

Activity No. 4.1	
Applying the Engineering Design Process	
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<p>Given Scenario: Managing Power Consumption in a Student Boarding House</p> <p>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.</p> <p>The landlord asks you, as computer engineering student, to come up with a solution to help monitor and reduce electricity waste.</p>	
<p>1. Identify the problem clearly</p> <ul style="list-style-type: none"> - The ones who are wasting the electricity are the students. They often forget to unplug their devices and leave the lights, fans on when they go out. On the other hand the one who is affected is the landlord. It means that he will pay more for monthly bills such as electricity, and it can even cost the environment since it's an increase of an energy use leading to energy waste. 	
<p>2. Research</p> <ul style="list-style-type: none"> - The causes of electricity waste in the boarding houses is mostly from appliances that are left plugged in, and maybe even old appliances, they tend to use more electricity than the new ones. There are some existing solutions to reduce the electricity waste and one of it is smart plugs that cut standby power in schedule, timers that automatically turns off the switch of appliances, reminder apps or chat notifications and upgrading old appliances into efficient ones, one of it can be high consuming lights and changing it into led lights which consumes less energy. 	
<p>3. Specify requirements</p> <ul style="list-style-type: none"> - The requirements should be affordable, effective and easy to use. Since the users are still students they have limited budget, and make it easy to use for the students to operate it without difficulty and less hassle and last it should be effective, it should have big differences than before in reducing electricity waste. 	

4. Brainstorm 3 solutions

- The best 3 solutions for me are mobile reminder app, appliance usage log and smart powerstrip with auto shut off. Basically, a mobile reminder app will send notifications to students and remind them to turn the lights, fans or unplug other appliances. Second is appliance usage log, it will record the consumption of energy and will tell which appliances consume the most electricity. And lastly, a smart power strip with auto shut off that cuts power supply will turn the power off if there is no activity or people detected in the boarding house.

5. Choose the best solution and justify why.

- The best solution for me is the Mobile reminder app. This is also the most affordable one, it will only require a smartphone which all students should already have making it accessible since students only have a limited budget. It is also easy to use as students only need to install the app then from time to time the app will remind the students to turn off or unplug appliances.

6. Create a prototype or model

Code :

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5     int choice;
6     string appliance;
7
8     do {
9         cout << "\n--- Reminder App ---\n";
10        cout << "What did you forget to unplug or turn off?\n";
11        cout << "1. Lights\n";
12        cout << "2. Electric Fan\n";
13        cout << "3. Charger\n";
14        cout << "4. Air Conditioner\n";
15        cout << "5. Exit\n";
16        cout << "Enter your choice (1-5): ";
17        cin >> choice;
18
19        switch (choice) {
20            case 1: appliance = "Lights"; break;
21            case 2: appliance = "Electric Fan"; break;
22            case 3: appliance = "Charger"; break;
23            case 4: appliance = "Air Conditioner"; break;
24            case 5:
25                cout << "Goodbye.\n";
26                break;
27            default:
28                cout << "Not in the choices, Try again.\n";
29                continue;
30        }
31
32        if (choice >= 1 && choice <= 4) {
33            cout << "Reminder: Please turn off/unplug your "
34            << appliance << " when not in use!" << endl;
35        }
36
37    } while (choice != 5);
38
39    return 0;
40}
```

Output :

```
--- Reminder App ---
What did you forget to unplug or turn off?
1. Lights
2. Electric Fan
3. Charger
4. Air Conditioner
5. Exit
Enter your choice (1-5): 2
Reminder: Please turn off/unplug your Electric Fan when not in use!
```

```
--- Reminder App ---
What did you forget to unplug or turn off?
1. Lights
2. Electric Fan
3. Charger
4. Air Conditioner
5. Exit
Enter your choice (1-5): 5
Goodbye.
```

```
Process exited after 17.84 seconds with return value 0
Press any key to continue . . . |
```

Explanation :

- So basically this code I made will remind the student every time they go out or sleep, they will just use the program or the prototype of the mobile reminder app, then it will display the appliances of what they plugged or turned on then the program will immediately remind them to turn or unplug the appliances. I used which case and looping for this program to work as a prototype in the mobile reminder app.