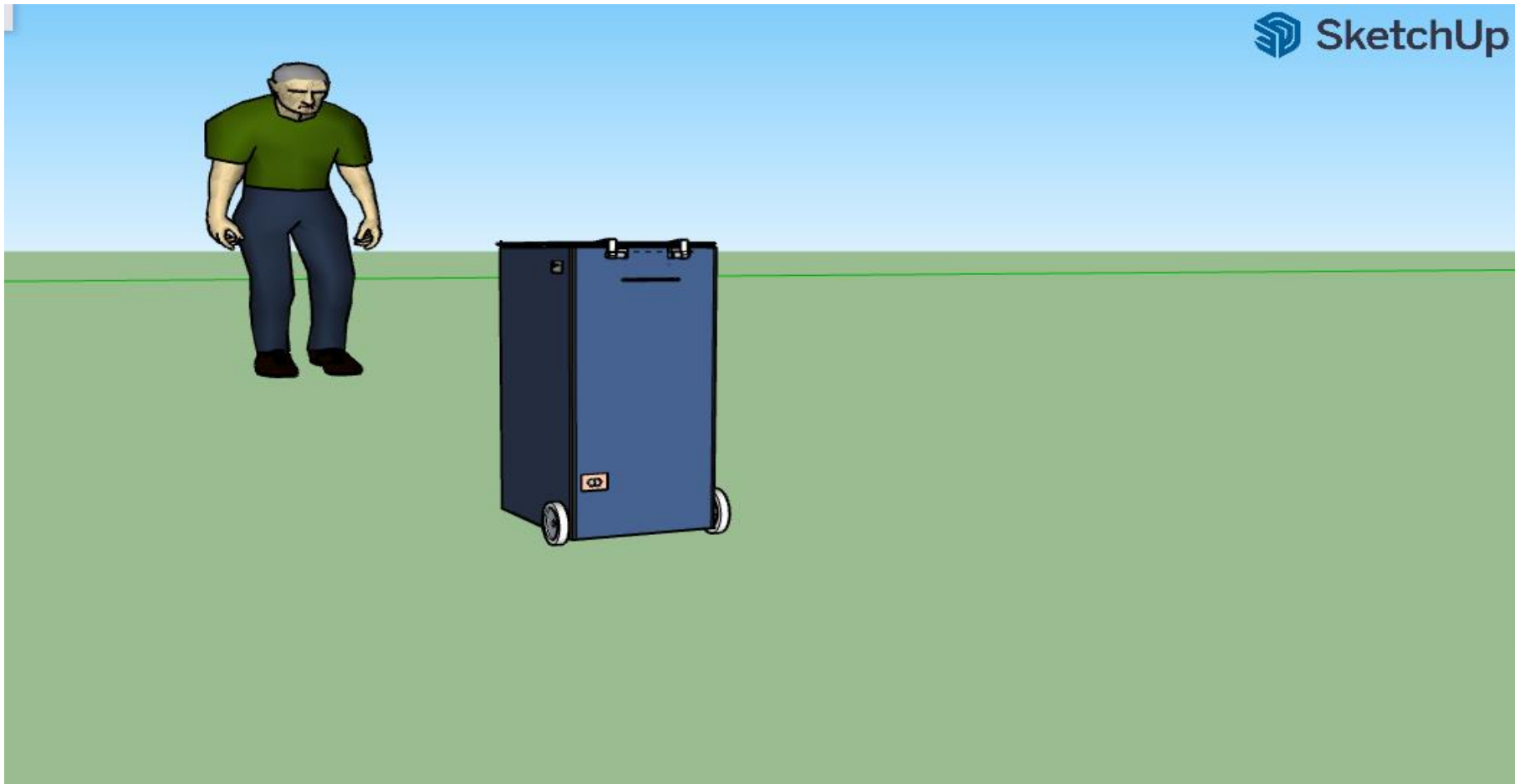


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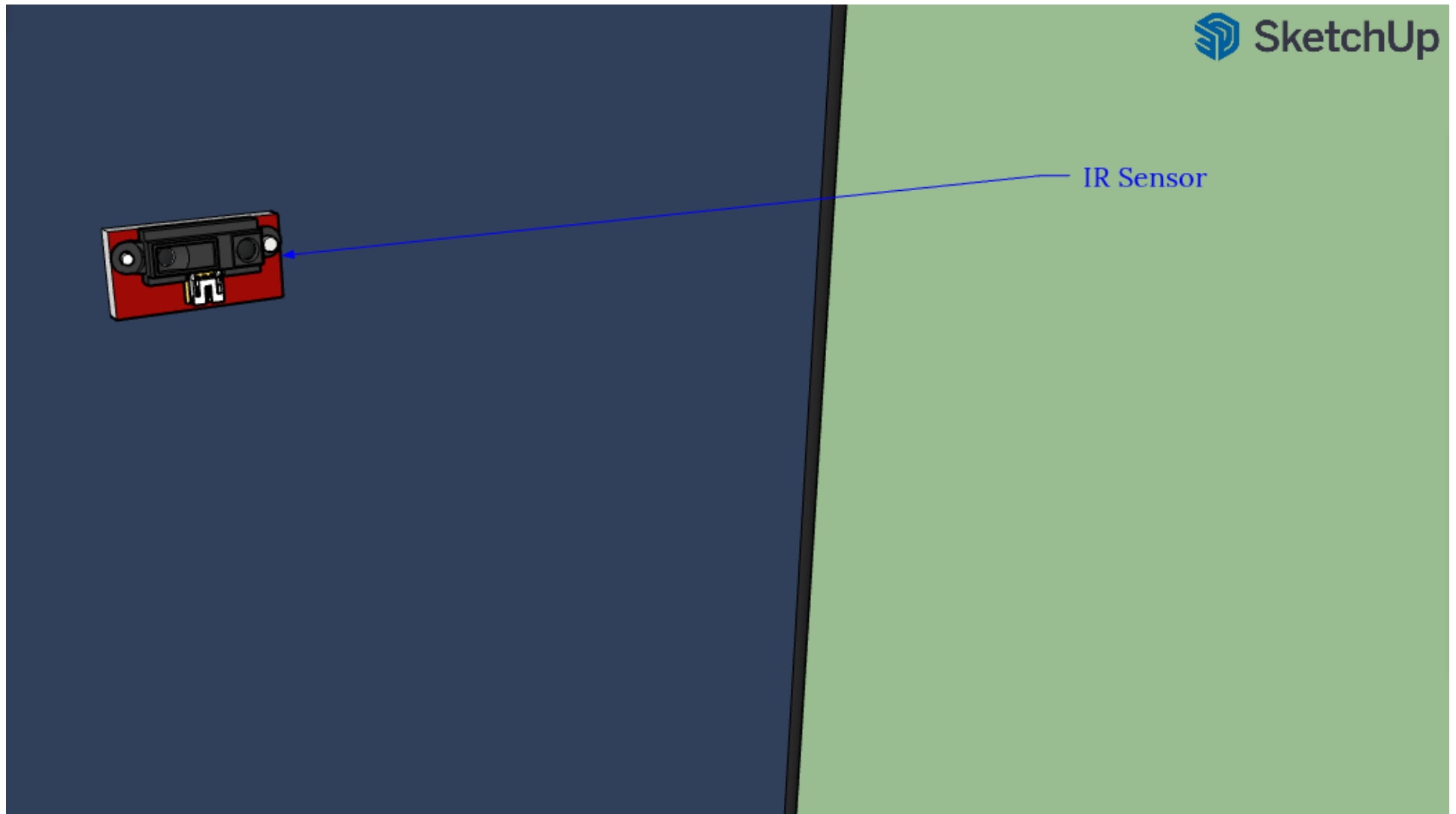
Conceptual design

Smart dustbin concept



In this report my conceptual design has been presented addressing the problems we have identified in the current dustbin design. In this design I have achieved the intended objectives that we presented earlier through the solutions I have provided.

Figure 1 Front view

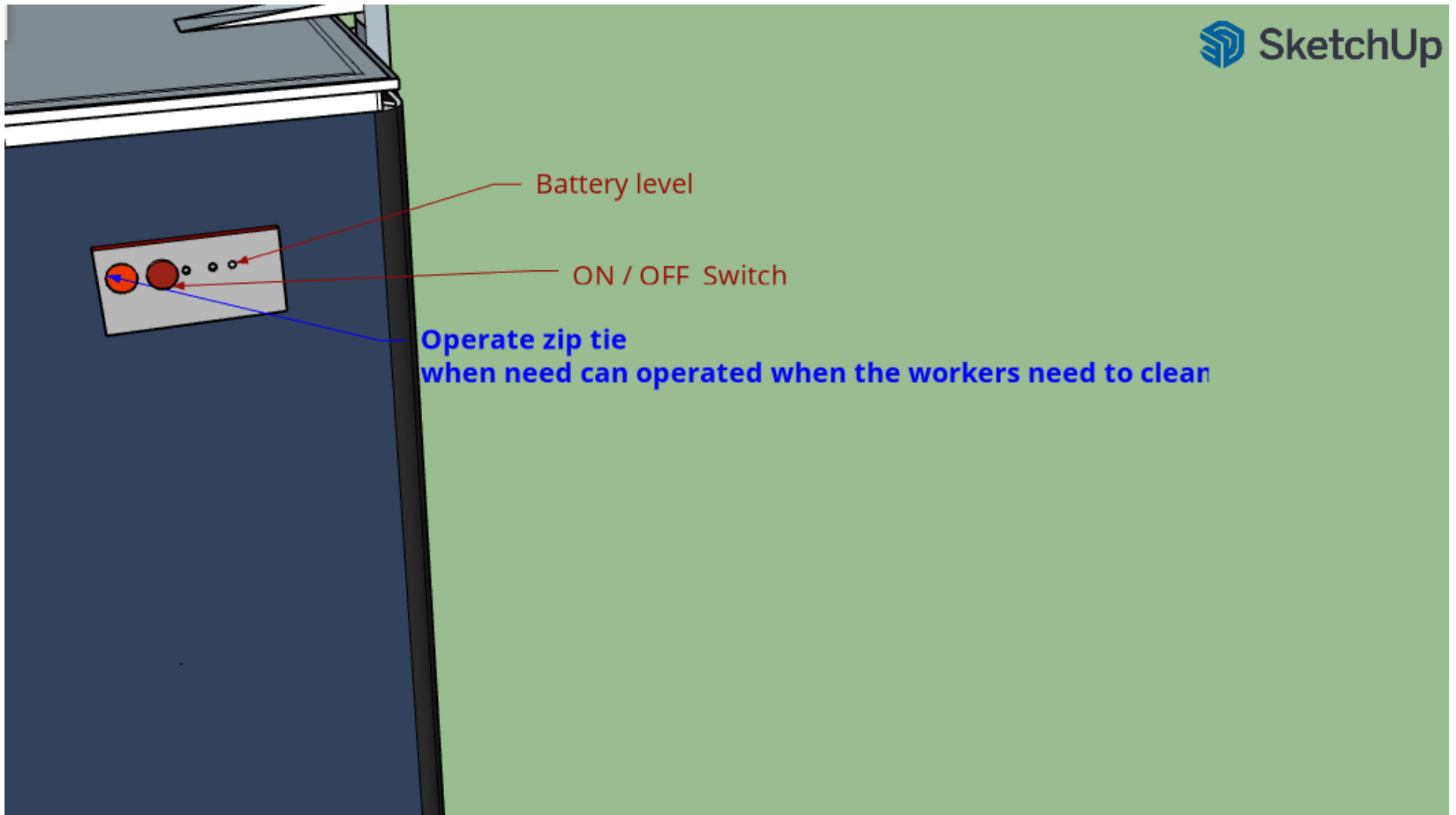


In this picture we can see an IR sensor used to detect if a person is nearby.

IR sensor - A IR sensor is used which has an angle of coverage of 5 degrees and a maximum range of 80cm

Rather than a ultra-sonic sensor which has a angle of coverage of 30 degrees and max range of 21 meters, IR sensor will have less errors

Figure 2 Side view



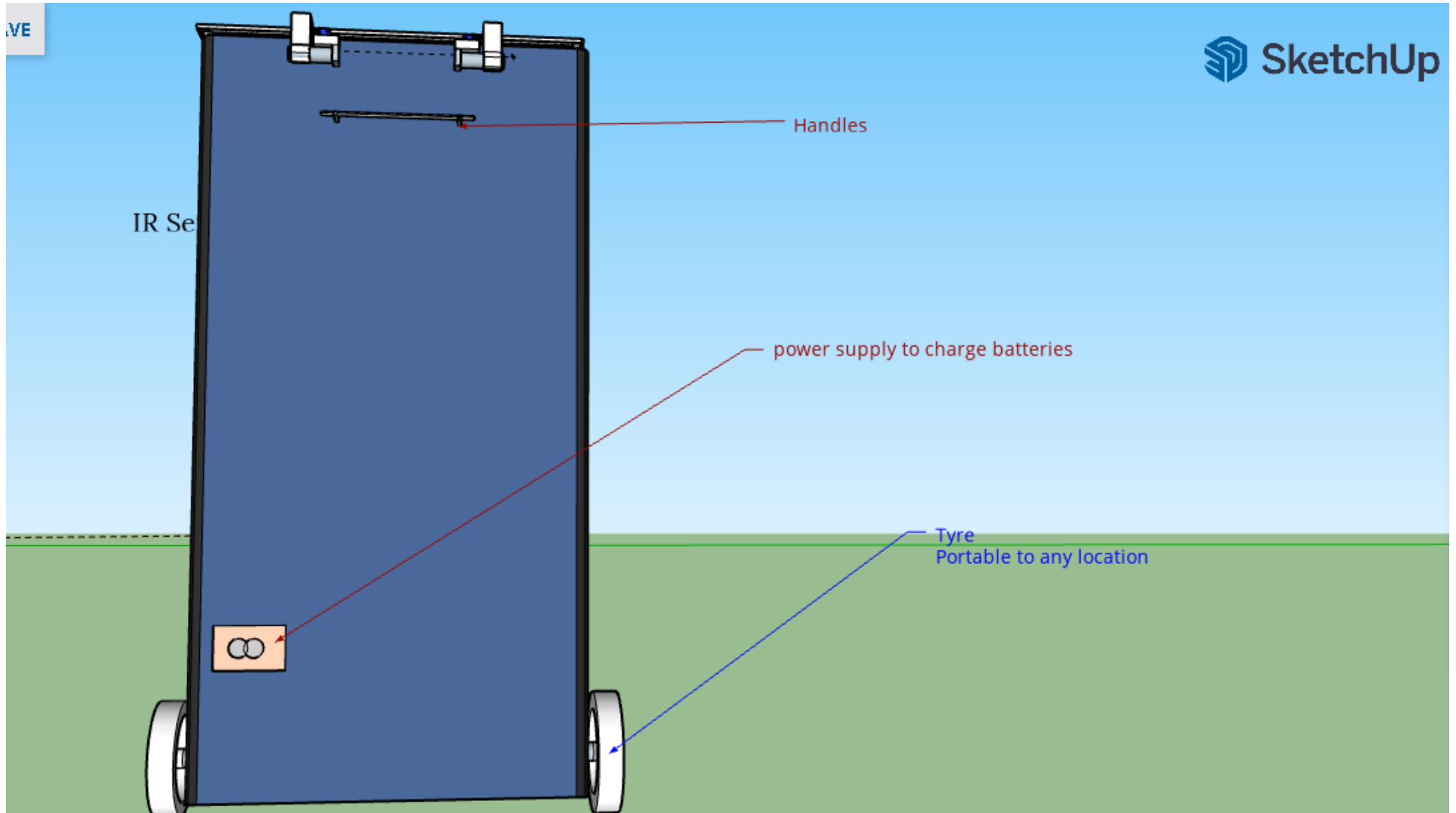
On the side of the trash bin the main control panel is located

Orange button – If the cleaning staff needs to clean the trash bin even though the trash bag isn't full that mechanism can be done by this button.

Red button – Turing the trash bin on/off can be done using this button.

Battery level – Battery level of the trash bin is displayed by three led bulbs placed in the control panel.

Figure 3 View from back

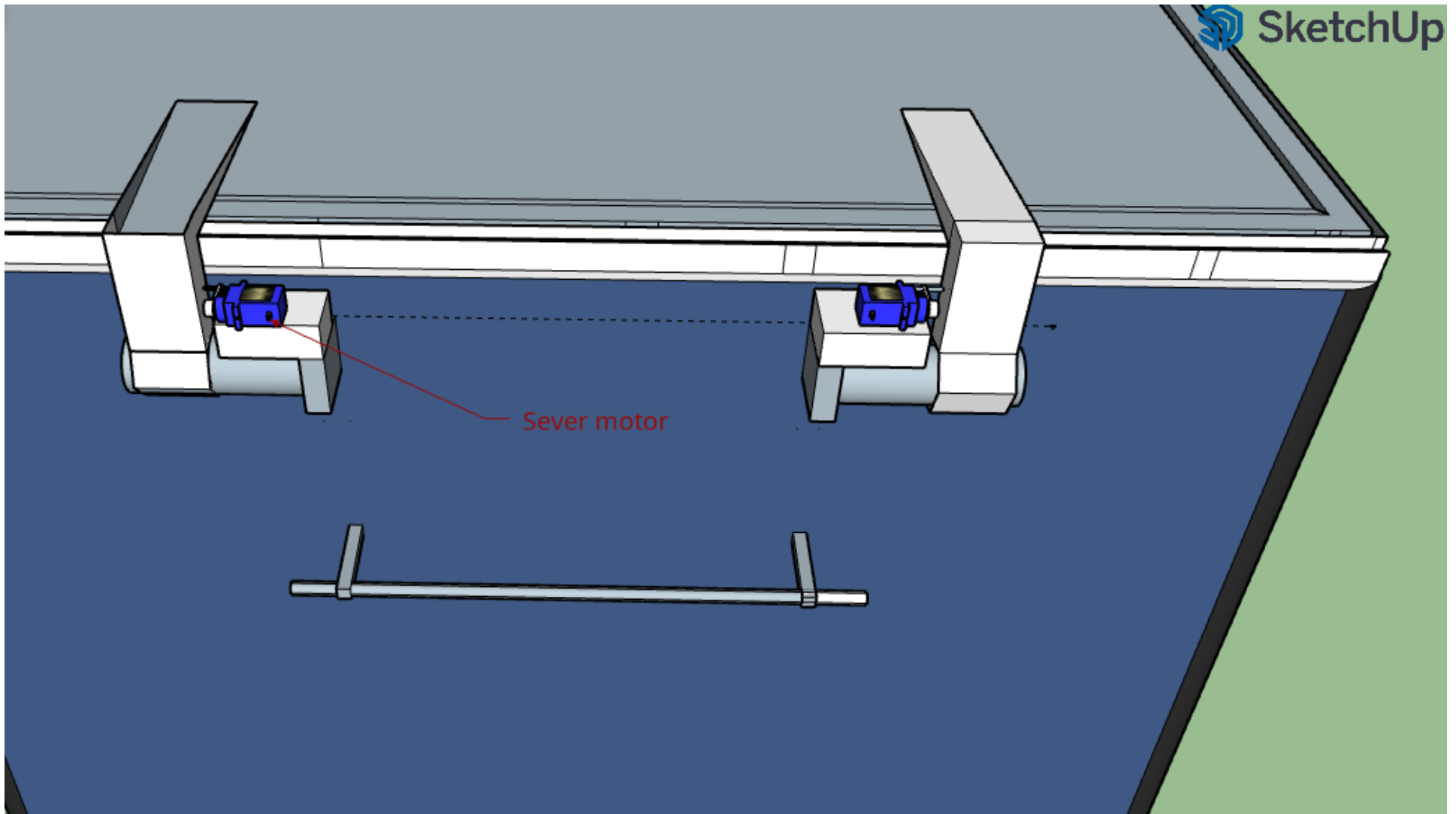


Handles – Using the handles placed in the back of the trash bin it can be transported to any location.

Power supply – The main battery placed beneath the trash bin can be charged using the with a charger plugged to the back of the trash bin.

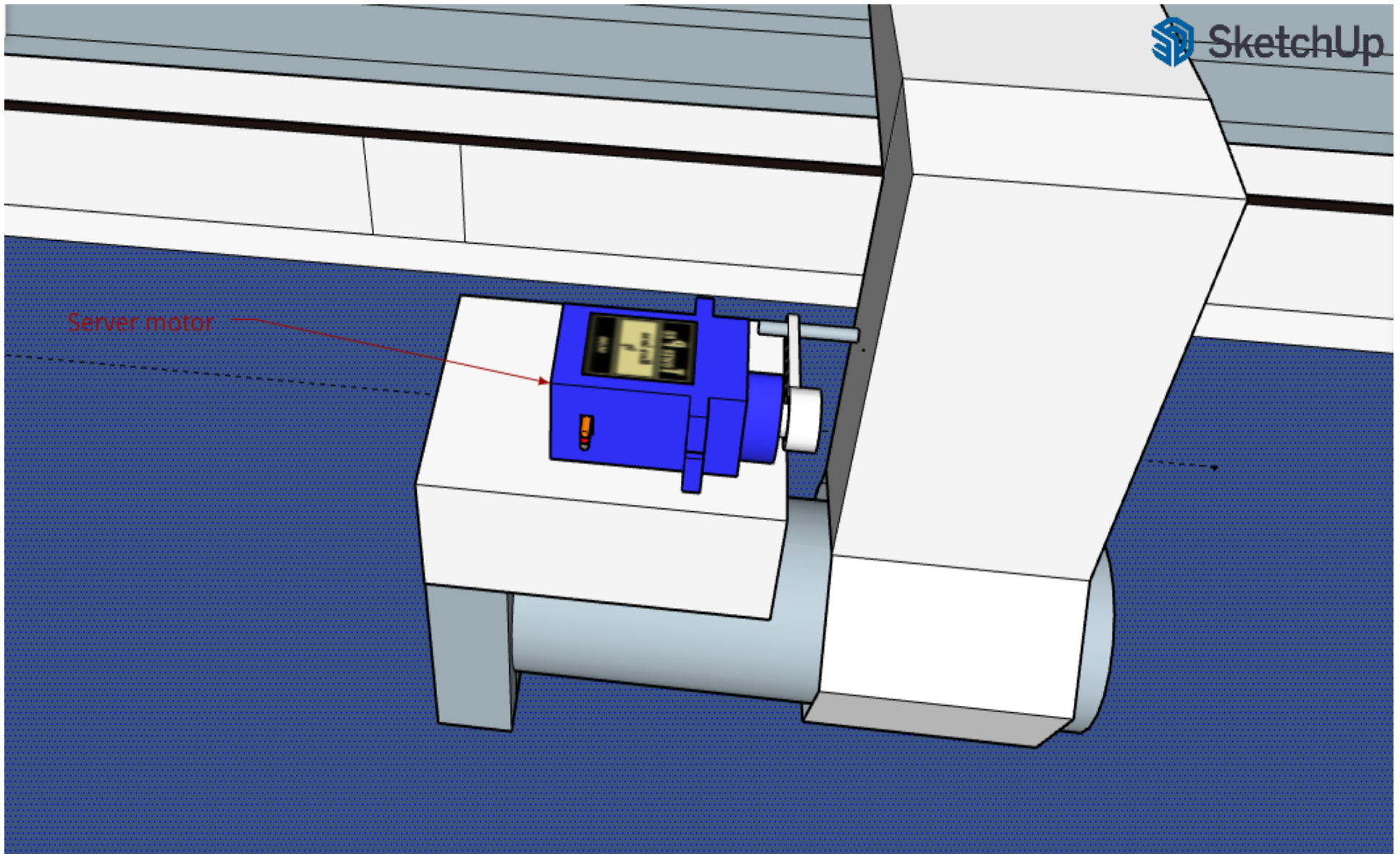
Tires – These help the Trash bin to be transported to any location indoors or outdoors.

Figure 4 Hinge



Server motor – Two sever motors have been used to lift the lid of the trash bin when a person gets closer
Using 2 server motors also increases the durability if the trash bin due to reduce of tress instead of a single server motor.

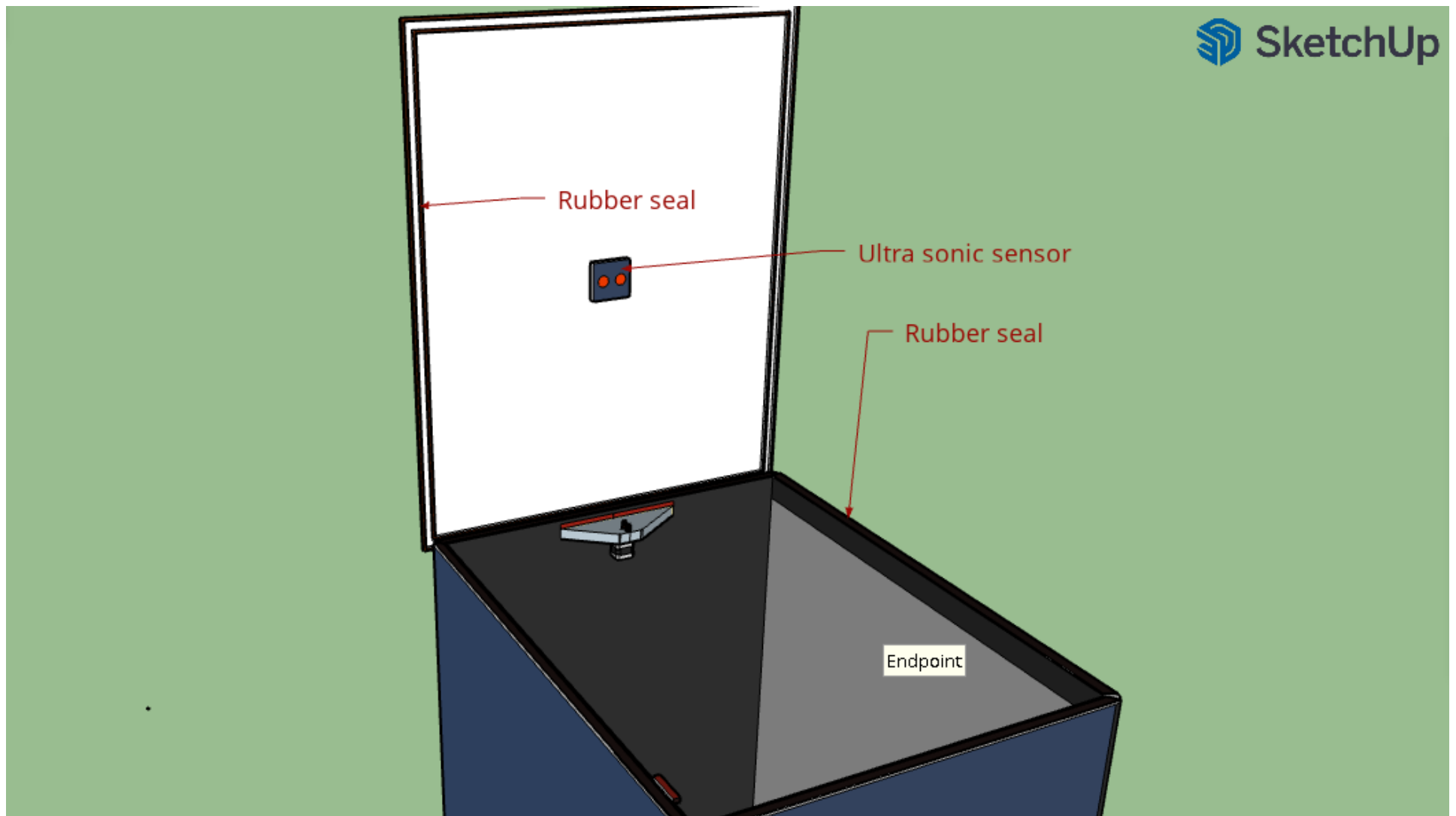
Figure 5 Hinge



The server motor has been connected to the hinge of the trash bin using a rod

A single servo motor has a torque of 250 foot pounds which can lift a weight up to 2.5kg and can easily lift the lid .

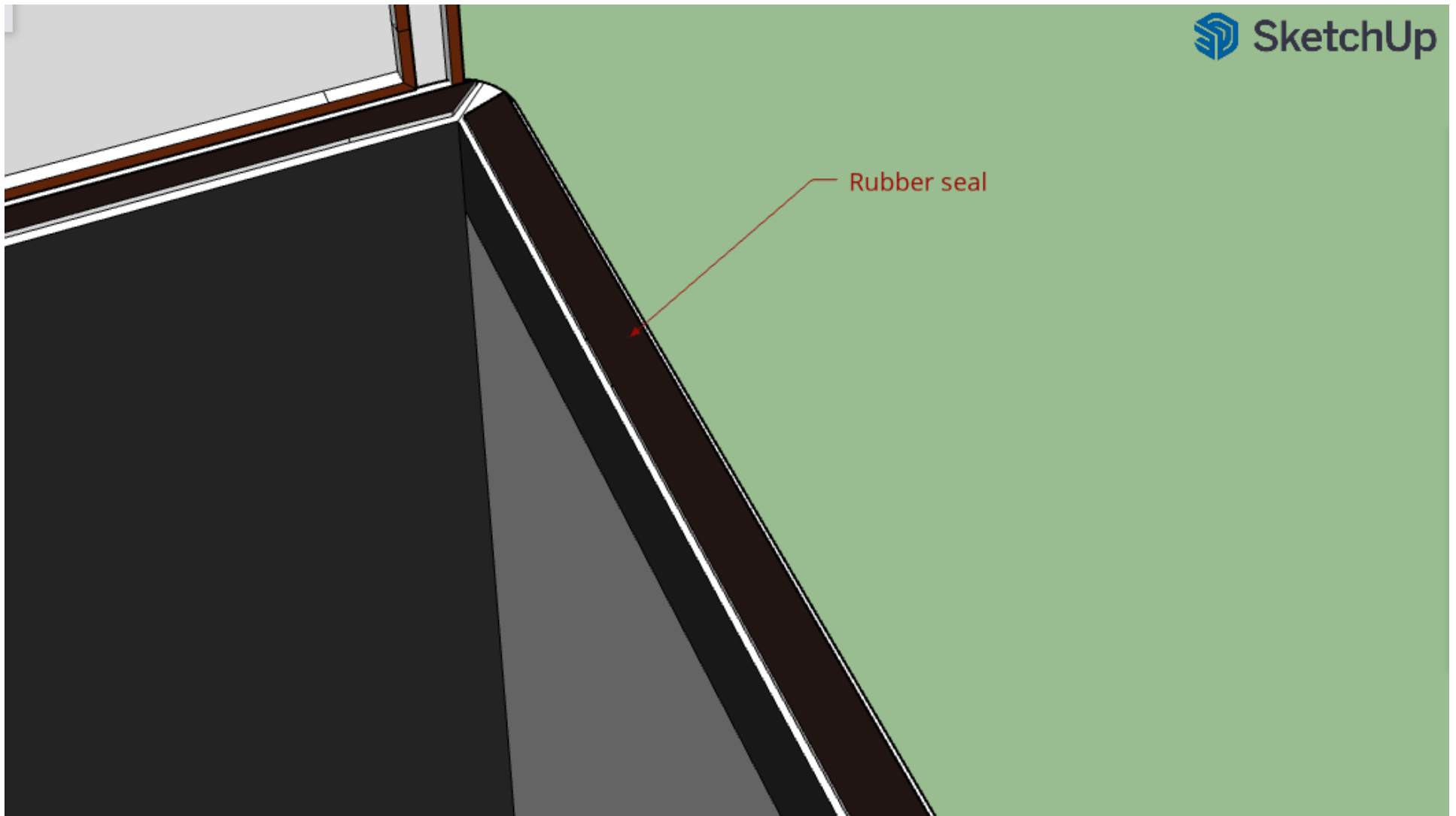
Figure 6 lid of the dustbin



Rubber seal -On the lid and on top of the trash bin – rubber seals has been placed on the lid with a space in between allowing another rubber seal fit through it.

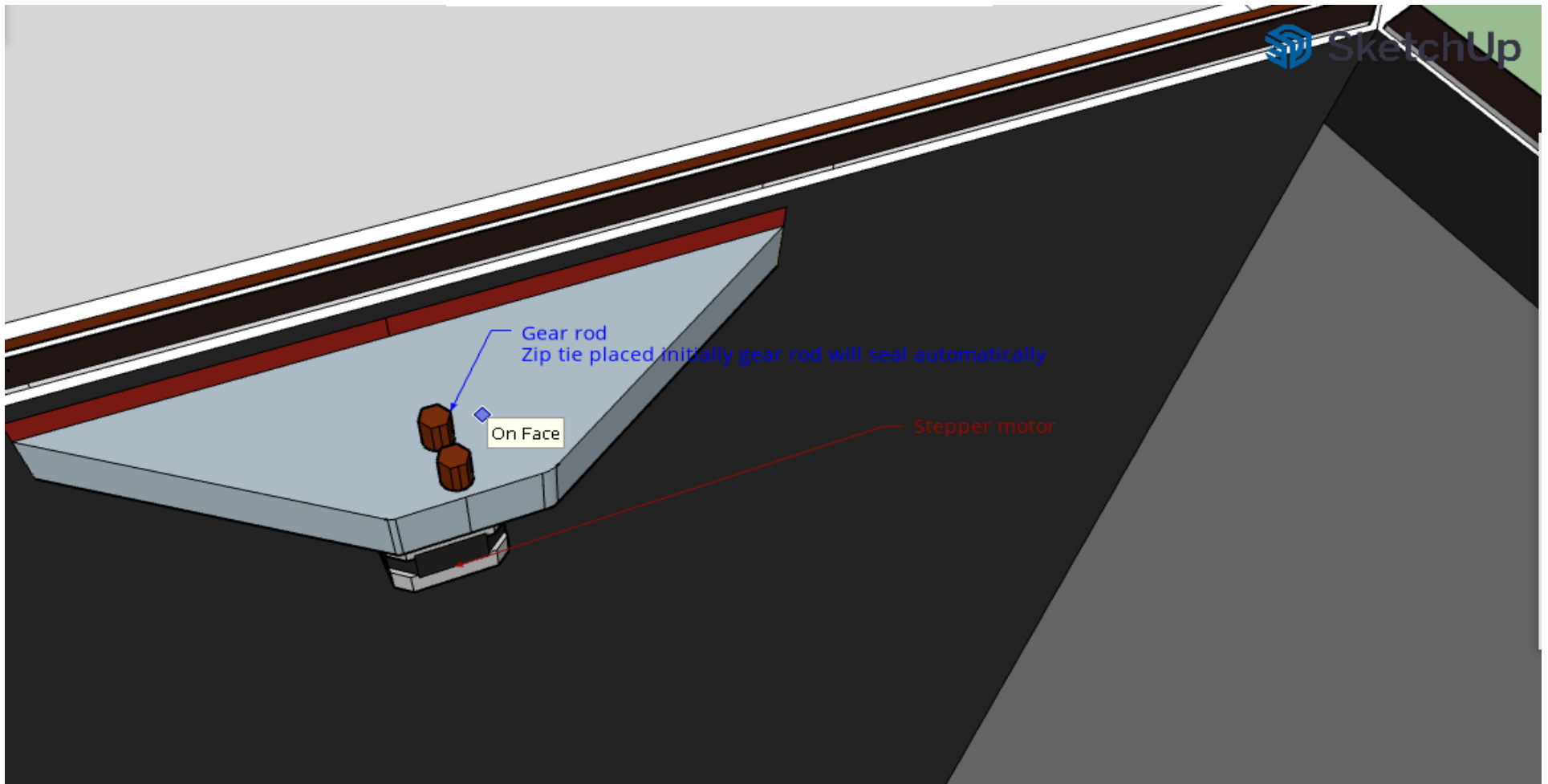
Ultra-sonic sensor – A ultra-sonic sensor has been placed beneath the lid of the trash bin. The ultra-sonic sensor has a coverage angle of 30 degrees which increases accurately measure the trash level inside the bin.

Figure 7 top of the dustbin



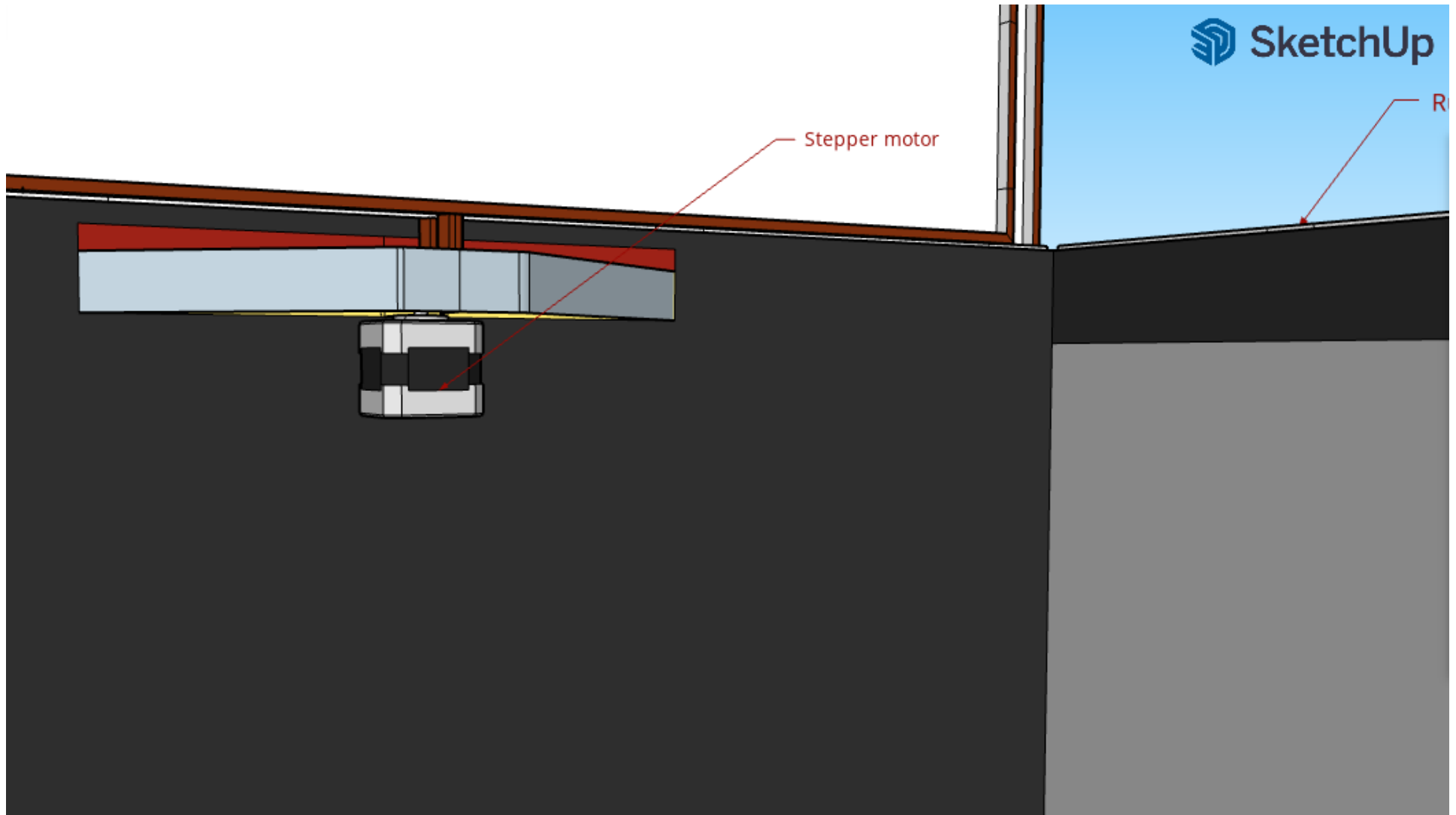
Rubber seal – The main rubber seal which prevent the odor from spreading. This also stops animals getting inside the bin.

Figure 8 Zip tying mechanism



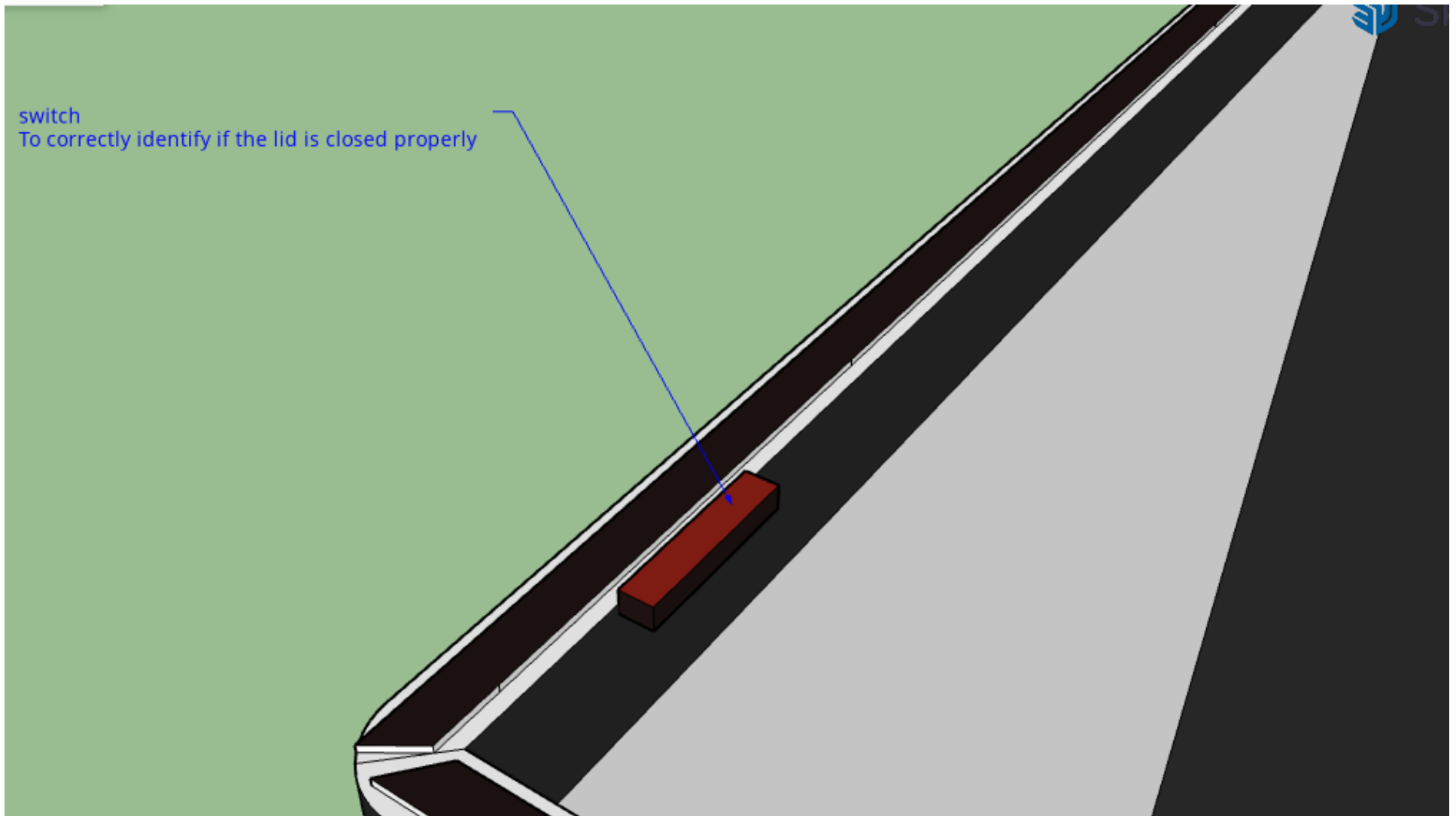
Gear rod – Two gear rods has been placed connecting one to the stepper motor which is placed underneath and another free rotating gear rod which moves freely. This allows zip tie to be placed in between the gear rod which can be used to seal the trash bag pulling the zip tie.

Figure 9 Zip tying mechanism



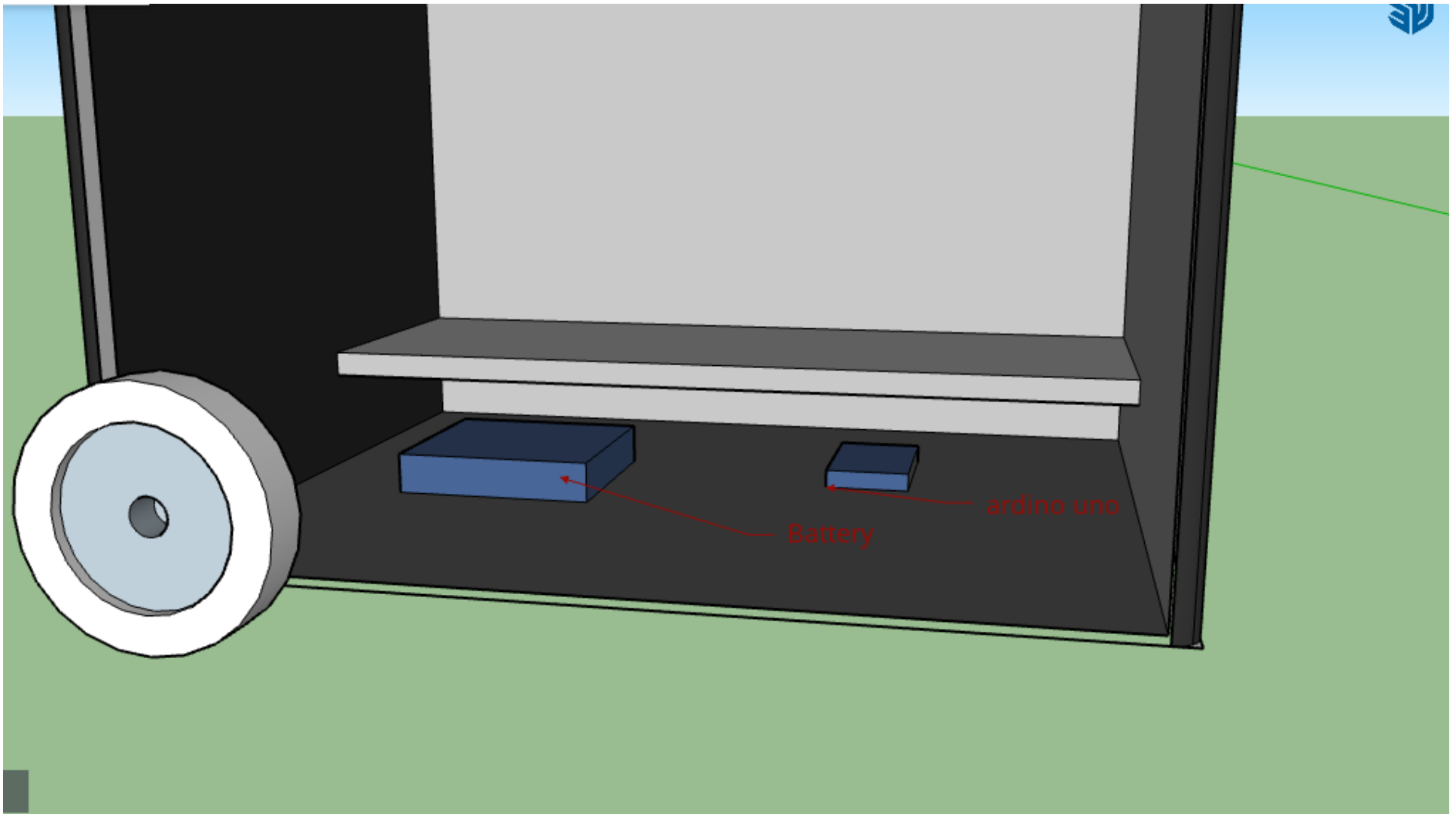
Stepper motor – A stepper motor has been used to turn the gear rod above. The stepper motor which has a 5.9 nm high torque and a low speed has been used to increase accuracy.

Figure 10



Switch – switch has been placed next to the rubber seal (on top of trash bin) which is used to stop the sever motor used in the hinges. Use of a switch to stop server motor over spinning after t\lid has been closed will make the motors more durable.

Figure 11 Circuits and power supply



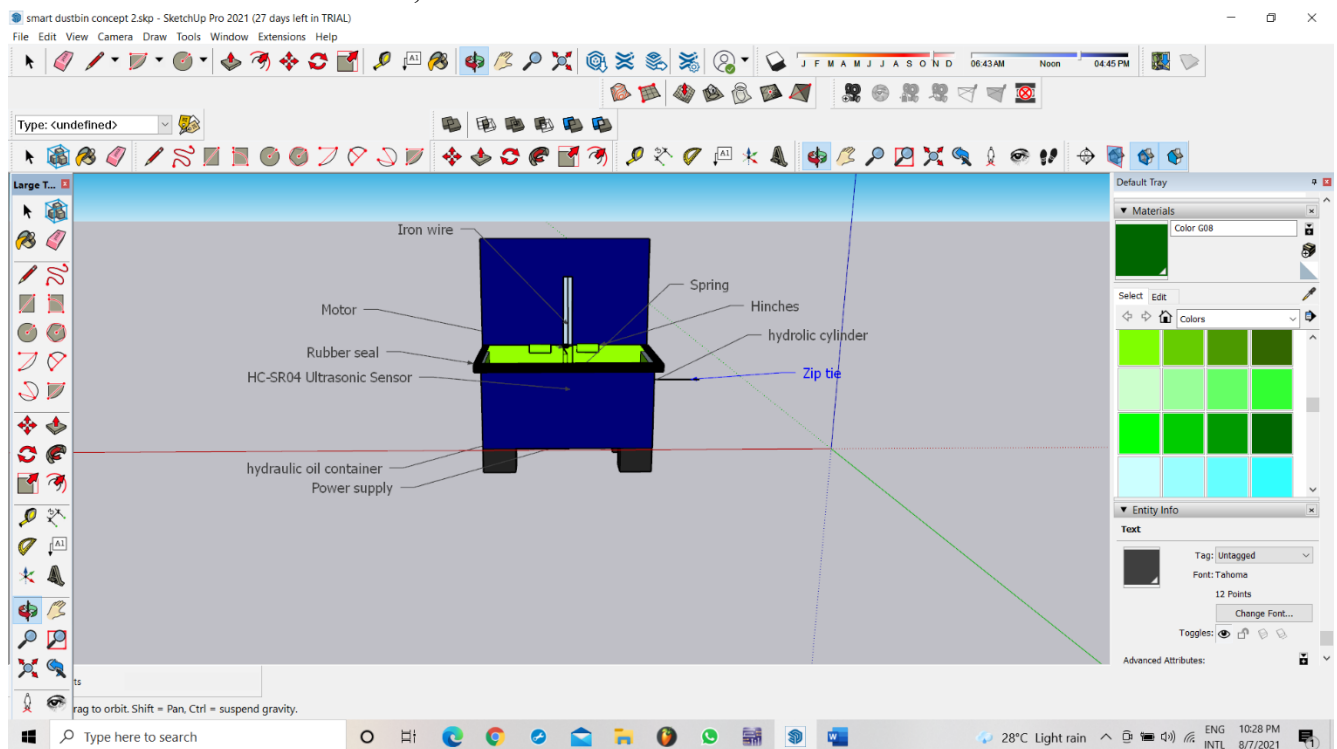
The battery and the Arduino and the other circuits has been placed underneath the dust bin which makes the dust stable and suitable to unexpected weather conditions.

Conceptual design

We did a presentation few weeks ago. There were five problems and solutions in it, but out of them we selected the smart dustbin concept. In this concept we developed objective trees, need hierarchy, mind maps and Ishikawa diagrams. While doing these assignments we added some new features into the concept. Now this is the place that we could show how we could implement this design. There would be many ways thought by our group members.

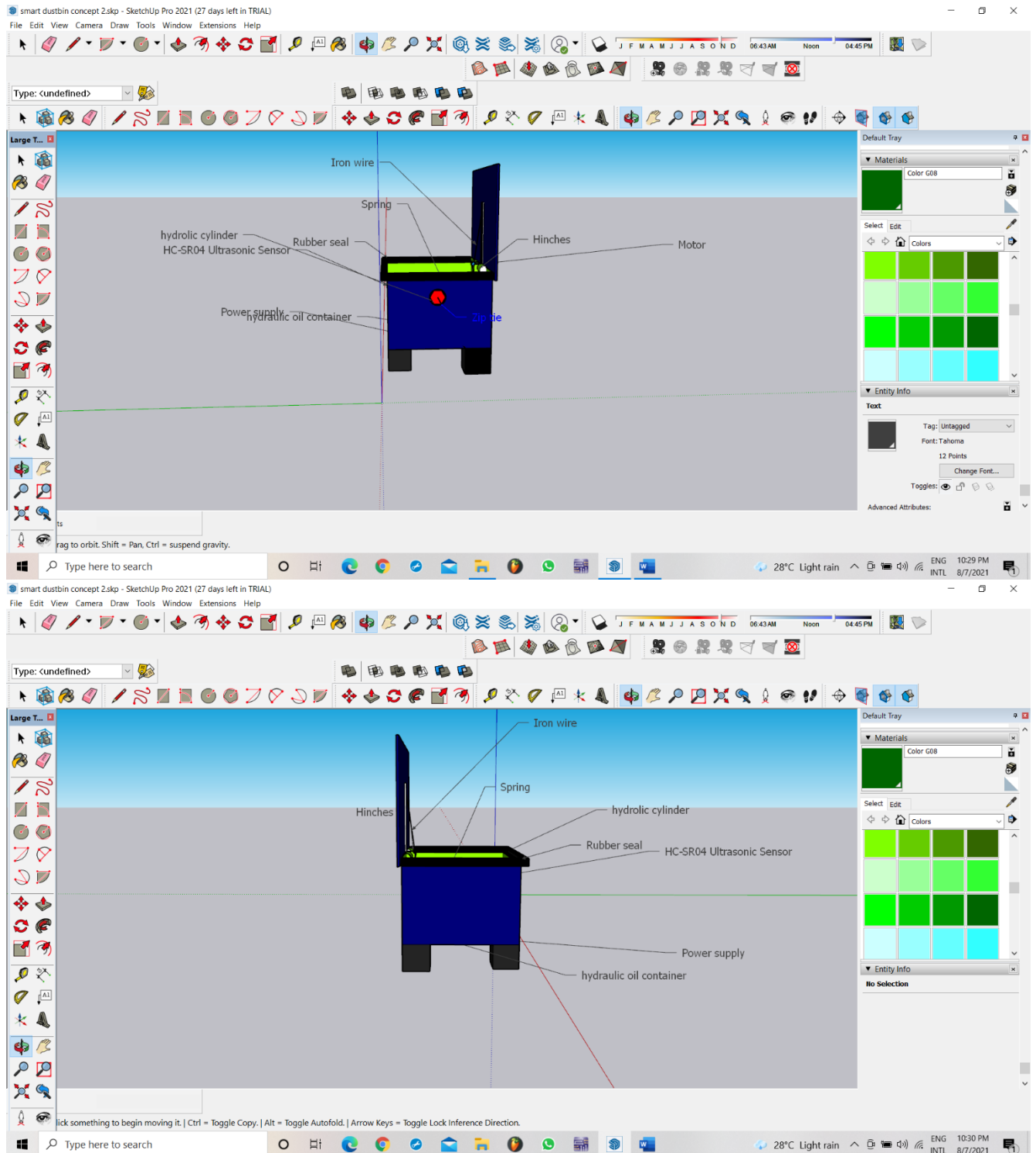
About the smart dustbin concept

- 1) This is the front view of the bin,



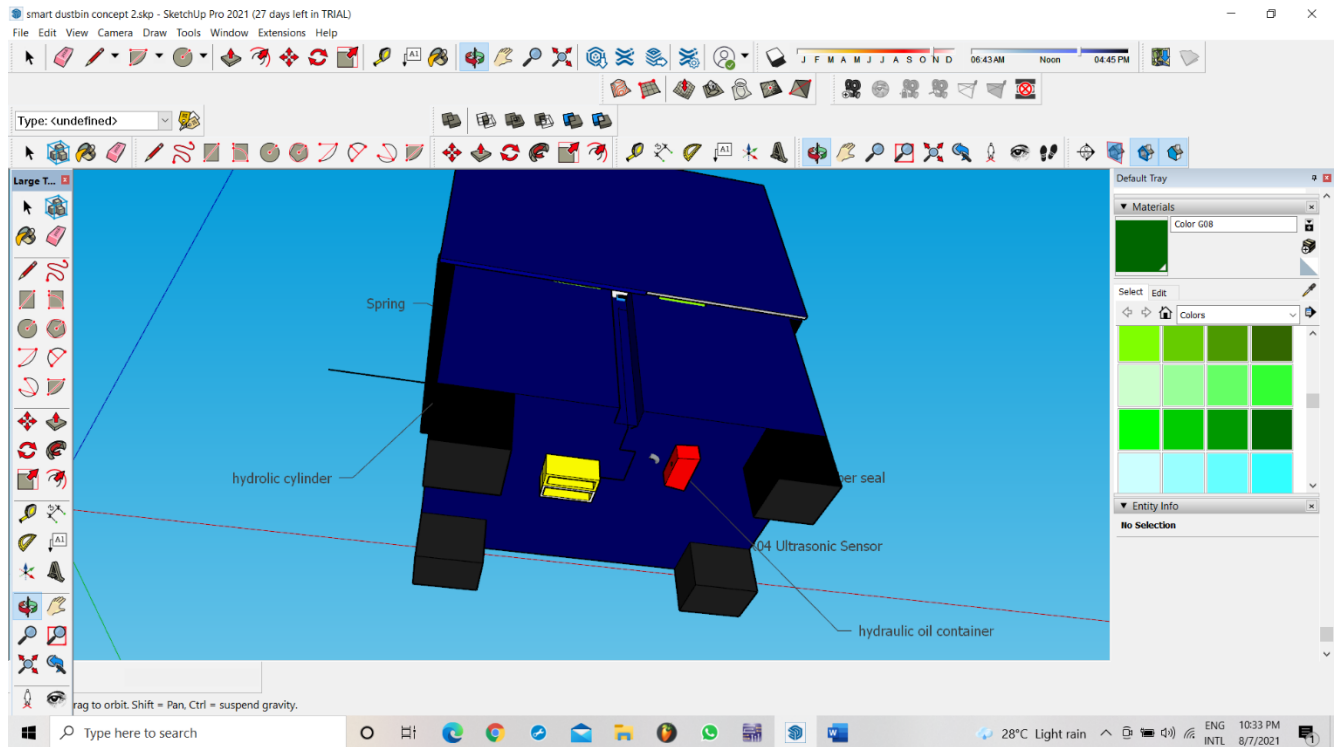
In this view I have included an ultrasonic sensor which cannot be seen because its bit smaller than the dustbin.

2) The side views



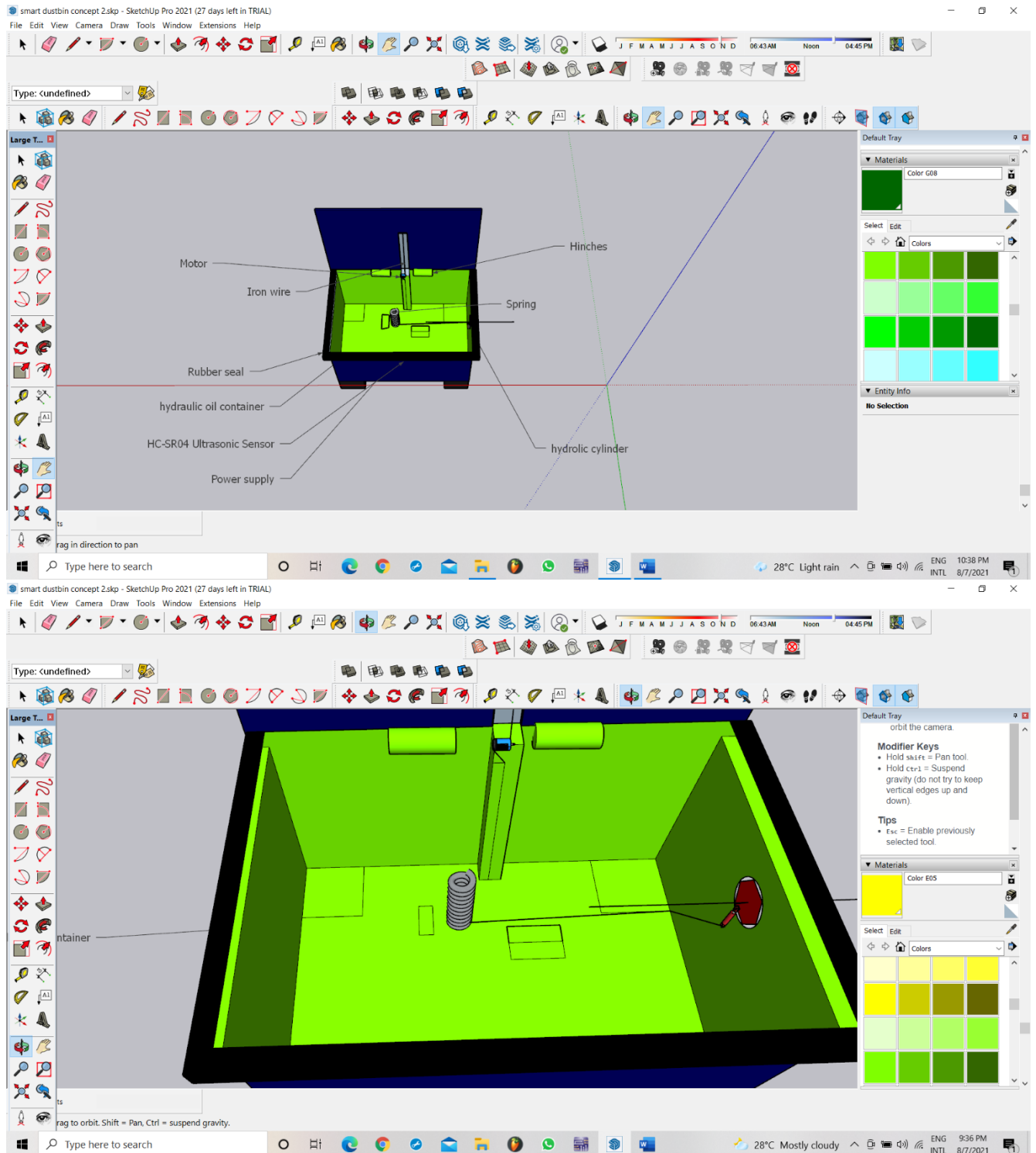
In his view there is the place to insert the zip tie. And could see the rubber seal. There are legs in this design as well to keep the design portable in indoors and outdoors.

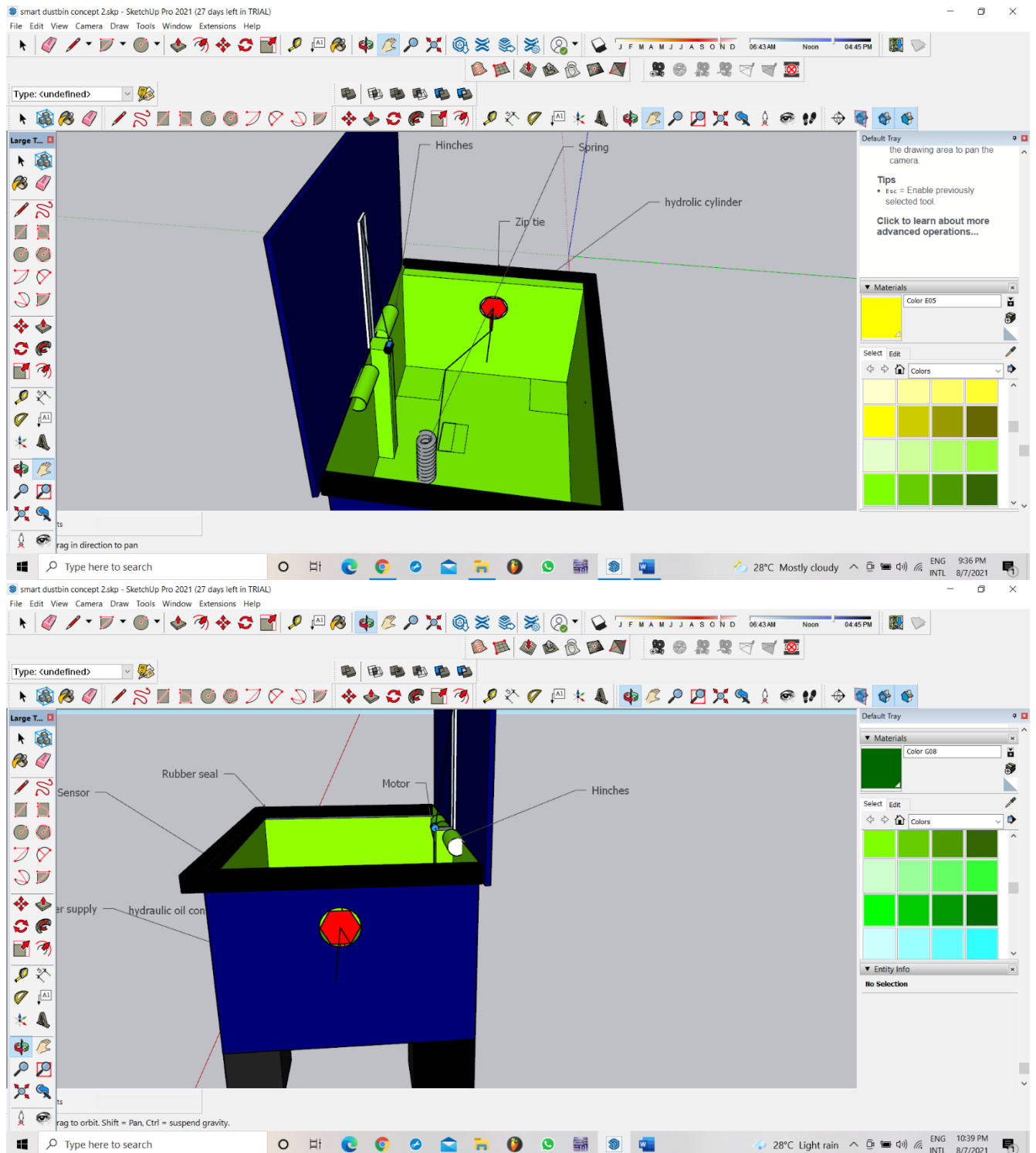
3) The view of the base of this bin.



In this view I placed the power supply as well as the hydraulic container. This was kept underneath because if the bin was placed outdoors, in a heavy rainy day, the power supply might be short circuited. The risk to get damage is also reduced to the power supply and the hydraulic container. The legs are being placed because it could give some sort of a safety and give a decent portability to the bin in any surface.

4) The inner view





Inside of this bin there is a bit to be explain. The main objects that I have included inside is a spring, a motor an iron wire, zip tie and a one-sided hydraulic cylinder.

5) The mechanism

In this design I have included an ultrasonic sensor to detect a person from 40 -60 cm moving near to the trash bin. Then with the help of the motor the lid will open automatically and after the man passes away from the detected area the lid is closing automatically. The lid when it's been closed, it is sealed with a rubber seal. When the level of the garbage bag has been filled the spring shrinks and that power is transmitted to the hydraulic cylinder and the piston transmits the power to the zip tie. So the zip tie is being pulled from out to inside and tie automatically.

EN21485640

Kasuni Dissanayake

Group 5

Conceptual Design

Smart Dustbin

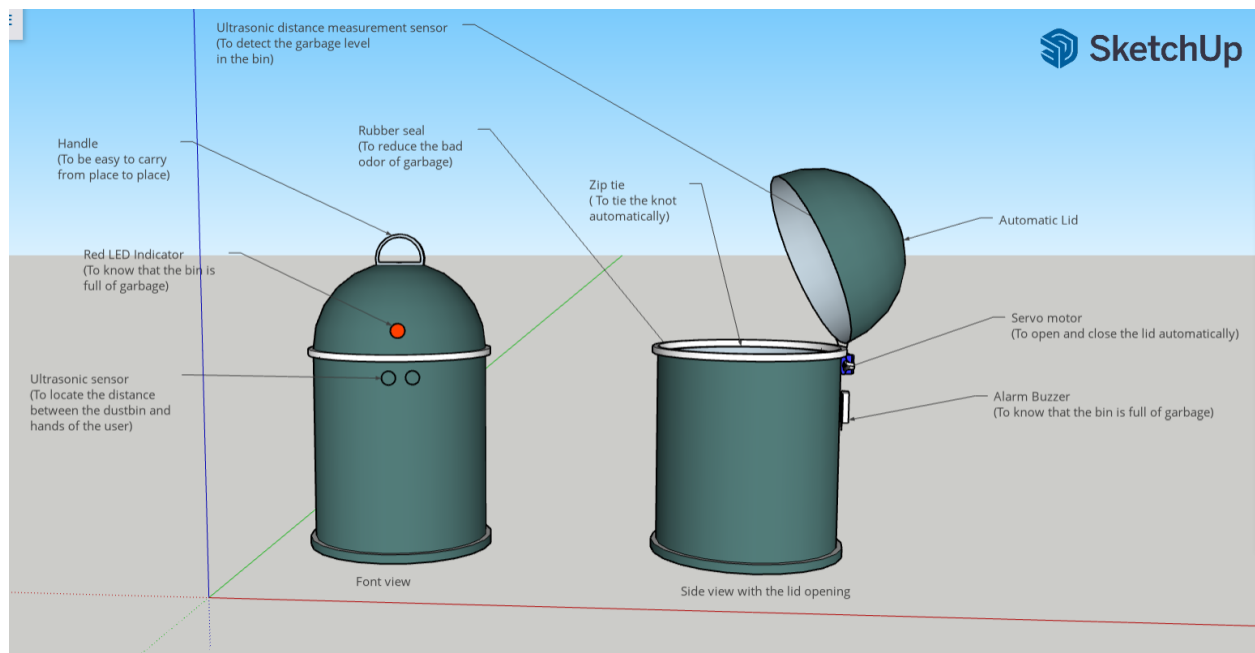


Figure 1:Font view

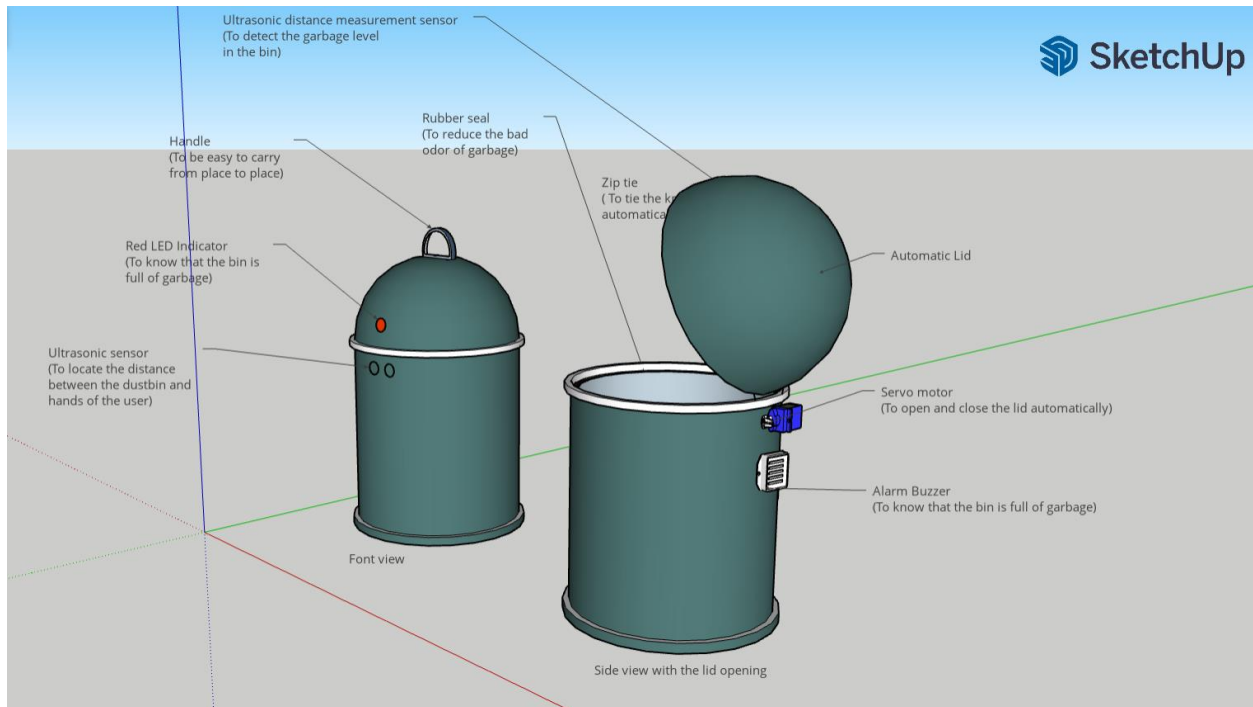


Figure 2: Side view

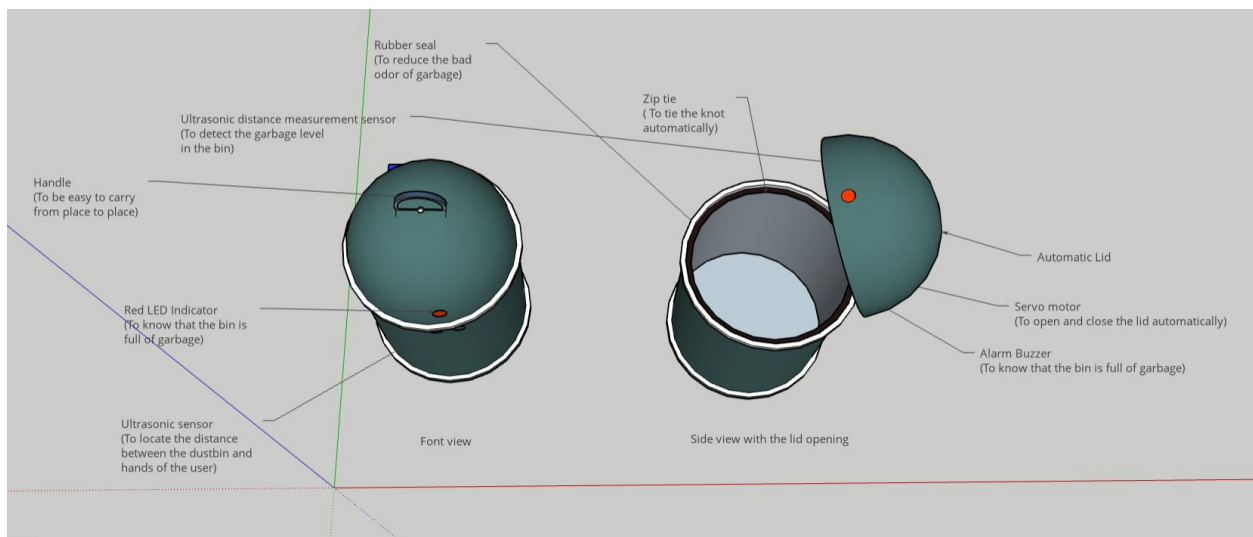


Figure 3: Top view

This is the conceptual design I am presenting related to the problem and solution we have found over the past few weeks.

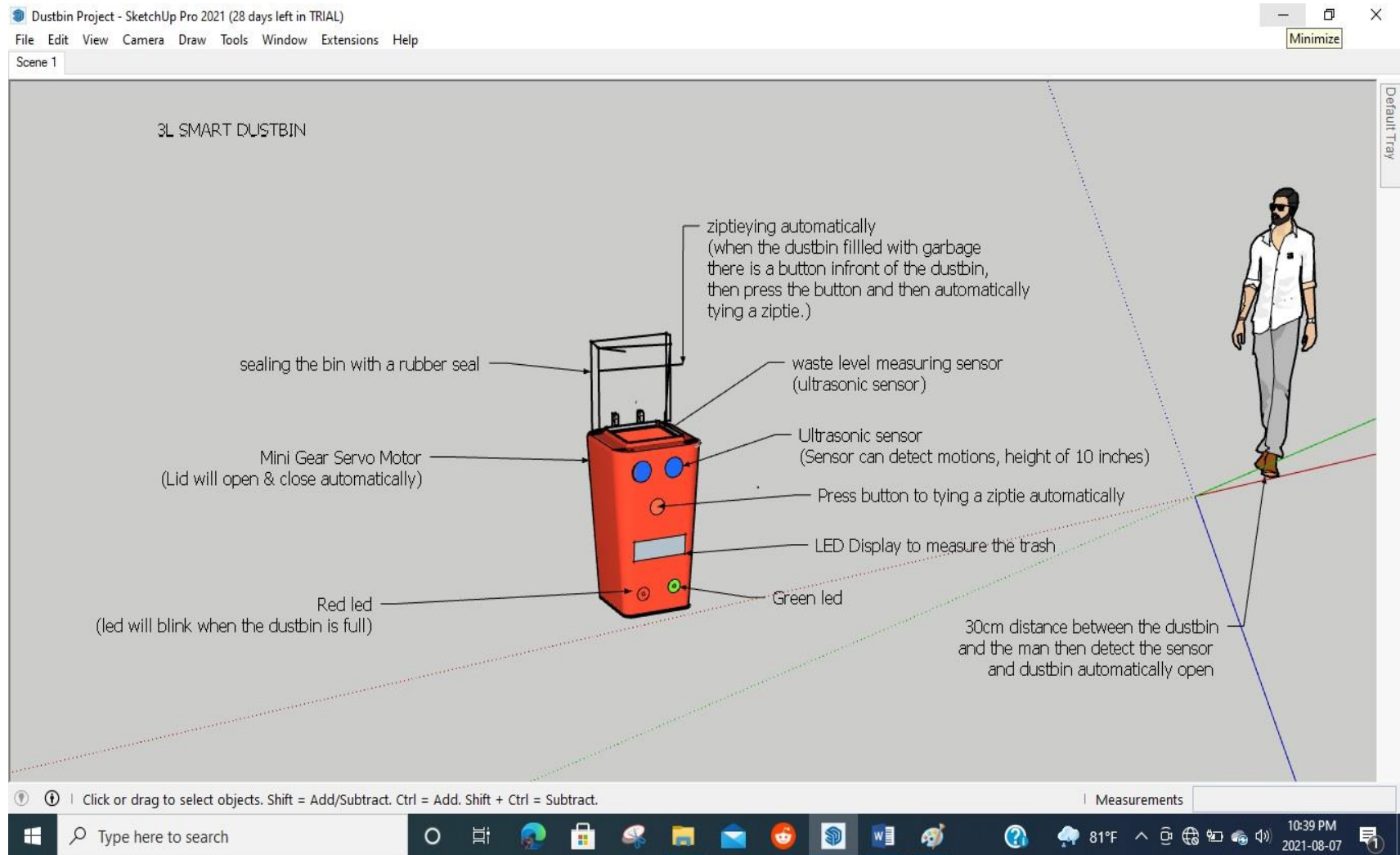
The problem we found was “Trash spilling out”. As a solution to this problem, we are going to add several new features and create a trash bin.

Below are the details related to the conceptual design of the trash bin that will be included with these new features.

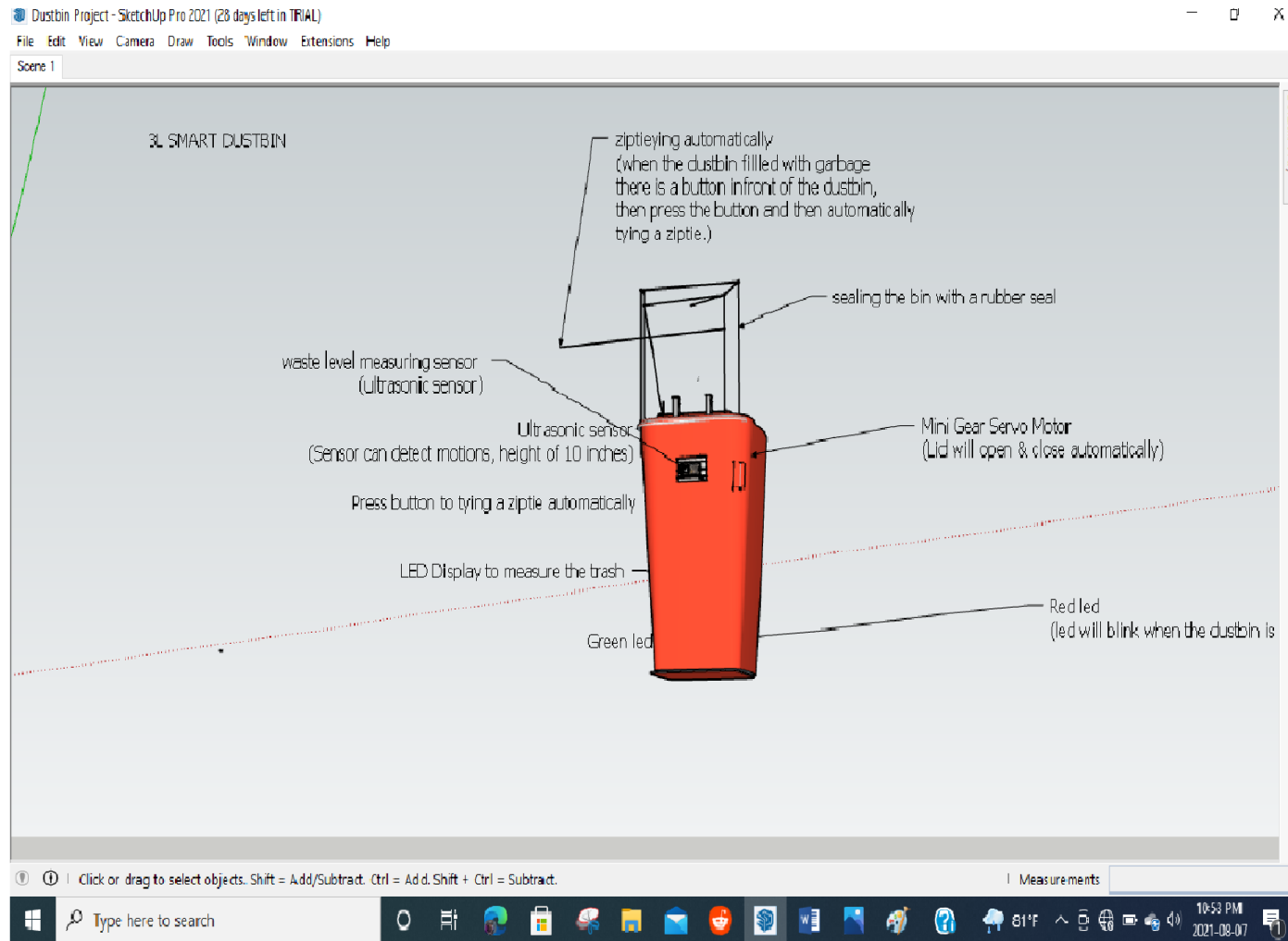
- Automated lid- This lid is used to put the trash into the trash can without having touched it.
- Servo motor- This is used to set the lid to open and close automatically.
- Ultrasonic sensor- The front view of the trash bin fits a sensor to locate the distance between the bin and the hands of the user.
- Zip tie- A gutter is cut below the open edges of the trash bin and a zip tie is trapped in it. Once it is known the trash is full, the zip tie tightens the knot with the help of a motor.
- Rubber seal- Rubber sealing system is used to seal the lid and trash can well.
- Ultrasonic distance measurement sensor- This sensor is placed to the top edge of the inside lid to detect the garbage level in the bin.
- Alarm Buzzer and Red LED indicator- These are applied to make it easier for humans to know after the bin is full of trash.
- Handle- This handle is used to move the trash can from place to place easily.

CONCEPTUAL DESIGN FOR SMART DUSTBIN

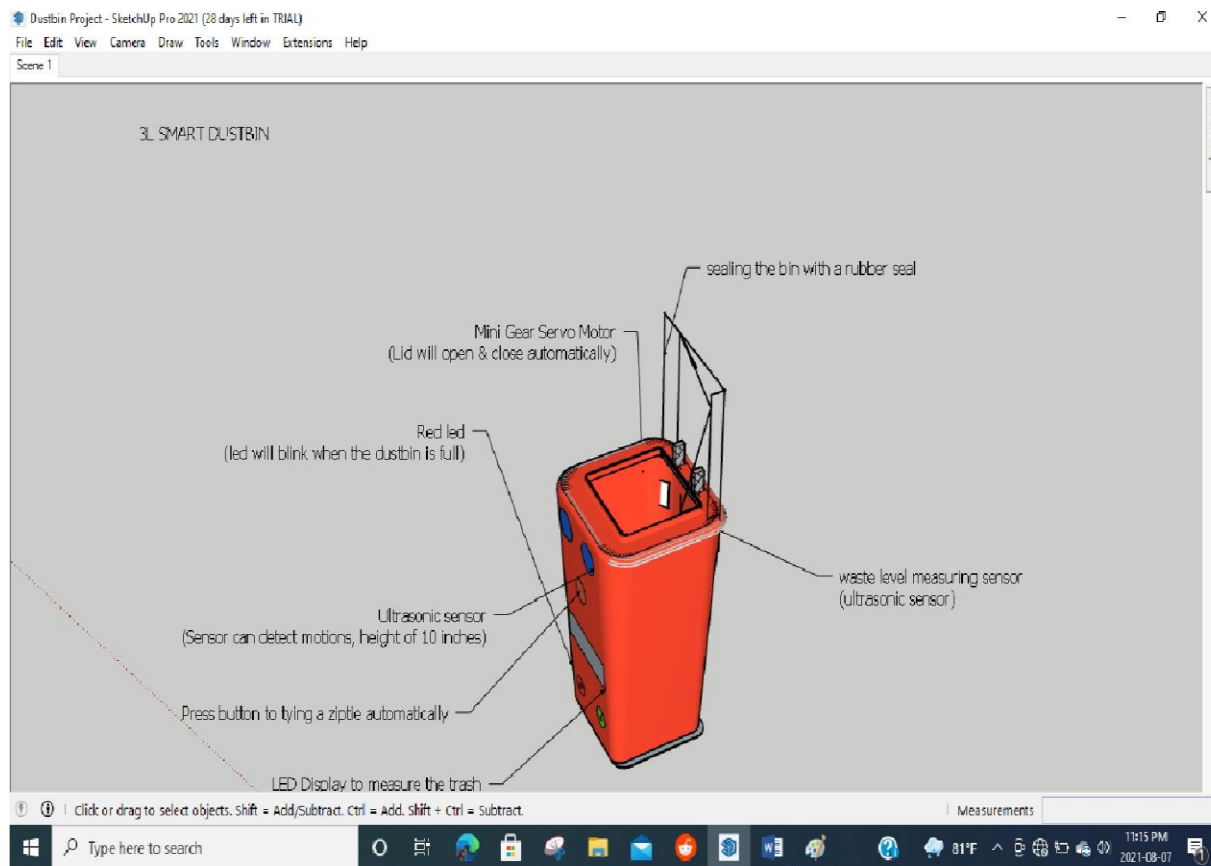
1. Front view of the dustbin



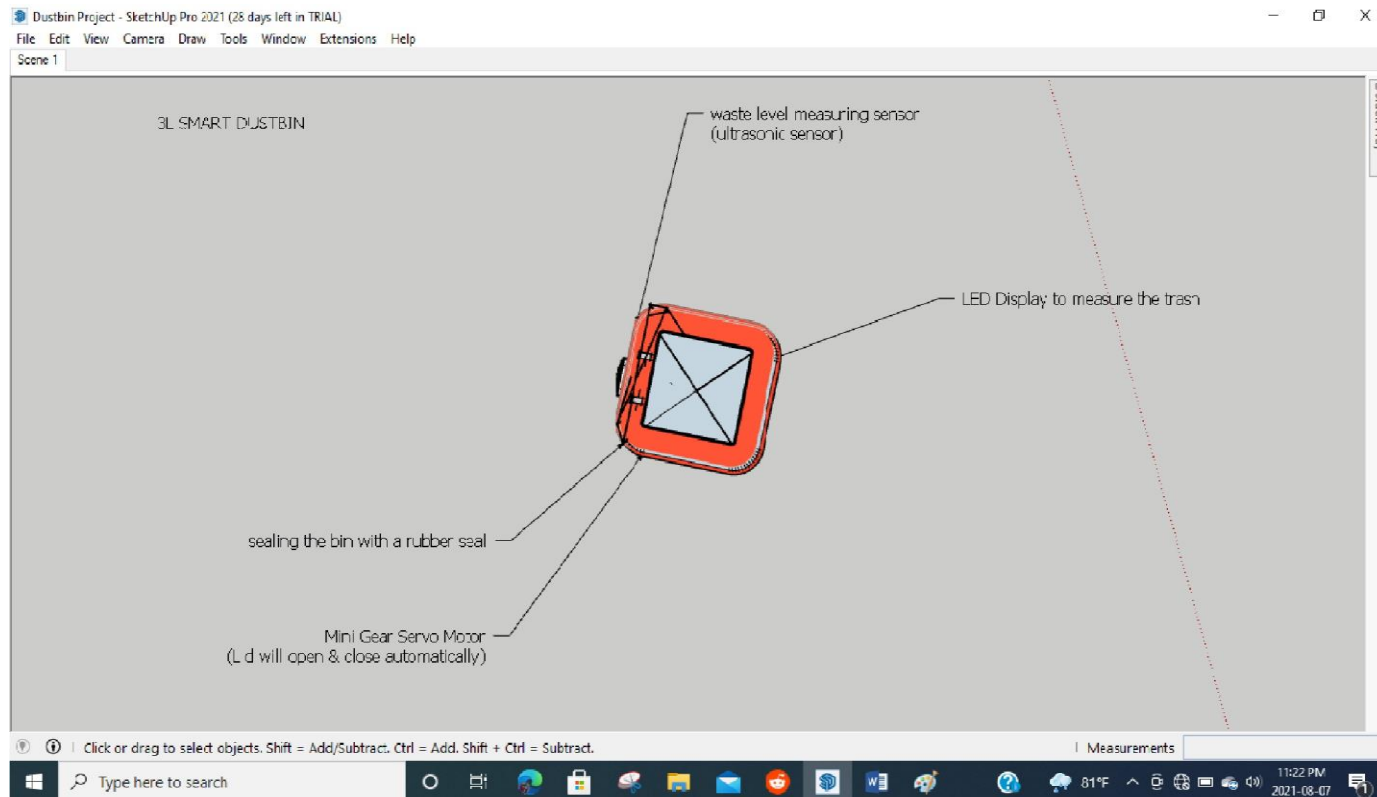
2. Back side view of the dustbin



3. side view of the dustbin



4. view from above the dustbin



This above conceptual design I connected LCD display front of the dustbin to measure the trash and I have connected waste level measuring sensor to back side of the dustbin. For the level measure I have connected RED LED, when the dustbin is full the red led will blink so then I can get a signal from it.

I have placed mini gear servo motor on the right side of the dustbin so the lid will automatically open and close. And also for the lid I have sealing around the lid with a rubber seal.

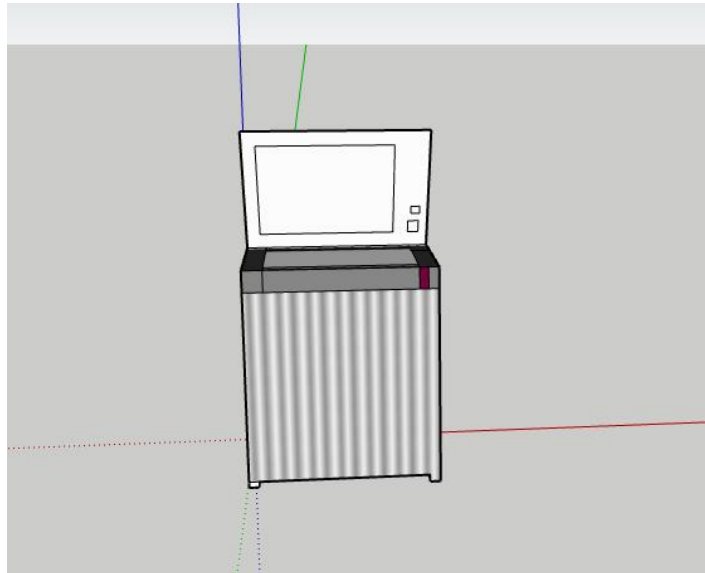
I have connected ultrasonic sensor to detect a person, 30cm of distance moving near to the dustbin.

when the dustbin filled with garbage, and red led blink there is a button front of the dustbin to press and then the ziptie comes and tying garbage bag . Inside of the button there is a servo motor to tying the ziptie around the garbage bag.

EN21492716

N.A. Thinuri Isaka

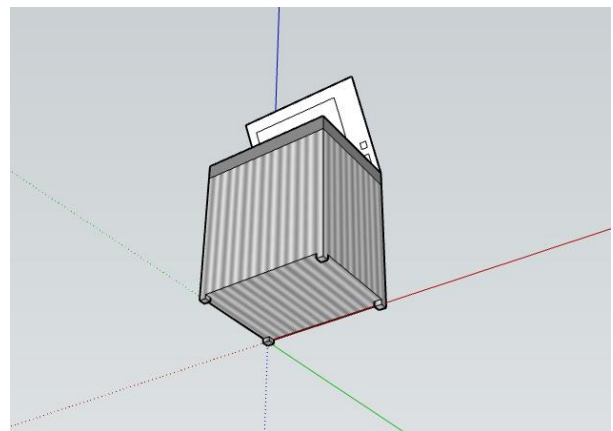
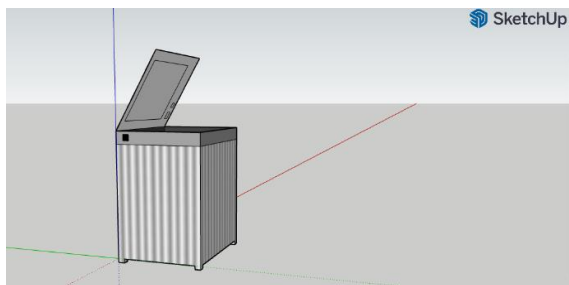
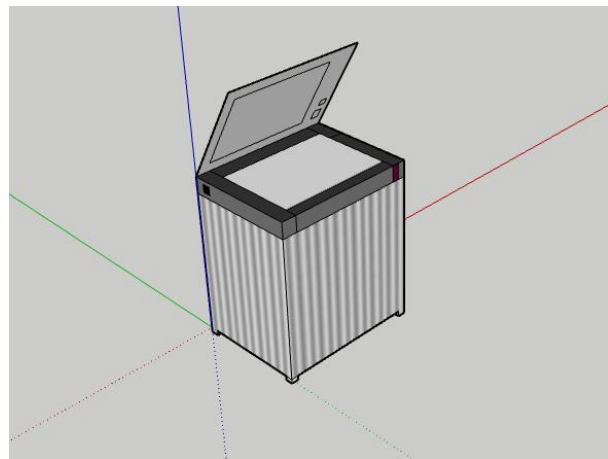
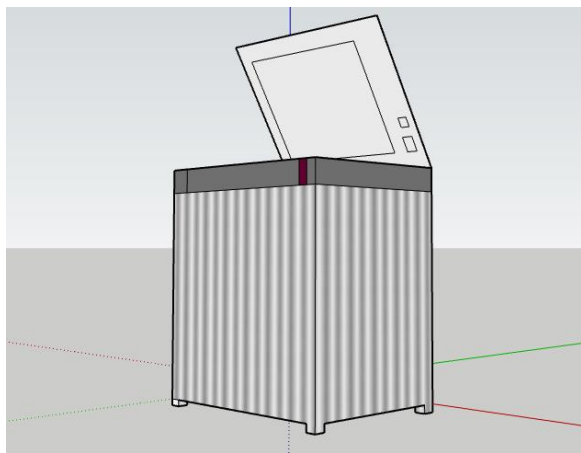
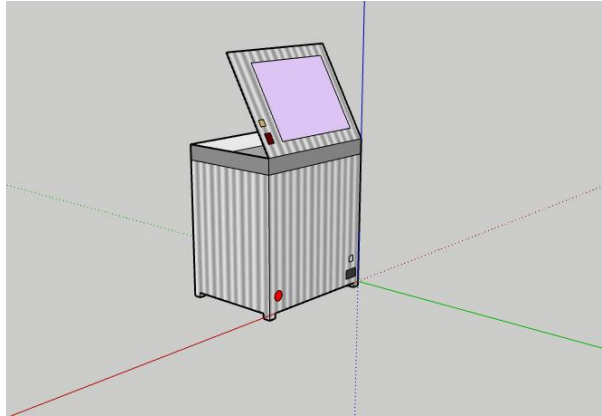
CONCEPTUAL DESIGN – SMART DUSTBIN



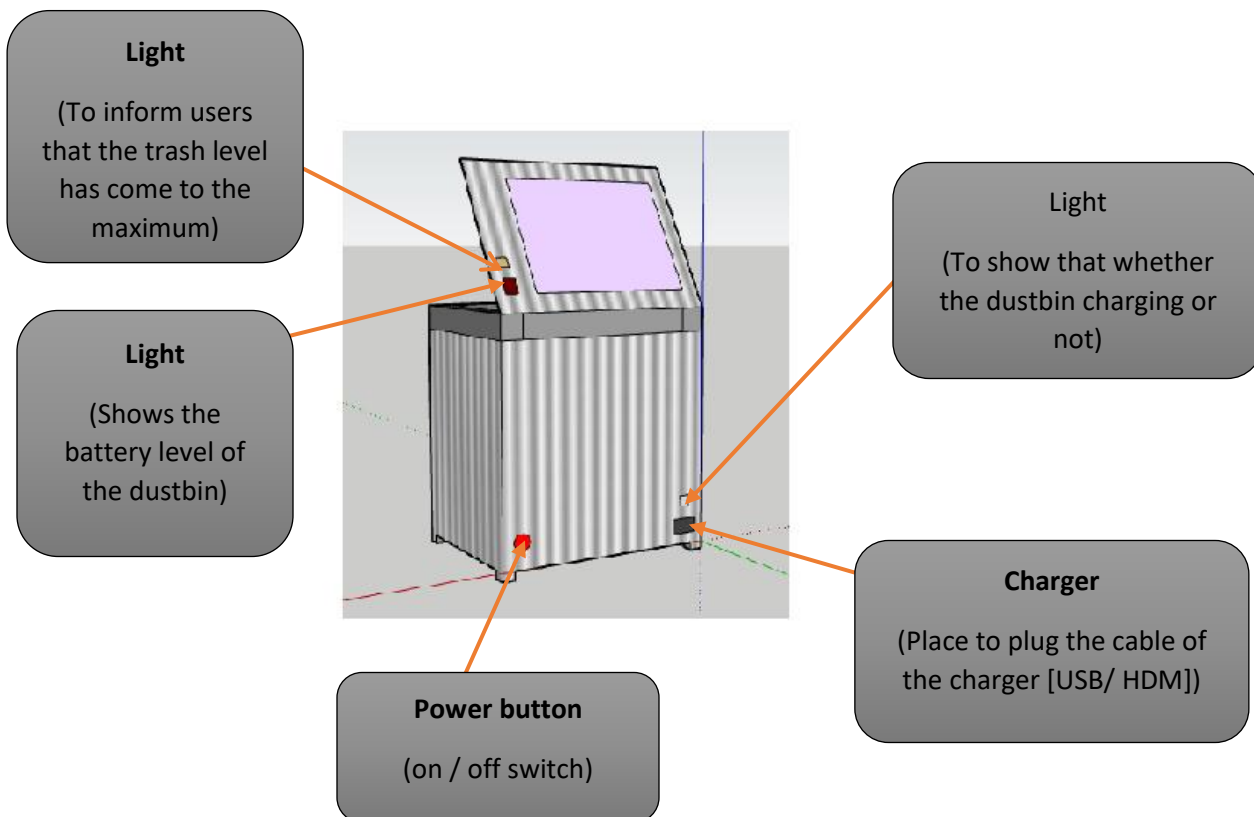
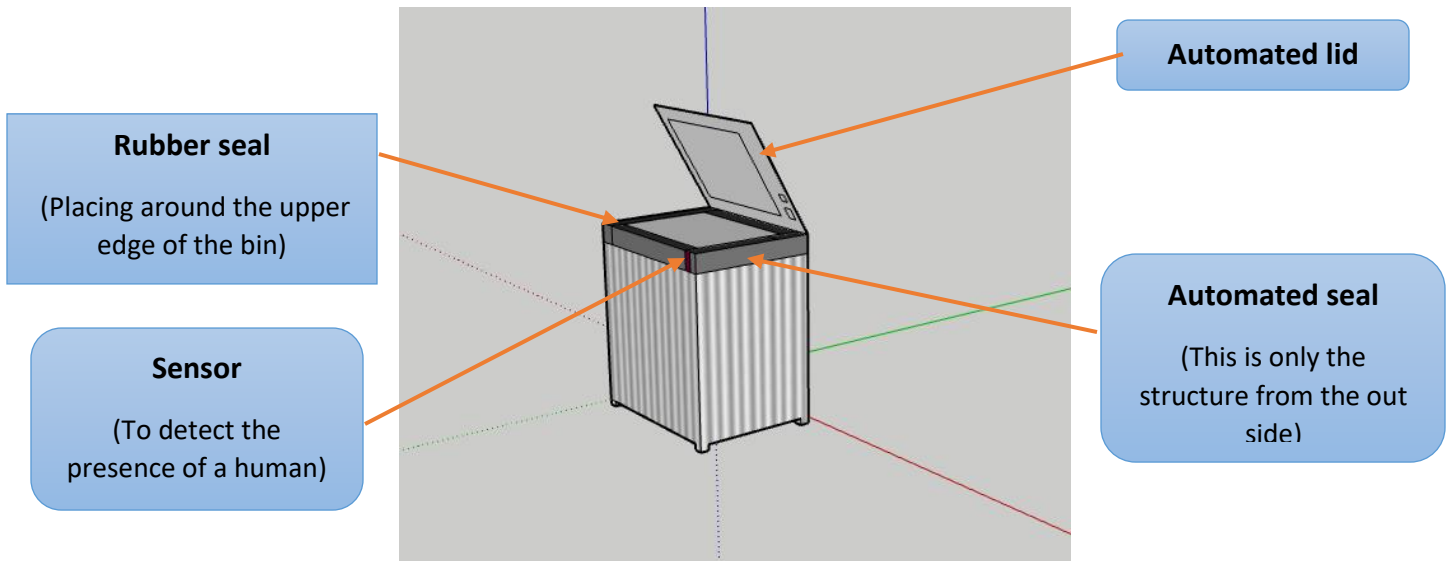
This is the **front view** of my design. It is a smart dustbin which is opening automatically (we planned to use a sensor to detect the presence of a human) and the dustbin is included some other features like rubber seal, automatic level (trash level) measurer and automatic sealer (to seal the trash bag).

And this is only for show our conceptual design individually, so I did not include the measurement values as it is not compulsory for this level (conceptual level). Therefore, I am going to describe only about our features and where we planning to place them on the dustbin (according to my opinion)

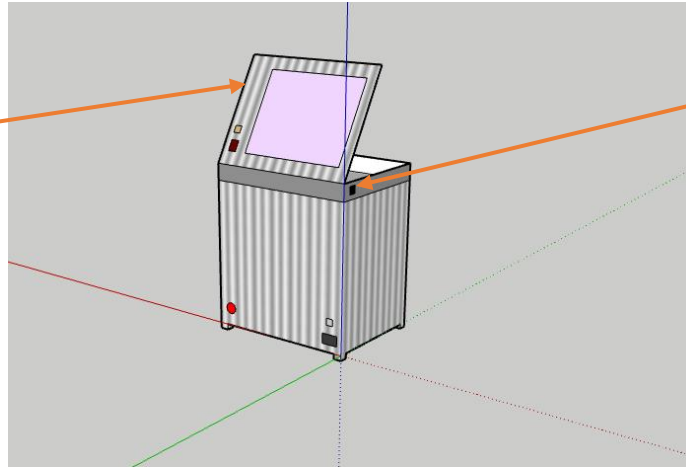
**There are some other
angles of my design.
(From outside)**



Parts of the design.



Automated lid

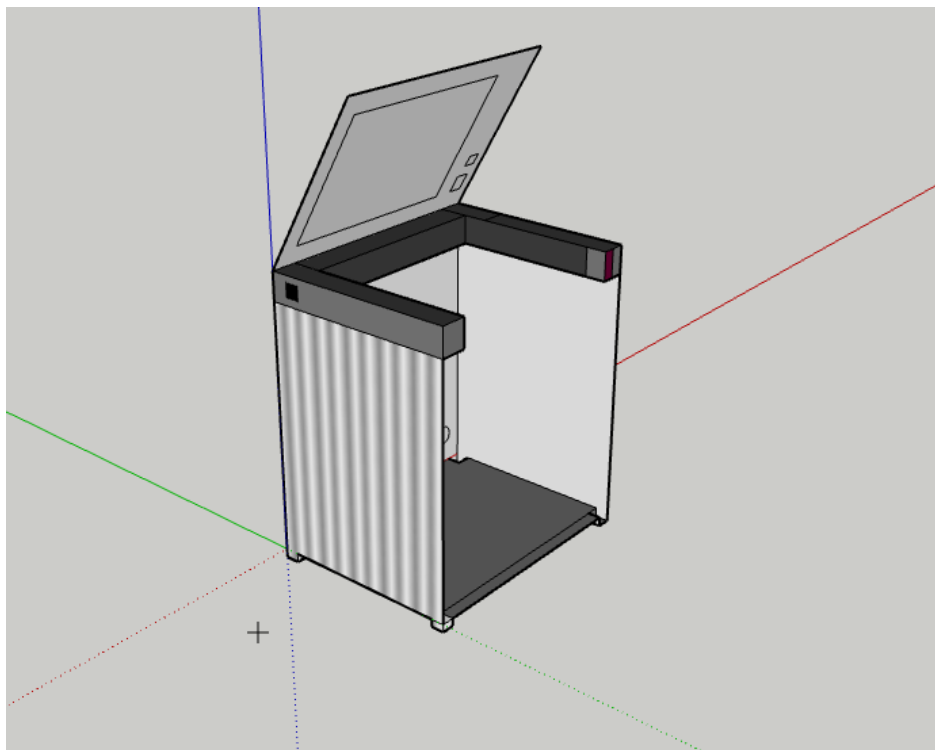


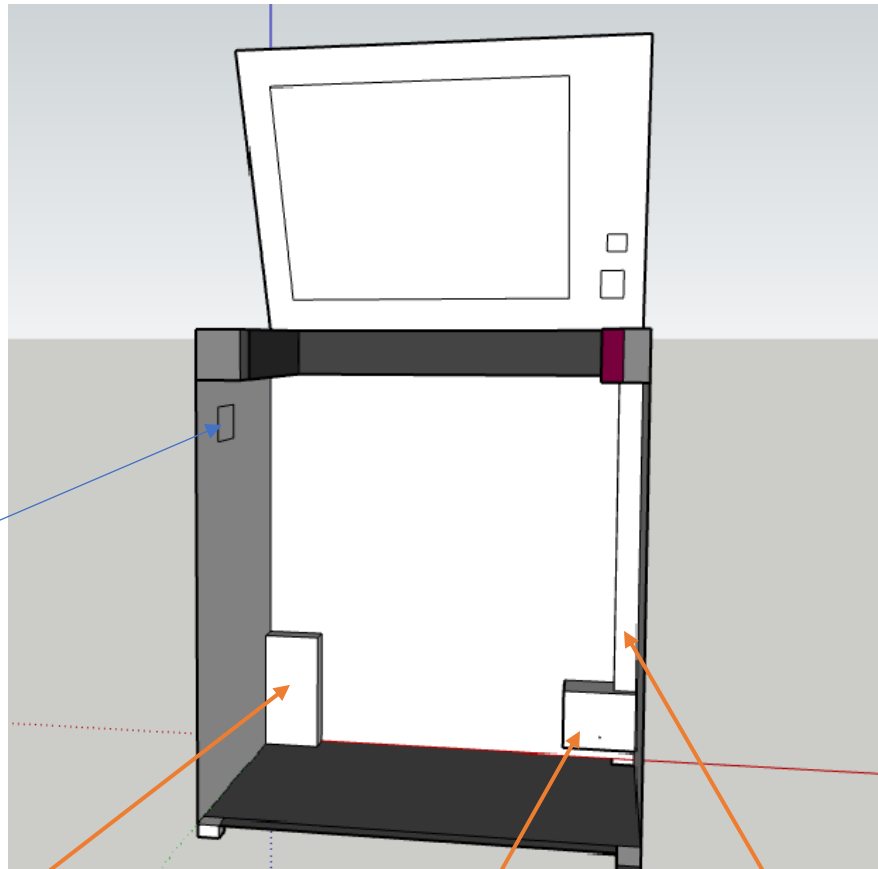
Button

(We can seal the trash bag by pressing this)

Inside of the design.

I remove one side of the dustbin to show a clear picture of the inside of it.





Sensor
(To detect the trash)

Covered the USB/HDM
charging & the light

Covered the power button

Included the wires from
the power button to the
lights on the lid