

## Assignment 4.1

### Applying the Engineering Design Process

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#### Given Scenario: Managing Power Consumption in a Student Boarding House

In a student boarding house near your campus, the electricity bill has been increasing every month. The landlord notices that many students forget to unplug their devices, leave lights or fans on when they go out, and use appliances inefficiently.

The landlord asks you, as a computer engineering student, to come up with a solution to help monitor and reduce electricity waste.

#### 1. IDENTIFY THE PROBLEM

##### Why is electricity being wasted?

- Forgetting to unplug devices.
- Appliances are left open even when not needed / using.
- Inefficient usage of appliances.

##### Who is affected?

- Landlord as it will cost more bills.
- Students itself, possibly rent will increase.
- The Environment as it consumes more carbon footprint because of higher energy consumption

#### 2. RESEARCH

##### Causes of wasted electricity:

- Lack of reminders or awareness.
- Over Reliance on manual switching.
- Shared living spaces where responsibility is unclear.

##### Existing Solution:

- Smart meters for detailed energy usage monitoring.
- Motion-sensors for lights and fans that turns on after movement.
- Energy-saving campaigns/posters in dorms.
- Smart home IoT apps.

### **3. SPECIFY REQUIREMENTS**

#### **The Proposed Solution should**

Be low-cost, since dorm owners and students have limited budgets.

Be user-friendly, with minimal setup and no technical training required.

Provide direct savings, either by alerting or automatically cutting power.

### **4. BRAINSTORM 3 SOLUTIONS**

#### **Mobile Reminder App**

- Send notifications: "Did you turn off the lights/fan?" after being on for a long period of time.
- Location Syncing and Combination of Sensors such as Motion so that it would automatically turn off after not detecting movements for a long period of time. Also uses geological detection based off device location.

#### **Energy-Usage Log and IoT Based Energy Detection System**

- Limits the over usage of electricity among appliances. Turns off after receiving a specific limit of energy used within the day (Users will have an ability to limit and set a specific amount of energy to be used on appliances or devices).
- The system creates accountability and a log that detects and possibly gives a suggestive amount of energy limit for the user to give a specific limit.

#### **Low-Cost Smart Plug System**

- Uses WiFi-enabled plugs for high-consumption appliances.
- Controlled by a shared mobile app.

### **5. CHOOSE BEST SOLUTION**

#### **THE MOBILE REMINDER APPLICATION**

Why? Affordable as it does not require hardware devices, only software and students nowadays always use their own devices so that this application will always be utilised and give notifications and it is easy to be used as it will give a reminder and its very effective against forgetful students.

Why not the other two proposed solutions? As the requirements needs the cost to be affordable as possible this is the best solution to come up by as the future sighting should be effective and user friendly which is easy to use as the application provides notifications and reminders it alerts the users and suggesting it to turn off the energy usage of a specific appliances that is being used.

## 6. CREATE A PROTOTYPE OR MODEL

