King Fahd University of Petroleum and Minerals

Computer Engineering Department

COE 444 – Project Report

Smart Home

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Abstract

In this project, our objective was to develop any home building by introducing the concept of the smart home. The smart home concept has some aspects to deal with. For instance, automating fire alarm systems, reducing electrical consumption, improving security aspects, and increasing automation. This report will illustrate the implementation for building a smart home using packet tracer.

10 May 2021

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INTRODUCTION

In this project, we modeled our futuristic vision for smart home. At the present time, the idea of the smart home has become essential for our daily life. The term smart homes refer to a useful home setup where appliances can be operated automatically and remotely connected from anywhere with a cyberspace connection using mobiles or computers. Smart home examples simulate a domestic experience wherever IoT smart machines are connected to a local network to give automation within the house. Instances of home automation consist of climate control, electricity storing, alarm and security events, and intelligent lights. The model we did is made to facilitate and automate the home tasks for the home residents. This should allow homeowners to improve in several categories. First, efficiency power consumption to electricity which means less cost and allow to them save more money. Moreover, comfortable experience in controlling the home remotely. Also, increase safety against fires, and security.

1. PROBLEM DESCRIPTION

Old-fashioned homes facing many difficulties that affect their mansion, and we can consider the four aspects. One of them is safety. Many of old-fashioned homes have low safety comparing to smart homes especially in facing fire by using the old techniques, such as fire blanket, and fire extinguisher which is an old way. Furthermore, we can consider the second aspect as automation. In old-fashioned homes, the residents are not allowed to access the home from outside the home. In the end, we can consider the third aspect is the cost. Old-fashioned homes waste more electricity in light, AC, and devices with fewer benefits by comparing with smart homes.

2. LITERATURE SURVEY

There are many projects that simulate smart hotels or smart homes networks in packet tracer. Nevertheless, we found some content focus only in a specific part of the home or just on room networks. We tried on our project to integrate a full smart home and be able to control it remotely and have many automated functionalities.
We would like to compare our project with this project
https://www.youtube.com/watch?v=uHRBgdvysYg&ab_channel=abdualrahmanalserihi

Which focuses on the smart home. Each of the two projects has some similarity in providing a fire alarm system and internal security with some IoT.

3. IMPLEMENTATION DESCRIPTION

4.1 Overall Layout

Out yard, which a small garden, office, Kitchen, Bedroom, Living room, Garage. Also, we tried in our model to make it comparable to most of the homes and be able to expand.

4.2. Out Yard

Out yard contain Water level monitor, Lawn Sprinkler, Street Lamp, Door, Window Wind detector, and RFID reader. If the card key match for RFID reader, all home doors switch from lock to unlock.

4.3. Home Rooms

We try to make the home similar almost to every home. The home has Office, Living room, Garage, Kitchen, and Bedroom. All of them are able to control remotely, and each of them has different functionality. For example, when the owner opens the Bedroom door, the Window is closed, and the Fan cell turned on, and the light turned on. Also, when the Kitchen door opens, the window closed and the fan cell turns on, and the light turns on.

4.4. Used Devices

We tried to use suitable home devices instead of using all or any IoT device, even though any IoT device is able to be integrated in our model. All home devices are connected to the gateway, and from the gateway, they connected to the switch. After that, they are connected to the server. Moreover, in our model, we use many devices such as RFID reader, street AC, Windows, Webcam, Smoke detector, fire sprinkler, and Motion detector.

4. DISCUSSION OF THE RESULT

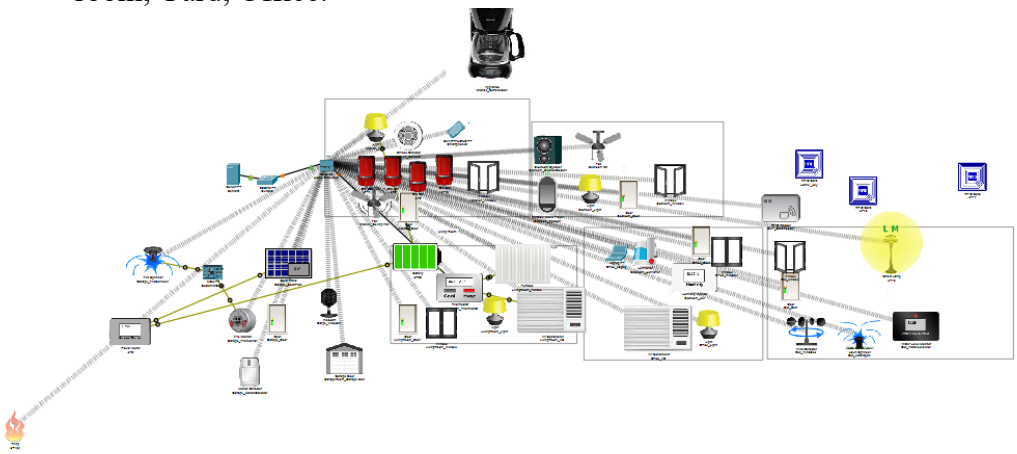
After we are finishing our model, we can say it is more efficient in consuming electricity. Also, our model facilities and provide automation functions for home residents. Moreover, our model has more safety regarding fire and security. The model has been worked well and all parts have been checked. There is just an issue in running the Firebase, it provides and infinite loop.

5. DIFFERENT DESIGN APPROACHES

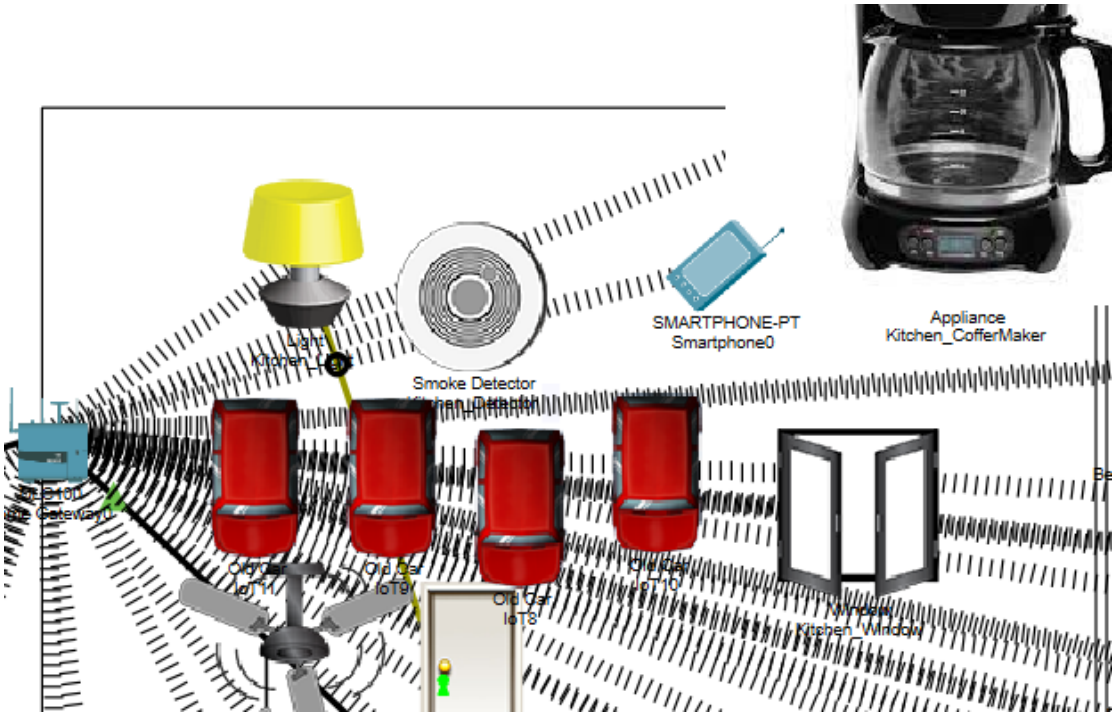
There are multiple approaches to design a smart home. First of all, we can use routers to connect several devices or we can use one gate home only as we did. In our project, there is no need for additional routers. Secondly, we can let the IOT server handles sending requests to the water sprinkler and make ON or we can use microcontroller. It is more efficient to use microcontroller because this will settle the problem of over dependency on one machine. In addition, we can use solar panels or we can remove them and depend only on electric appliances. This approach will deepened on how much budget we have. We can use RFID cards or depend only on the smart phone requests via Wi-Fi TCP communications. There are also different platform that can be used to save the data on a database.

6. DESCRIPTION OF THE PROJECT

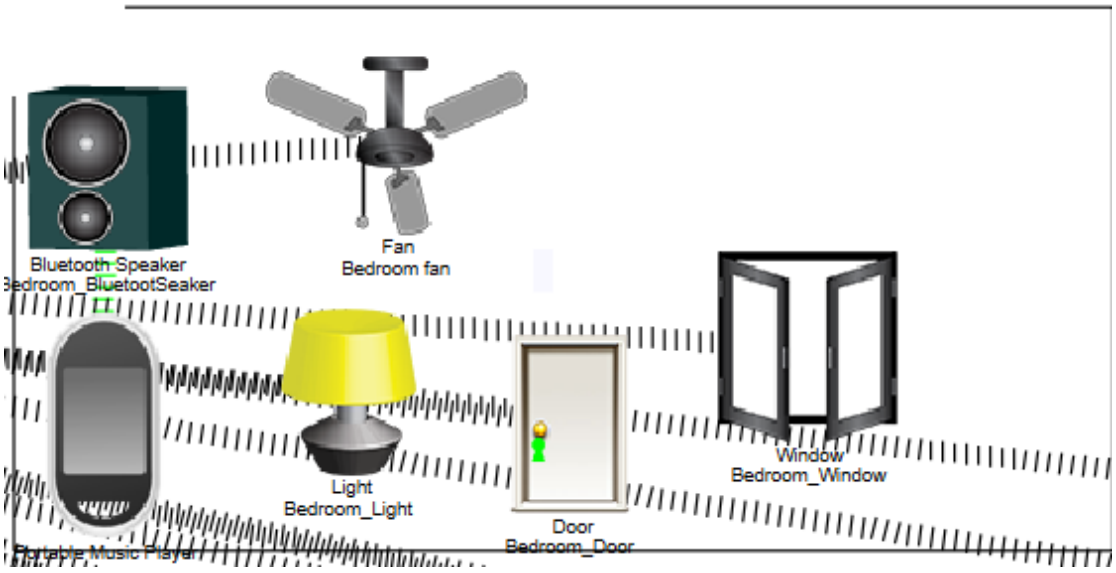
1. the home in the project consists of a Garage, Kitchen, Bedroom, Living room, Yard, Office.



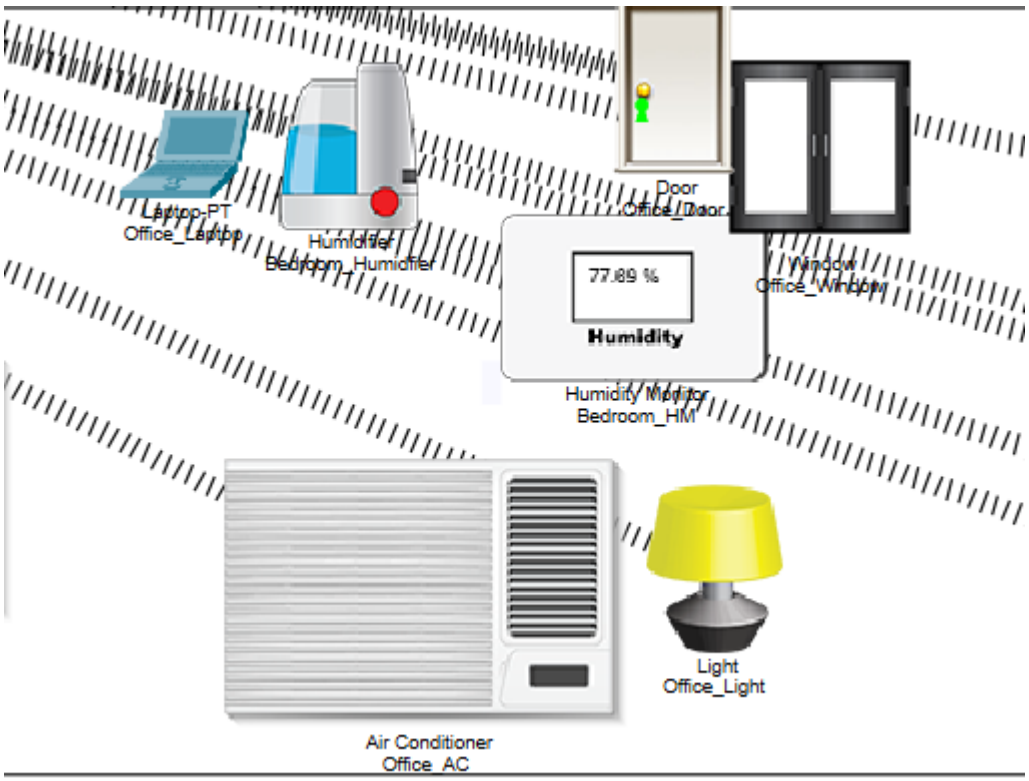
2. The Kitchen has two functions, when the door is closed, the window is open to get free fresh air. On other hand, when the door is open the Coffee maker turns on, also the light turns on.



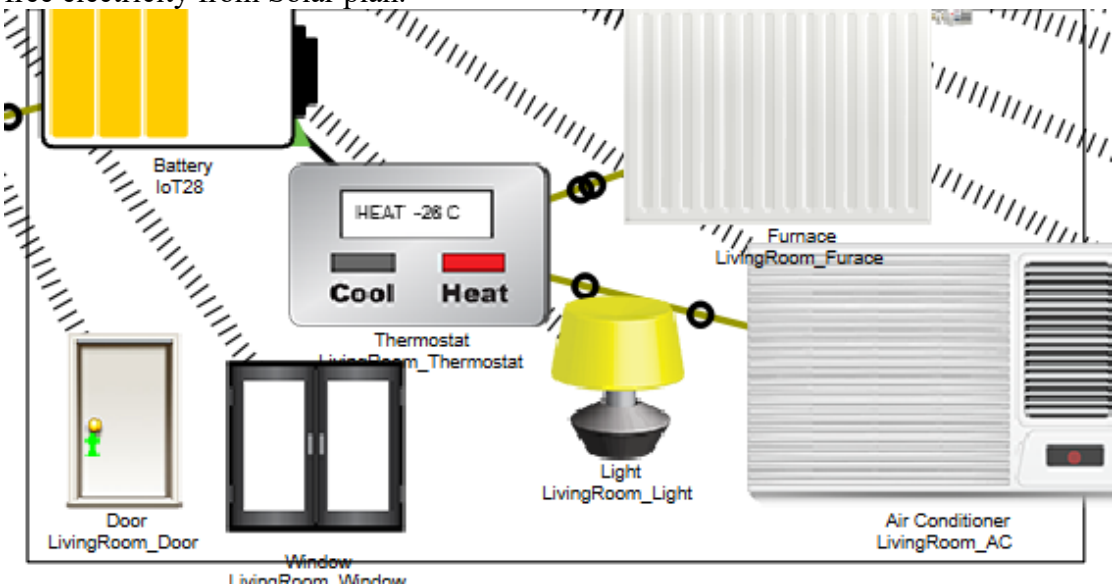
3. The Bedroom has two functions, when the door is closed, the window is open to get free fresh air. On other hand, when the door is open the Cell Fan turns on, also the light turns on.



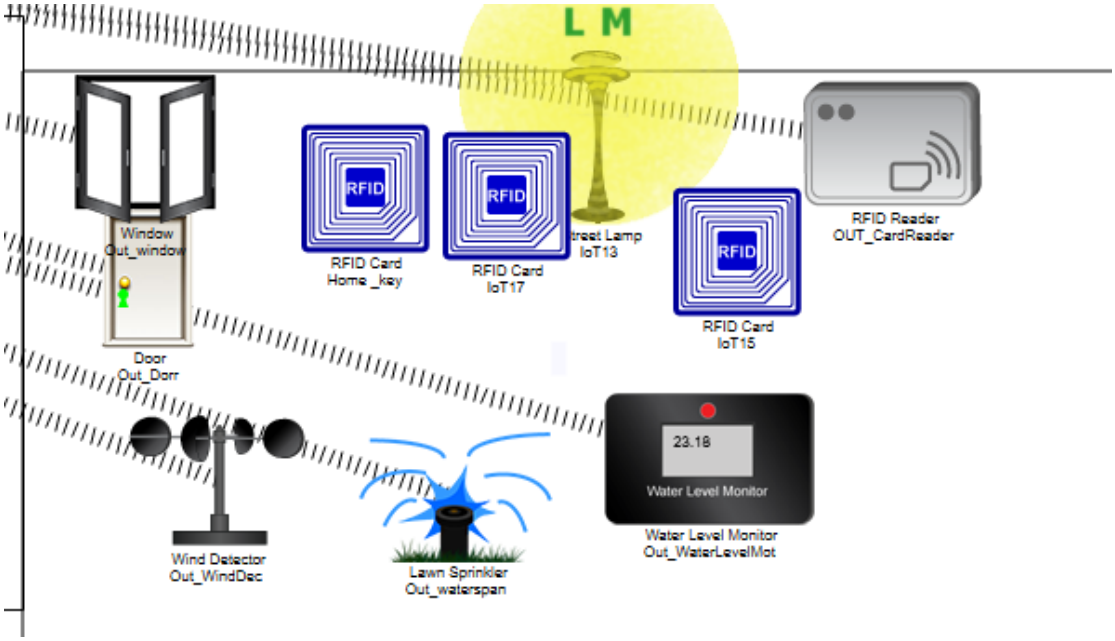
4. The Office has remotely controlled furniture



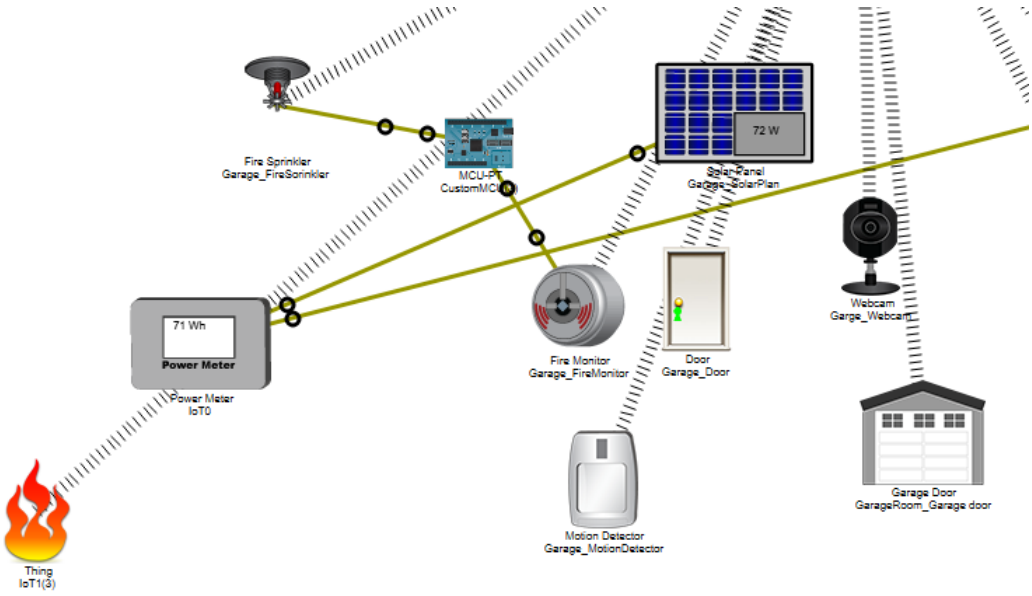
5. The Living room has remotely controlled furniture and Battery provide free electricity from Solar plan.



6. The Out Yard has remotely controlled Sprinkler and Wind Detector, Water level Monitor. Also, Has RFID reader, when the key is correct all of home doors turn to unlock. Otherwise, if the key is not correct, all home keys turn into lock.



7. The Garage has two functions, if there any motion detected the cam turns on, other wise the cam is off. In addition, when the fire monitor detects any fire the water Sprinkler turns on. Moreover, the Garage has Solar Panel to provide the needed power to the Battery.



8. We implement MQTT which is a messaging protocol used for Internet of Things. We implement different topics based on its place and Appliance's type like, Home/LivingRoom/Door. Then we send its status to a given subscribed clints for this example closed or opened.

9. We used Firebase which is a database provided from Google that can receive real time streaming data to save given data like alarming when there is a fire In a specific location. Firebase is not compatible with Packet Tracer but we used third party to make connection between the two applications. We have used the Wi-Fi

IPv4 address of our local machine to receive the data from Packet Tracer then send it to Firebase after decoding it.

7. CONCLUSION

In summary, we have faith in our vision can help homeowners to have a better experience and be able to convert their lifestyle from old-fashioned into smart homes. Home residents can have an easier and automated experience, and they can create or delete any feature to their devices at any time. Moreover, the smart home provides a better solution a in facing fire, and this can be considered as a good way to invest in. Also, how owners can make more money be spend less on electricity and maintenance devices or replace them such as lamps.

7. Reference

1- Old projects videos

8. Work Distribution

Task	Bassam	Hassan
	Final Report Progress report	Create firebase account
	Create Packet tracer file, design the home and put devices, configure, and connect them to the gateway and the server	Connect component
	Make conditions for IoT	Modify on notification from Python code