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Software Engineering Assignment#1

DEPARTMENT OF COMPUTER SCIENCE

INFORMATION TECHNOLOGY UNIVERSITY

Requirements of Course Project:

We want to make an smartphone application called “My Home” that will help automate our homes making our lives more efficient, reducing day to day labour and effort. Our goal is to implement a user-friendly mechanism that connects smart switches with our smartphones to control any connected device (fan or a light) more easily. This smartphone application will have the ability to access information and even turn the appliances on or off via the internet remotely. This app will also calculate the power consumption of the connected devices on a monthly basis. Apart from turning on the room lights, fan , air conditioner and other appliances remotely through your smartphone the app will also only turn on those lights which are required at a given time. For example, if a person is standing in the wardrobe then it will only turn on the lights of the wardrobe. The user can set a timer for the amount of time he wishes to turn on a device. After the give time has elapsed the device will automatically turn off. Thus it will contribute towards efficient consumption of electricity on a daily basis and generally reduce power usage. A raspberry pi along with its camera will also be connected with the app. The camera can used as a baby monitor or for security purposes. The application will also have some voice based features. It will greet the user when he opens the app with a welcome message. It will also notify the user when an appliance has been switched on or off.

- **Do you think you need mathematical verification of correctness of your system or a part of your system? Why?**

  Yes we do. Since our project aims to our homes more power efficient it will calculate the power consumption of the devices it is connected with and calculate how much electricity it saves daily. To verify these results we will have to compare them from power consumption readings before the installation of the app. Also considering the future changes that can be made to our app, our project may involve many calculations and measurements so the correctness could be further verified mathematically too. For example if we are able to add object detection then we will need to calculate the accuracy of the system.

- **Can you separate various concerns of your project from functional and quality perspectives? Highlight the concerns and describe how can you handle concerns separately?**

  Yes, we can separate various concerns of our project from a functional perspective and a quality perspective.

  - ❑ **Functional Concerns:**
    - ❑ Connect with the Appliances
    - ❑ Control those Appliance
    - ❑ Notify the user in a human voice
  - ❑ **Quality Concerns:**
    - ❑ Smooth connectivity with Appliance
    - ❑ Power Saving
    - ❑ Ease of Use
    - ❑ Accurate control of Appliances

  At first we will deal with the functional concern. Connecting with the Electronic appliances and then controlling them will be our prior concerns. Then we will deal with the remaining concern one by one, to improve the quality of our app.

- **Identify some functional modules in your system. Discuss coupling and cohesion aspects.**

  Some functional modules are as

  - Connecting to appliances.
  - Receiving and processing the data from the sensors
  - Controlling the appliances.

  Since all these functional modules perform their task individually and are less dependant upon each other so it satisfies the cohesion. These modules transfer some of their data to each other but to very little extent so coupling is very low. So, all the functional modules are highly cohesive and very low coupled.

- **Identify the potential future changes in your system. Pick one potential change and discuss how would you address it in your system?**

  There are many future changes that can be made to our app such as adding object detection on the camera feed to detect when to turn on a device or find lost items in your room. Some other future changes and the methods which can be used to address them are discussed below:

  - **Adaptation with the user behaviour:**

    We will make our system to remember user routine, when he comes home it will turn on the AC, when he sleeps it will turn off the lights, etc.
  - **Implementation of Security feature:**

    We will make a “AI Neural Network” and we will train it with the specific user’s photo. If anyone else enters his/her room, then a message with the “Intruder’s Photo” will be sent to the owner’s phone (via internet).

- **Which increments would you suggest if you are asked to build your system incrementally?**

  At first we should make an App that works on a small scale (controlling only a single electronic Appliance). After successfully adding one device, we would expand our circle and modify our app to control another electronic Appliance. One appliance at a time and by resolving all errors and dependencies, we will eventually achieve our goal of connecting multiple devices in an efficient manner.
