Electricity: Unit Generator & Bill Calculator

I. INTRODUCTION

Understanding the basic flow of electricity, its usage by household appliances is unknown to children in the age bracket of 7-12. These school-going children are often termed as erratic, hyper-active and hence are provided freedom to some extent.

These children aren't well versed with the concepts of electricity and its working and are too young to understand the technical terms used by graduates and professors .They are unfamiliar with the why's and how's of the system or any advanced system in general.

Schools have tried to adopt various learning techniques to make learning fun and help these students understand the basics of this particular problem. PowerPoint presentations is the widely used method to tackle this problem but it doesn't attract everyone. Animated Clips is another interesting way to solve this problem as it is entertaining and fun to watch-&-learn.
But most schools aren't equipped with such systems or are unable to integrate such methods into their curriculum.

An alternative approach was to create an application, like a video game, that would be entertaining yet educational. The rise of smartphones and computers has allowed children to use these devices for various purposes, mainly for interaction and enjoyment. They use these devices on a daily basis to play games and are adept to the process and operation.

Studies show that when learning is made fun, students grasp and understand information quickly and it is ingrained into our memory.

II. APPLICATION INDEX

1. ***DEMO***

- **Understanding the application**
  a. **Drag & Drop Feature**
  b. **Unit Generator**
- **Bill Calculator**
  a. **Bill Calculation**
  b. **Electricity and Fuel Flow**
- **Video Links**

2. ***ADVANCED***

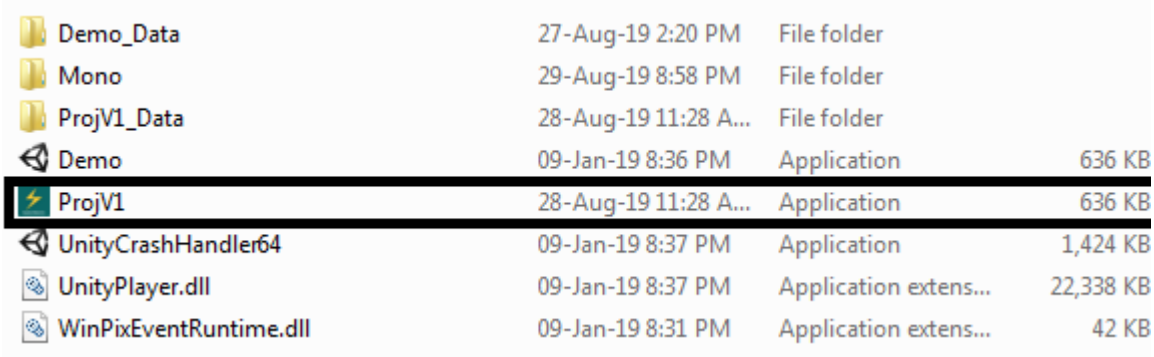
- **Plans**
  a. **1 BHK**
  b. **2 BHK**
  c. **3 BHK**
  d. **4 BHK**

- Selection of Appliance
  a. Company
  b. Star Rating
- Bill Calculation

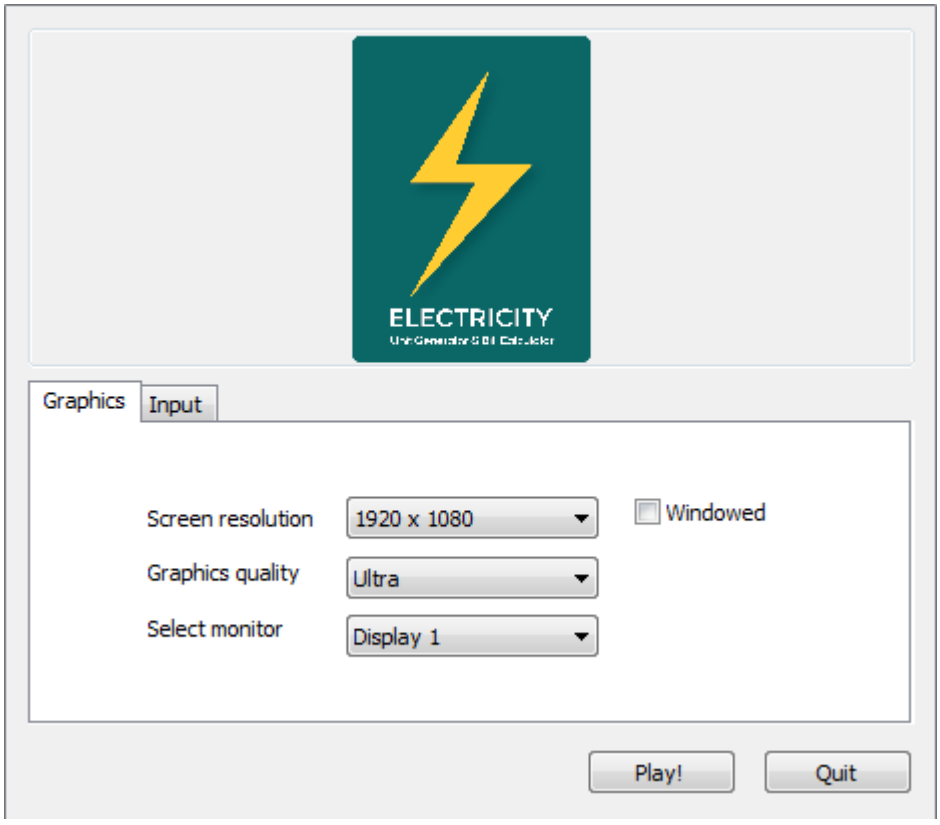
III. APPLICATION INTERFACE

NOTE: The interface is identical for Demo and Advanced.

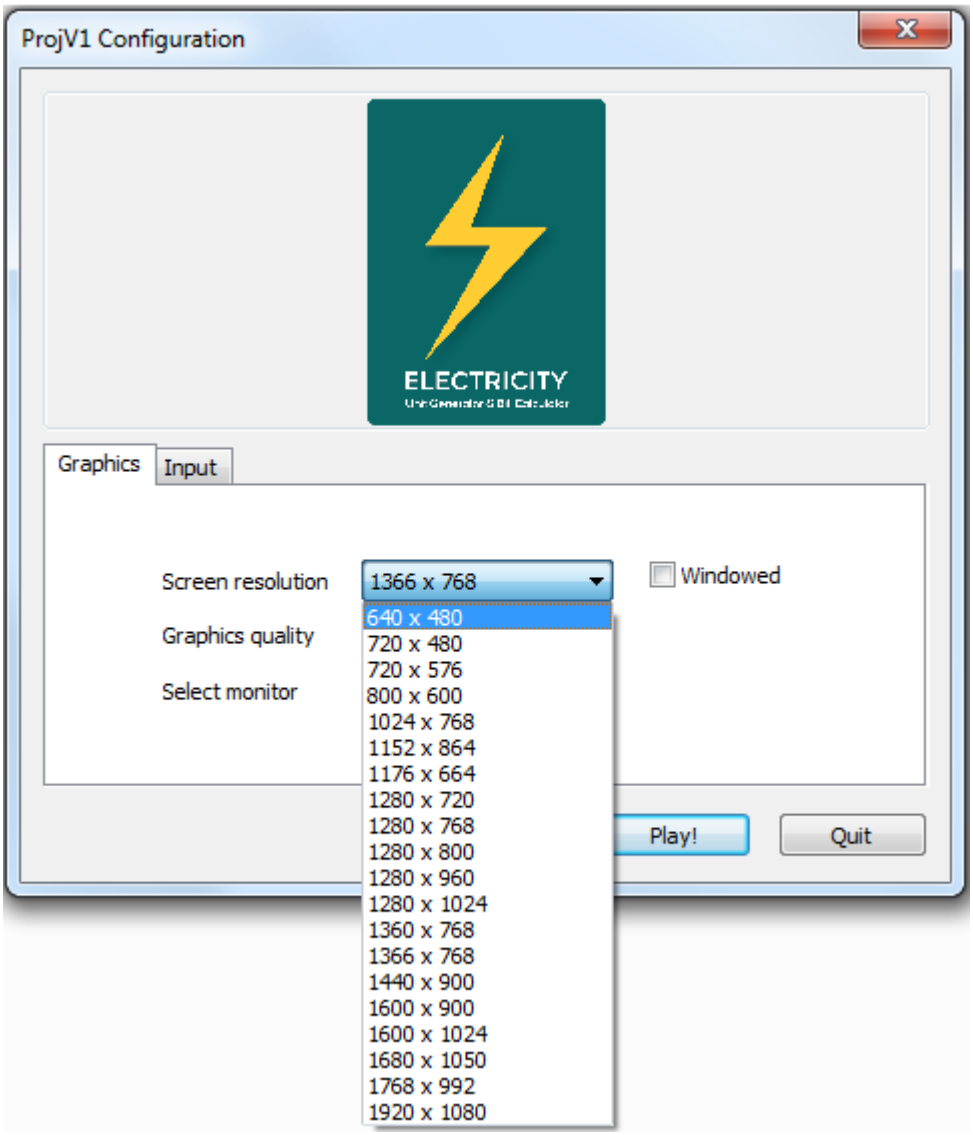
- To start the application, click on "ProjV1" file.



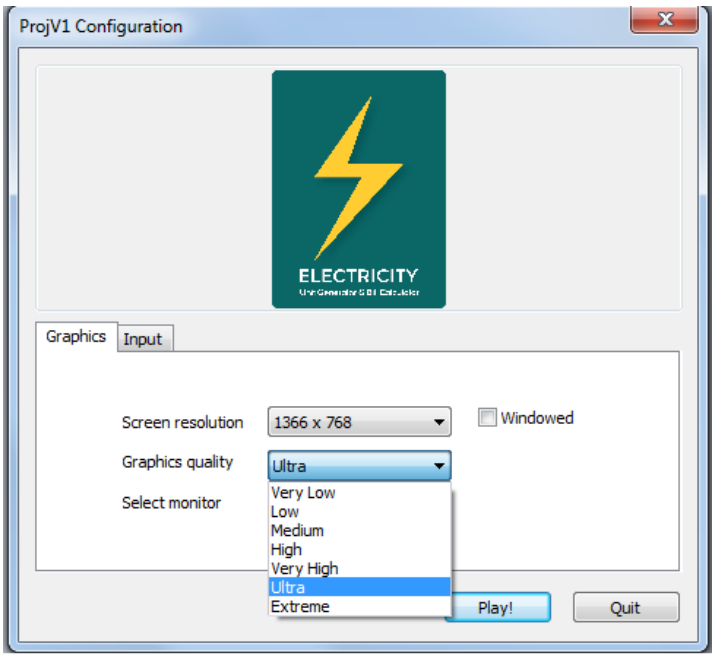
- A Config box will appear which will display the Graphics and Input Option for the user.



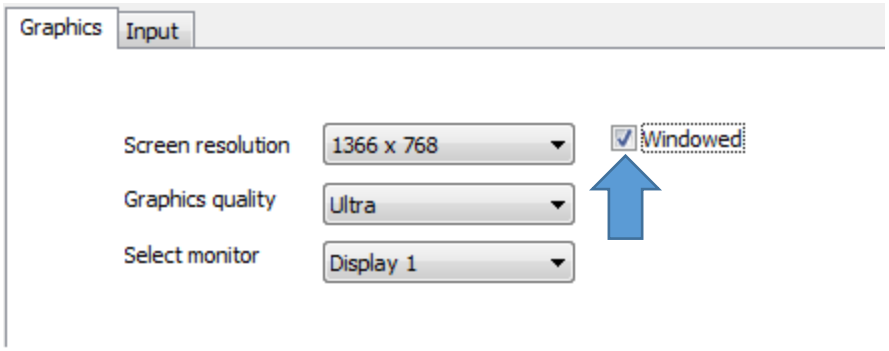
- The screen resolution can be changed from the screen drop-down list.



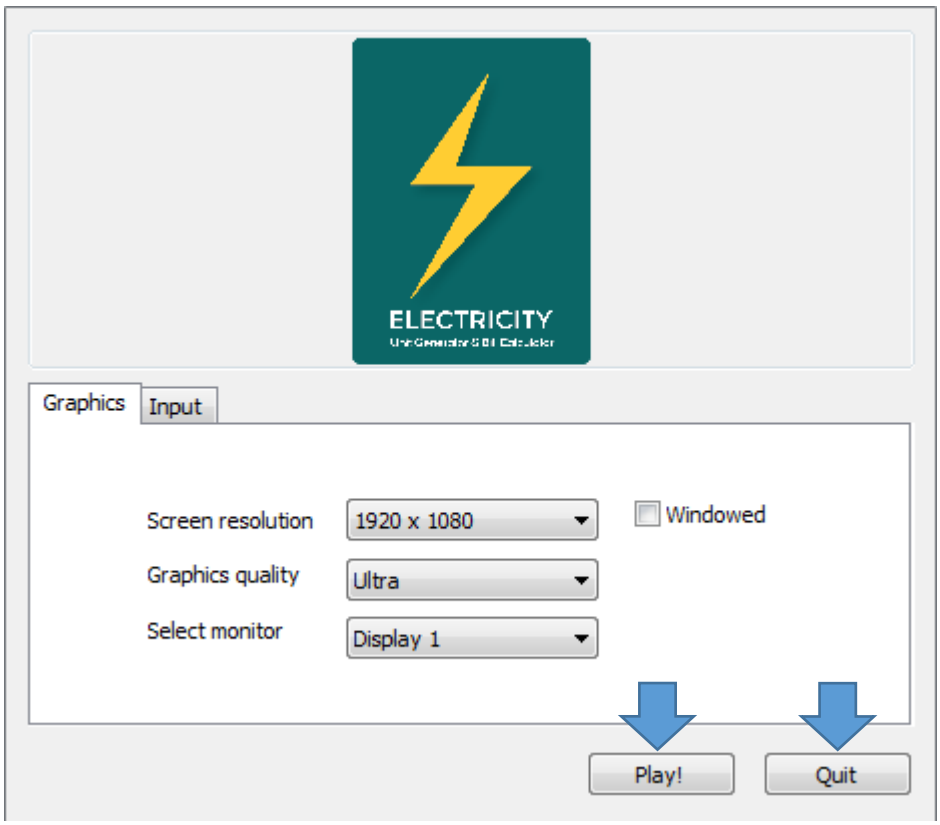
- **The quality of the graphics can be changed from the graphics quality drop-down list.**



- Monitor drop-down list is used only if a multi-monitor setup is in place.
- Windowed Mode : On ticking the box, the application runs in windowed mode.



- Since this application doesn't require keyboard inputs, Input Option is left untouched.
- Clicking 'Play!' starts the application. Clicking Quit closes the Config box.



- **In-game exit buttons are provided at required junctions.**

IV. APPLICATION EXECUTION

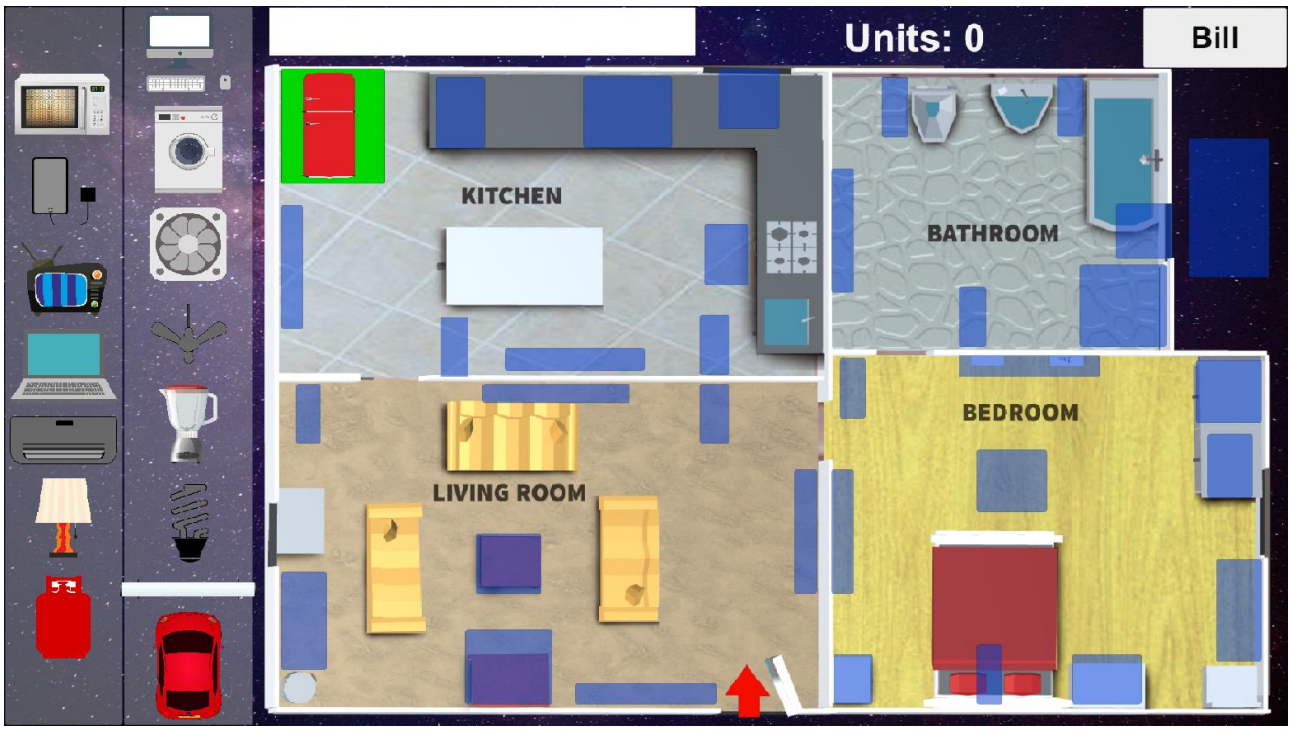
1. DEMO

- **On running the application the first scene that appears is the plan of a house.**

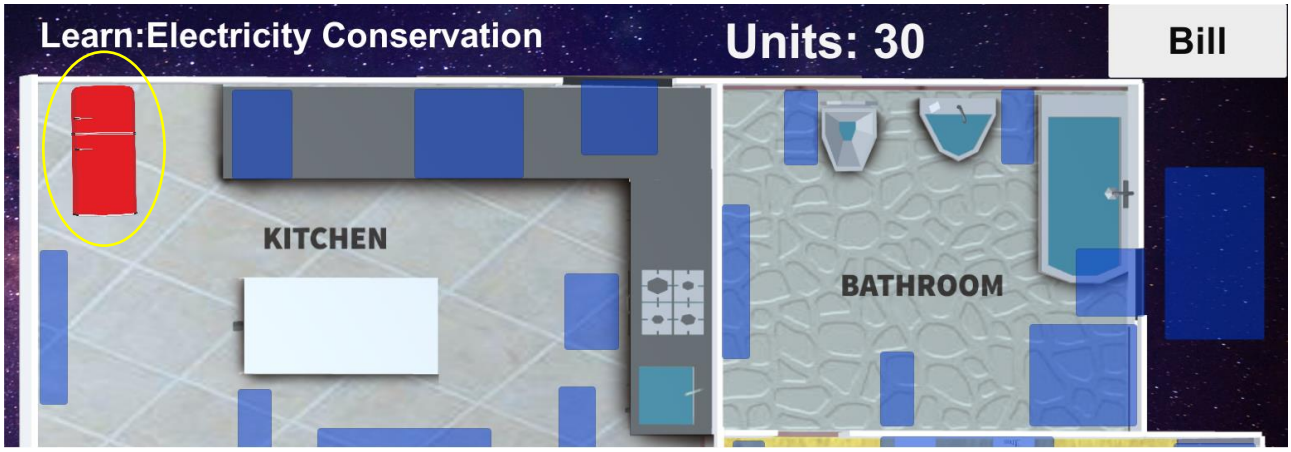
- On the left hand-side, there exist 2 slots containing various household appliances.

- On the top, Units Bar and Bill Button are placed.

- The units bar displays the number of units consumed by the appliance and the bill button generates the bill.
- In this Demo, drag & drop feature is used for user to interact with the application.
- The user clicks on a particular appliance and drags it across the plan and drops it on its location. This location is highlighted in green colour for user to drop.

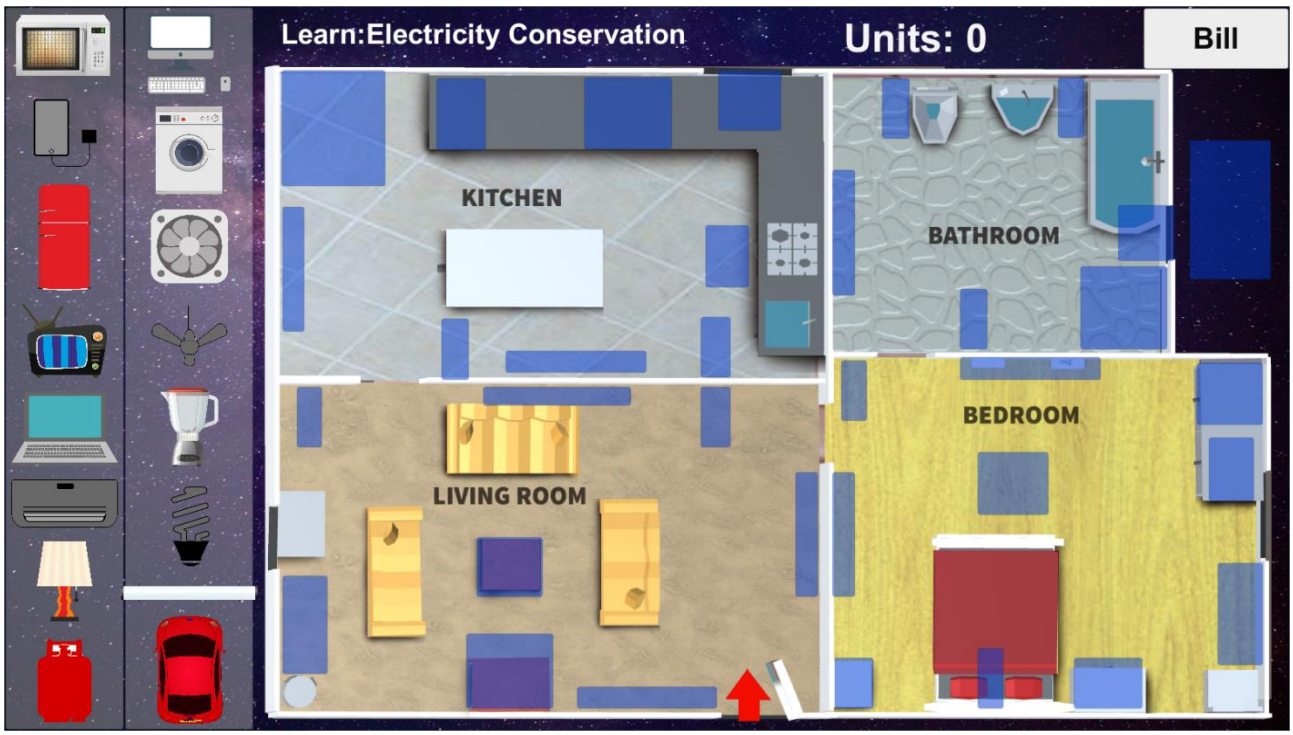


- The appliance has to be dropped wholly on the highlighted location to place it in the plan.
- On dropping the appliance, the units bar is updated by adding the number of units used by the appliance.



- To remove an appliance, click on it (when placed on the location) and drag it back to the slot in which it was present.

- **On removing the appliance, the location is made visible & the units are deducted from the units bar.**



HOUSEHOLD APPLIANCES

Microwave	Computer
Mobile Charger	Washing Machine
Refrigerator	Exhaust Fan
Television	Fan
Laptop	Table Lamp
Air Conditioner	Bulb
Tubelight	Mixer

- Certain appliances need duplicates as they have multiple locations. Example – A house has more than 1 fan, bulb.

APPLIANCES WITH DUPLICATES

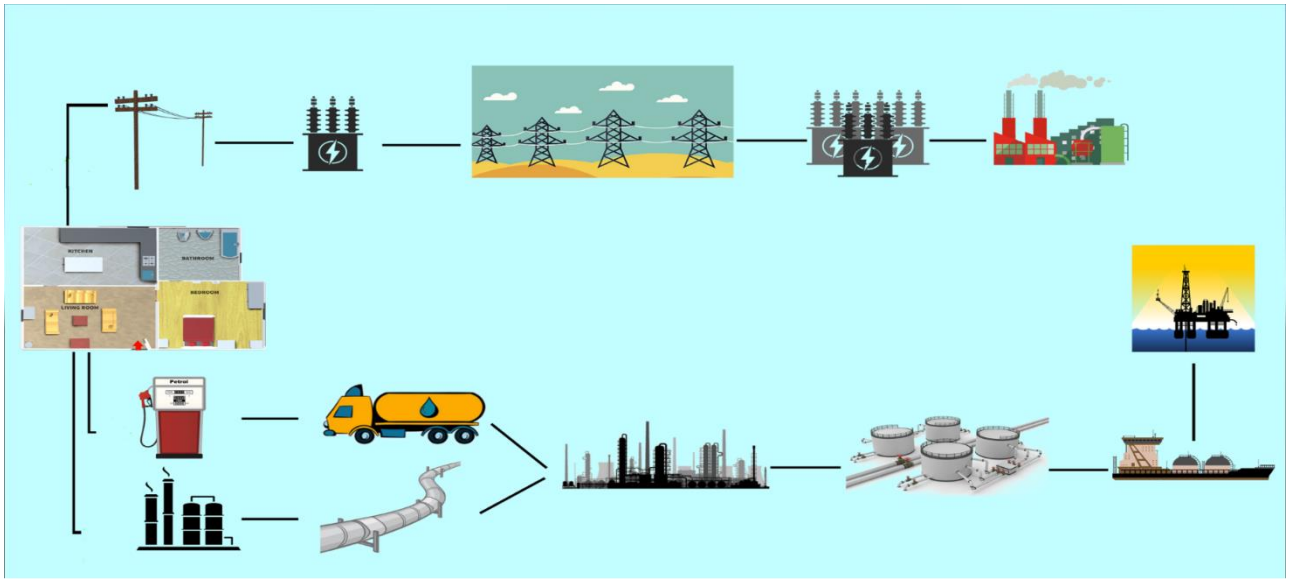
APPLIANCE	NO. OF DUPLICATES
Bulb	10
Fan	2
Tubelight	3
Air Conditioner	2
Exhaust Fan	2

- Other than household appliances running on electricity, there are other devices which run on fuel. These devices are also present in the application.

Device
Cylinder
Car

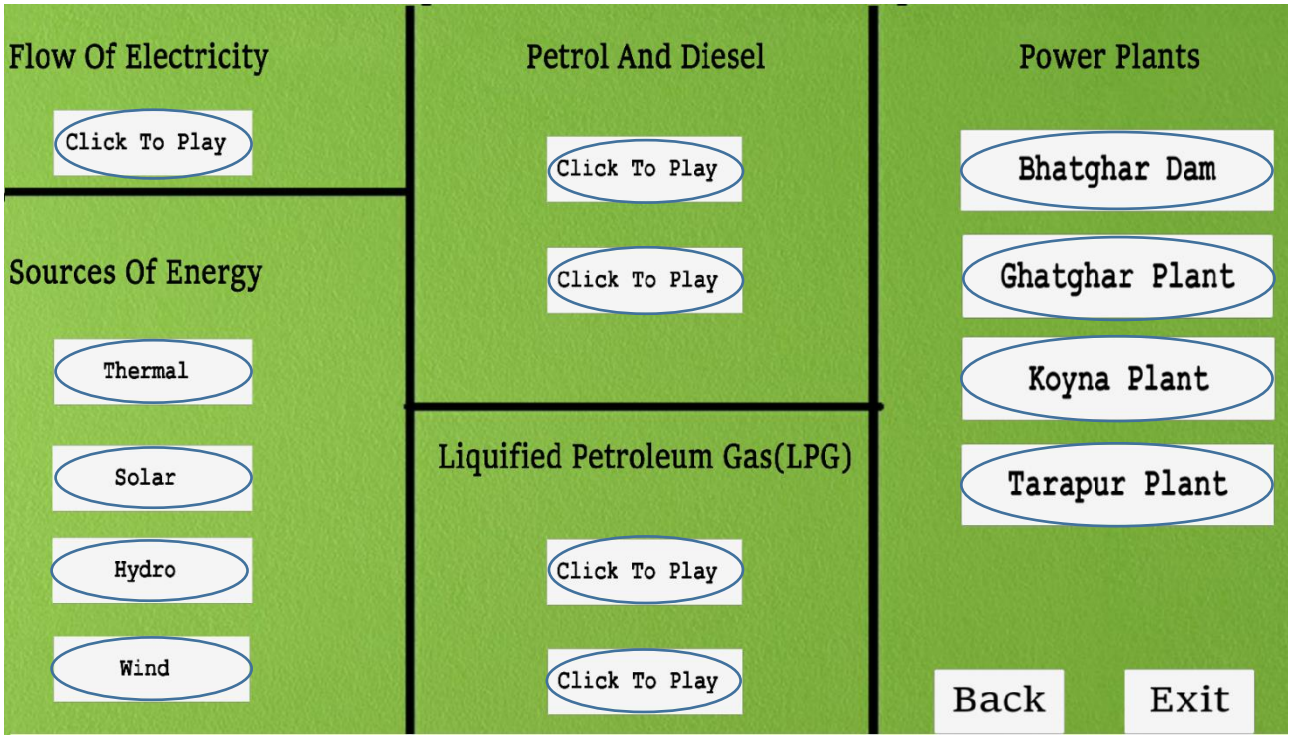
- Car and Cylinder are fuel based devices.
- These devices can also be placed using the drag & drop feature on their respective locations but they do not have any values assigned.
- These devices can be removed and will not affect the bill in any way.
- Once the user is satisfied with the placement of the appliances, the final unit is generated at the top.
- On clicking the bill button, the next scene is loaded, which houses the bill and the electricity & fuel flow gif.

- The electricity bill calculated shows the amount in rupees with reference to the units.
- The GIF is a represents the procurement and processing of electricity and fuel for domestic use.



- On clicking 'Back', user goes to the previous screen. All values are reset.
- On clicking 'Next', user goes to the next screen.

- This screen contains the links to the selected videos on YouTube.
- On clicking the button, the application is minimised and the video is loaded on YouTube. An internet connection is mandatory to play these videos.



- On clicking '**Back**', user goes back to previous screen.
- On clicking '**Exit**', user exits the application.

2. ADVANCED

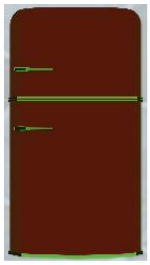
- On running the application the first scene that appears is that of a menu.
- This menu is called as the 'Plan'. It holds 4 buttons named as 1,2,3,4 BHK respectively.

- On clicking a particular button, the plan associated with it opens.

Button	Plan
1 BHK	1
2 BHK	2
3 BHK	3
4 BHK	4

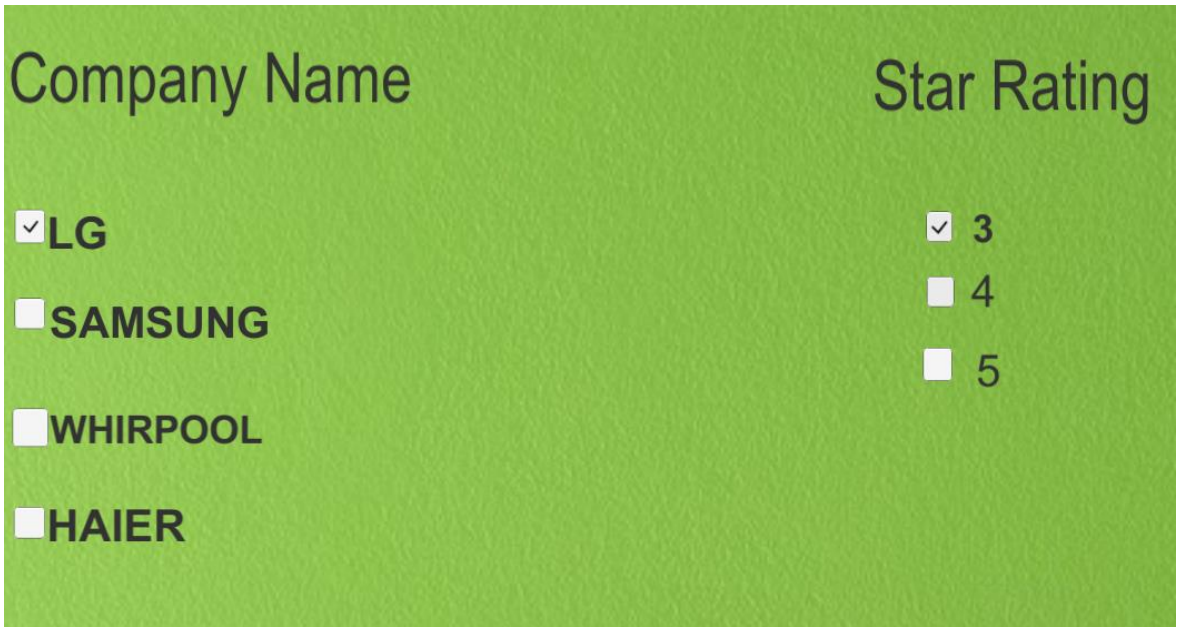
- The loaded scene will look like this.

- Here common household appliances are already placed at appropriate locations. Appliances – Bulb, Fan, Tubelight, Mixer.
- Luxury Appliances which include Television, Air Conditioner, Washing Machine, Refrigerator, and Microwave are also placed with respect to the average Indian house layout and structure.
- These luxury appliances are buttons which are highlighted when the cursor is placed on them. Only these 5 appliances are provided with this feature.

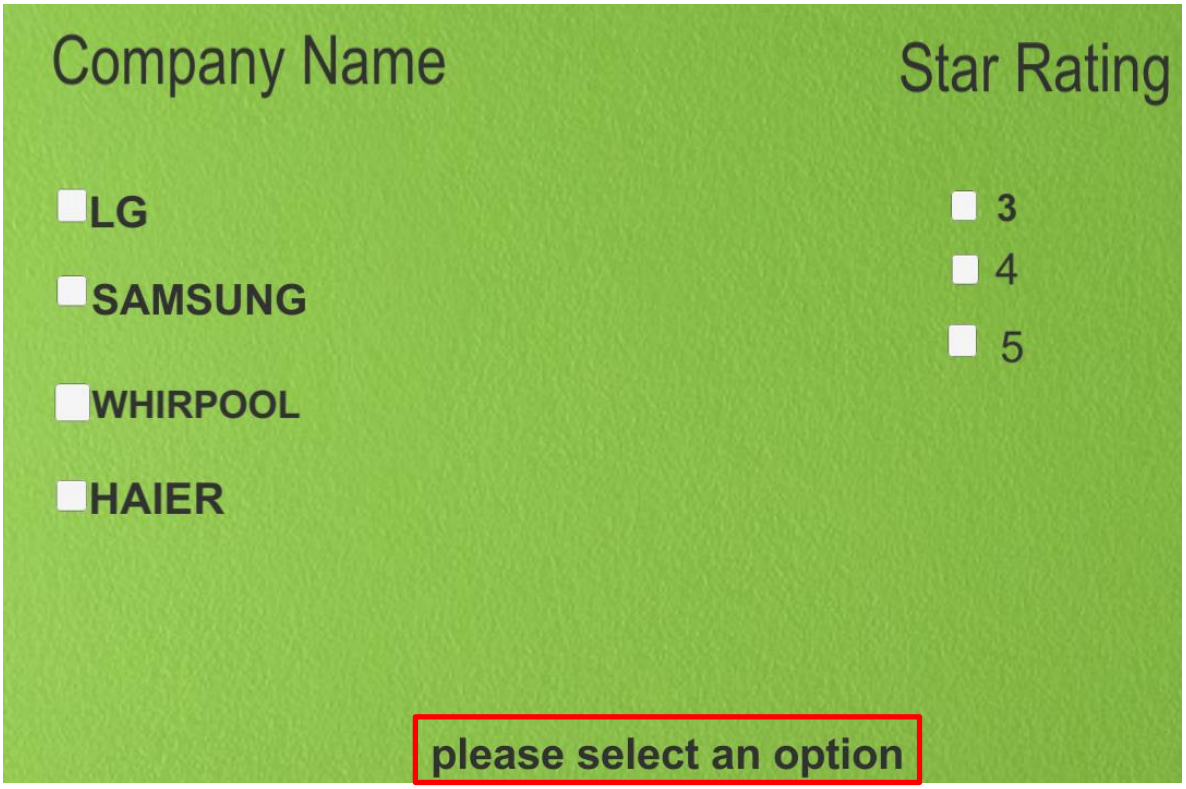


- On clicking, a new scene is loaded. These 5 appliances are provided with this feature.
- This new scene contains the name of the company which manufactures this device and the star rating of the appliance.

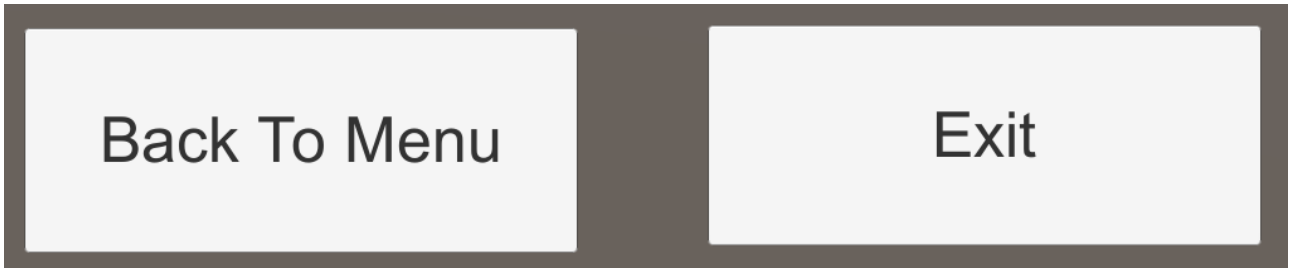
- The star rating is a label provided by the Bureau of Energy Efficiency (BEE) which helps customers identify the efficiency and performance of a particular appliance. Higher the rating, better the efficiency and performance.
- First, select the company name of your choice and then the star rating of the appliance. Click OK to set the values.



- Selecting both options is compulsory. A warning is provided if both boxes aren't selected.



- If user doesn't want to select a particular appliance, he need not click on the button. By default the values are set to zero.
- However, once the button is clicked, user needs to select the options provided and set the values. The values cannot be reset until the plan is revisited from the 'Plan' Menu scene or if the application is restarted.
- Once all desired appliances are selected, click the Next button. This button loads the next scene.
- The bill is calculated along with the fixed rates if the pre-placed appliances namely Bulb, Fan, Tubelight, Mixer.
- There are 2 buttons provided on this screen – Back to Menu and Exit.
- Back to Menu – Back to 'Plan' Menu.
- Exit – Exit the Application.



- On exiting or going back to the menu will reset all values to default.

NOTE: The bill has been calculated with formulas referred from MSEB.
The bill is accurate. (Up to -2%)
All bills calculated are calculated for a month.

Particulars
Fixed Charges (FC)
Energy Charges (EC)
Electricity Duty (ED) @ 16 %
Wheeling Charges @ 1.28 Rs/U
Fuel Adjustment Charges (FAC)
Tax on Sale (TOS) @ 0 Ps/U

V. INPUT AND OUTPUT

Mouse is used for Input.
For Demo – Units and Bill are Output.
For Advanced – Bill is Output.