Department of Electrical Engineering
Indian Institute of Technology Jodhpur

B.Tech. Project Report

Title: Smart Campus Design Using IOT

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ABSTRACT :

One of the revolutionary products of the Internet is IOT. IOT is an universal global neural network system in the cloud which has the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Nowadays IOT is used as a system that contains computing devices, mechanical and digital machines with unique identifiers which interact and communicate with other physical devices, with environment, with infrastructures etc. Apart from having major implications in the areas of transportation, smart home, agriculture, industrial applications, military operations, medical and healthcare, it has a huge implication in educational institutions. An institute has a large scope of inserting the applications of IOT to make a smart environment. Therefore our aim of this project is to describe a concept called Smart Campus by providing a detailed description of the IOT framework and layout of the sensor networks.

Contents:

1.MOTIVATION :

The motivation we got to do this project is due to advancement in modern technology which not only helps in improving human living standard but also increases efficiency of doing multi tasking.

In today's world, where every college is connected to the internet. So there is a need for IOT based technology to utilize secured and modern technology for online campus activities. IOT provides a platform where we connect,sense and control the devices remotely across a network server.The idea of smart campuses is not a new concept. It is already being practised in many developed countries from years ago. Smart campuses are quite trendy applications in IOT's world.

2.METHODOLOGY :

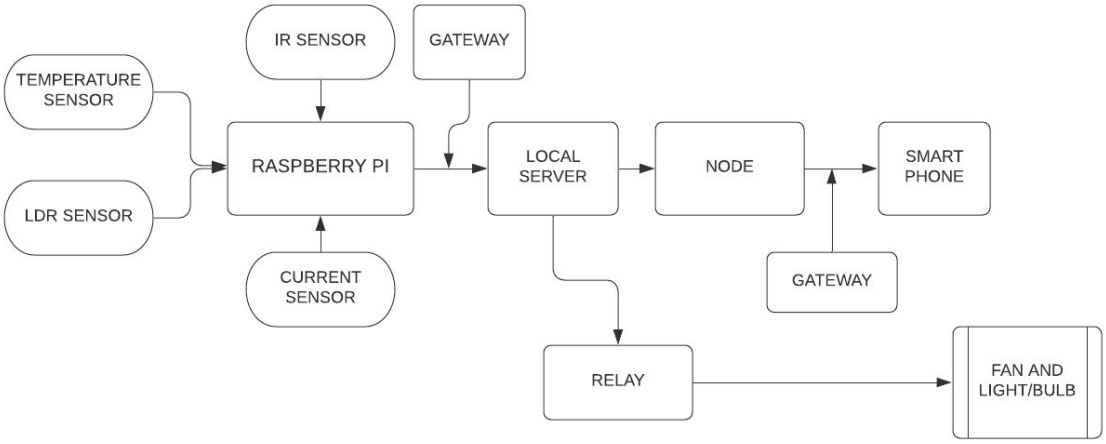
In this project we used multiple sensors like current sensor, temperature sensor, LDR sensor, IR sensor that are connected to a main processor which is Raspberry Pi(model 3B +). Each sensor sends the information to the main module which saves the information into a database and sends the information to Cloud/Local server.

The temperature sensor,light sensor and current sensor are used to determine temperature,light and current respectively. And the IR sensor detects whether any person is present in the system or not.

Here, temperature sensors are used to detect ambient temperature so that we can control fans in the campus accordingly. The LDR sensors are used to check light intensity so that we can control the lights/bulbs in the campus accordingly.

As we know that in IOT each device is connected to the internet so smartphones are used to remotely control all the function and features of the devices from anywhere.The node used in the sensor network is capable of performing processing and gathering of sensor information and communicating with cloud servers.

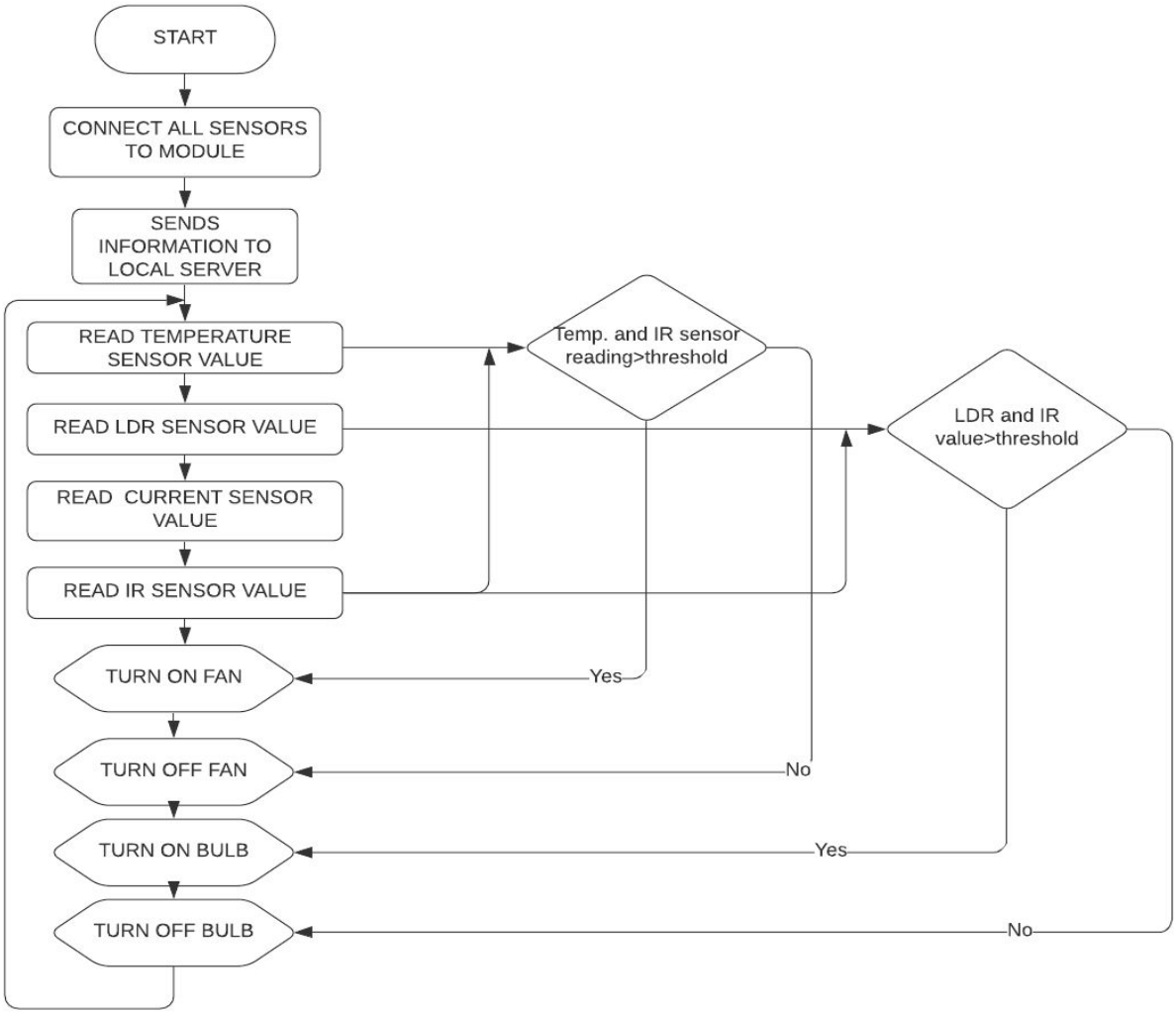
Block diagram:-



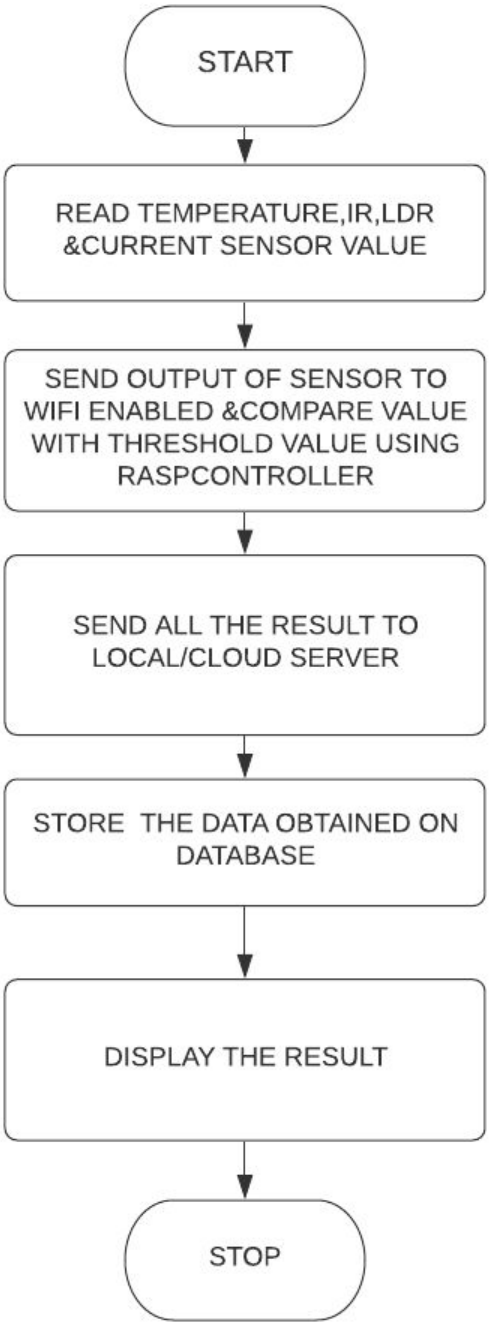
Proposed Steps:-

Step-1:- Connect all sensors to the main module (Raspberry pi).
Step-2:- Each sensor sends information to the main module and wifi enabled.
Step-3:- The stored information is given to Cloud/local server .
Step-4:- Server creates a web based GUI to display all the information.
Step-5:- On comparing the values of temperature sensor and IR sensor with the threshold value set earlier.
Step-6:- If both the reading i.e, temperature sensor reading and IR sensor reading is above threshold value. FAN will be automatically turned ON.
Step-7:- In the similar fashion, if reading of LDR sensor and IR sensor is greater than threshold value. LIGHT/BULB will be automatically turned ON.
Step-8:- If any of the conditions is not fulfilled it will not turn ON the lights and the FAN.

Hardware flow of proposed system:-



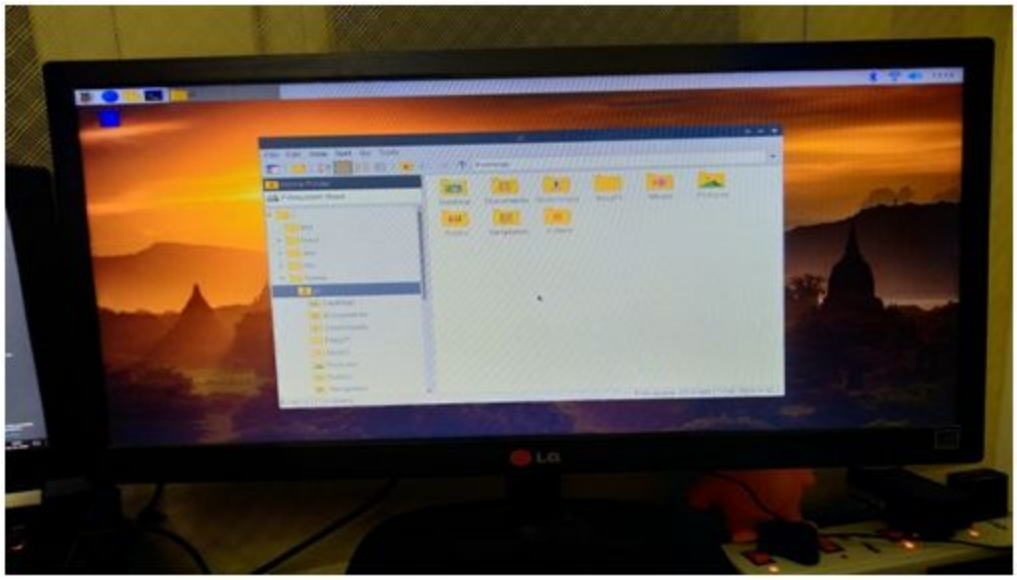
Software flow of proposed system:-



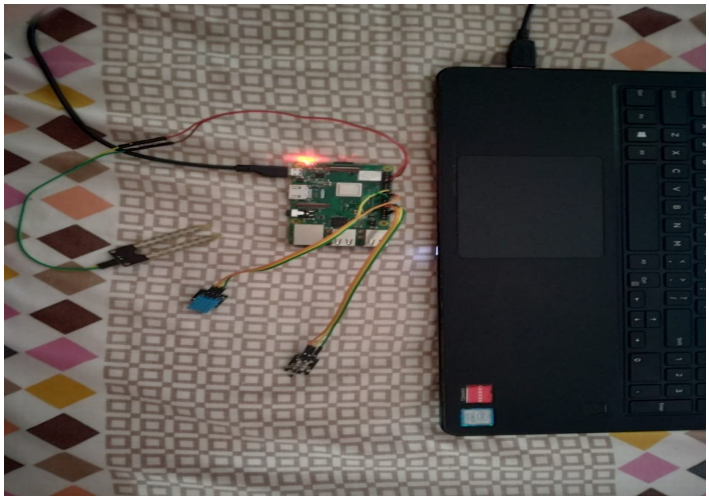
Monitoring Setup :-

Following are the steps for installation of Raspbian OS, VNC Viewer for configuration setup :-

step-1:-First of all we allocate a drive(SD card) for installing OS.
step-2:-Download BALEN ECHER zip file and extract it.
step-3:-Then select the file and run as administrator.
step-4:-Select the extracted image file and flash it.
step-5:-Exit the image file and now eject the SD card.
step-6:-Download VNC viewer from realvnc.com for screen sharing.



Experimental Setup :-



3.RESULTS AND DISCUSSION:

After receiving data from all the sensors connected, the controller decides what action has to be taken. Here the cloud and database is obtained from RaspController cloud server, which will also let us store the data and manipulate the devices. We can also manipulate the Bulbs/Lights and fan using the RaspController. So from the output of temperature and IR sensor, the fan will be automatically turned ON and OFF. Similarly from the output of LDR sensor and IR sensor, lights can be controlled by RaspController.

The expected result must lie in range listed below:-

1. Maximum data rate >> it is around 300Mb/s theoretically
2. Maximum transmission bandwidth >> it can support up to 50MHz single ended.
3. Maximum power consumption >> (i) for recommended PSU current capacity :- 2.5 A
   (ii) for maximum total USB peripheral current draw:- 1.2A
   (iii) for typical bare board active current consumption:- 500 mA

4.Maximum number of sensor that can be attached to Raspberry pi >> for 3B + model , we have 28 GPIO pins. So we can connect around 20-25 sensors at optimal level.

5.for temperature sensor >> it can handle upto 125°C (260°F), but it's recommended to use it below 100°C (210°F).

4.CONCLUSIONS:

With the use of Internet of Things (IOT), we can control and monitor the information and data from anywhere.Usually humans forget to switch off the appliances when the devices are not in use and in such cases, these systems are quite useful in order to maximize the power efficiency. This is a powerful, well proposed and dependable system.Though we have suggested a huge system but when it came to actual implementation, we so far finished only a part of it which includes a Raspberry Pi processor connected with multiple sensors (that includes temperature, IR, LDR sensor).

This proposed system can be enhanced by using more sensors like **proximity sensors** to detect the presence of nearby objects without any physical contact and **fire sensors** to detect the presence of a flame or fire.This kind of system will be more useful when it runs for larger areas.The proposed system may work slower later on as many applications are connected together. To overcome this issue, we can use high performance microprocessors in the system for better flexibility.

The web interface can be further enhanced to implement more functionality related to data management, data visualization and data analysis. In the future, we can make devices a bit smarter using machine learning algorithms.

5.REFERENCES:

[1] Snehal K. Dixit, S.M.Kulkarni.Et al. 2017. Smart Campus System using IOT. International Journal of Advanced Research in Science & Engineering, Vol. 6, Issue No. 08.

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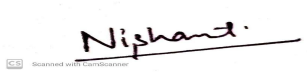
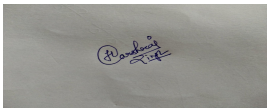
[3] Hentschel, K., Jacob, D., Singer, J., and Chalmers, M. Et al 2016.Supersensors: Raspberry Pi Devices for Smart Campus Infrastructure. In: FiCloud 2016: 2016 IEEE 4th International Conference on Future Internet of Things and Cloud, Vienna, Austria.

[4] Raspberry pi Compute Module 3B + , datasheet released on 1,january 2019

SIGNATURES:

Students

1. 

2. 

Supervisors