Python pioneers smart home project report

Introduction:

No one can doubt that smart homes are a big revolution in the IOT field. A smart home system application controller plays a pivotal role in transforming traditional homes into intelligent and efficient living spaces. This innovative technology has gained widespread recognition for its ability to enhance convenience, security, energy efficiency, and overall quality of life. The application controller serves as the central hub that allows users to monitor, control, and automate various aspects of their homes through a single, user-friendly interface as shown as a sample in figure (1).

Figure (1): Interface of smart home controlling all of the house facilities

With just a few taps on a smartphone or voice commands to virtual assistants, people can adjust room temperatures, dim lights, control devices, and even set up complex automation scenarios tailored to their preferences.

Security is another crucial dimension where the smart home application controller shines. Users can receive real-time notifications and remotely monitor their homes and give the ability to make timers to the devices to ensure the safety of the house and controlling the electricity.

The grand challenge that we solve:

- **Energy Efficiency:** Traditional homes often face challenges in optimizing energy consumption. Smart home systems enable users to monitor and control their energy usage efficiently. This includes features such devices timer and controlling to all electrical appliances, helping to reduce energy waste and lower utility bills.
- **Security and Surveillance:** Home security is a common concern, and smart home systems address this by providing advanced security features. Users can monitor their homes in real-time through safety in accounts , confirmation questions and timer alarms, enhancing overall home security.
- **Remote Monitoring and Control:** The ability to monitor and control various aspects of the home remotely is a significant advantage of smart home systems. In addition to the ability to have modes for parent and child to ensure the security and safety of the children in the home with the temperature, gas and dangerous devices.

Our prototype:

Our project aims to solve all these problems by generating a code that can be considered as a smart home software system which control all the facilities of the smart house. Our project consists mainly of two parts:

The first part: Creating accounts and user management (Signup and Login):

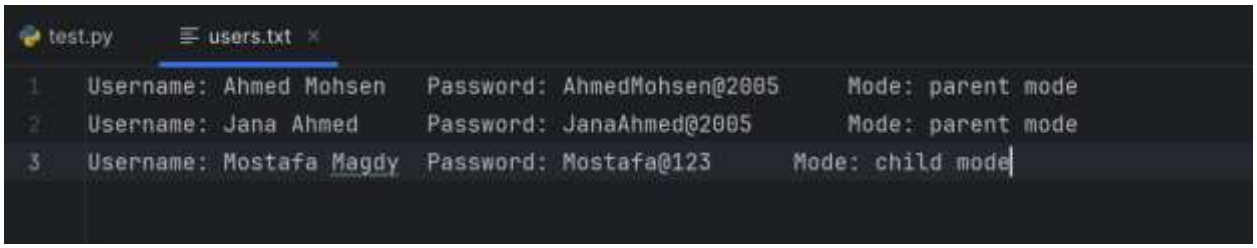
First of all, to ensure the security of the users of the house, we implemented a full system of creating accounts for the first-time users and login for the old users.

Creating account for the first-time users:

First of all, we ask the user to choose to signup or login, if he chose signup, he begins to create a new account with entering the (parent or child) mode, username and password.

```
Welcome to your smart home
Signup or login? signup
Are you a parent or a child? parent
Enter username: Jana Ahmed
Enter your password JanaAhmed@2005
strong password
Signed up successfully
```

The password must be more than 8 digits, have special characters, uppercase letters, lowercase letters, and digits to ensure that it is a strong password. After creating the account, all the accounts are going to be saved in the user.txt file.



If the user chose to login, he enters the account, and the program checks that it is found in the users text file, and if it is found, the program logins successfully.

```
Welcome to your smart home
Signup or login? login
Welcome back! Please log in.
Enter your username: Ahmed Mohsen
Enter your password AhmedMohsen@2005
Login successful <3
```

If the program finds that the user is not found in the users text file, it will recognize that and asks the user to enter valid username and password.

```
Welcome to your smart home
Signup or login? login
Welcome back! Please log in.
Enter your username: Hamza Gamal
Username not found. Please check your username or sign up.
```

The second part: the controlling of home appliances:

```
Do you want to know the home status? : yes
bedroom temperature is 23
bedroom light is turned off
livingroom temperature is 21
livingroom light is turned on
sofra temperature is 12
sofra light is turned on
bathroom temperature is 14
bathroom light is turned on
bathroom water is closed
bathroom gas is opened
bathroom devices are opened
kitchen temperature is 12
kitchen light is turned off
kitchen water is opened
kitchen gas is opened
kitchen devices are closed
```

Before the control, the program asks the user if he wants to know the status of the house. If he said yes, the program generates random values for all the facilities of the house (temperature, water, gas, light, devices) for all the rooms.

Then, the program asks the user if he wants to change the status of the house. If he said yes, the program begins to show the modes of control.

There are two modes of controlling:

- **Parent mode:** which can control of the whole features (temperature, water, gas, light, devices)
- **Child mode:** which can control only the features of (water, light, devices) to ensure the safety of the children and prevent any accidents.

After that, the program asks the user to choose what he wants to change, the room he wants to change it in, and a confirmation question to ensure that the decision is made by the user not by accident.

```
Which thing you want to change? (temperature, water, gas, light, device) : temperature
which room you want to change in it? (bedroom,livingroom,sofra,bathroom,kitchen): bedroom
Are you sure that you want to change the temperature of bedroom? yes
```

Features can be controlled:

1) **Temperature:**
   If the user chose to change the temperature, the program asks him where he wants to change it and a confirmation question. The user should enter a temperature between 10 degrees C and 30 degrees C which is a safety temperature.

```
Which thing you want to change? (temperature, water, gas, light, device) : temperature
which room you want to change in it? (bedroom,livingroom,sofra,bathroom,kitchen): bedroom
Are you sure that you want to change the temperature of bedroom? yes
enter new temperature: 8
too low
please enter temp again45
too high
please enter temp again25
temperature is changed from 23 to 25
```

2) **Water:**

If the user chose to change the water, the program asks him where he wants to change it and a confirmation question. He can change the (tap , bathtub or washing machine) in bathroom while he can change (tap or dish washer) in kitchen.

The program asks the user if he wants to open or close the water, and what he chooses applies to the device.

```
Which thing you want to change? (temperature, water, gas, light, device): water
which room you want to change in it? (bathroom , kitchen or both): bathroom
Are you sure that you want to change the water status of bathroom? yes
change (tap or bathtub or washing machine) tap
tap water is closed
do you want to open or close water? : open
tap water is opened
```

3) **Gas:**

If the user chose to change the gas, the program asks him where he wants to change it and a confirmation question. He can change the heater in bathroom while he can change butagas in kitchen.

The program asks the user if he wants to open or close the gas, and what he chooses applies to the device.

```
Which thing you want to change? (temperature, water, gas, light, device) : gas
which room you want to change in it?(bathroom , kitchen): bathroom
Are you sure that you want to change the gas of bathroom? yes
change (heater only) heater
heater gas is opened
do you want to open or close the gas? : close
heater gas is closed
```

There is a timer in the gas service to ensure the control of the time of the device to avoid any dangers or accidents. When the timer finishes, it asks the user if he is still using the device, if he is still using it the timer restarts again until he says no, so the device will be closed.

```
Do you want to change another thing? yes
Which thing you want to change? (temperature, water, gas, light, device): gas
which room you want to change in it?(bathroom , kitchen): bathroom
Are you sure that you want to change the gas of bathroom? yes
change (heater only) heater
heater gas is closed
do you want to open or close the gas? : open
heater gas is opened
You have been using this device for a long time, are you sure that you are still using it? yes
You have been using this device for a long time, are you sure that you are still using it? yes
You have been using this device for a long time, are you sure that you are still using it? no
heater is closed
```

4) **Light:**

If the user chose to change the light, the program asks him where he wants to change it. He can change the light in any room.

The program asks the user if he wants to turn the light on or off and applies what he chooses.

```
Do you want to change another thing? yes
Which thing you want to change? (temperature, water, gas, light, device): light
Which room you want to change in it? (bedroom,livingroom,sofra,bathroom,kitchen) : sofra
Do you want to turn it (on, off)? on
light in sofra is turned on
```

5) **Device:**

If the user chose to change the device status, the program asks him where he wants to change it and a confirmation question. He can change the (Blender, Dish washer, Microwave, Air suction, or Electric switch) in kitchen, he can change (TV, Air conditioner, Fan, Steam iron, curtains, trademill or speakers) in bedroom, he can change (Curtains, self vaccum cleaner or speakers) in sofra, he can change (TV, Air conditioner, Fan, Electric switch,or speakers) in livingroom, and he can change (Air suction or washing machine) in bathroom.

The program asks the user if he wants to open or close the device, and what he chooses applies to the device.

```
Do you want to change another thing? yes
Which thing you want to change? (temperature, water, gas, light, device): device
which room you want to change in it? (bedroom,livingroom,sofra,bathroom,kitchen) bathroom
Are you sure that you want to change the device status of bathroom? yes
Do you want to change (Air suction or washing machine)? washing machine
Do you want to open or close washing machine? open
Washing machine is opened
```

There is a timer in the device service to ensure the control of the time of the device to avoid any dangers or accidents. When the timer finishes, it asks the user if he is still using the device, if he is still using it the timer restarts again until he says no, so the device will be closed.

```
Do you want to change another thing? yes
Which thing you want to change? (temperature, water, gas, light, device): device
which room you want to change in it? (bedroom,livingroom,sofra,bathroom,kitchen) kitchen
Are you sure that you want to change the device status of kitchen? yes
Do you want to change (Blender, Dish washer, Microwave, Air suction, or Electric switch)? microwave
Do you want to open or close Microwave? open
Microwave is opened
You have been using this device for a long time, are you sure that you are still using it? yes
You have been using this device for a long time, are you sure that you are still using it? no
microwave is closed
```

The programs continue to ask the user if he wants to change anything until he says no, so the program closes with a message saying (“Ok, app is closed”).

```
Do you want to change another thing? no
ok,app is closed
```

The program has an option for wrong syntaxes, if the user entered unsuitable word the programs print (“Wrong Syntax”)

```
Welcome to your smart home
Signup or login? jana
Wrong syntax
```

How did we distribute the work to us?

All of us understood all the 15 functions, but each one of us made 5 functions:

Ahmed Mohsen: temperature, water, gas, device, light

Jana Ahmed: login, Save_info, Save_user, rand, user_info

Mostafa Magdy: timer, security_t, parent_mode, child_mode, password_mask

Conclusion:

In conclusion, the significance of smart home system controllers cannot be overstated in today's rapidly evolving technological landscape. These controllers serve as the central nervous system of a smart home, controlling the integration of various devices and enabling users to manage and automate their homes with safety, convenience and efficiency.