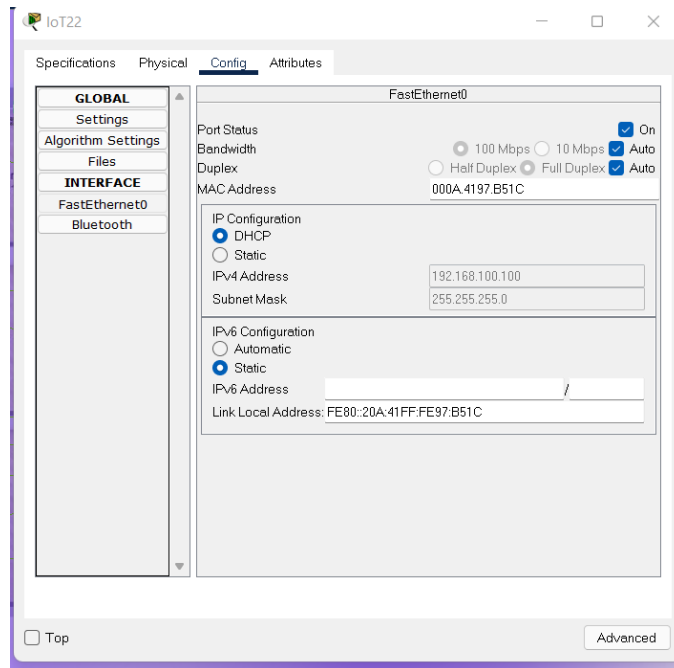
*write down IP address of IOT server.

* write down username and password of IOT server there.

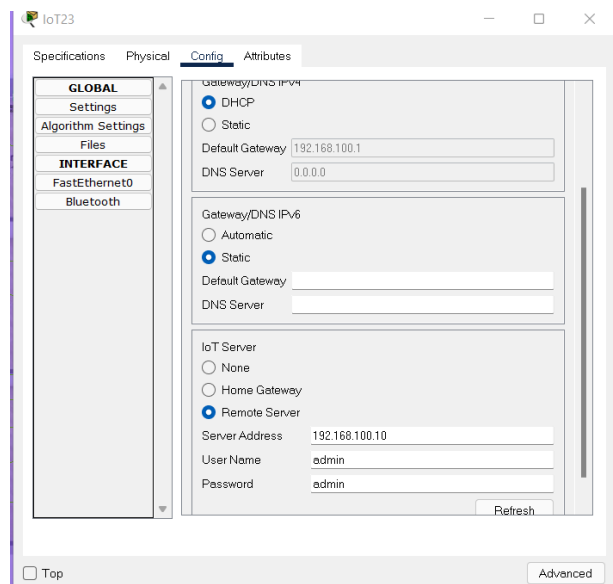


2-DHCP

- * click on the device.
- *go to the configuration of the device.
- * choose DHCP.

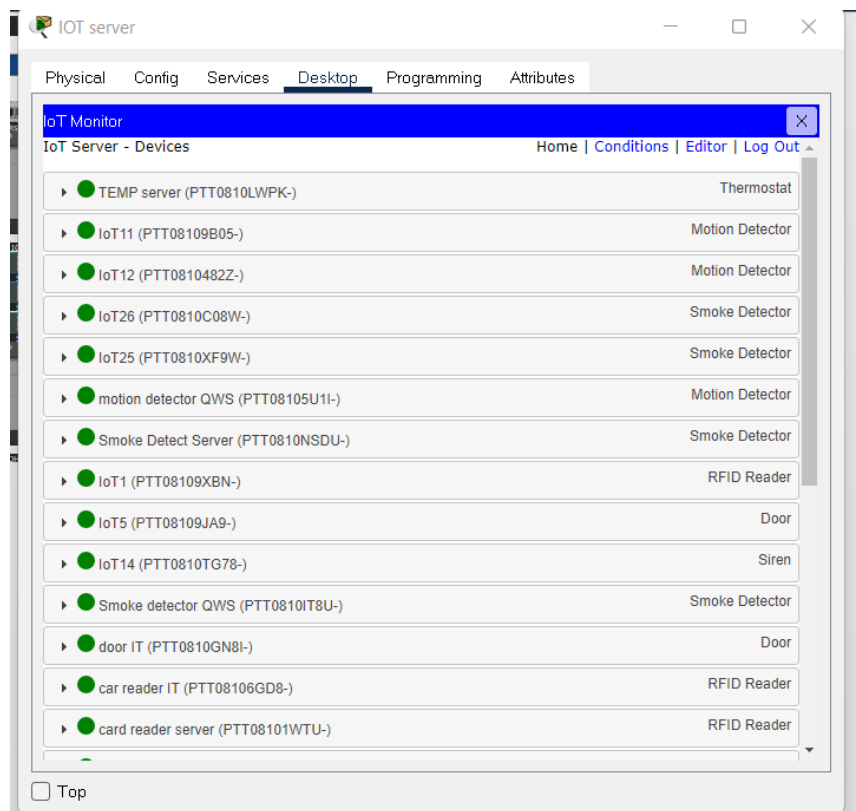
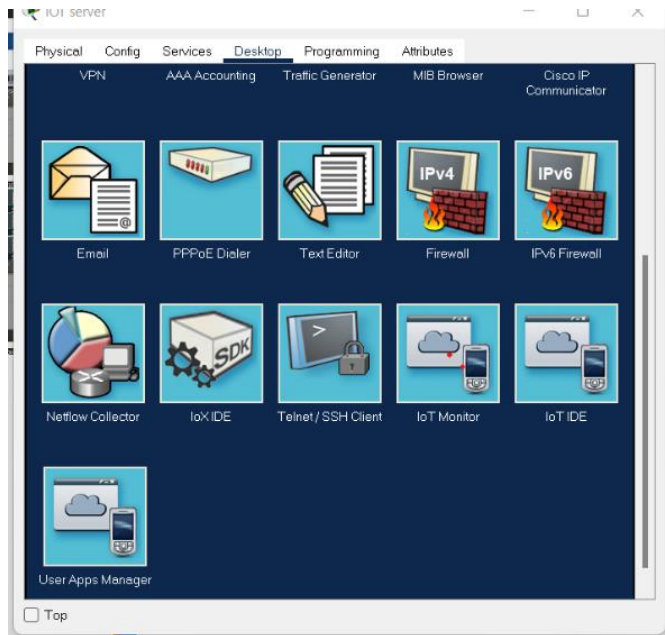


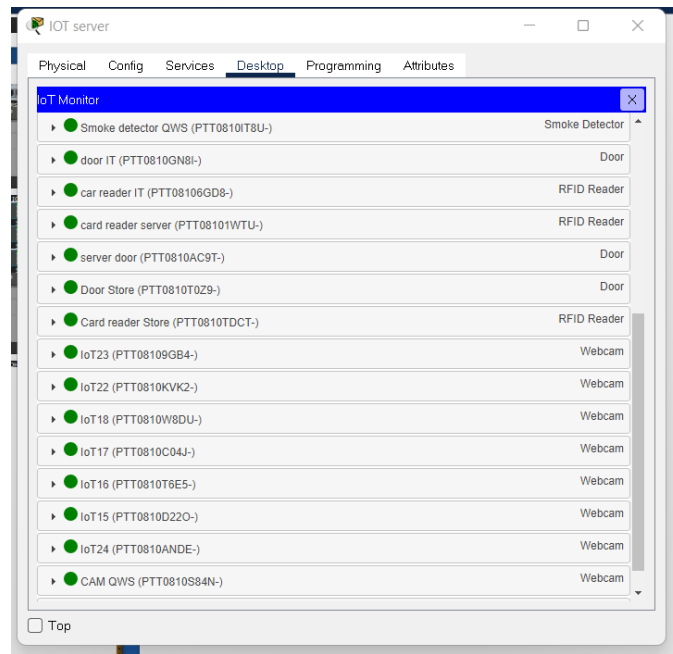
- *write down IP addresses of IOT server.
- * write down username and password of IOT server there.



- ❖ To check the connectivity of the devices , we go to the IOT sever then click on IOT monitor we put IP address of IOT server, username and password and there we'll see the list of devices which we'd connected to.

From there we can set the conditions for the devices.





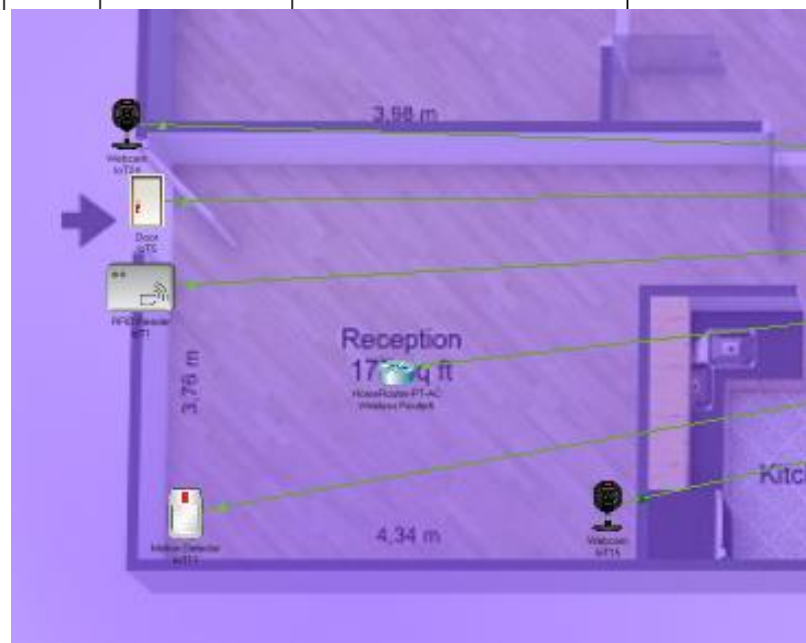
- ❖ The conditions are :
- Once the motion detection device detects a motion it'll turn the cameras on.

The screenshot shows the 'IOT server' application window with the 'Desktop' tab selected. The 'IoT Monitor' window is open, displaying the 'IoT Server - Device Conditions' table. The table has columns for Actions, Enabled, Name, Condition, and Actions. The table contains two rows of conditions for IoT16.

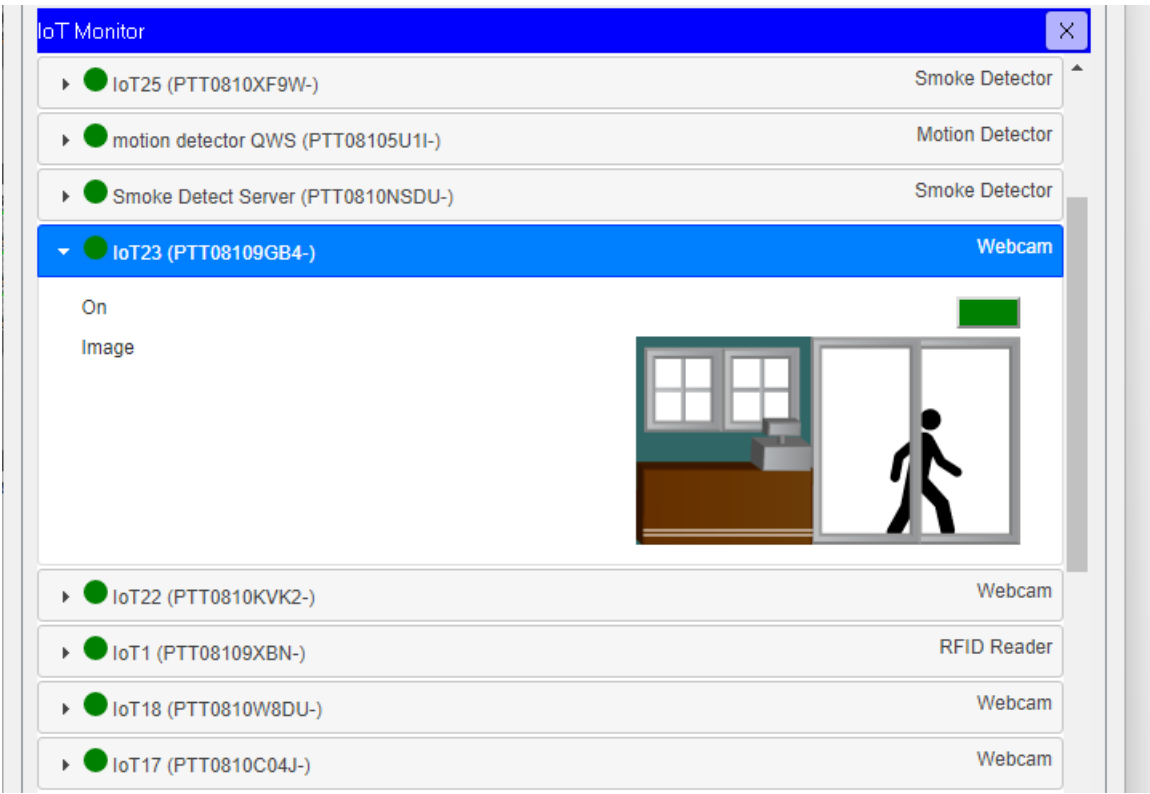
Actions	Enabled	Name	Condition	Actions
Edit Remove	Yes	IOT16	IoT12 On is true	Set IoT16 On to true
Edit Remove	Yes	IOT16off	IoT12 On is false	Set IoT16 On to false



Remove	Yes	smoke	Smoke Detector QWS Level 0.1	Set IoT14 On to true
Edit Remove	Yes	iot	IoT11 On is true	Set IoT24 On to true Set IoT15 On to true
Edit Remove	Yes	iotoff	IoT11 On is false	Set IoT24 On to false Set IoT15 On to false

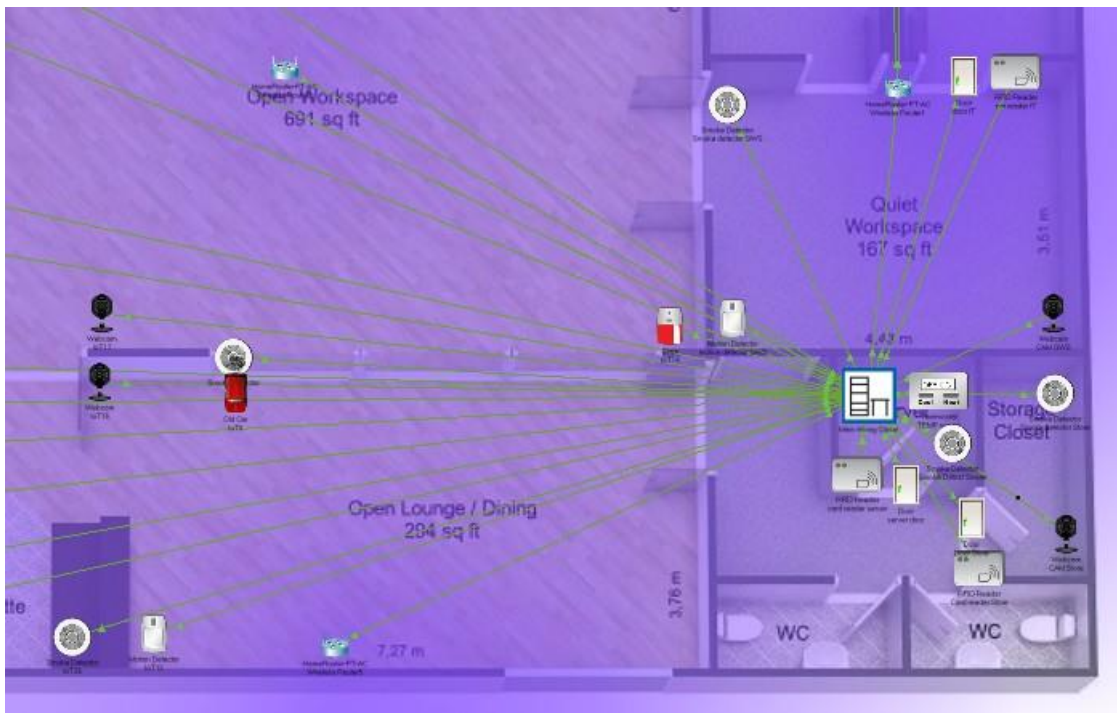


Other cameras are always on.



When smoke is detected by the smoke detector device, it's turned on which in turn activates the siren.

Remove	Yes	QWS On	false	Set IoT14 QWS On to false
Edit	Yes	smoke	Smoke detector QWS Level >= 0.1	Set IoT14 On to true
Remove				
Edit				Set IoT24 On to true



- ❖ Only authorized personnel who have a identification employee cards can pass through the entrance smart door, whereas the IT technician and engineer who have a higher degree of authorization can enter the server room to check for any troubleshooting.



Remove	Yes	QWSOn	false	Set CAM QWS On to raise
Edit	Yes	iotoff	IoT11 On is false	Set IoT24 On to false
Remove				Set IoT15 On to false
Edit	Yes	RFID Card	IoT1 Card ID = 55	Set IoT1 Status to Valid
Remove				
Edit	Yes	No RFID Card	IoT1 Card ID != 55	Set IoT1 Status to Invalid
Remove				
Edit	Yes	door	IoT1 Status is Valid	Set IoT5 Lock to Unlock
Remove				
Edit	Yes	door lock	IoT1 Status is Invalid	Set IoT5 Lock to Lock
Remove				

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Chapter Five

5.1 Conclusion:-

Nowadays most of the People spend A lot of time in offices. Office environment directly affects the working efficiency of employees. So comfort is needed in office. That's why we need to design and implement a modern smart office that's (secure, safe, reliable and trusted) such a project can be achieved by IOT devices. We use devices that are the least costly and the Most important, and the most wanted (which are demanded by the customers) For the design. And we had put the cameras in a way that can cover the largest area. Also a special camera and motion detection device for sensitive places like server and storage room.

Future developments: It can be used on a larger scale like in buildings or on the scale of a whole city, A notification will be sent to the mobile device or laptop(to which the sensors are connected) in the case of any problem faced like in the case of burglary and when there is a fire, In short Our project can be used for many other larger projects in a more developed way on a larger scale It would be more secure, safer and more trusted.

Chapter Six

6.1 References:-

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