INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 6.078
*(Volume 6, Issue 2)*
Available online at: www.ijariit.com

# IoE – Smart Classroom

*T. Prathyusha*
*prathyushatelaga@yahoo.in*
*School of Information Technology, Jawaharlal Nehru Technological University*
*Hyderabad, Telangana*

## ABSTRACT

***This paper explains the functionality of a Smart classroom. The room consists of a home gateway and all the IoT devices like a smart window, laptop, camera, door, and fan are connected to it. An RFID reader is integrated into the door. When the student/faculty scans the student id card (RFID Card)/faculty id card the door automatically opens and the student roll number/faculty id number is stored in the server. The laptop is the admin laptop and all the IoT devices in the room can be controlled and monitored like turn on/turn off the fan, open/close the window, turn on/turn off the camera. The door is connected to the laptop which makes the opening and closing easier when a student/faculty forgot to carry the ID cards. There is a smartphone integrated into the network where the Head of the department can monitor the classroom from anywhere. The camera helps to check whether the classes are functioning properly on time.***

***Keywords***— *IoE, IoT, Smart classroom, RFID, IoT Devices, Smartphone, Cell tower, Internet, ISP, Servers.*

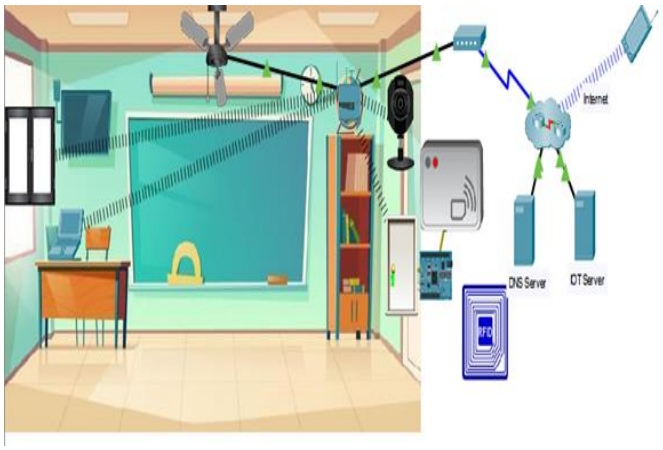
## 1. INTRODUCTION

The internet consists of a Cell tower connected to the central office server. The ISP router is connected to a central office server, switch and a cloud. The switch is connected to the DNS server and IoT server to established the communication between the IoT devices. A cable modem is used between the home gateway and the internet. Home gateway is connected to all the IoT devices through wired and wireless. The Laptop is used to monitor and operate those devices within the room. A smartphone is connected through a cell tower which enables the head of the department to monitor the activities inside the classroom from anywhere. The students and faculty staff are provided with RFID integrated ID cards. This card helps them to check-in and check-out of the classroom easily further records the roll number/ ID number and timings in the server.

## 2. INITIAL ASSUMPTIONS

There is no monitoring system in place for the head of the department to monitor the functioning of classes. How many classrooms are effectively utilized and how many are not. Are students and faculty on time during class timings or not. Are classes going on as per the scheduled time table or not.

## 3. BLOCK DIAGRAM




## 4. EXPLANATION

The students/the faculty belonging to the department can enter the classroom by scanning their id cards. The login information is stored on the servers. There is a smart camera in the room capable of monitoring the activities of the classroom. The home gateway is connected to the internet through a cable modem. The laptop in the room is connected to the gateway and all IoT devices in the room like fan, window, door, the camera can be operated with this laptop. The head of the department is provided with a smartphone through which all the IoT devices inside the classroom can be monitored from anywhere. DNS server acts as a gateway establishing communication between all the devices over the internet. IoT server provides access for the laptop and smartphone to monitor and control the IoT devices over the internet.

## 5. WORKING

The classroom window, Laptop, door, camera are connected wireless to the home gateway. A fan is connected through an ethernet cable to the home gateway. For the wireless connection of IoT devices, we need to configure the SSID, WPA2-PSK of the home gateway. Both wired and wireless we also need to configure the IoT server address with username and password, DNS server and Home gateway address. The door is also integrated with RFID Reader.

The students and staff are provided with ID cards to enter the room. The cable modem is a hardware device that allows the IoT devices to connect and communicate to the internet by converting the analog signals to digital signals. The internet consists of ISP Router which is connected to a switch further to the DNS, IoT servers. The central office server is connected to the ISP router and cell tower. This cell tower enables 3G/4G devices like a smartphone to access the IoT devices in the network from anywhere.

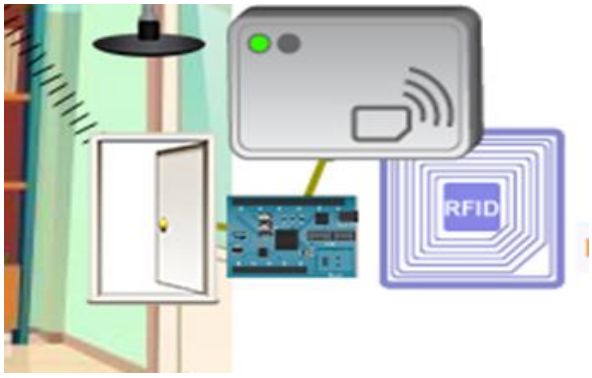
## 6. IMPLEMENTATION

This block diagram implementation is done using a tool cisco packet tracer 7.3.0. The door and RFID reader are integrated by using the below code:

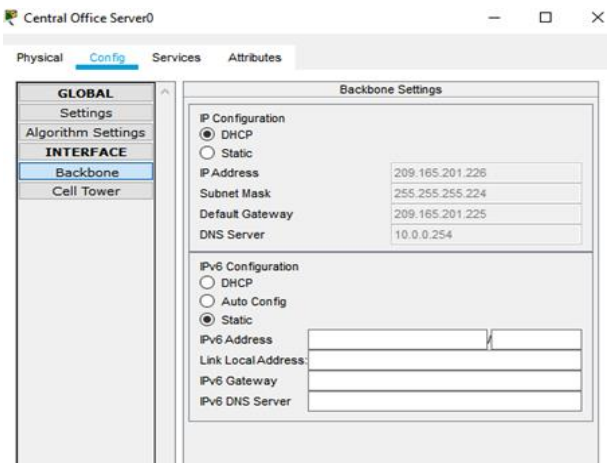
main.js

```
var door = 1;
var reader = A0;
function setup() {
    pinMode(door, OUTPUT);
    pinMode(reader, INPUT);

}

function loop() {

    if(analogRead(reader) === 0){
        customWrite(door,1);
    }
    else {
        customWrite(door,0);
    }

    digitalWrite(1, HIGH);
    delay(1000);
    digitalWrite(1, LOW);
    delay(500);
}
```

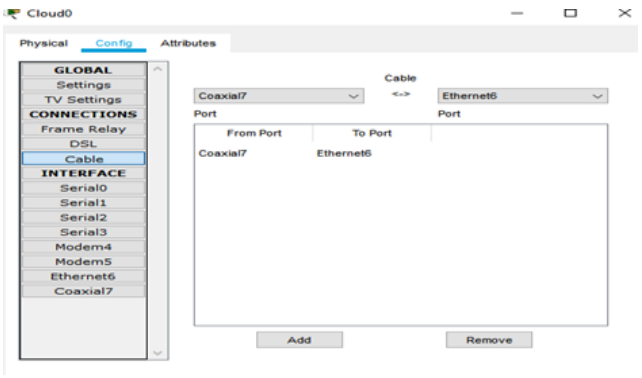
The below image opens the door when the RFID card is scanned to the RFID reader:



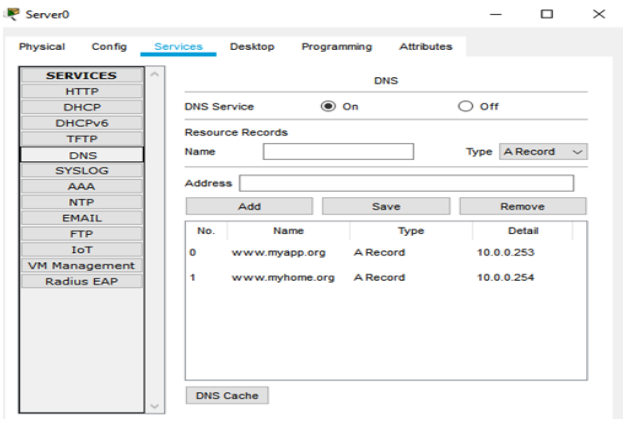

The below image shows the configuration of central office server connected to cell tower:



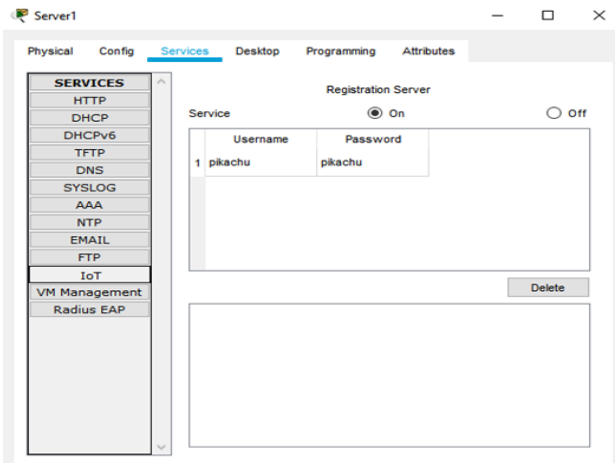

Cable modem configuration:



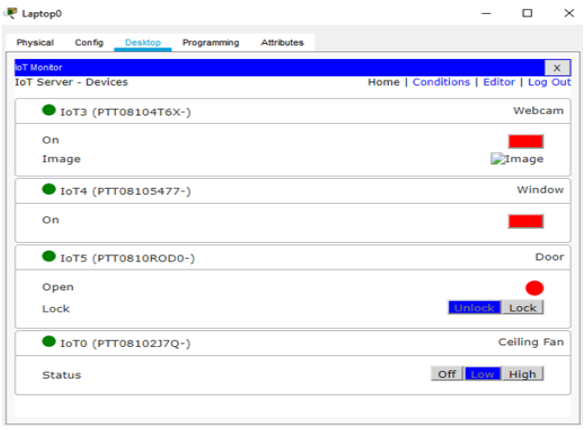

The DNS server registration:




The IoT server registration:

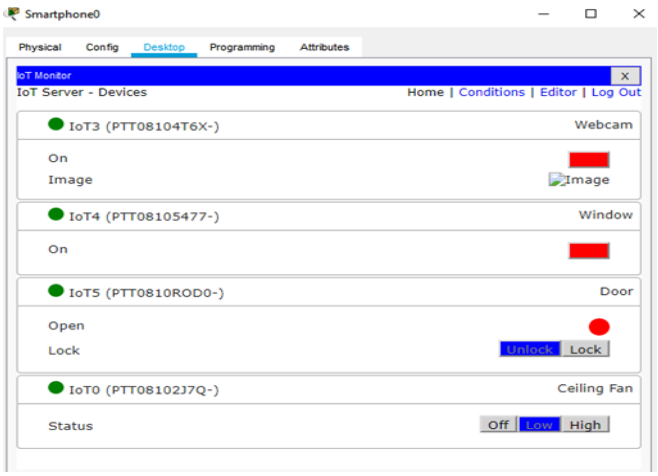



The laptop can monitor and operate the IoT devices:



The smartphone can monitor and operate the IoT devices:




## 7. CONCLUSION

This will help the head of the department to monitor the functioning of classes from anywhere anytime by just logging in with the smartphone. It will also give a clear picture of how many classrooms are being properly utilized by the students in the department. The timings of the students and faculty are captured in the server so we can easily check whether the classes are going as per the scheduled time table.

## 8. REFERENCES

[1] Priscilla Oppenheimer. Top-Down Network Design.
[2] https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst4000/8-2glx/configuration/guide/supcfg.html.
[3] CCNA Exploration LAN Switching and Wireless.
[4] https://www.cisco.com/c/en/us/support/docs/cloud-systems-management/configuration-professional/111999-basic-router-config-ccp-00.html
[5] https://community.cisco.com/t5/routing/how-to-configuring-a-cell-tower-on-central-office-server-packet/td-p/3833022
[6] https://www.packettracernetwork.com/internet-of-things/pt7-iot-devices-configuration.html
[7] https://www.computerhope.com/jargon/c/cablemod.htm
[8] https://www.freepik.com/free-vector/empty-classroom-interior-school-college-class_6993851.htm#page=1&query=classroom&position=0
.