Baby Cheetah Walking Robot in Tinkercad

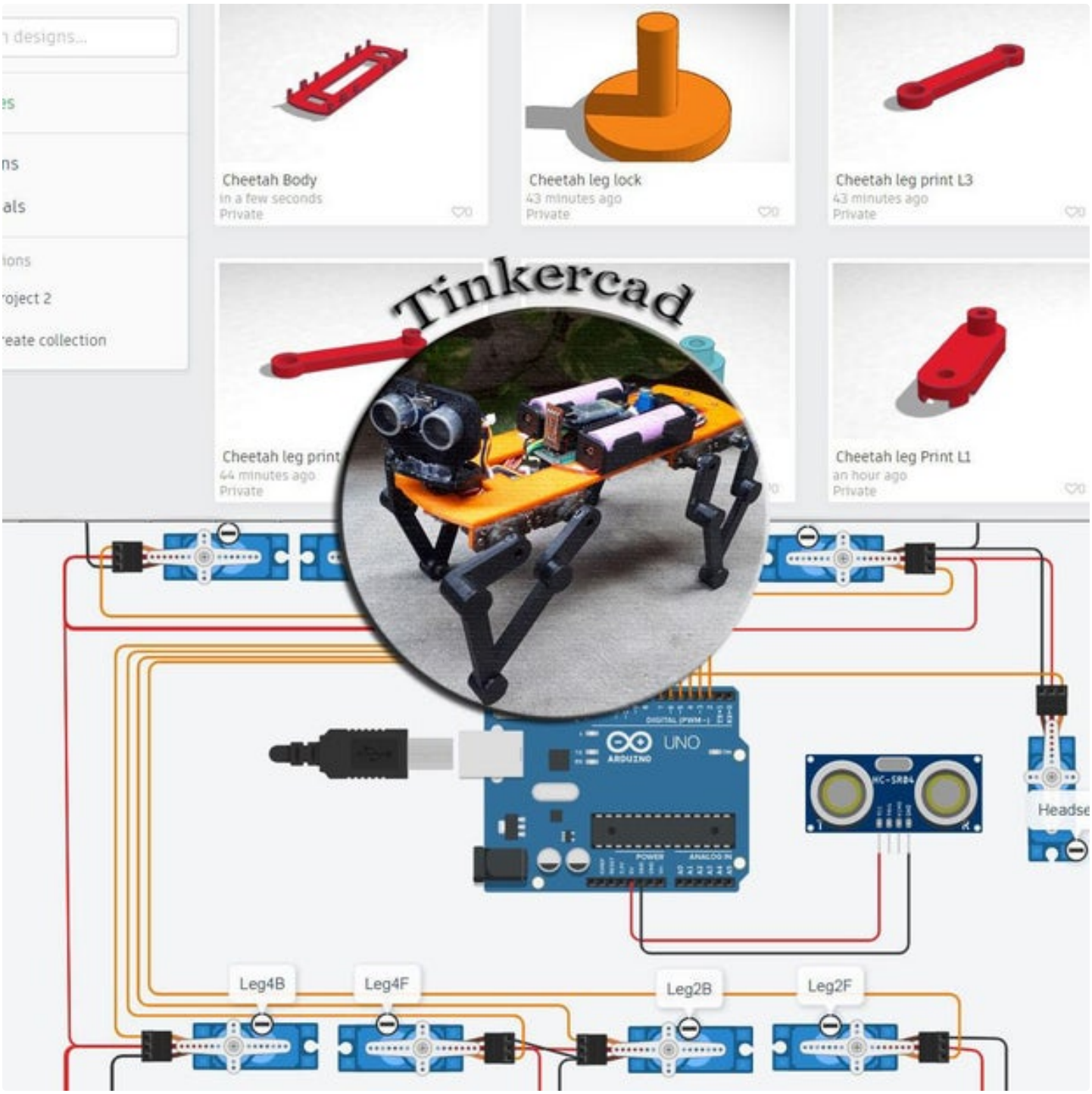
by jegatheesan.soundarapandian

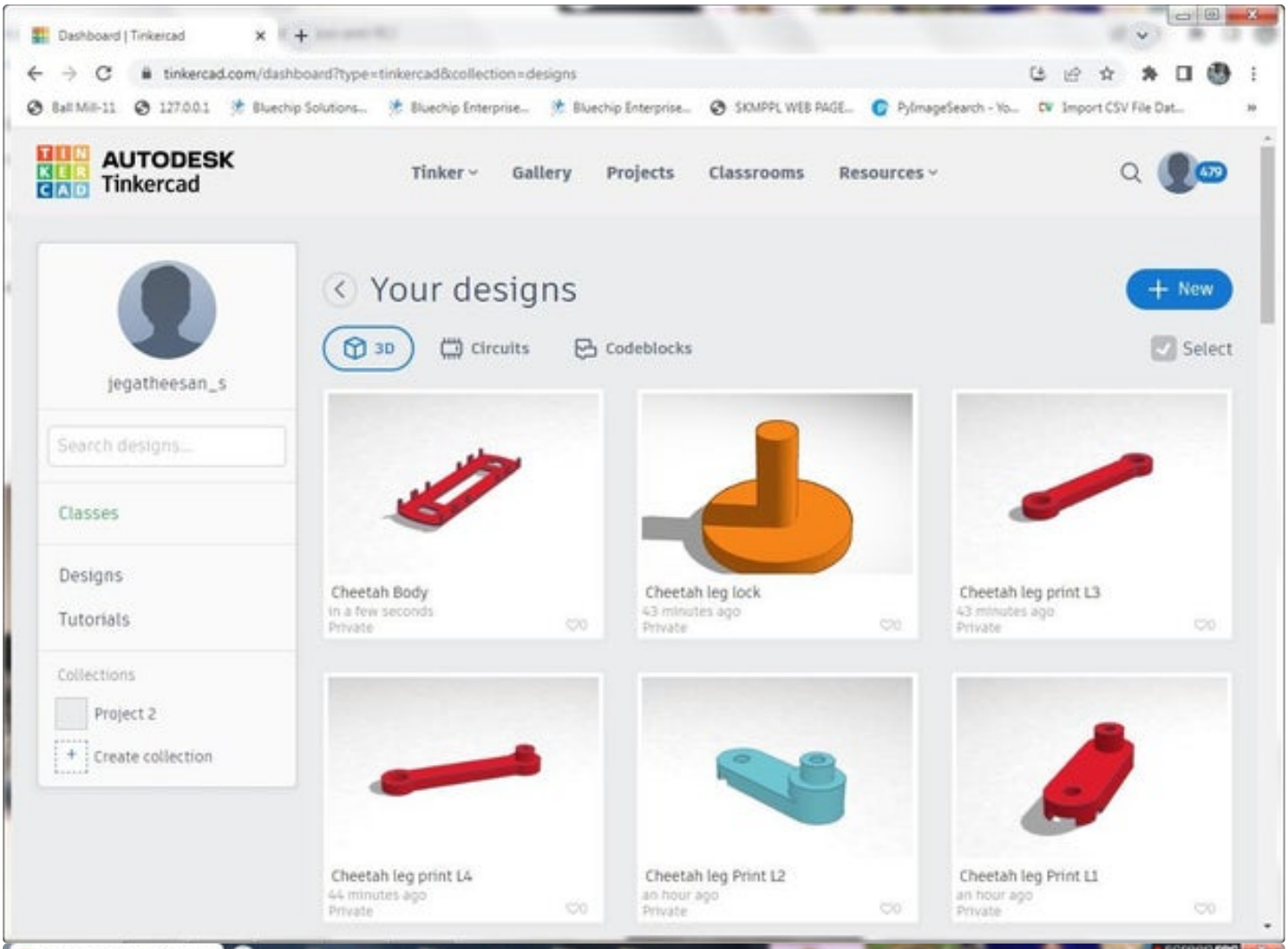
Thank very much to God and my dear ones and my followers and my project readers for my 100th instructables, first i want to make some thing more special and then continue other project but that project take a very long time. So when i just go through my previous projects i found my cheetah project is such a wonder full project with lot of discussions and comments. So i plan to explain detail about that project designing. Here also i found tinkercad challenge relating the same. So i give in details step of designing the material and the circuits in tinkercad step by step in detail.

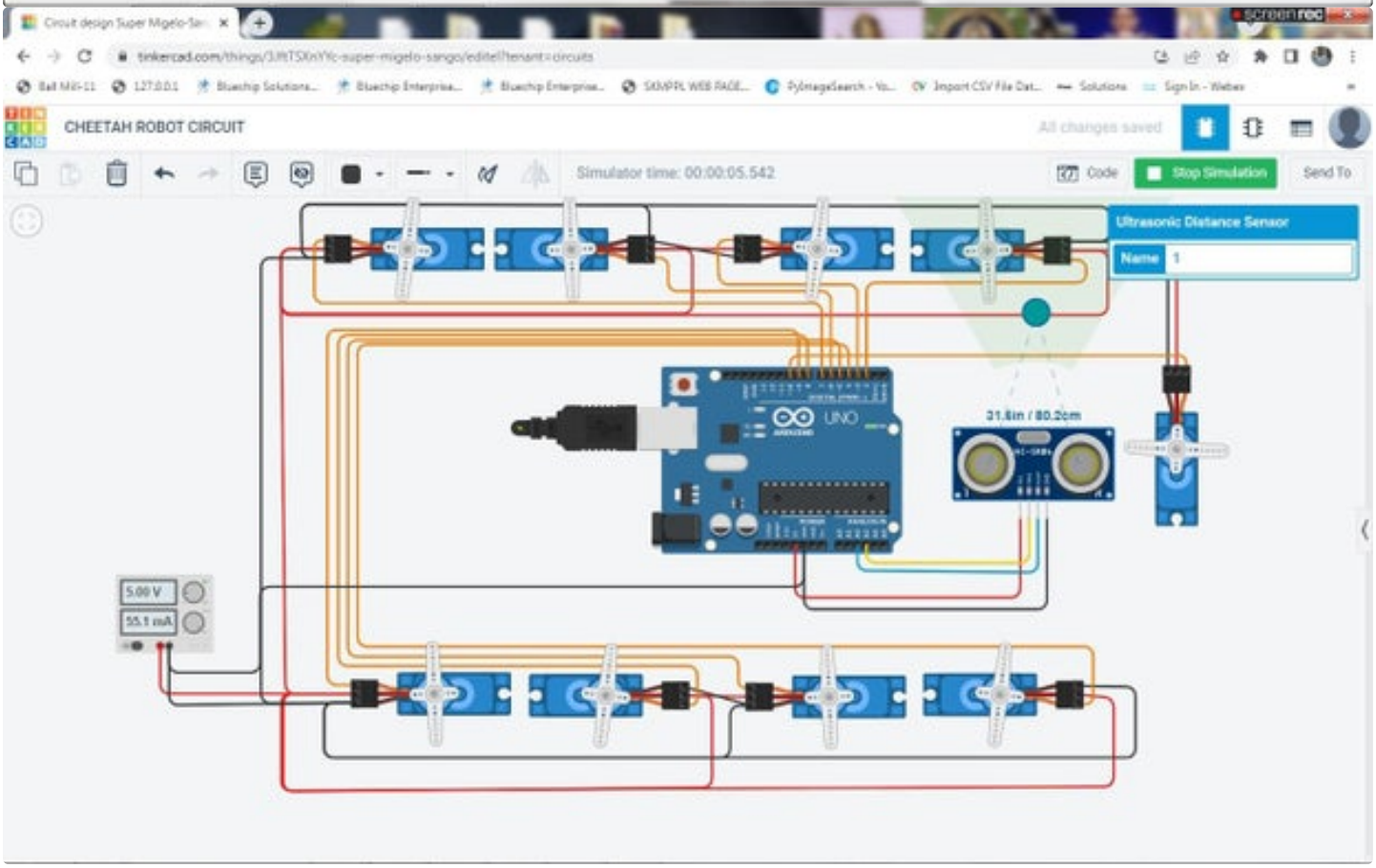
Supplies:

TINKERCAD

for details of materials used to complete project please see my old project Baby MIT Cheetah Robot V2 Autonomous and RC


Cheetah Body
in a few seconds
Private
Cheetah leg lock
43 minutes ago
Private
Cheetah leg print L3
43 minutes ago
Private
Tinkercad
Cheetah leg print
44 minutes ago
Private
Cheetah leg Print L1
an hour ago
Private
UNO
Leg4B
Leg4F
Leg2B
Leg2F


Dashboard | Tinkercad
tinkercad.com/dashboard?type=tinkercad&collection=designs
AUTODESK Tinkercad
Tinker
Gallery
Projects
Classrooms
Resources
jegatheesan_s
Search designs...
Classes
Designs
Tutorials
Collections
Project 2
Create collection
Your designs
New
3D
Circuits
Codeblocks
Select
Cheetah Body
in a few seconds
Private
Cheetah leg lock
43 minutes ago
Private
Cheetah leg print L3
43 minutes ago
Private
Cheetah leg print L4
44 minutes ago
Private
Cheetah leg Print L2
an hour ago
Private
Cheetah leg Print L1
an hour ago
Private


CHEETAH ROBOT CIRCUIT
Simulator time: 00:00:05.542
Code
Stop Simulation
Send To
Ultrasonic Distance Sensor
Name
UNO
31.8in / 80.2cm
5.00 V
55.1 mA

https://youtu.be/zKC4nrbestI

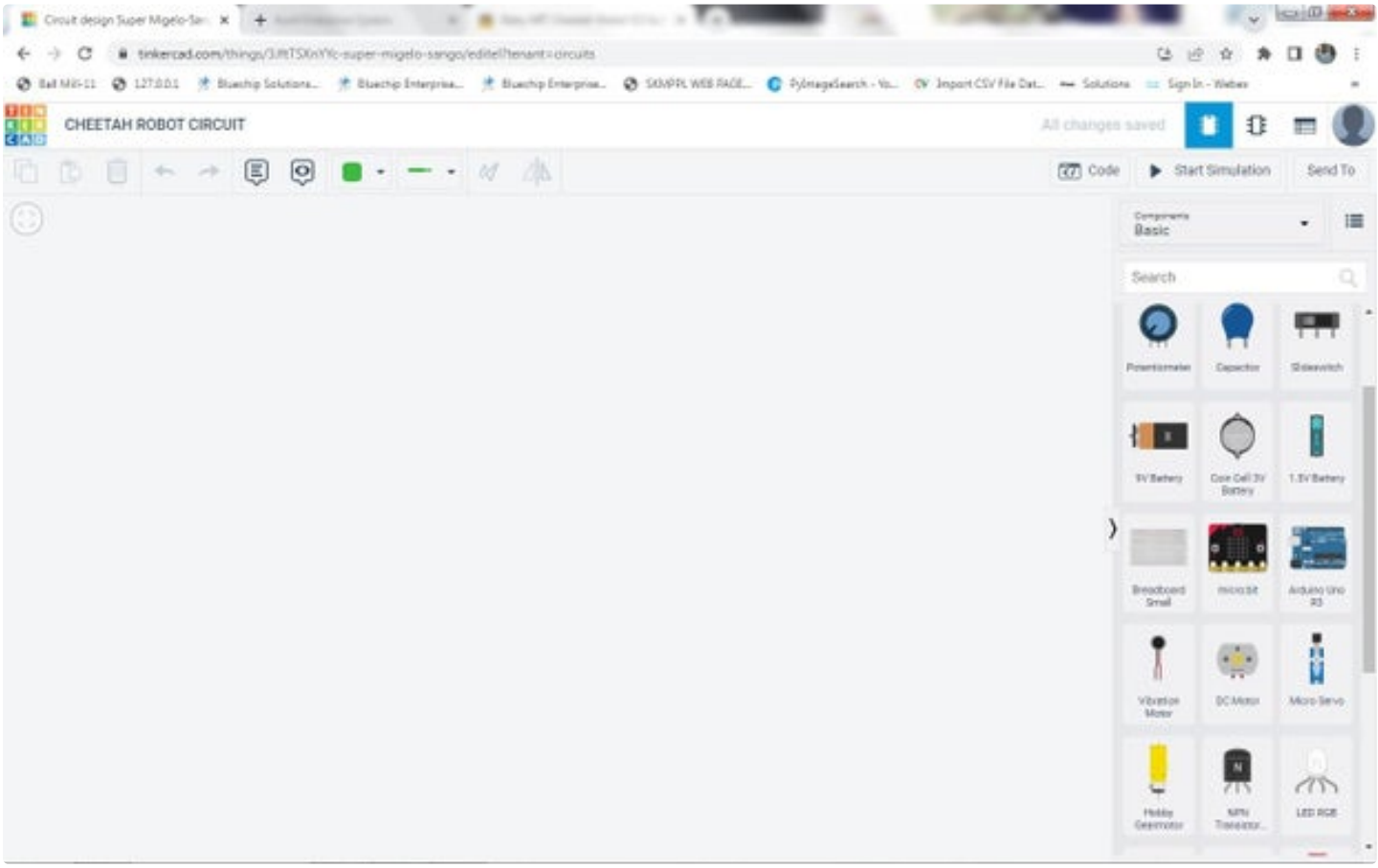
Step 1: Circuit Development - Selecting Components

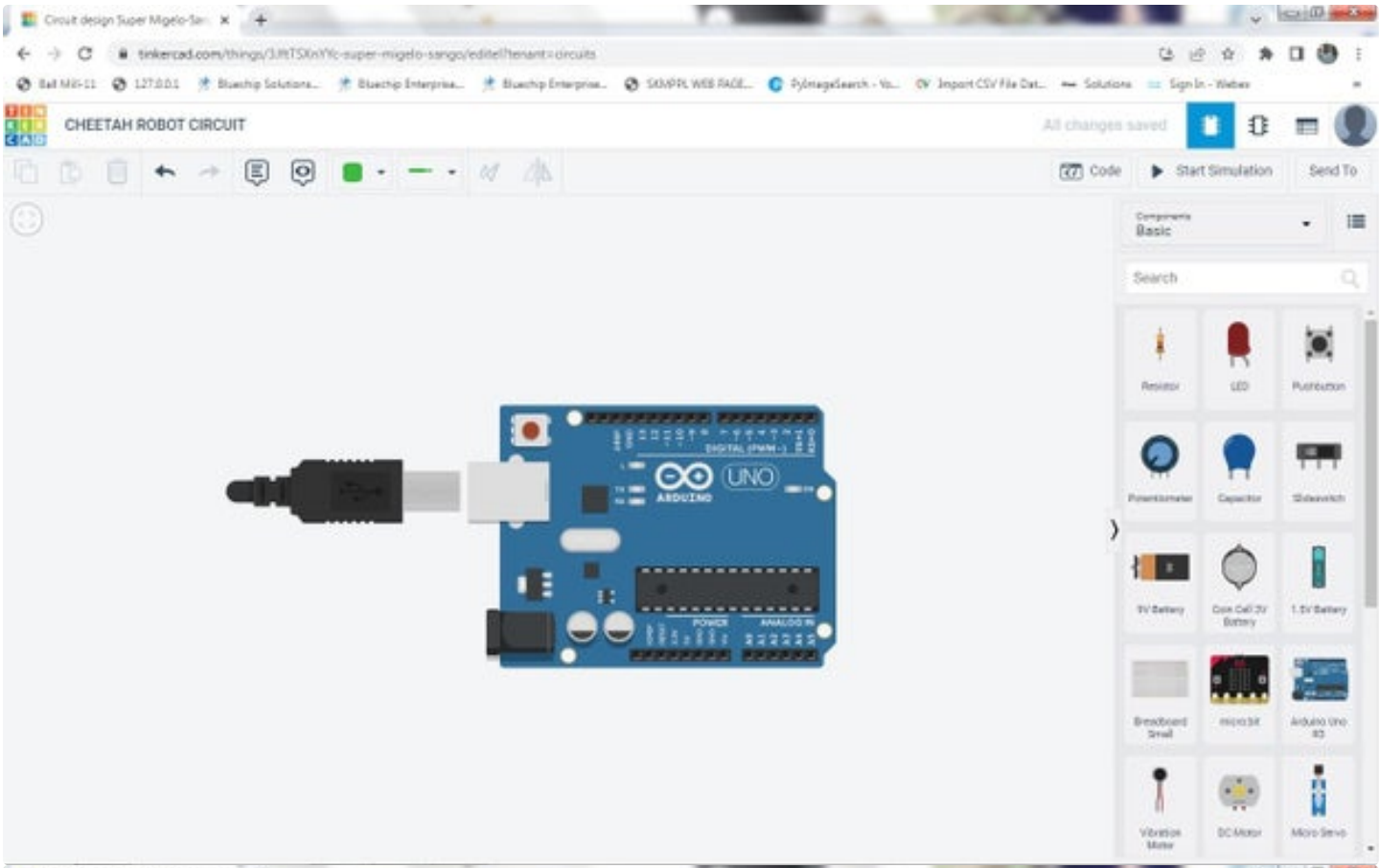
1) In tinkercad open new circuit project and name it as Cheetah Robot Circuit.

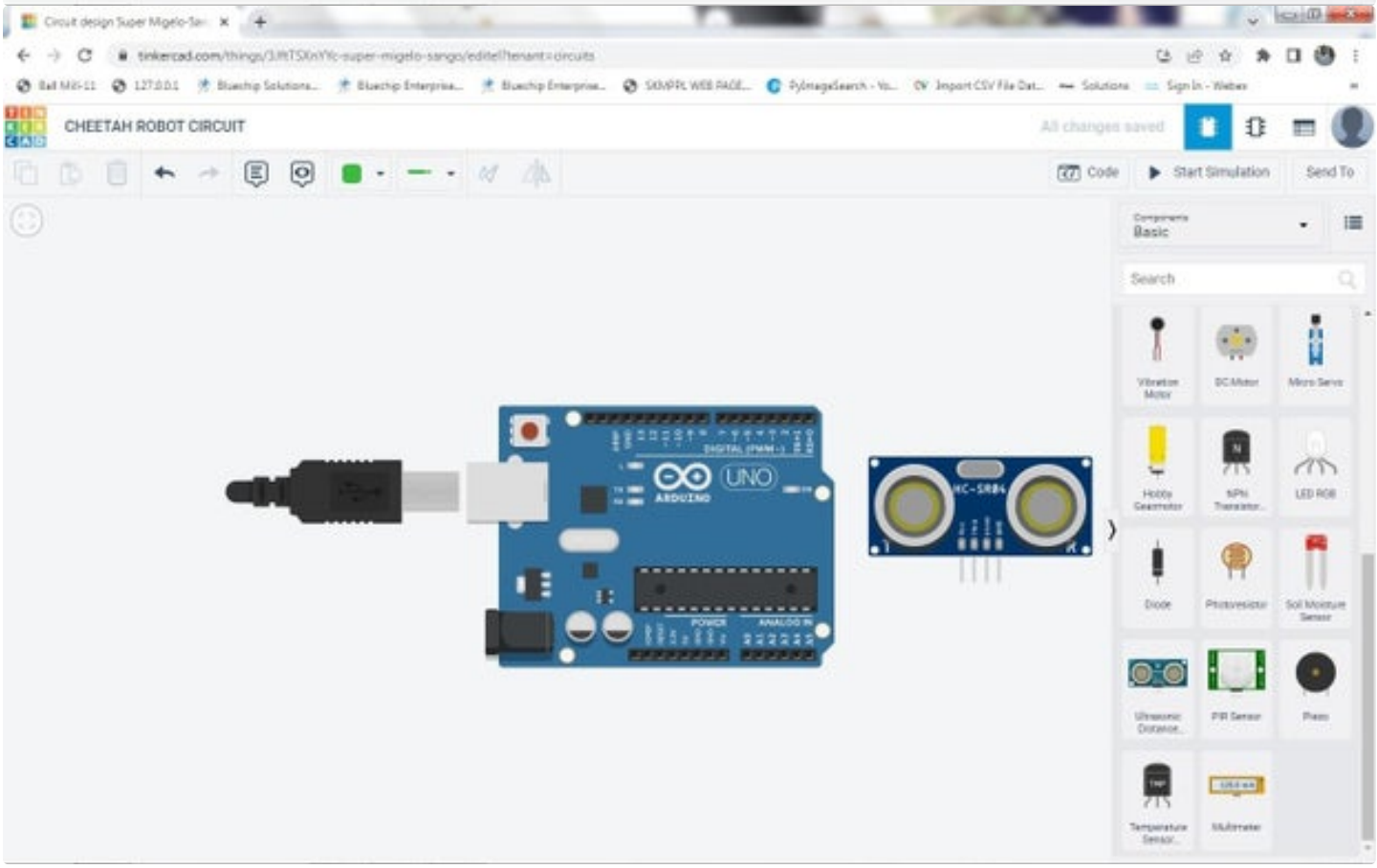
2) Drag the UNO designing area.

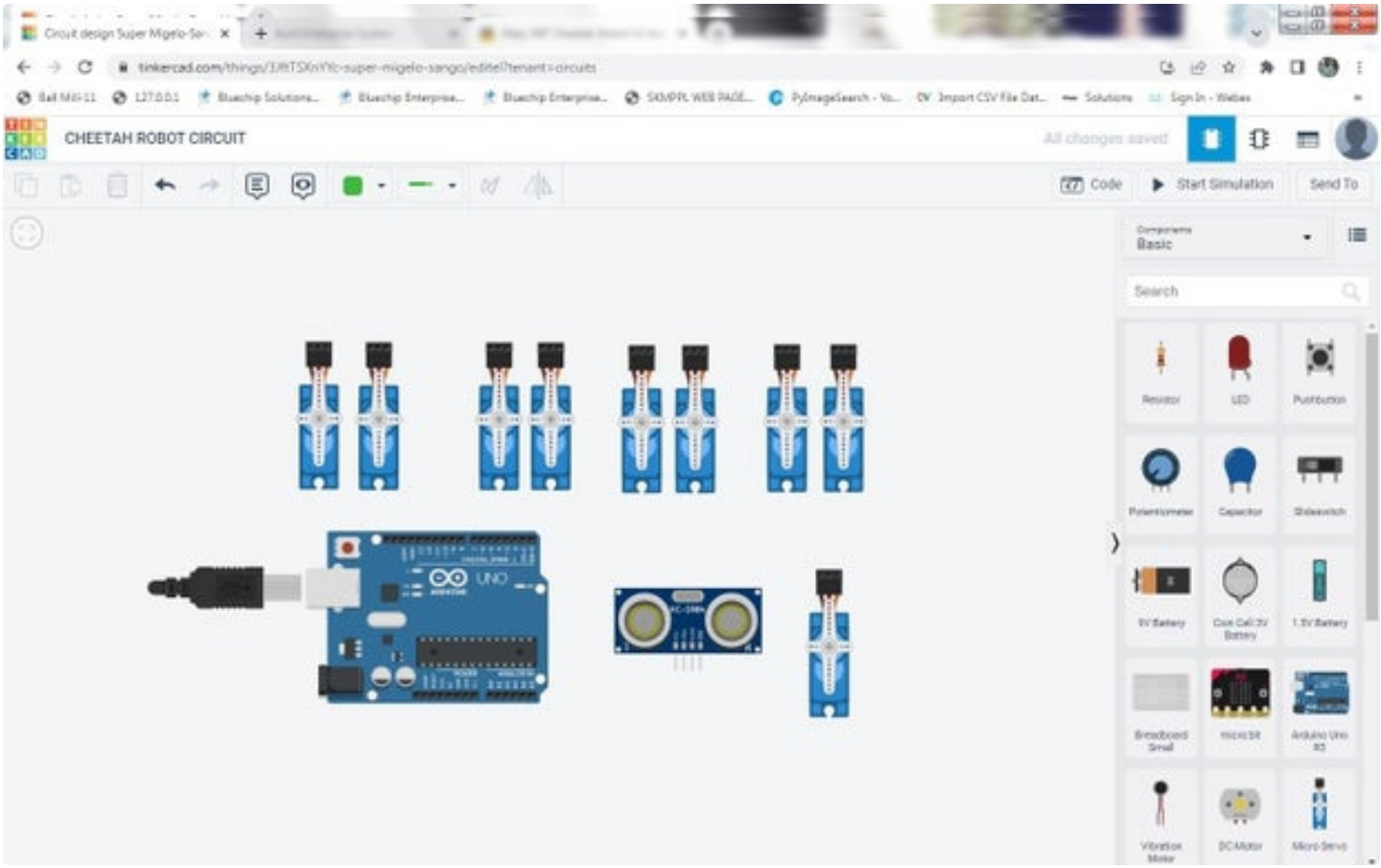
3) Drag a HC-SR04 ultrasonic distance sensor to the design area.

4) Drag 9 micro servo to the design area.



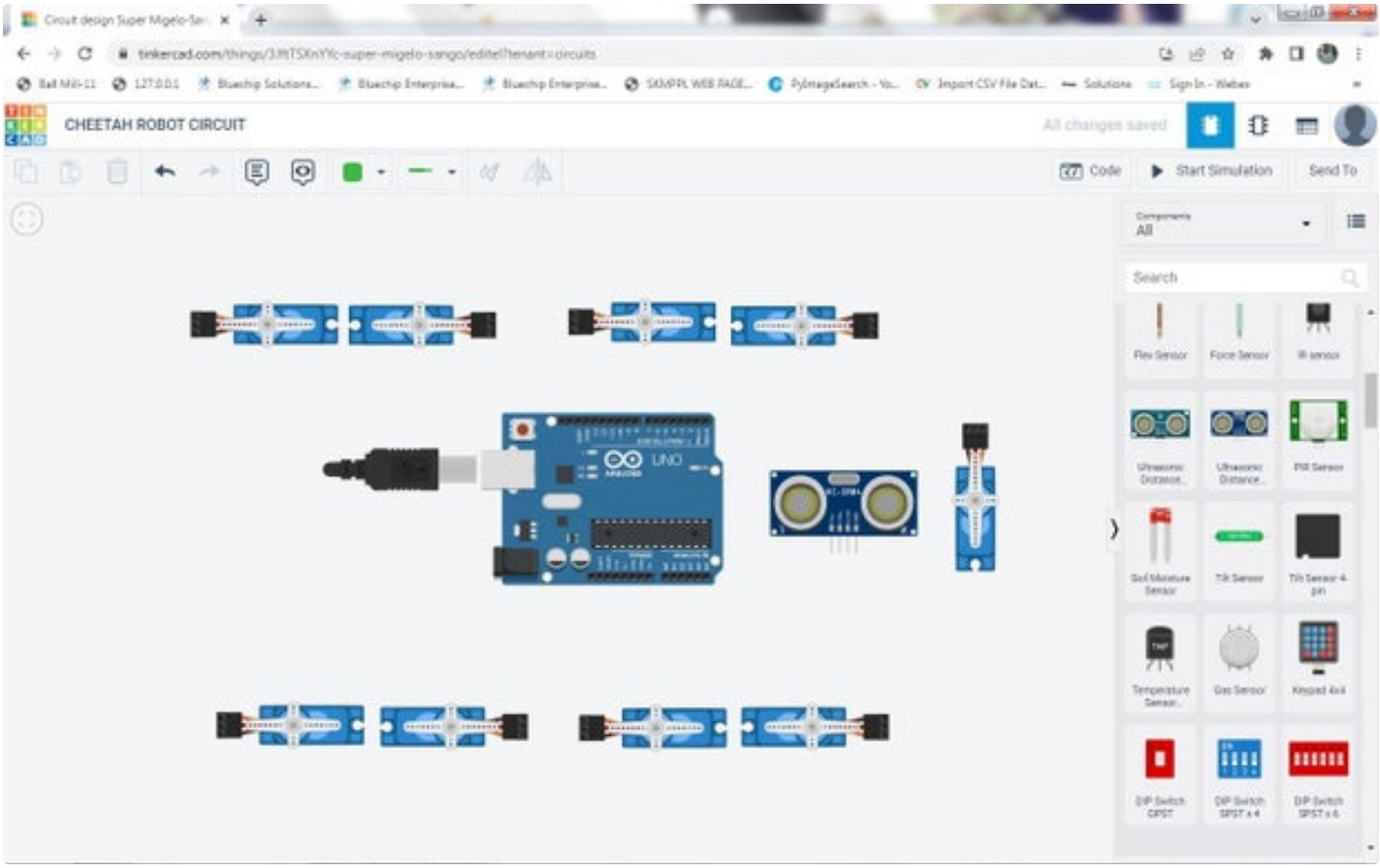

CHEETAH ROBOT CIRCUIT
Code
Start Simulation
Send To
Basic
Search


CHEETAH ROBOT CIRCUIT
Code
Start Simulation
Send To
Basic
Search



Step 2: Circuit Development - Arranging Components

1) Use the key R to rotate the controls and move the controls to the required area.



Step 3: Circuit Development - Wiring Components

Change the color of the wire and connect the terminals as per circuit plan.

1) First connect the vcc of the servos and ultrasonic distance generator.

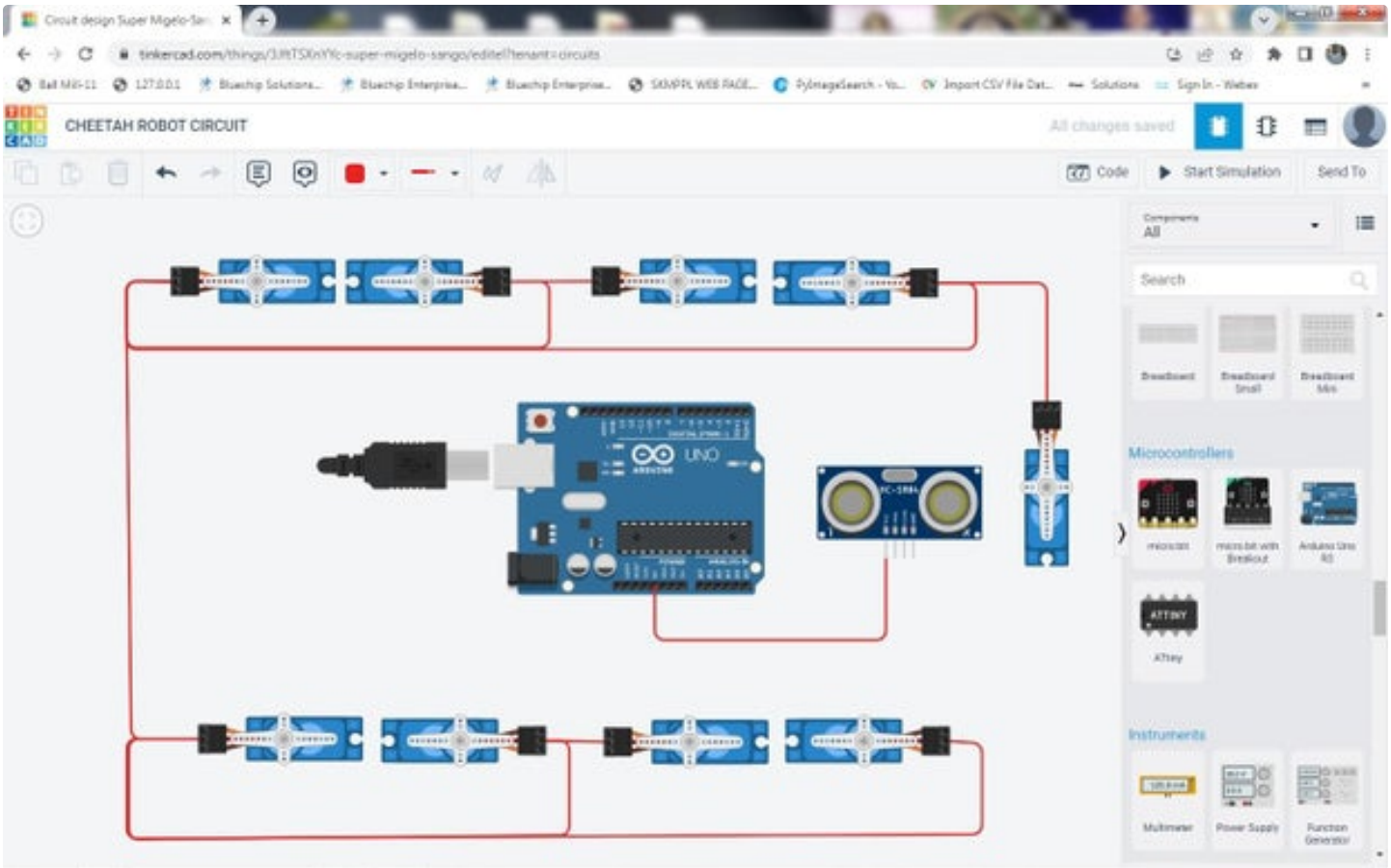
2) Then connect the GND of the servos and ultrasonic distance generator.

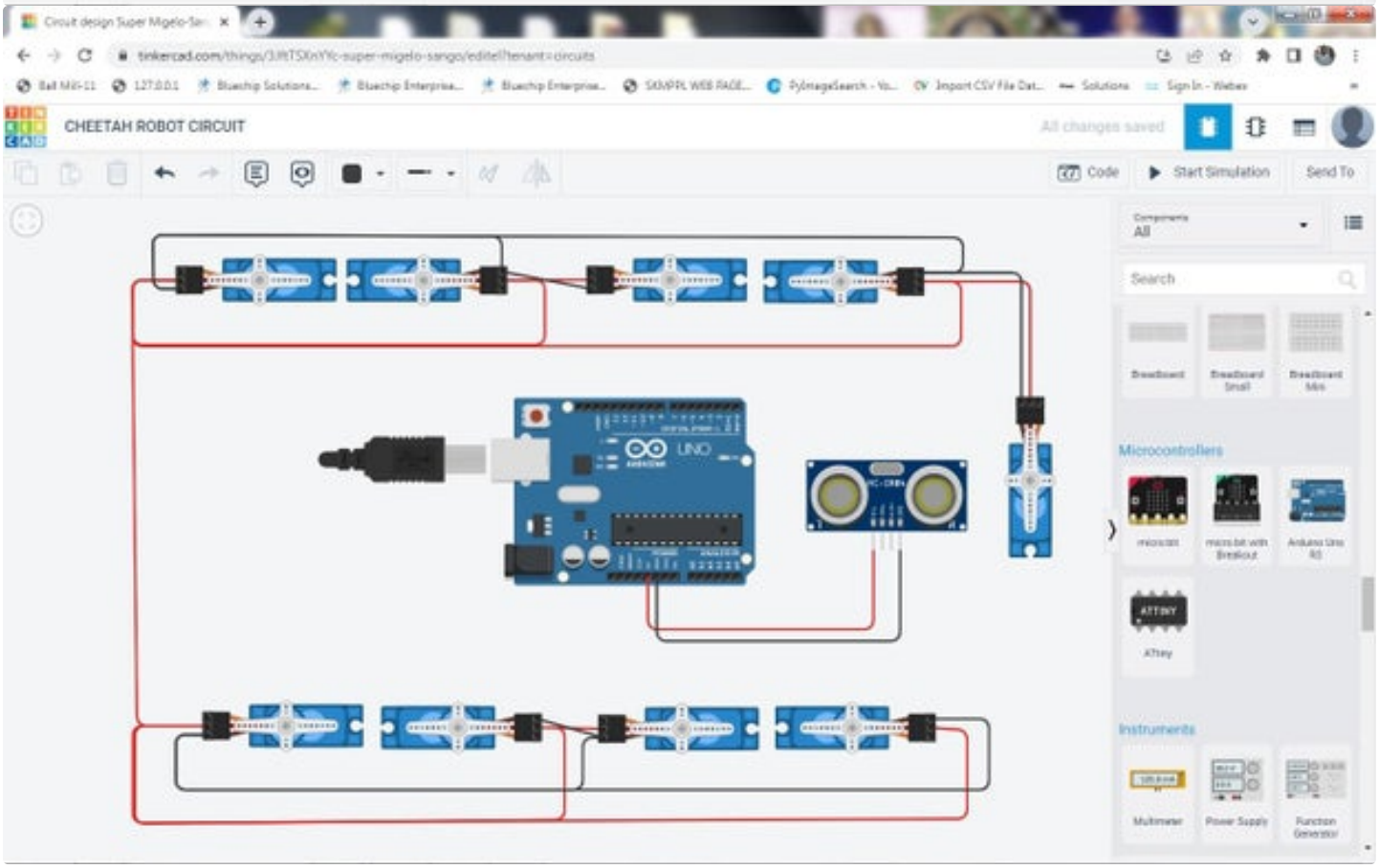
3) Connect the servo signal to Digital pins D2 to D10 (Orange wire).

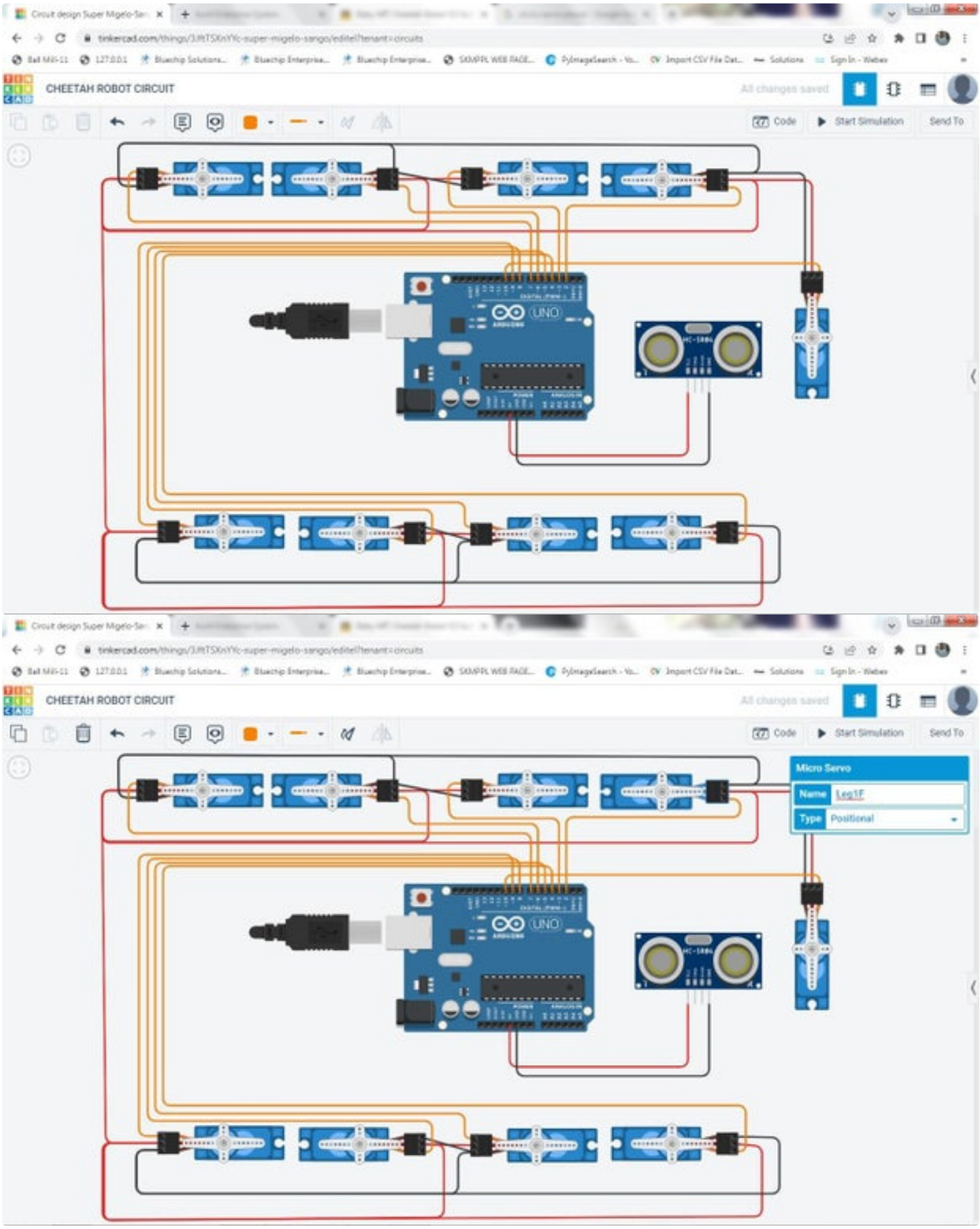
4) Change the name of the servo as per the program requirement.

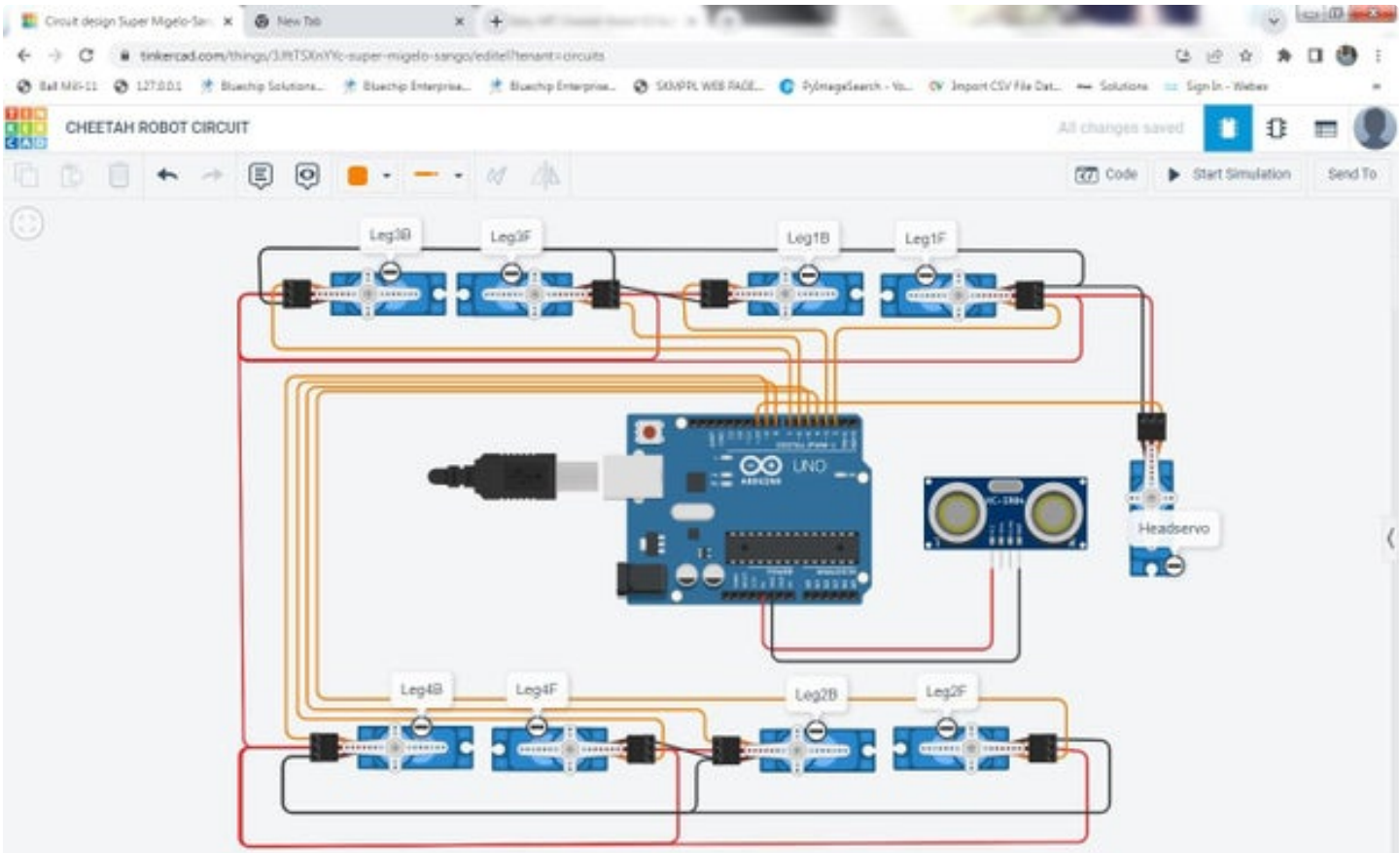
5) I show the name in the servo in lables.

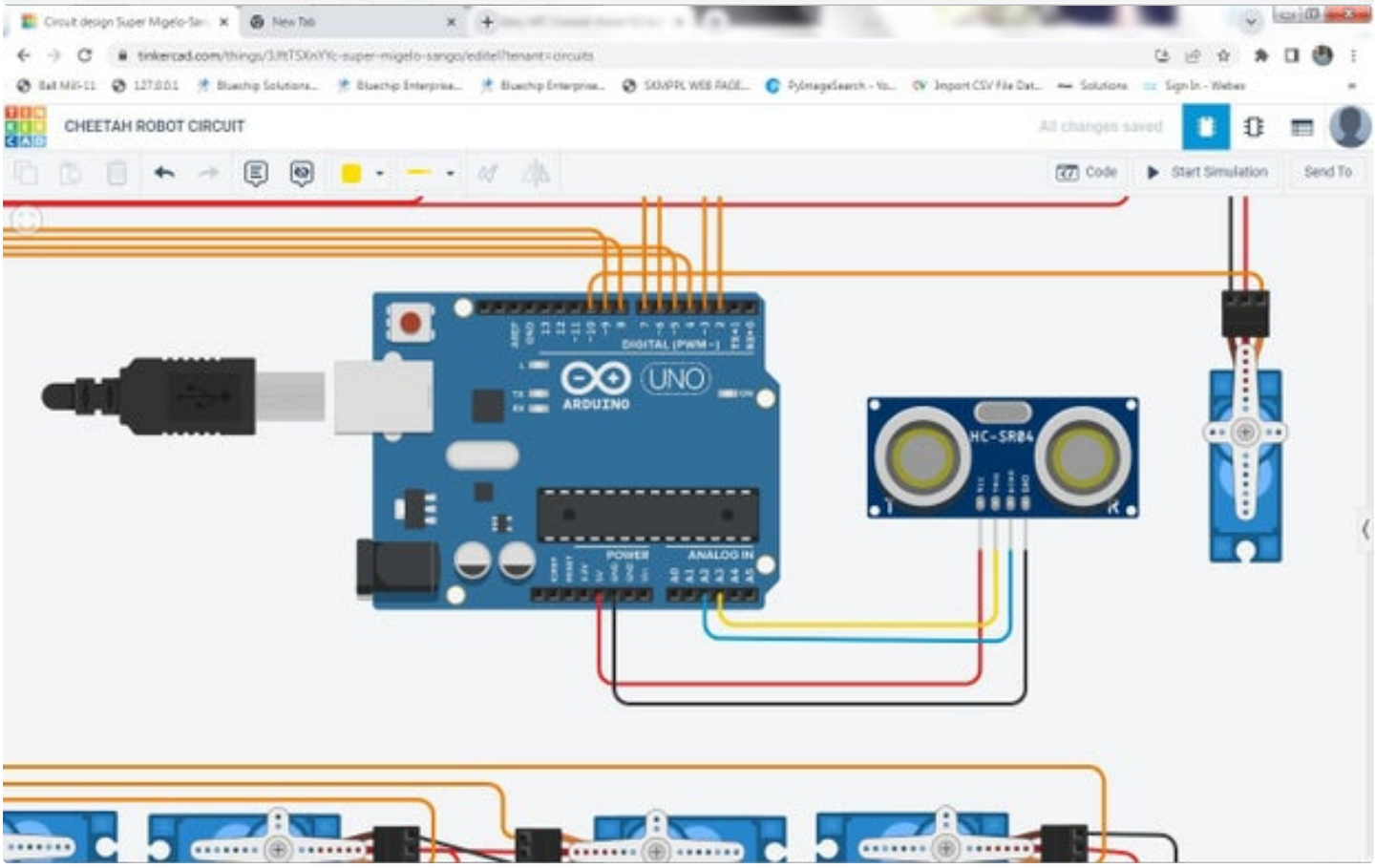
6) Connect A2 to ultrasonic Echo and A3 to ultrasonic trigger.


CHEETAH ROBOT CIRCUIT
Code
Start Simulation
Send To
Search
Microcontrollers
Instruments


CHEETAH ROBOT CIRCUIT
Code
Start Simulation
Send To
Search
Microcontrollers
Instruments


CHEETAH ROBOT CIRCUIT
Code
Start Simulation
Send To
UNO
CHEETAH ROBOT CIRCUIT
Code
Start Simulation
Send To
Micro Servo
Name
Leg1F
Type
Positional
UNO

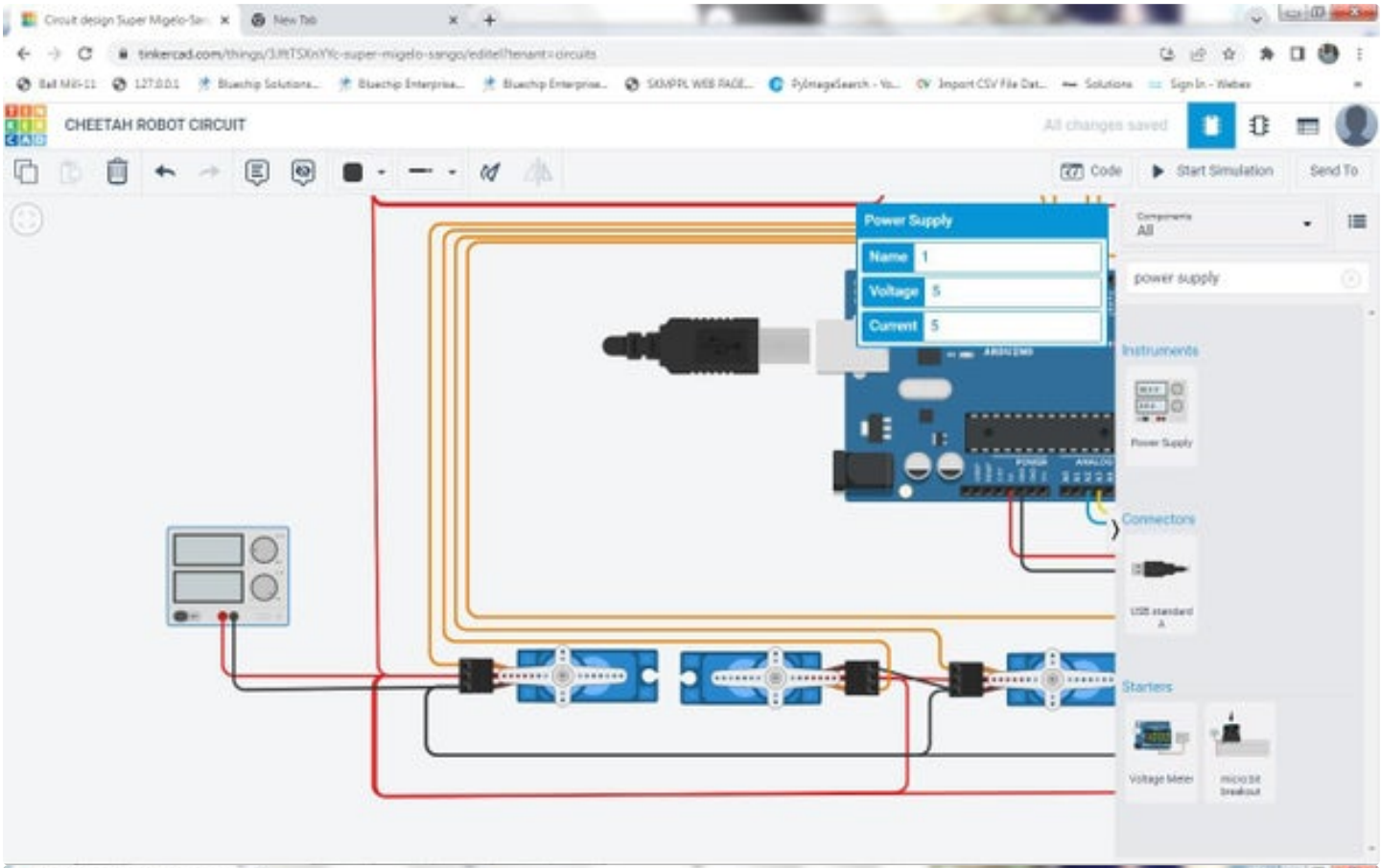


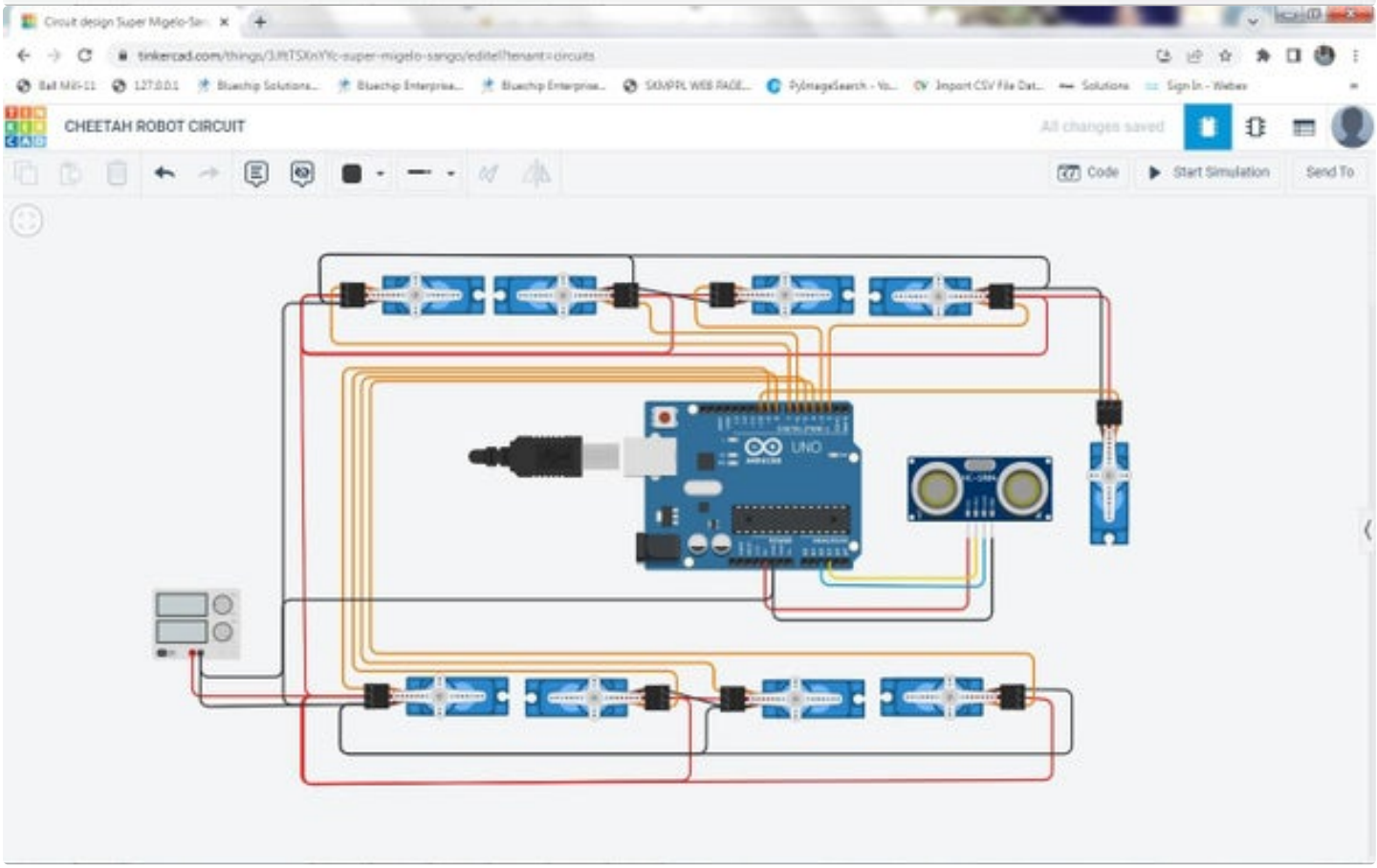


Step 4: Circuit Development - Adding Power Supply

1) Adding a Power supply to the circuit and connect the vcc and gnd to the circuit. Set the output voltage to 5V.

2) Connect the gnd of the power supply to the arduino ground.



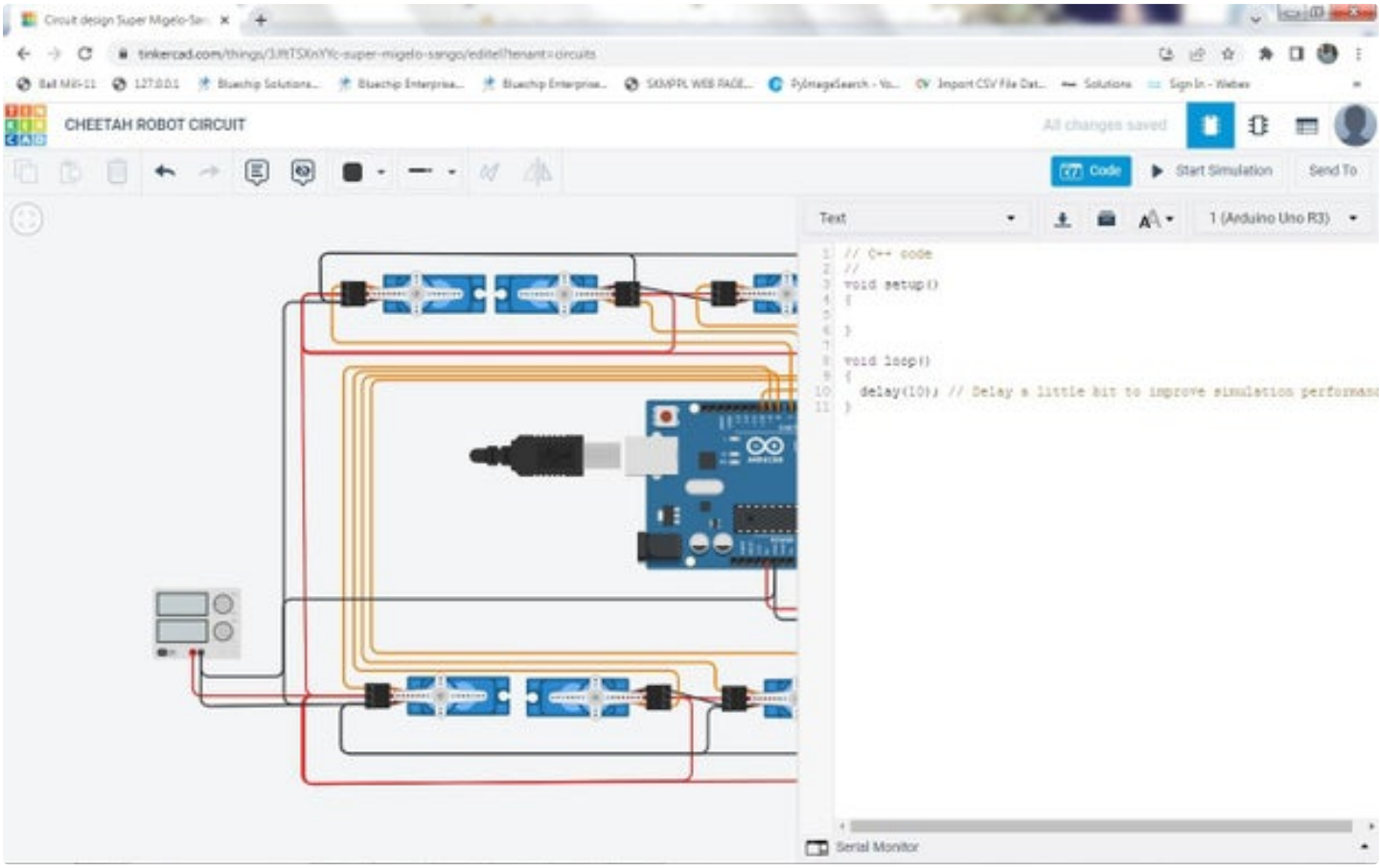


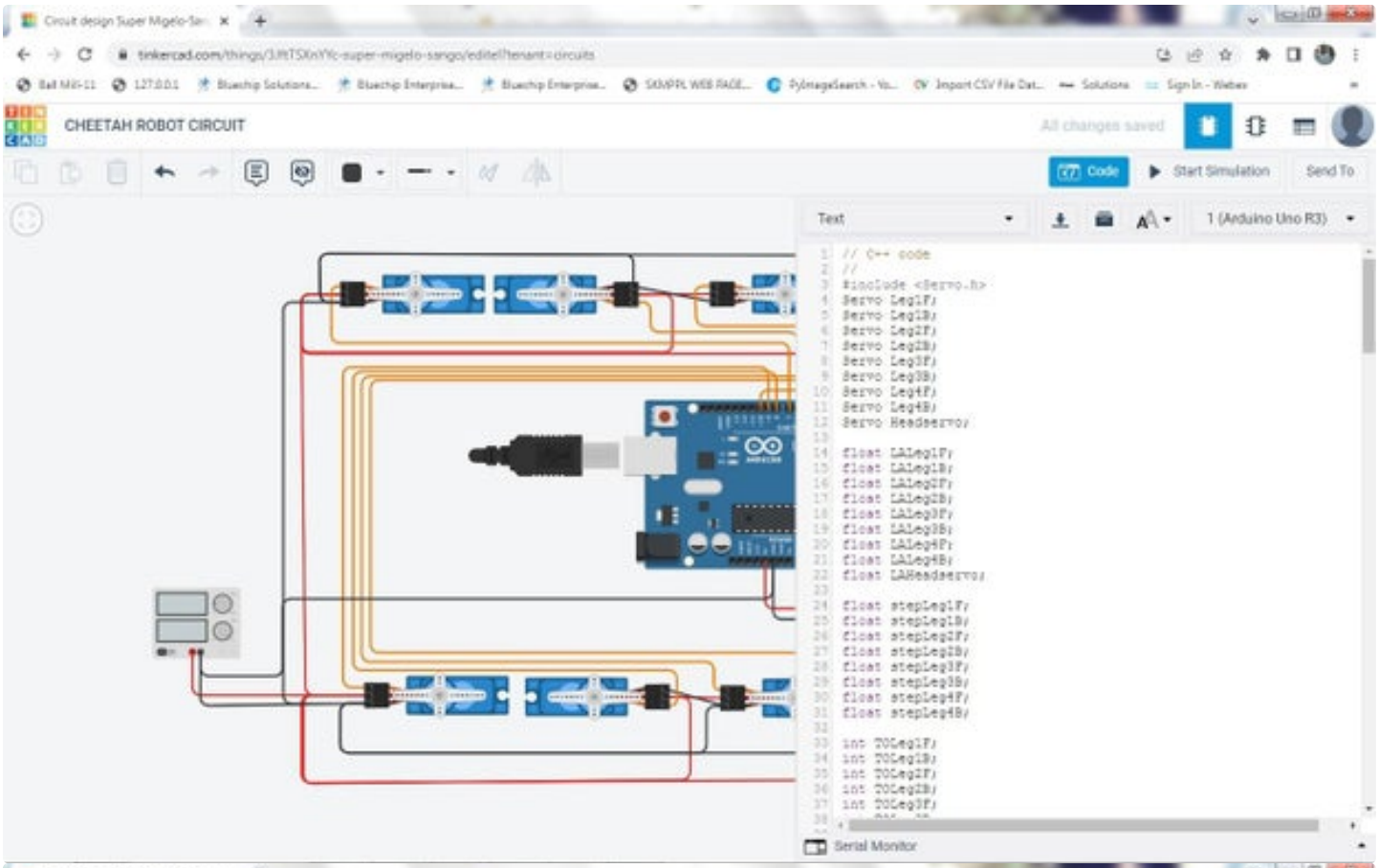
Step 5: Circuit Development - Adding Code

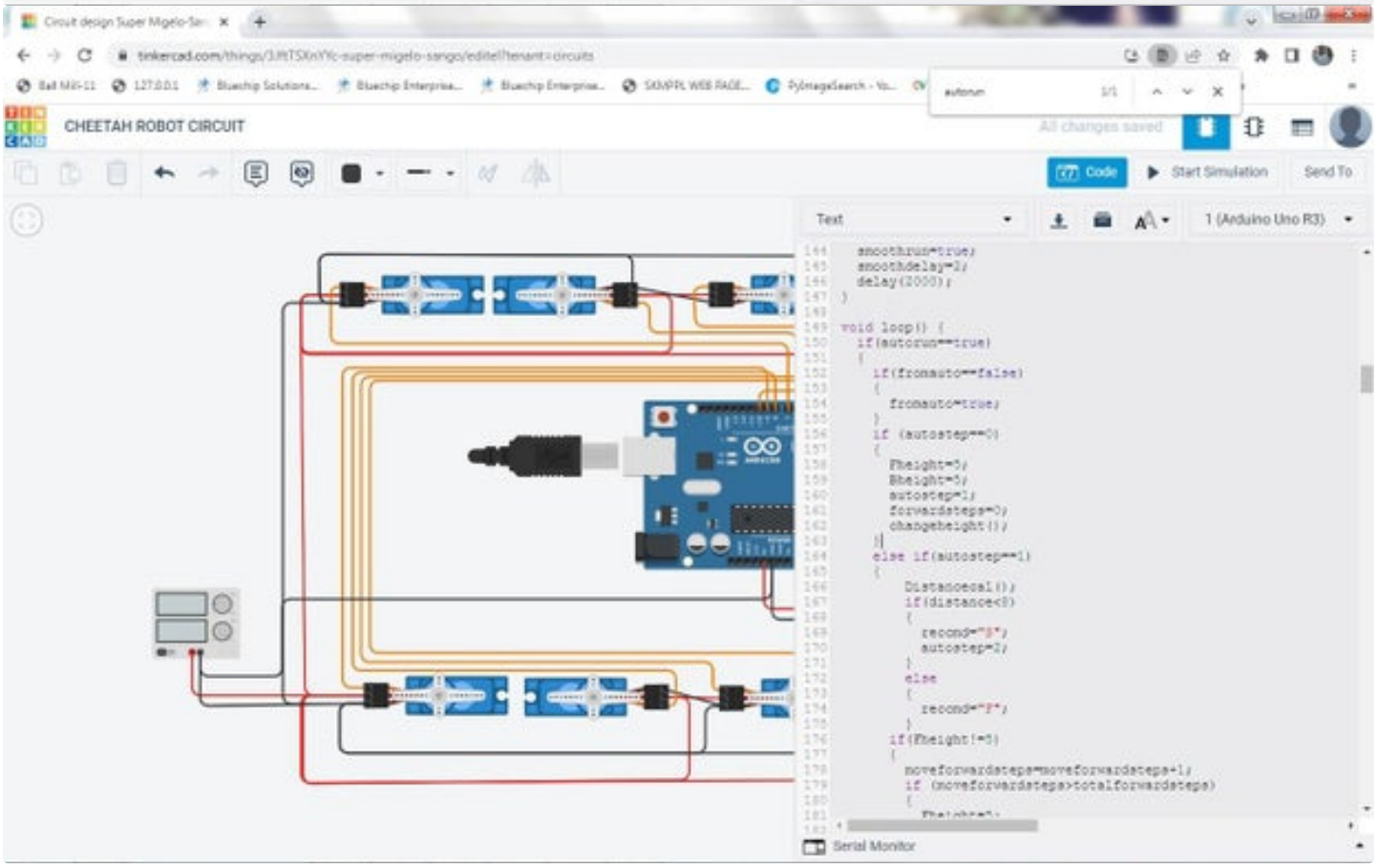
1) Click the code on the right side of the circuit design. First block is shown change it to text.

2) First enter a sample code to check the servo and simulate and run.

3) Enter the full code and then check with start simulation.



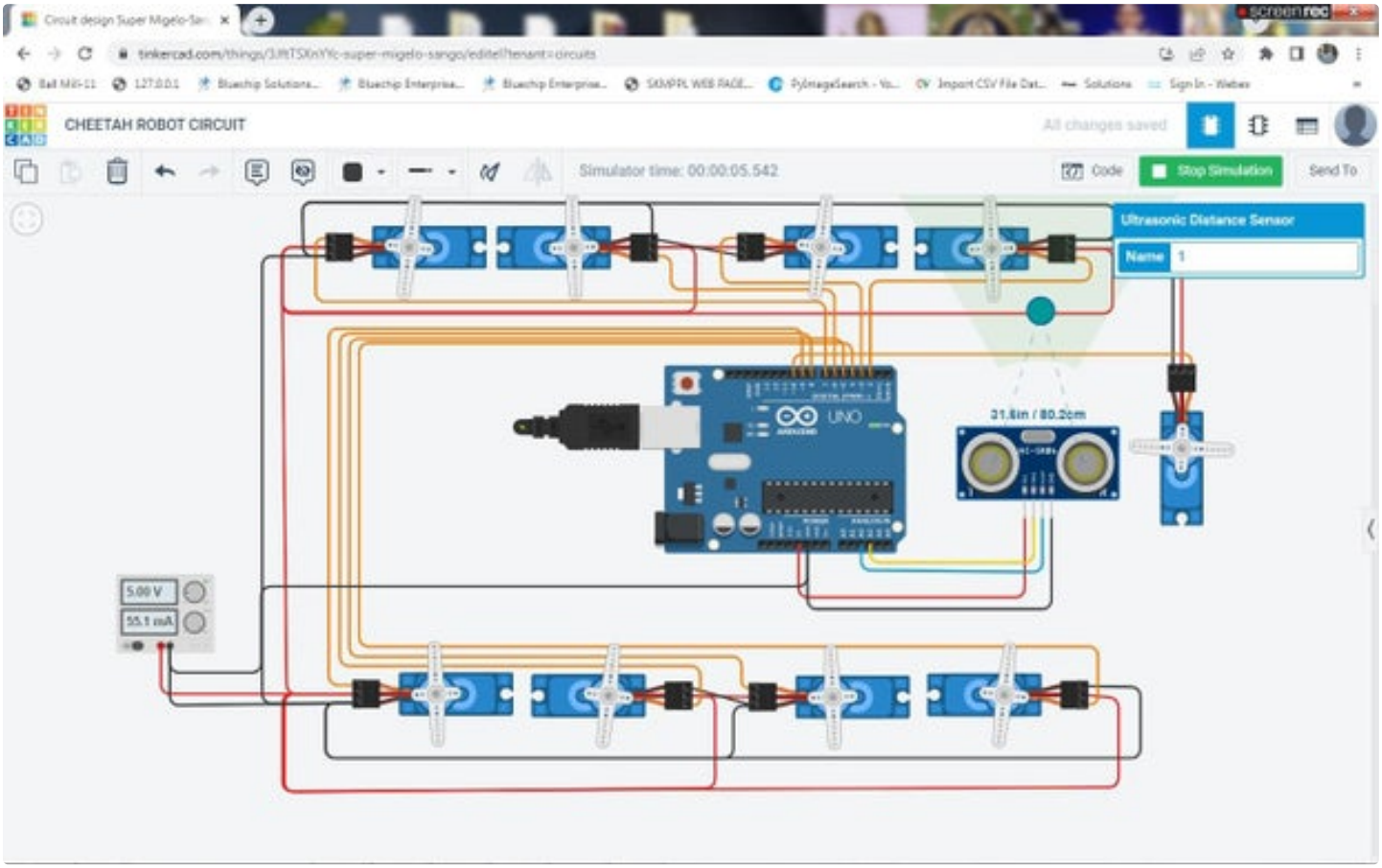




Step 6: Circuit Development - Simulation

1) After finish click start simulation and change the distance of the object from ultrasonic and test.

See the simulation video for how its works.



https://youtu.be/zKC4nrbestI

Step 7: Tinkercad - Circuit

https://www.instructables.comhttps://www.tinkercad.com/embed/3JftTSXnYYc

Step 8: Cheetah Leg-1 Design

Cheetah leg has 4 unique leg joints and 3 same lock for each leg. All the dimensions are in the image so i never mention the diension below.

1) Open a new 3D design.

2) Draw a box.

3) Draw a round roof and rotate and fit it with the Box.

4) Copy the roof and paste it on the other side of the box and rotate.

5) Group the box and two roof.

6) Create a cylinder and move it to the top of the object already created.

7) Group the cylinder with the object.

8) Create a cylinder hole and place it on the center of the cylinder in the object.

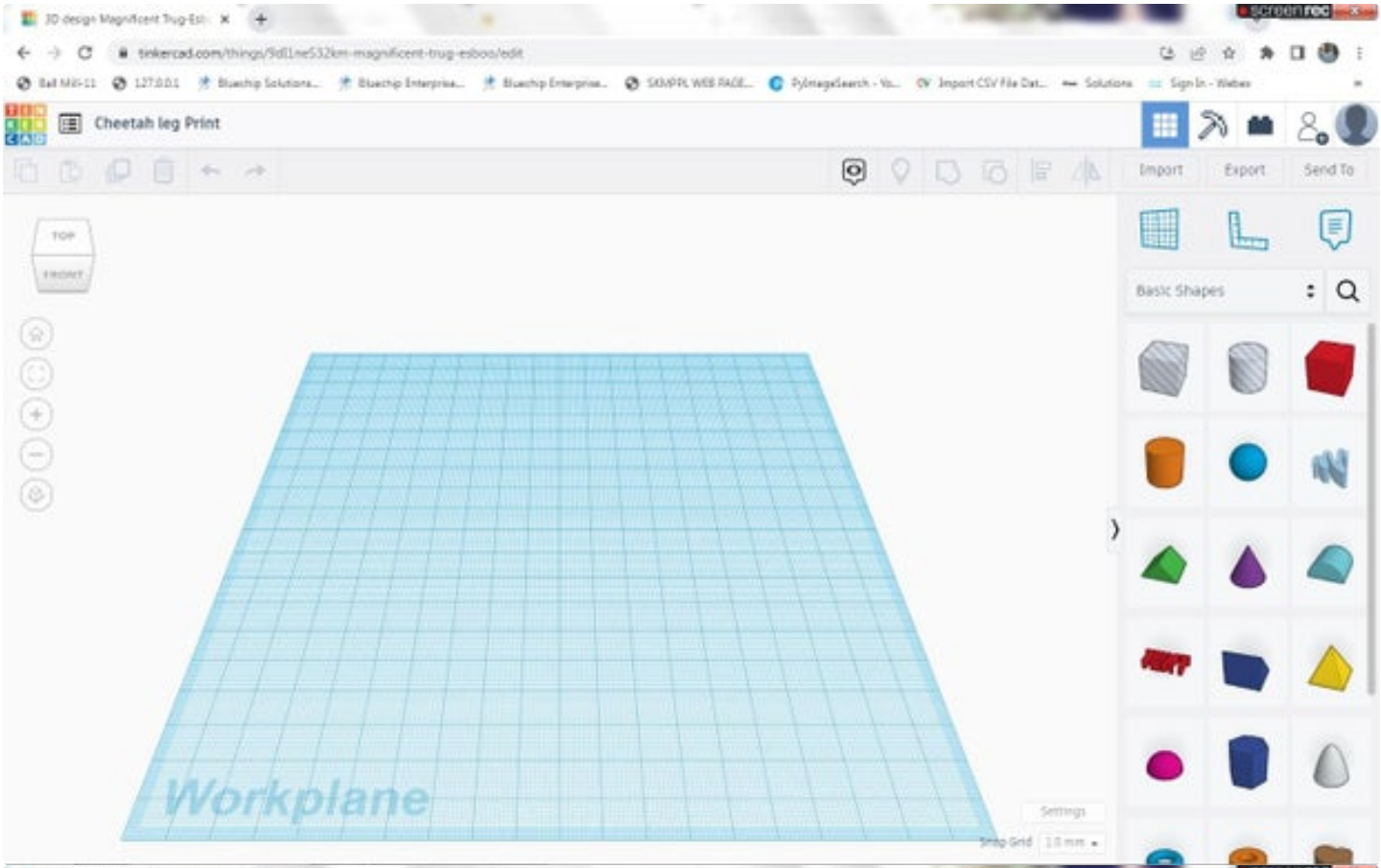
9) Group it to form a hole in the object.

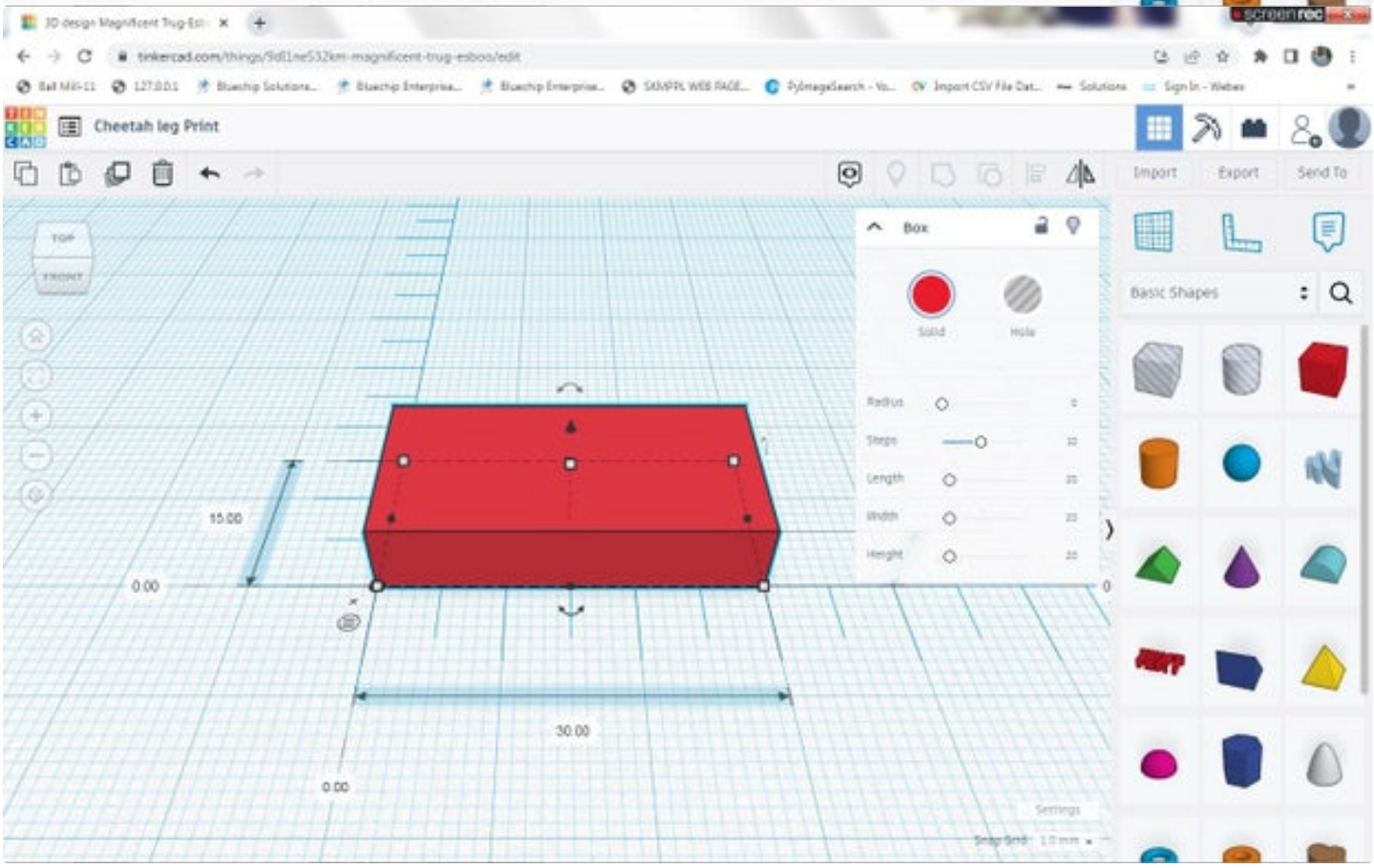
10) For servo arm fit hole i already make a object copy that object to the design.

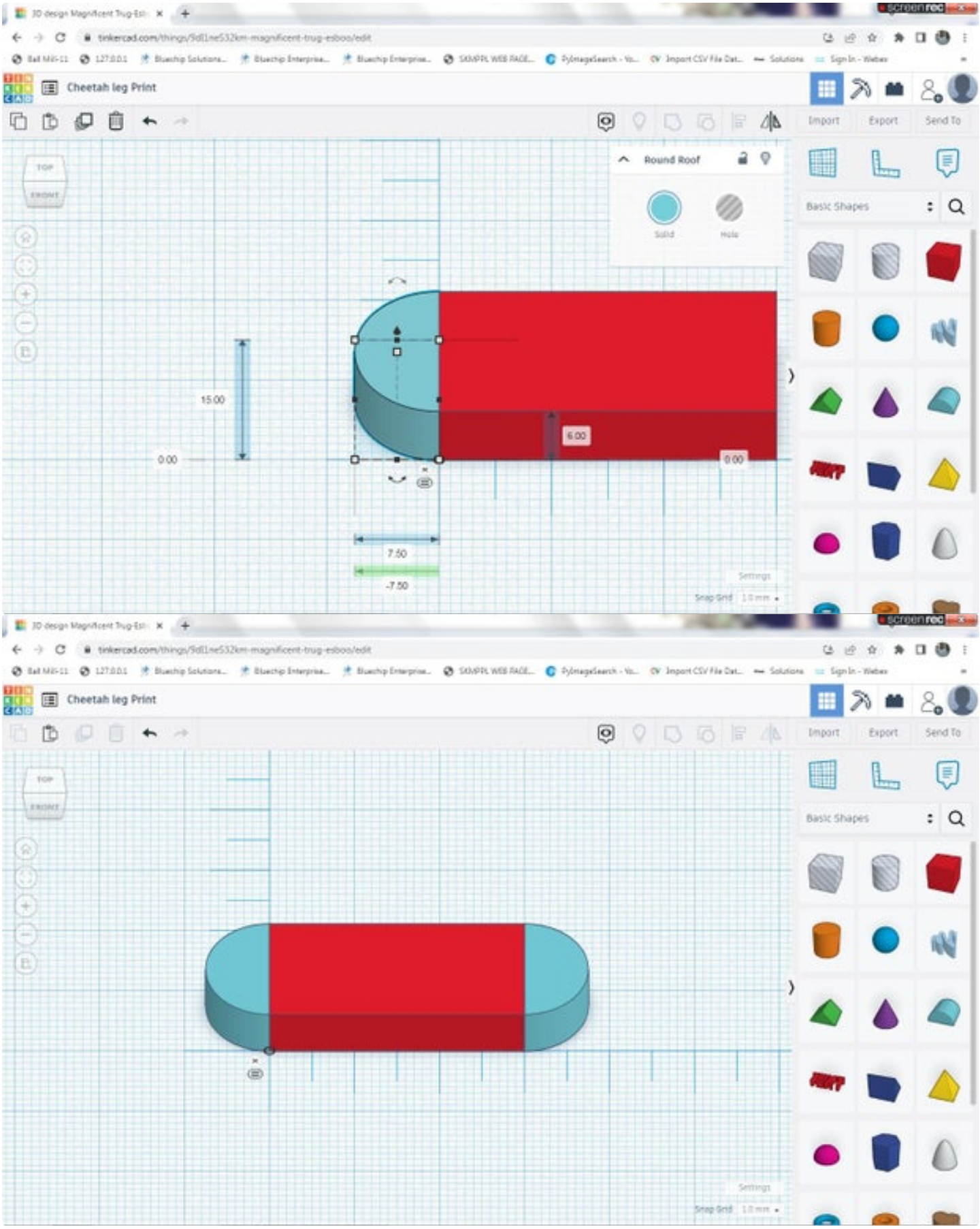
11) Place it in the other side of the object and convert it to hole.

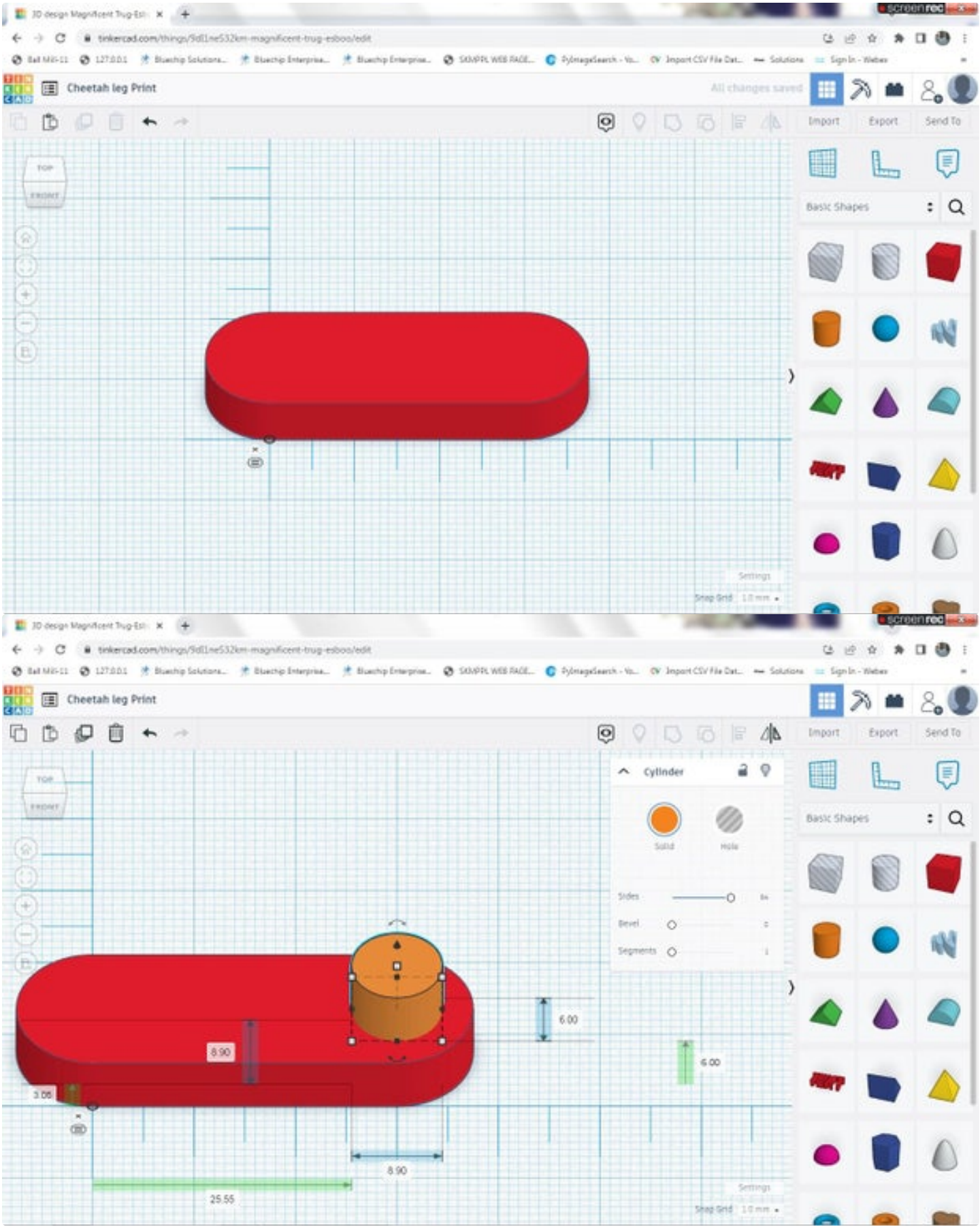
12) Group it with the object and leg 1 completed.

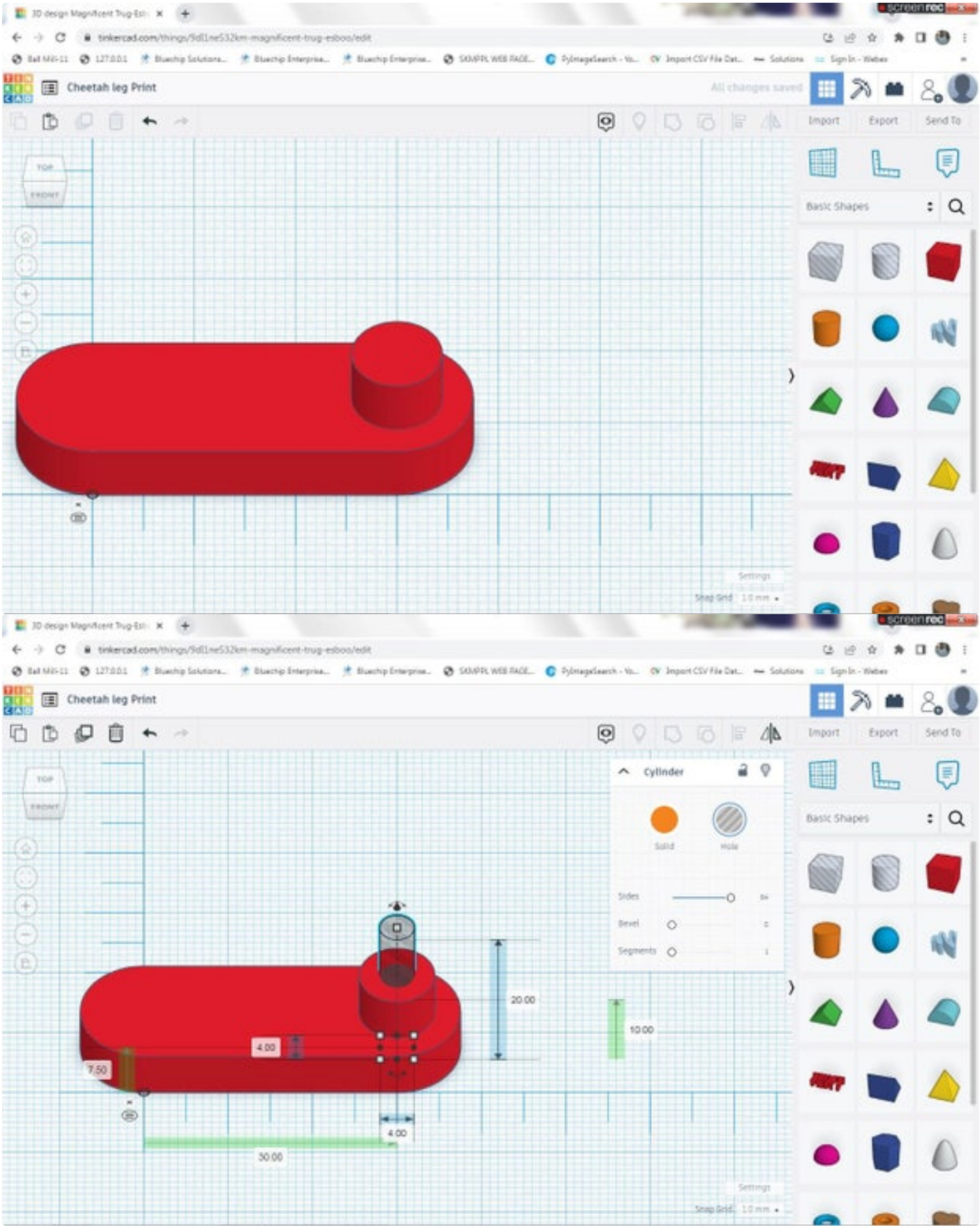
13) See the bottom side of the object.

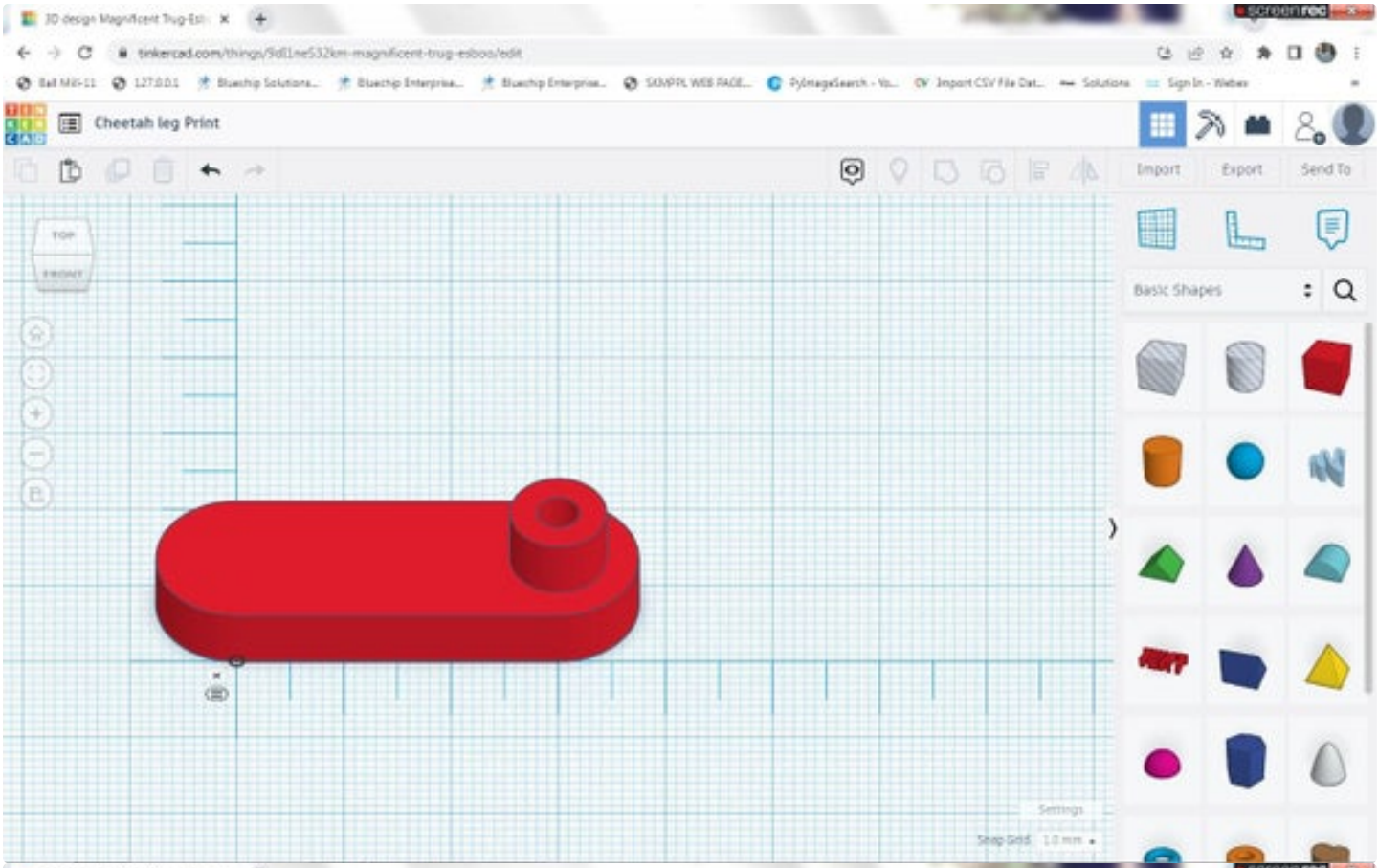

Cheetah leg Print
Import
Export
Send To
Basic Shapes
Workplane

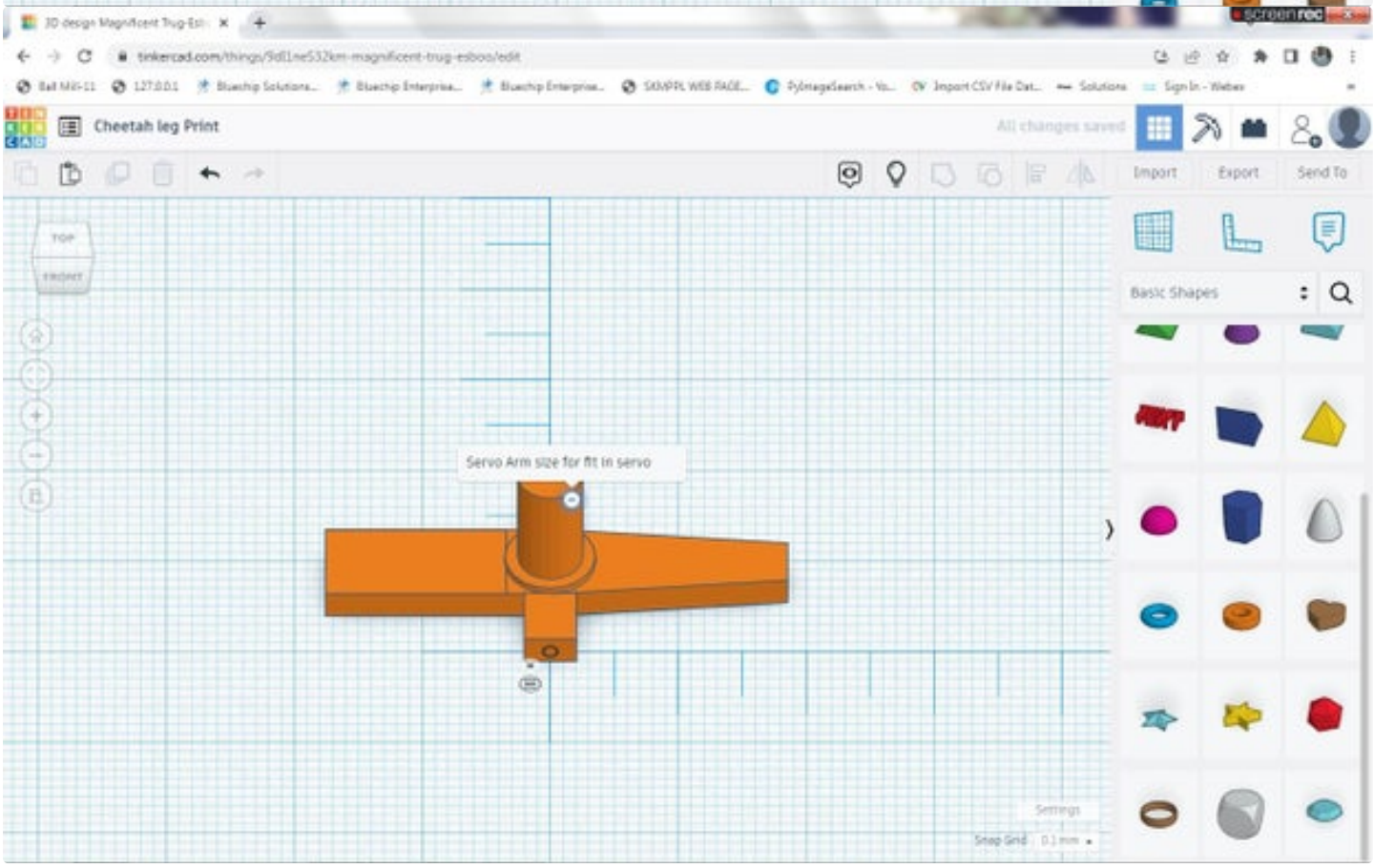

Cheetah leg Print
Import
Export
Send To
Box
Solid
Hole
Basic Shapes
15.00
0.00
30.00
0.00

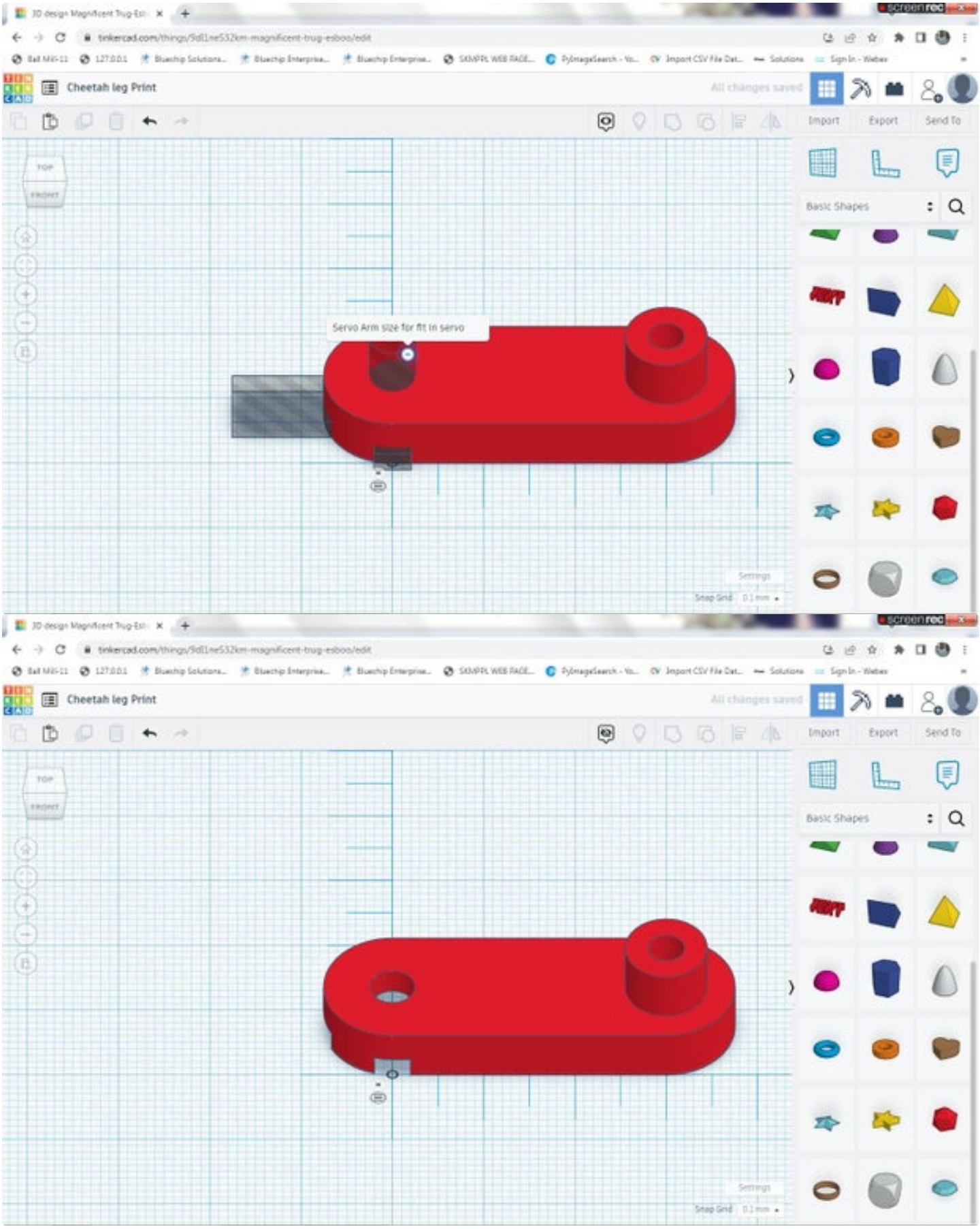

Cheetah leg Print
Import
Export
Send To
Round Roof
Solid
Hole
Basic Shapes
15.00
0.00
6.00
0.00
7.50
-7.50
Settings
Snap Grid
Cheetah leg Print
Import
Export
Send To
Basic Shapes
Settings
Snap Grid

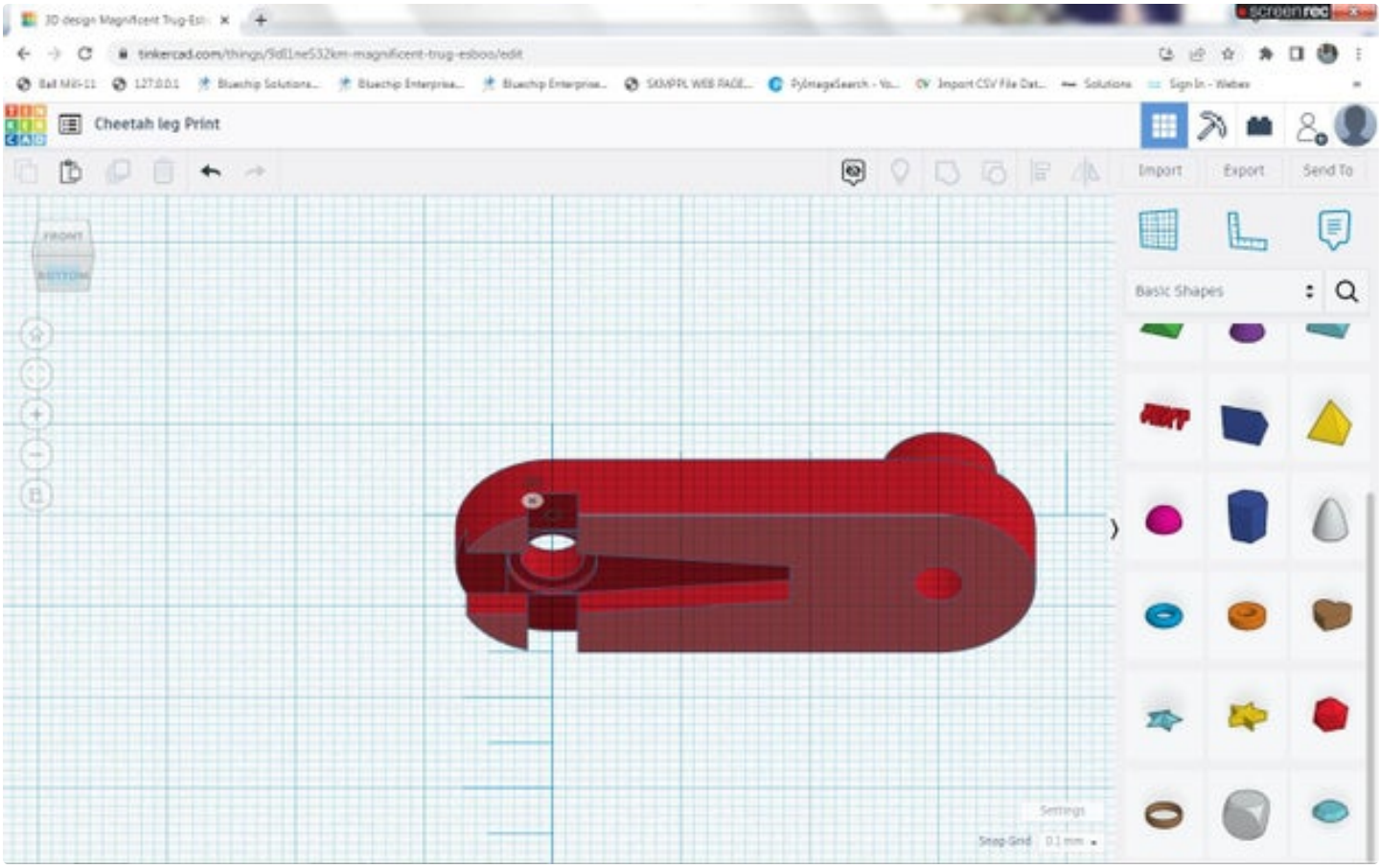

Cheetah leg Print
Import
Export
Send To
Basic Shapes
Cylinder
Solid
Hole
Sides
Bevel
Segments
6.00
8.90
3.00
25.55


Cheetah leg Print
Import
Export
Send To
Basic Shapes
Cylinder
Solid
Hole
Sides
Bevel
Segments
20.00
10.00
4.00
7.50
4.00
30.00


Cheetah leg Print
Import
Export
Send To
Basic Shapes


Cheetah leg Print
Import
Export
Send To
Basic Shapes
Servo Arm size for fit in servo


Cheetah leg Print
Import
Export
Send To
Basic Shapes
Servo Arm size for fit in servo
Cheetah leg Print
Import
Export
Send To
Basic Shapes



Step 9: Tinkercad - Leg Print L1

https://www.instructables.comhttps://www.tinkercad.com/embed/9dI1neS32km

Step 10: Cheetah Leg-2 Design

1) Duplicate Leg1 and rename the file to leg2. Ungroup all the object.

2) Decrease the height of the box and Round Roof.

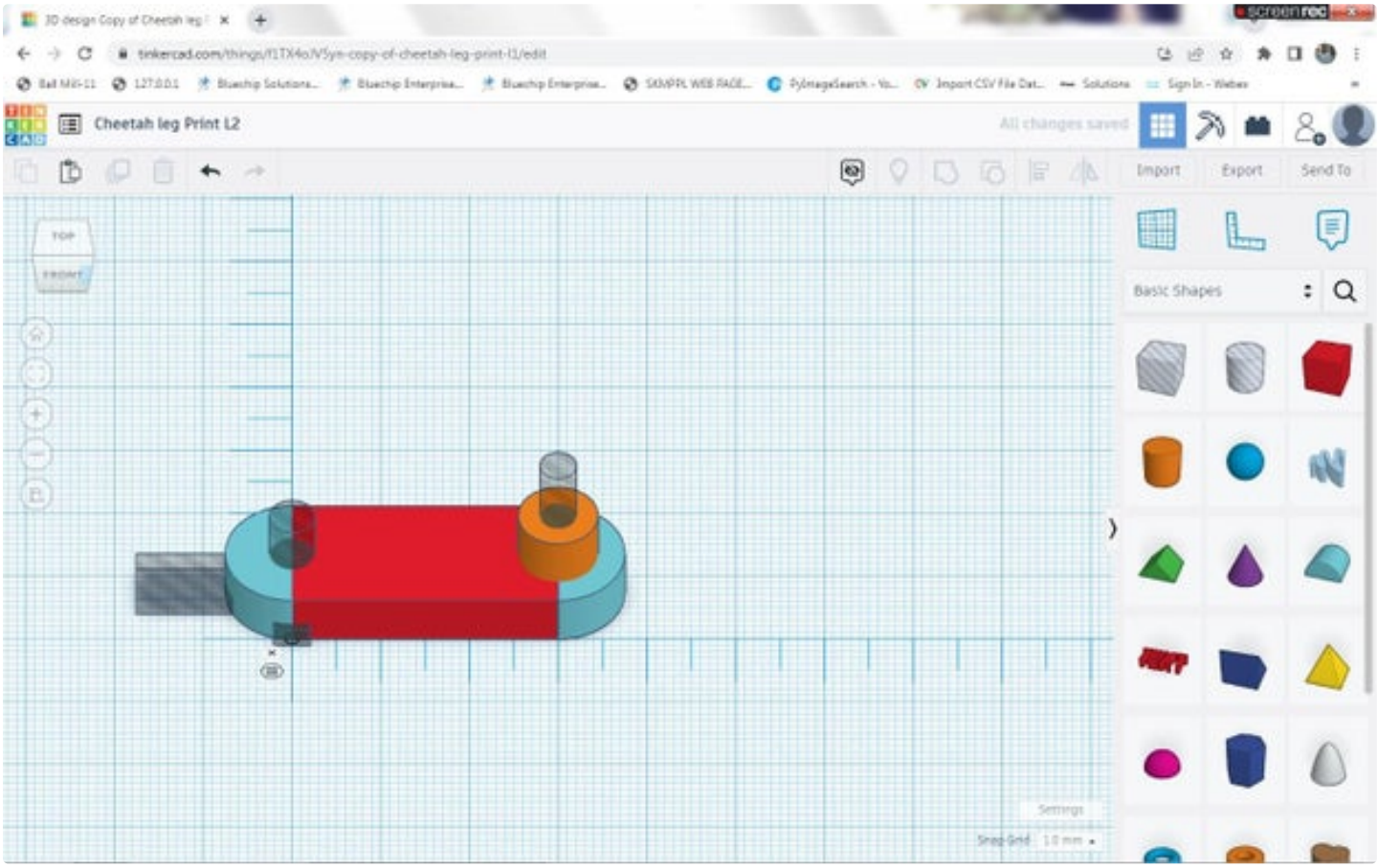
3) Delete the Round roof on the right side.

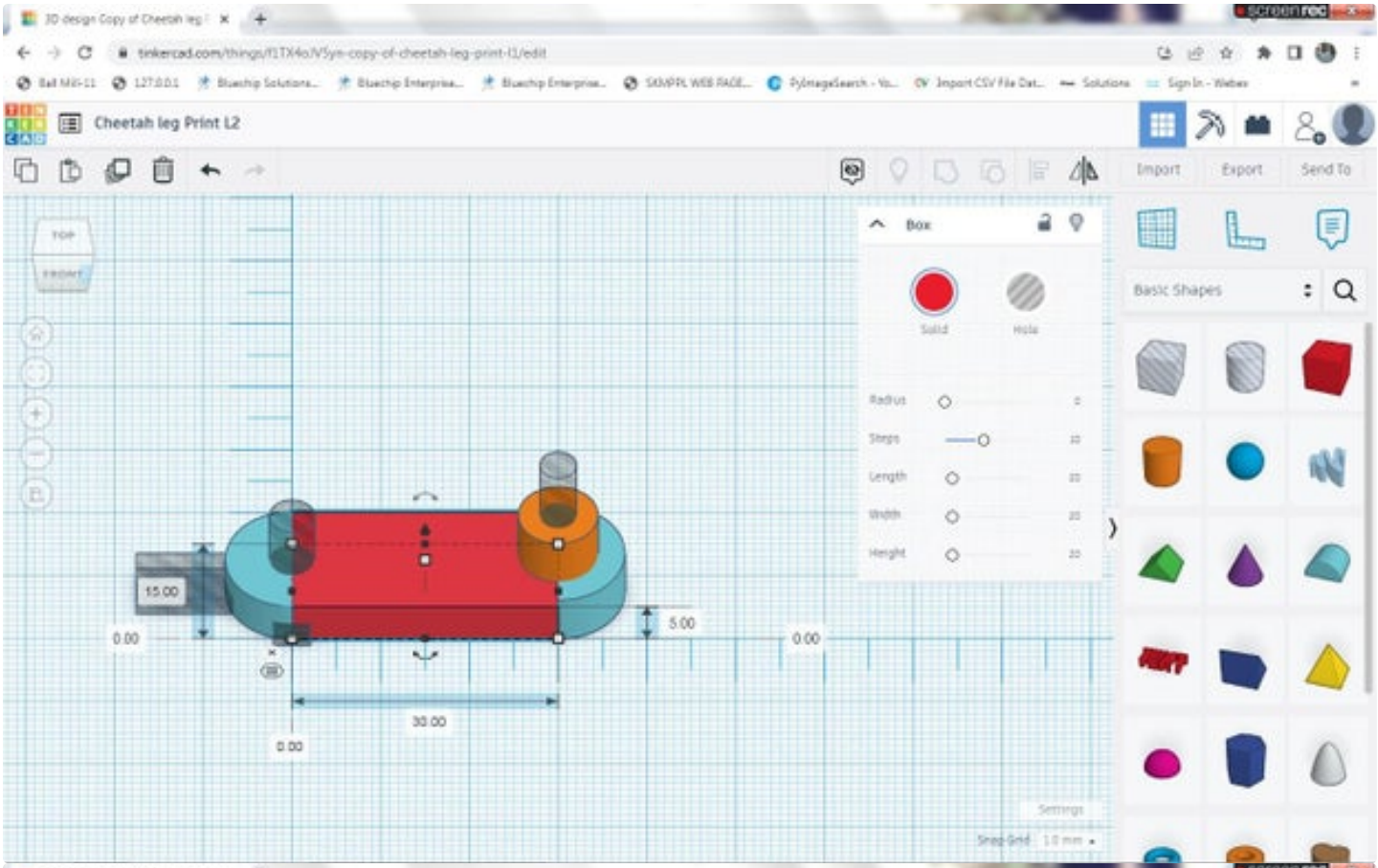
4) Draw a Cylinder in the place of the deleted round roof. Change the size of the small cylinder.

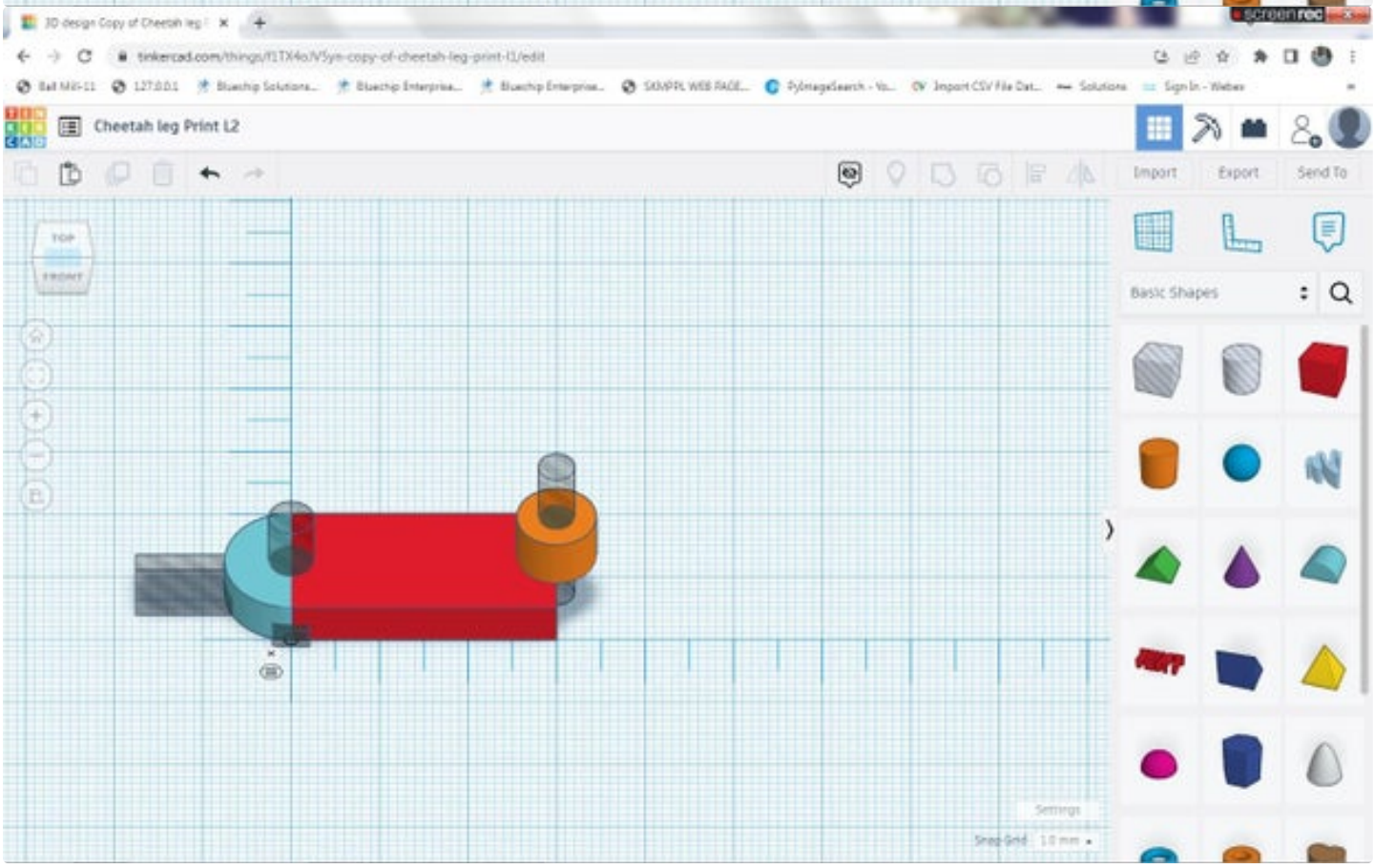
5) Group all the Solid together.

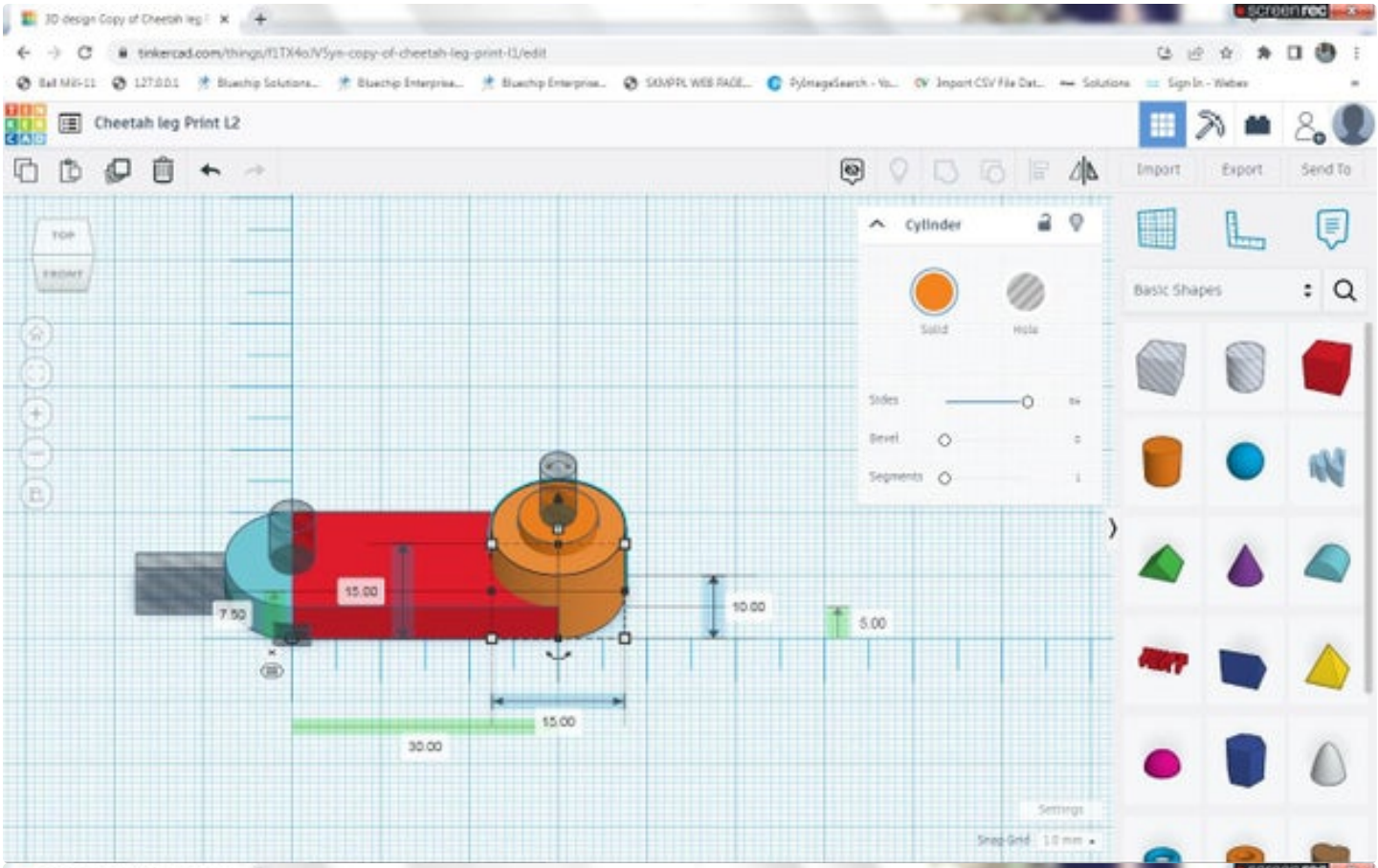
6) Group the solid with the hole. Second leg link is ready.

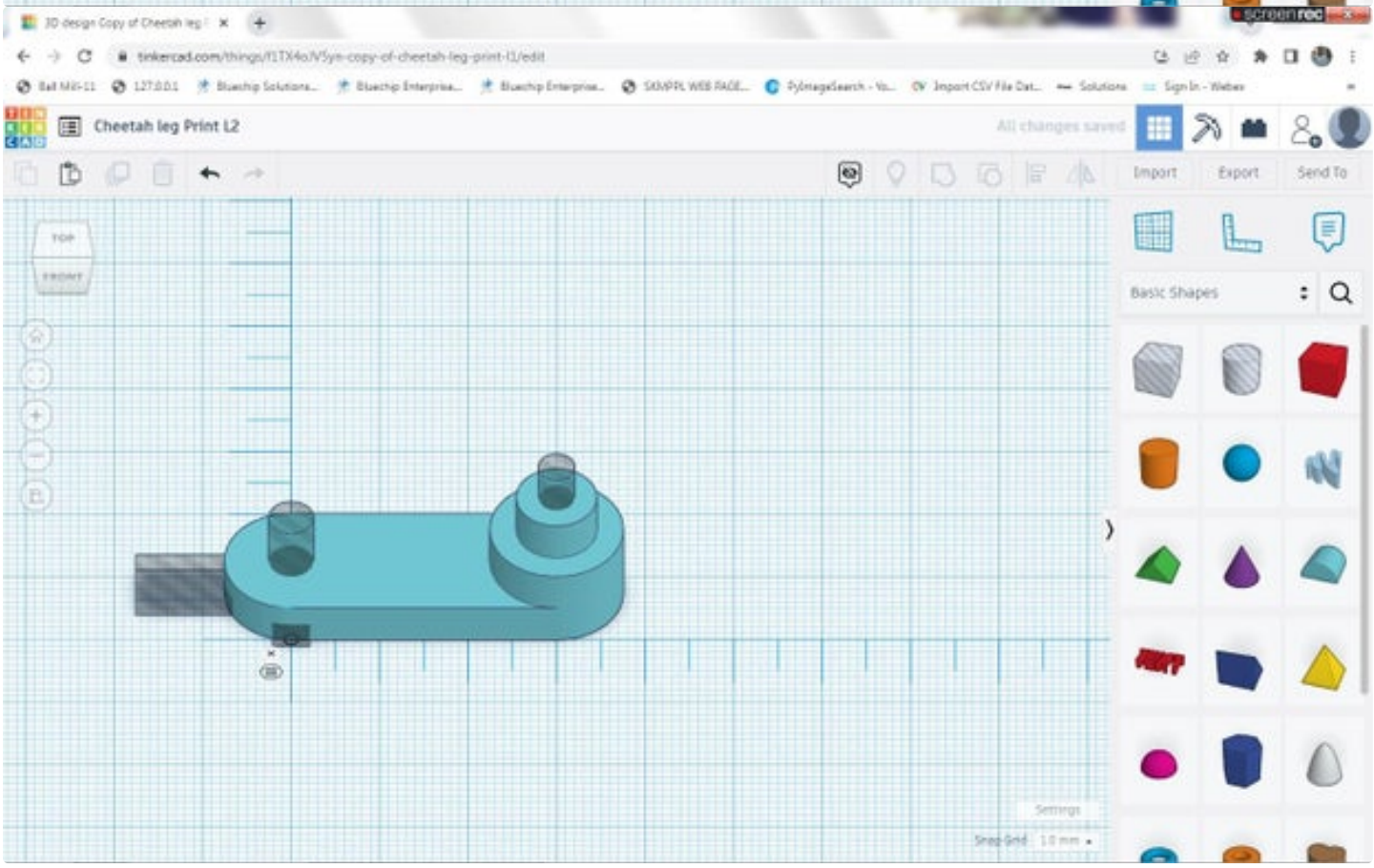
7) See the back side of the link.

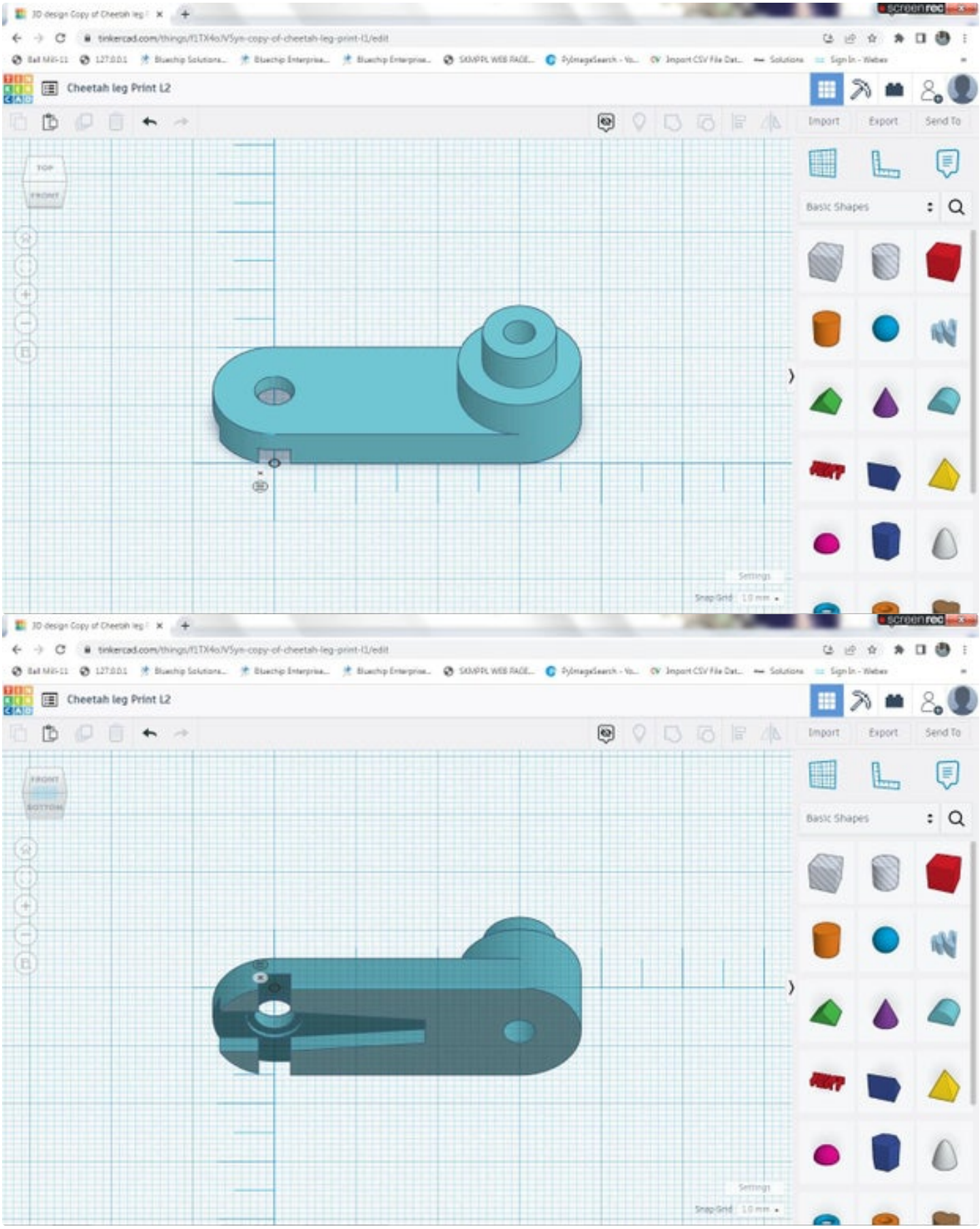



Cheetah leg Print L2
Import
Export
Send To
Box
Solid
Hole
Basic Shapes
15.00
5.00
0.00
0.00
30.00
0.00


Cheetah leg Print L2
Import
Export
Send To
Basic Shapes


Cheetah leg Print L2
Import
Export
Send To
Cylinder
Solid
Hole
Sides
Bevel
Segments
Basic Shapes
15.00
7.50
10.00
5.00
15.00
30.00


Cheetah leg Print L2
All changes saved
Import
Export
Send To
Basic Shapes



Step 11: Tinkercad - Leg Print L2

Step 12: Cheetah Leg-3 Design

1) Create a new 3d design file for leg link3. Draw a Box.

2) Draw a Cylinder on one side of the box.

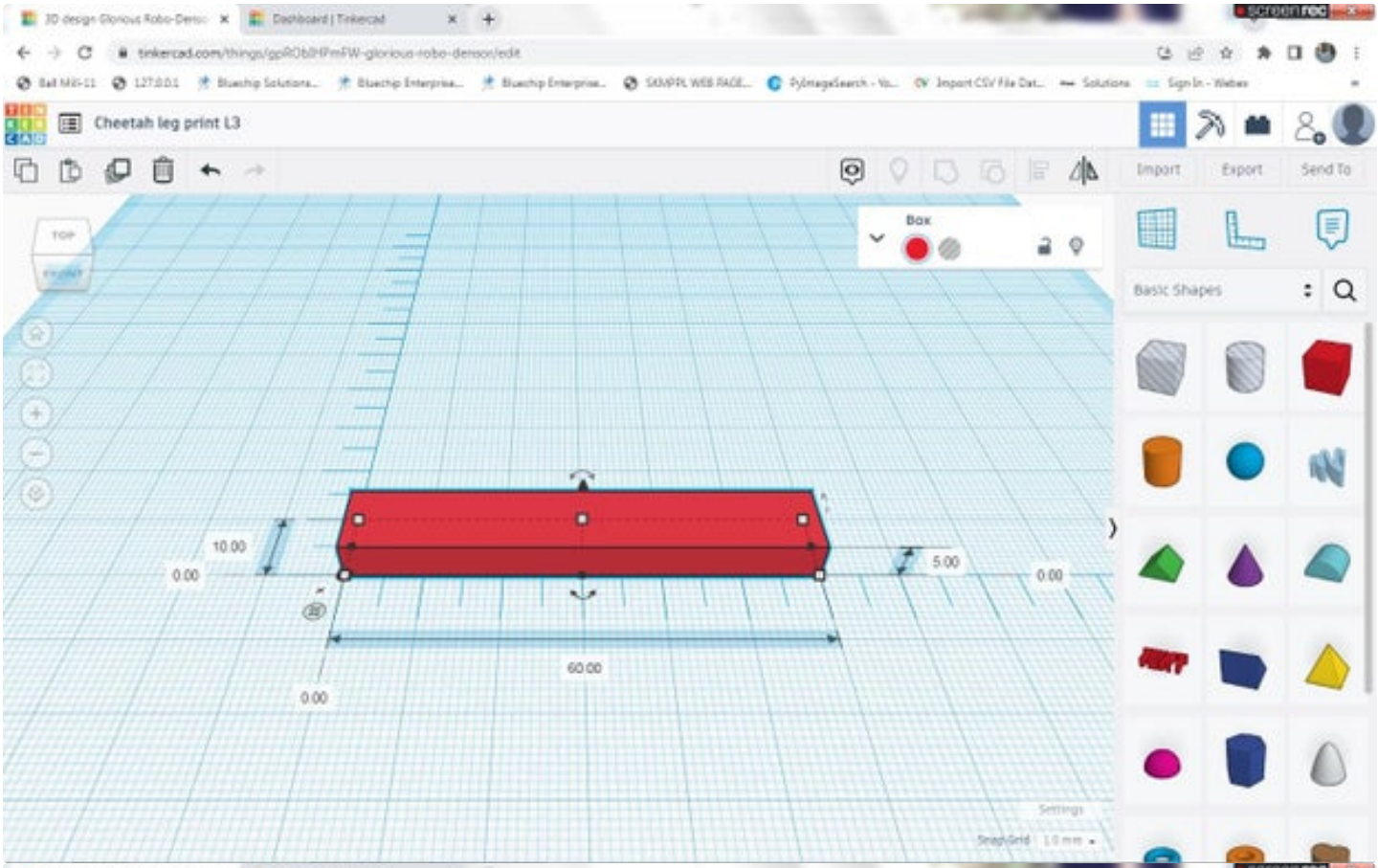
3) Copy the same cylinder on the other side of the box.

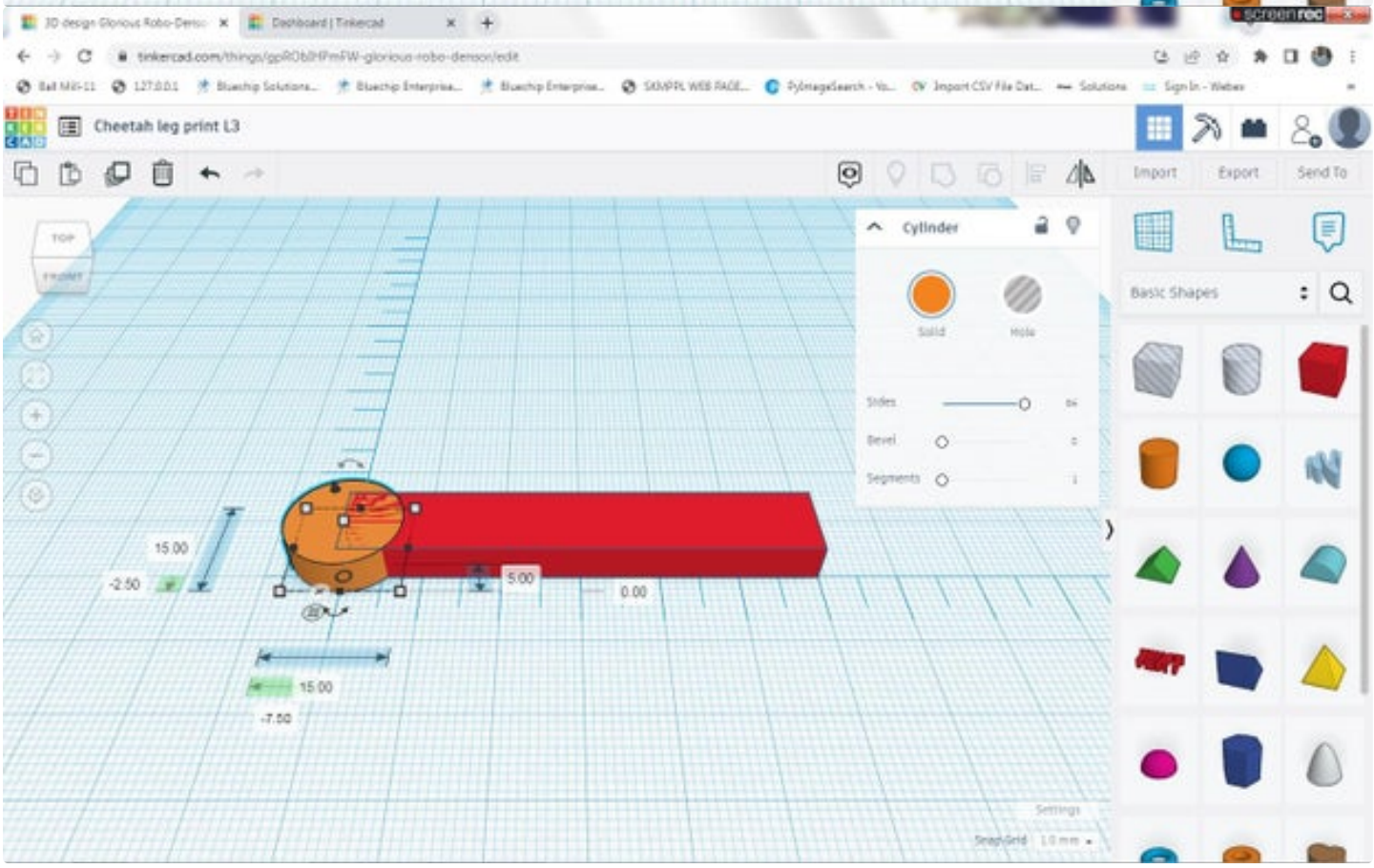
4) Group the solids together.

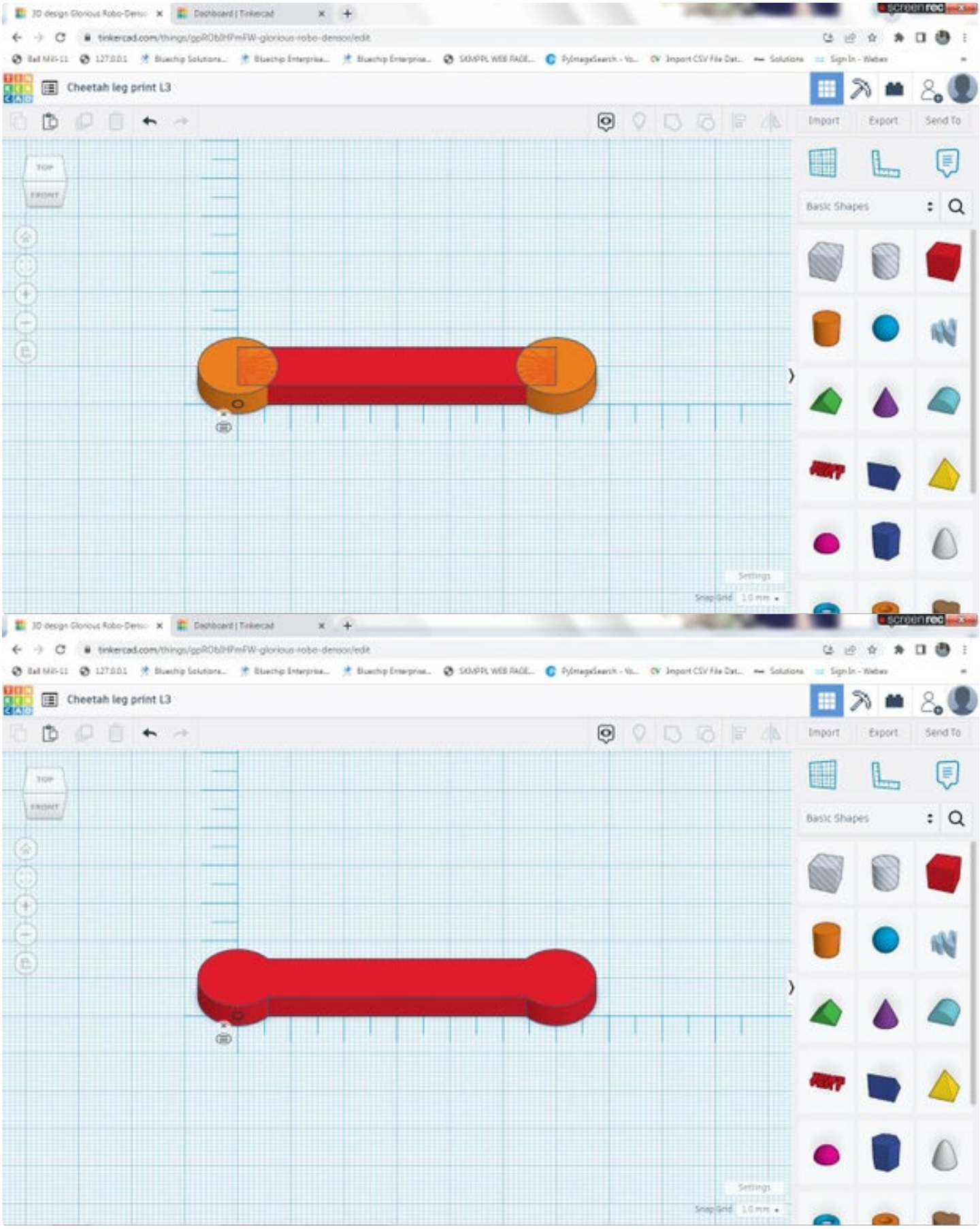
5) Create hole cylinder and put it in the center of the solid cylinder side.

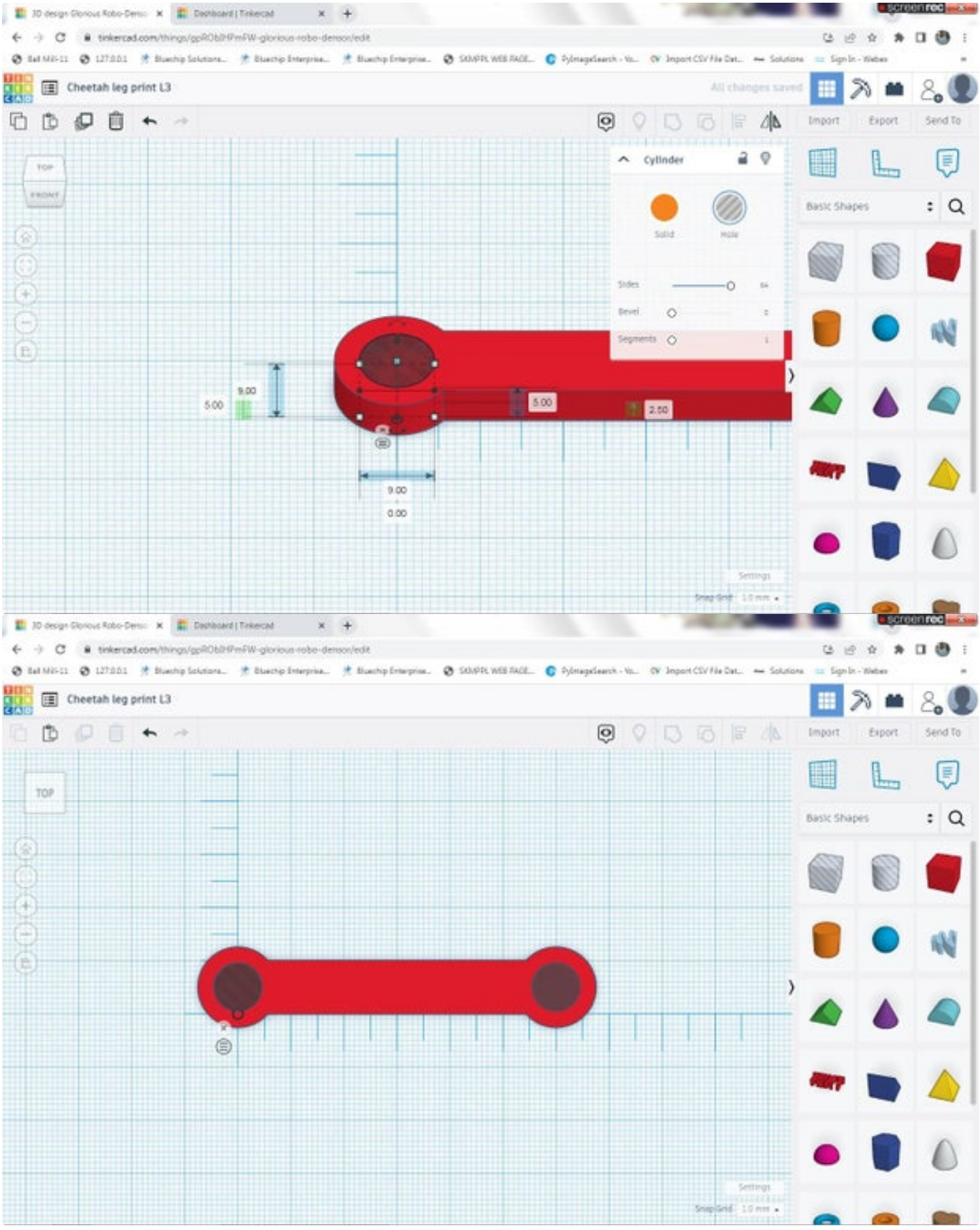
6) Copy the hole cylinder and place it on the other side center also.

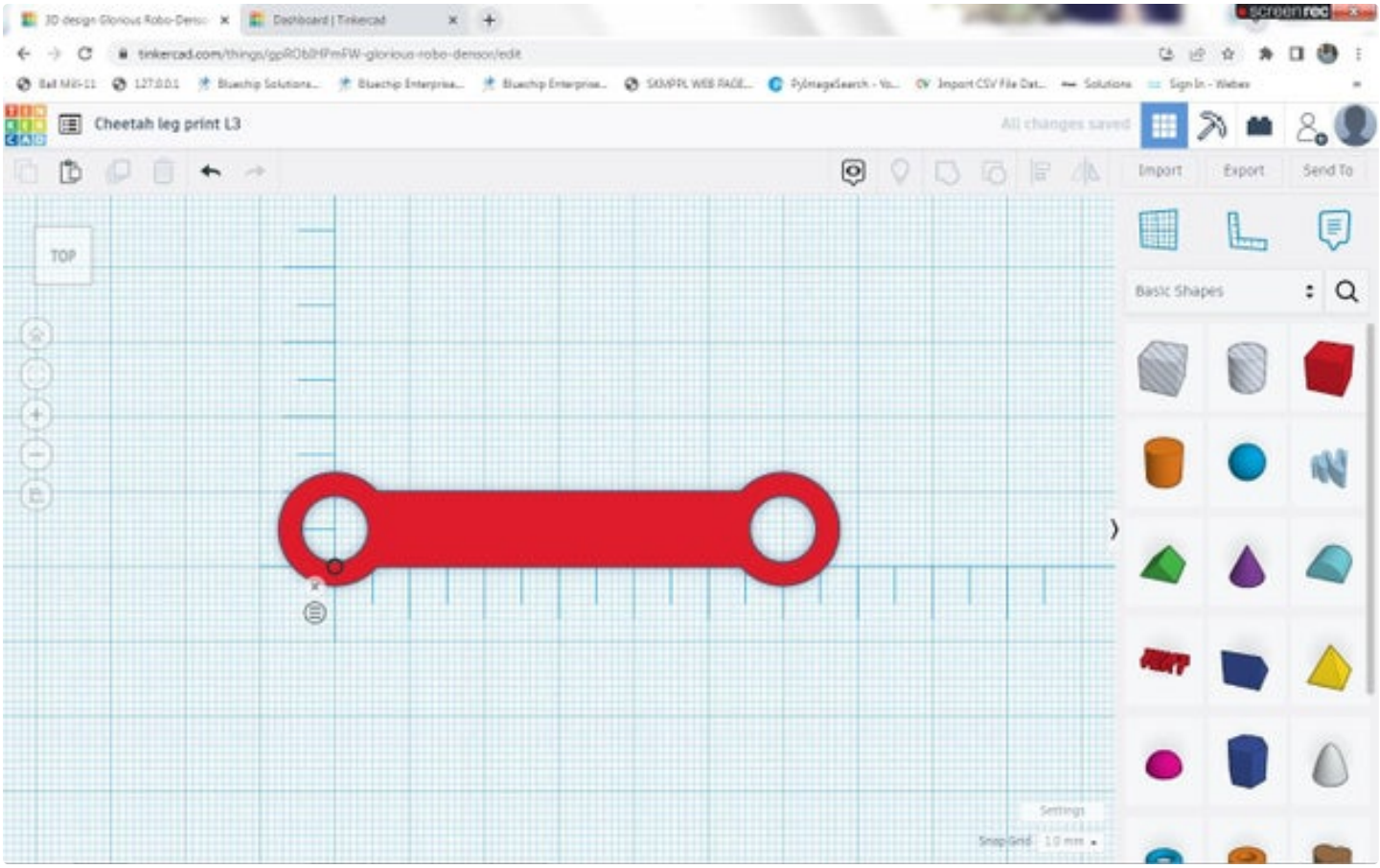
7) Group it together now the 3rd link is ready.


Cheetah leg print L3
Import
Export
Send To
Box
Basic Shapes
10.00
0.00
5.00
0.00
60.00
0.00


Cheetah leg print L3
Import
Export
Send To
Cylinder
Solid
Hole
Basic Shapes
15.00
-2.50
5.00
0.00
15.00
-7.50


Cheetah leg print L3
Import
Export
Send To
Basic Shapes
Cheetah leg print L3
Import
Export
Send To
Basic Shapes


Cheetah leg print L3
Import
Export
Send To
Cylinder
Solid
Hole
Sides
Bevel
Segments
Basic Shapes
TOP
5.00
9.00
5.00
2.50
9.00
0.00



Step 13: Tinkercad - Leg Print L3

https://www.instructables.comhttps://www.tinkercad.com/embed/gpRObIHPmFW

Step 14: Cheetah Leg-4 Design

1) Duplicate the 3rd leg link. change the leg to 4th link.

2) Ungroup the solid one time.

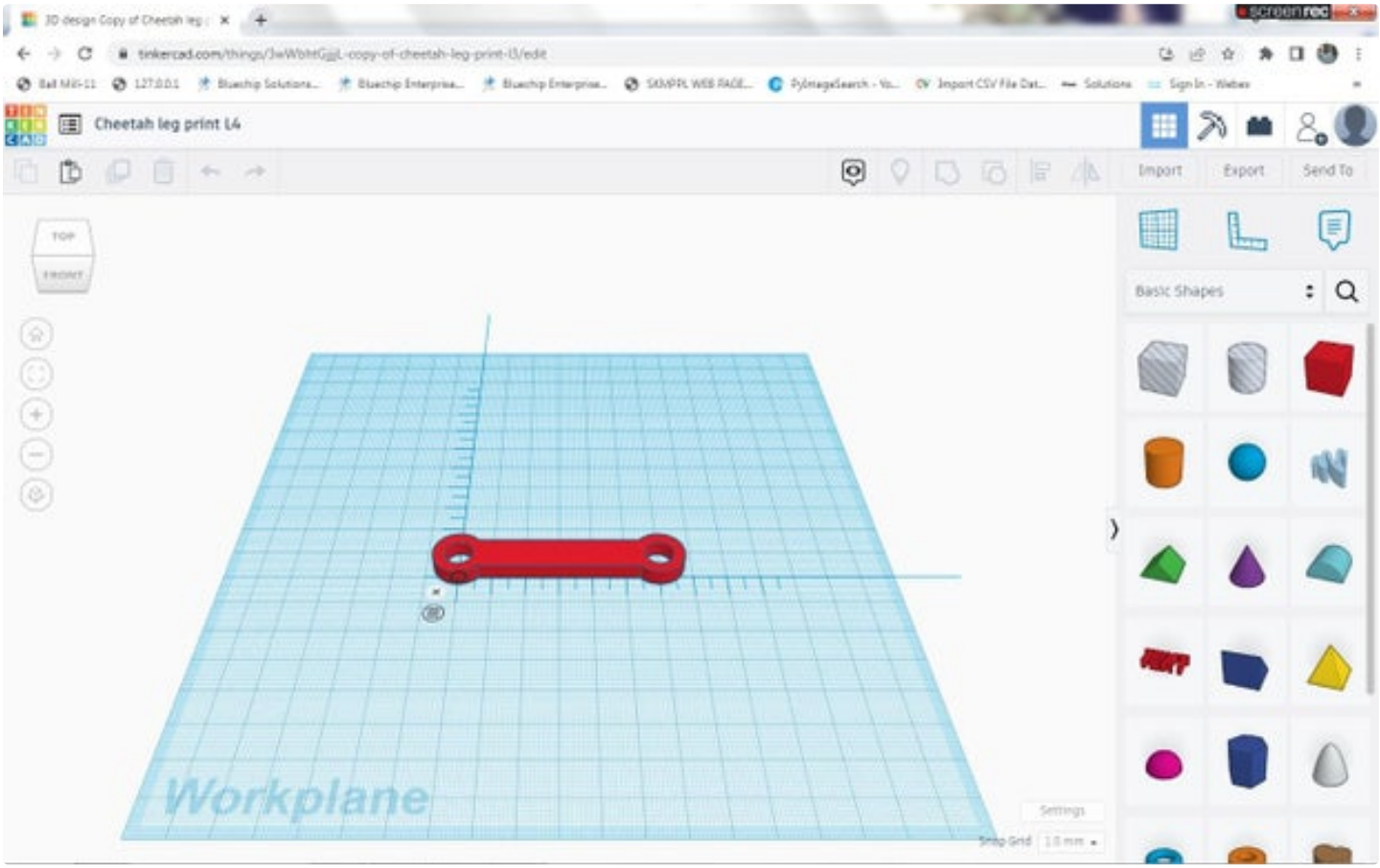
3) Delete the hole cylinder on the right side Draw a cylinder on the right side of the object and place it in the center of the object cylinder.

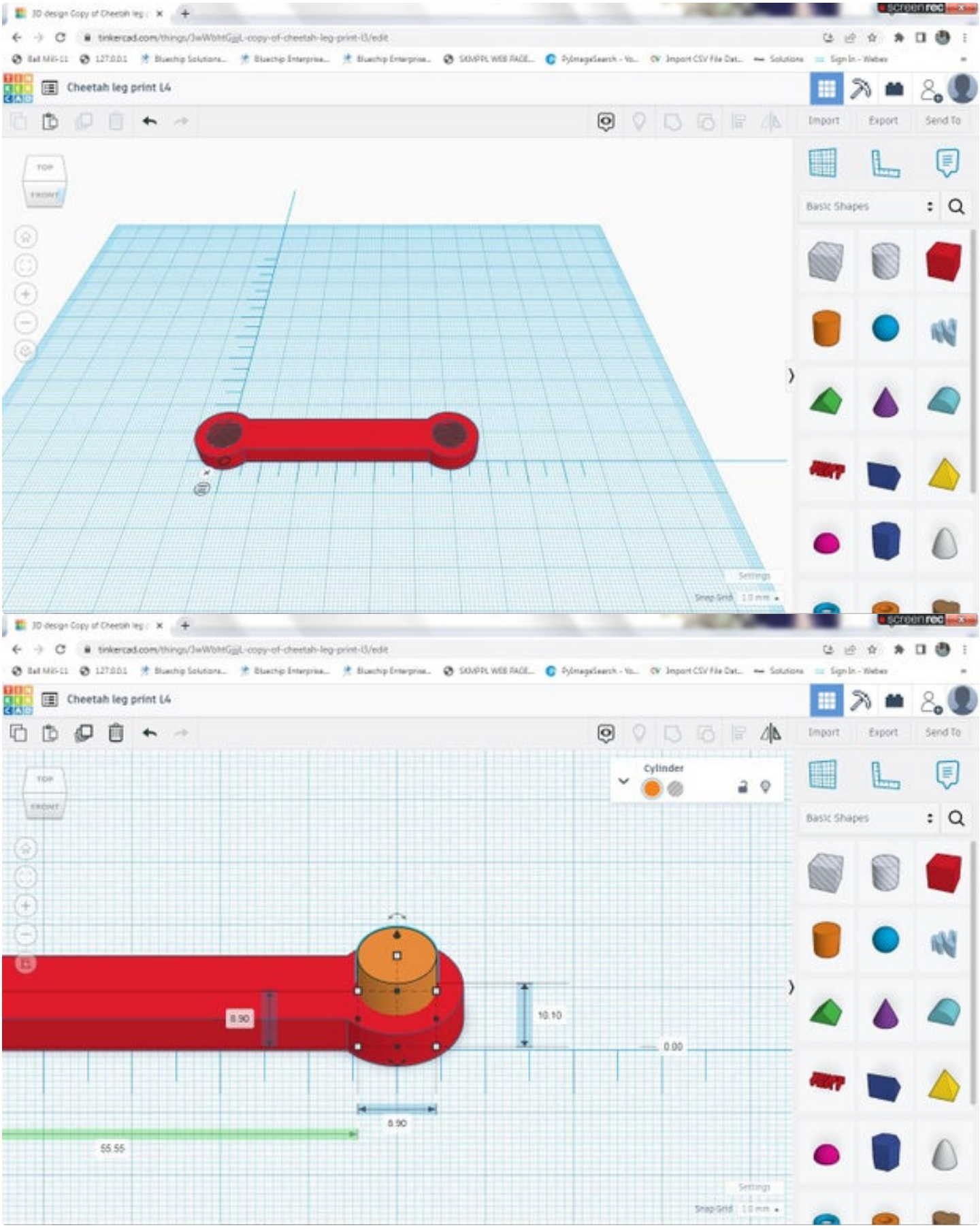
4) Group it with the solid.

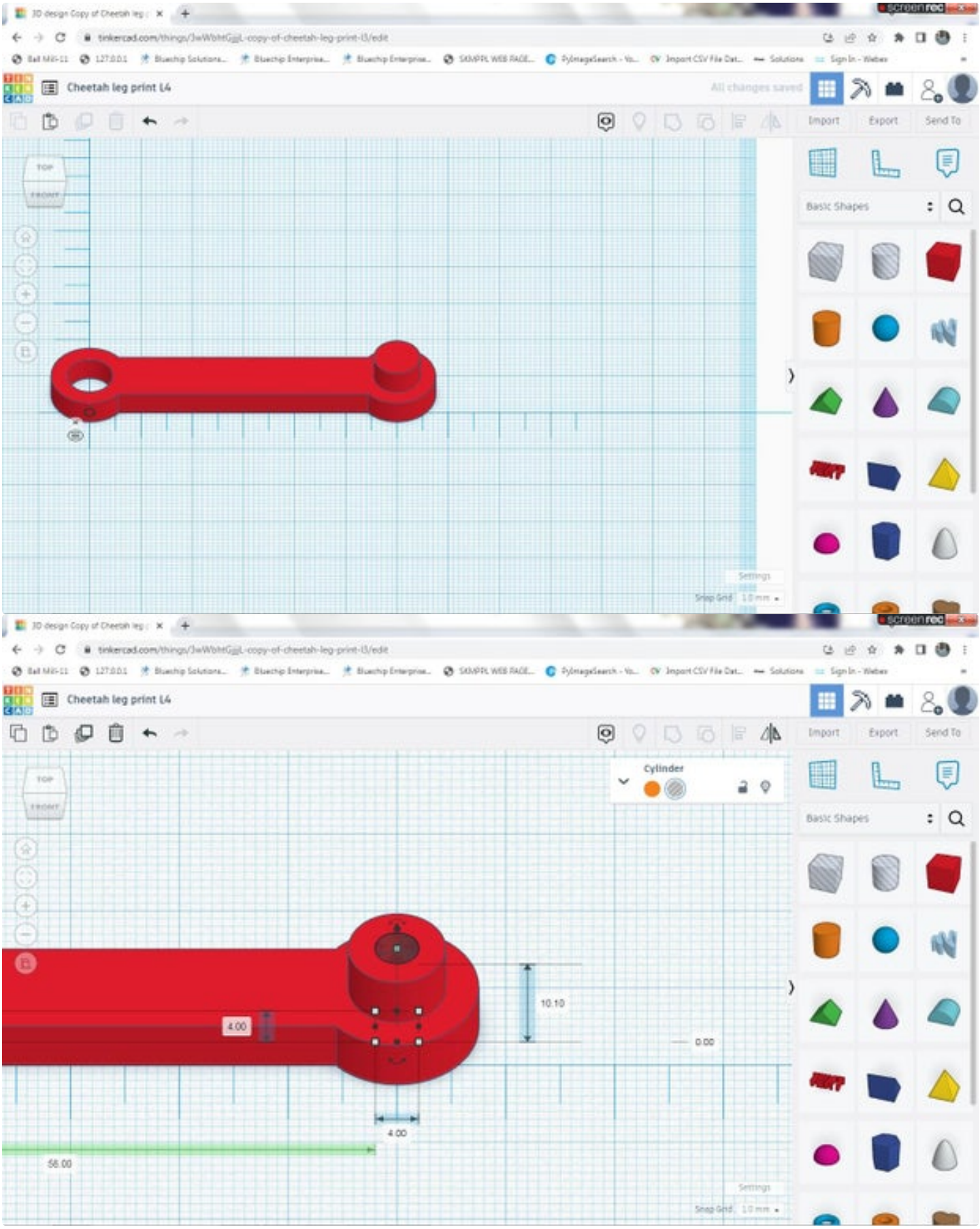
5) Draw a hole cylinder on the right side.

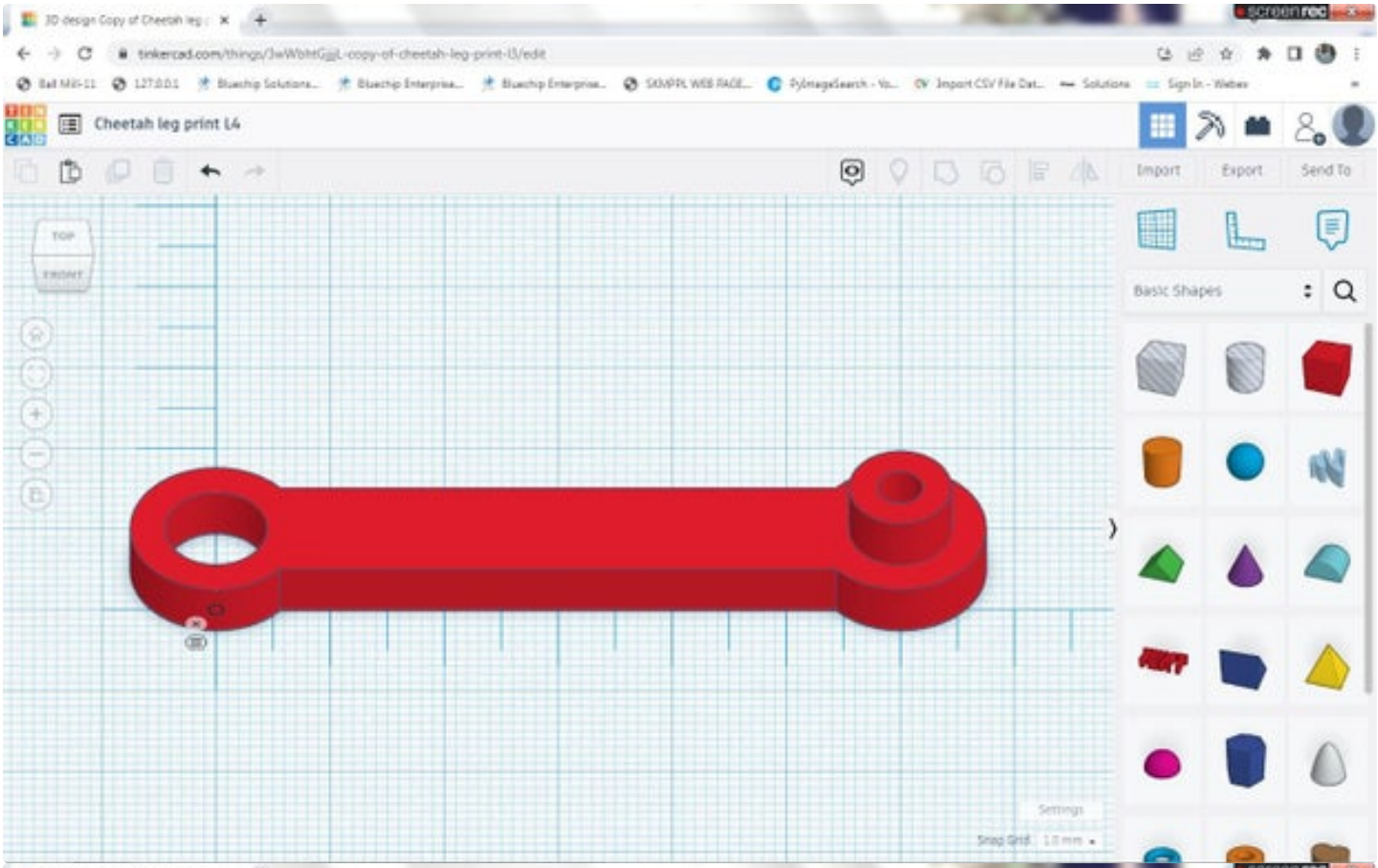
6) Group it with the solid. Link 4 completed.

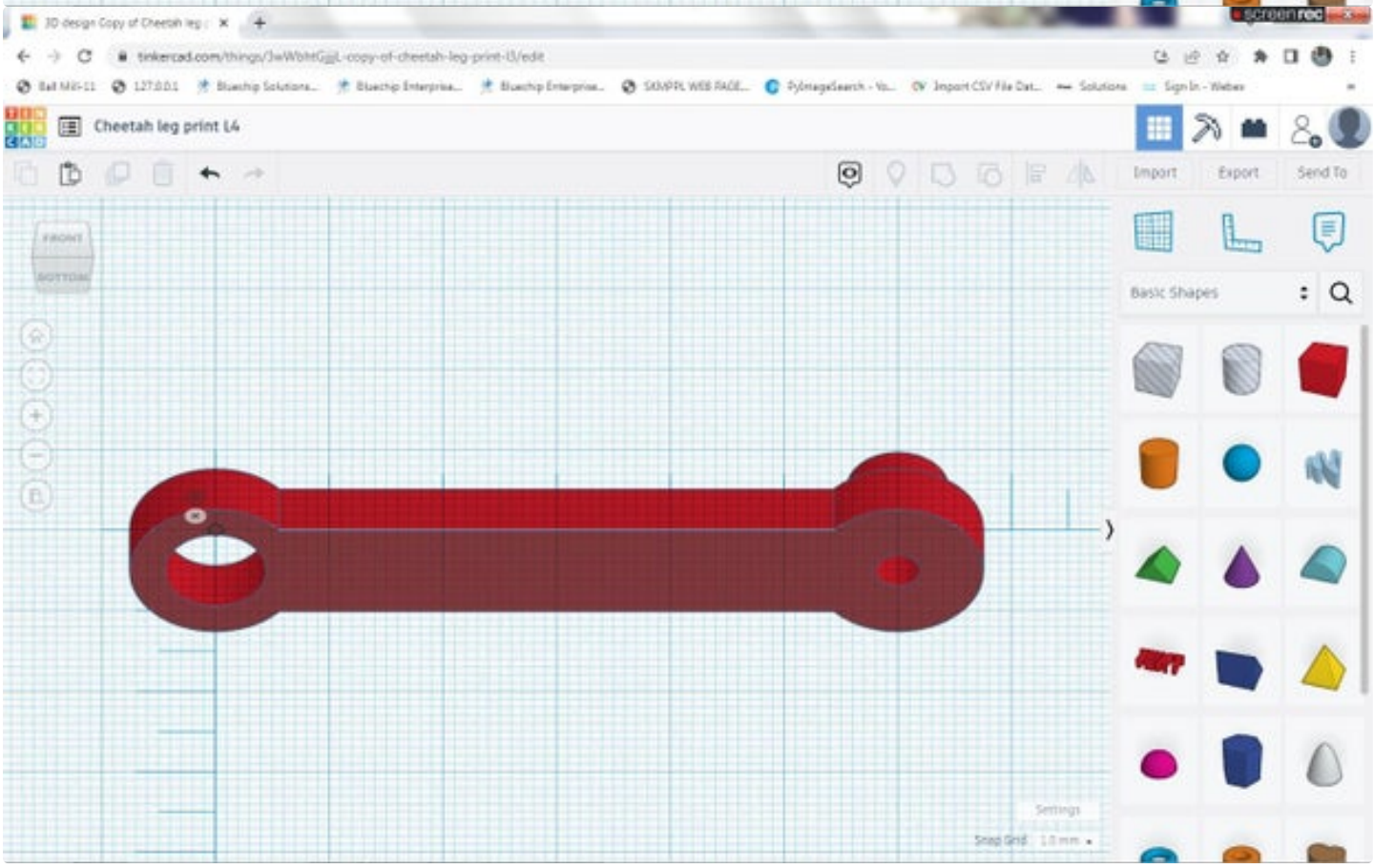
7) See the other side of the Leg.




Cheetah leg print L4
Import
Export
Send To
Basic Shapes
Cylinder
8.90
10.10
0.00
8.90
55.55


Cheetah leg print L4
Import
Export
Send To
Basic Shapes
Cylinder
4.00
10.10
0.00
4.00
56.00





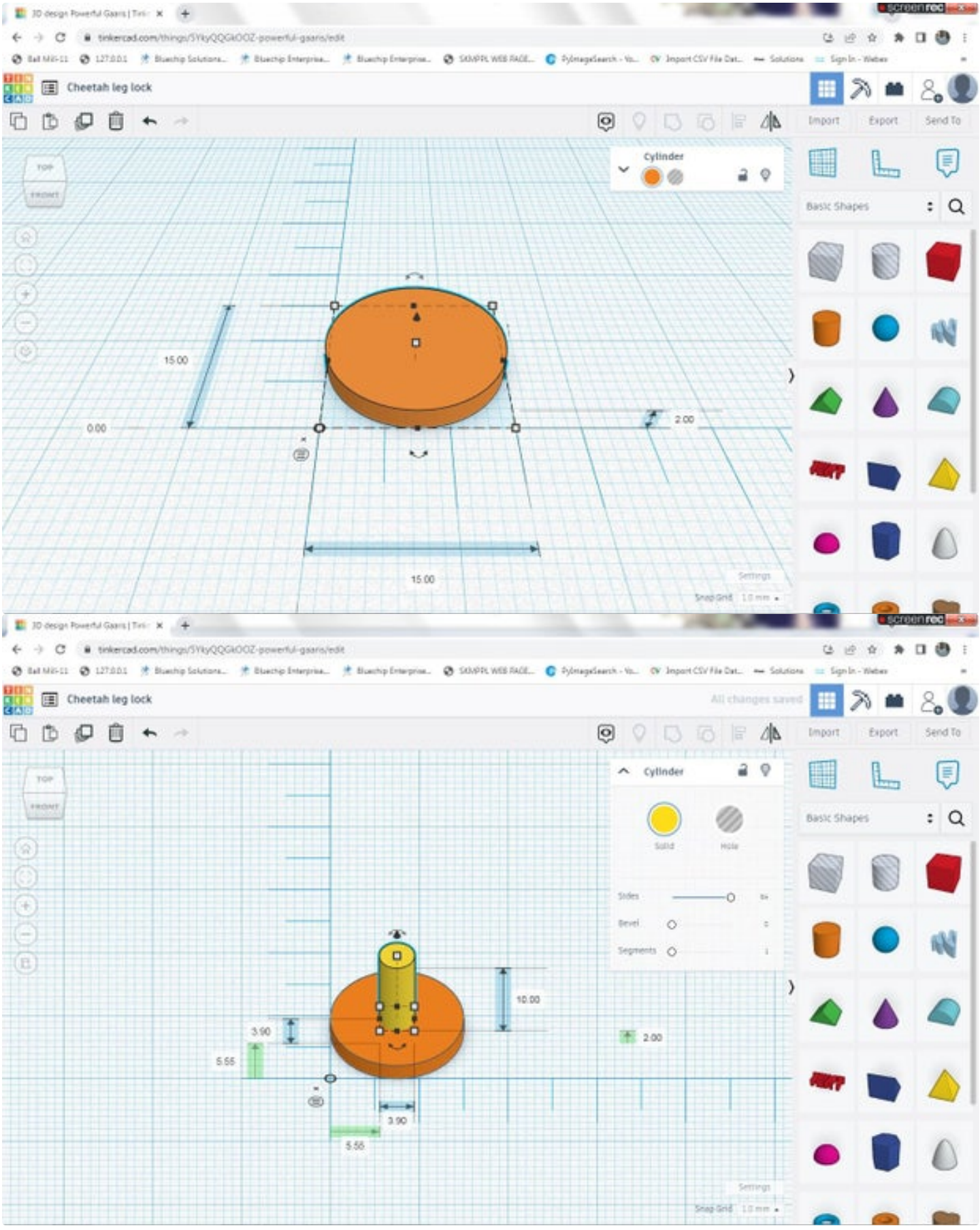
Step 15: Tinkercad - Leg Print L4

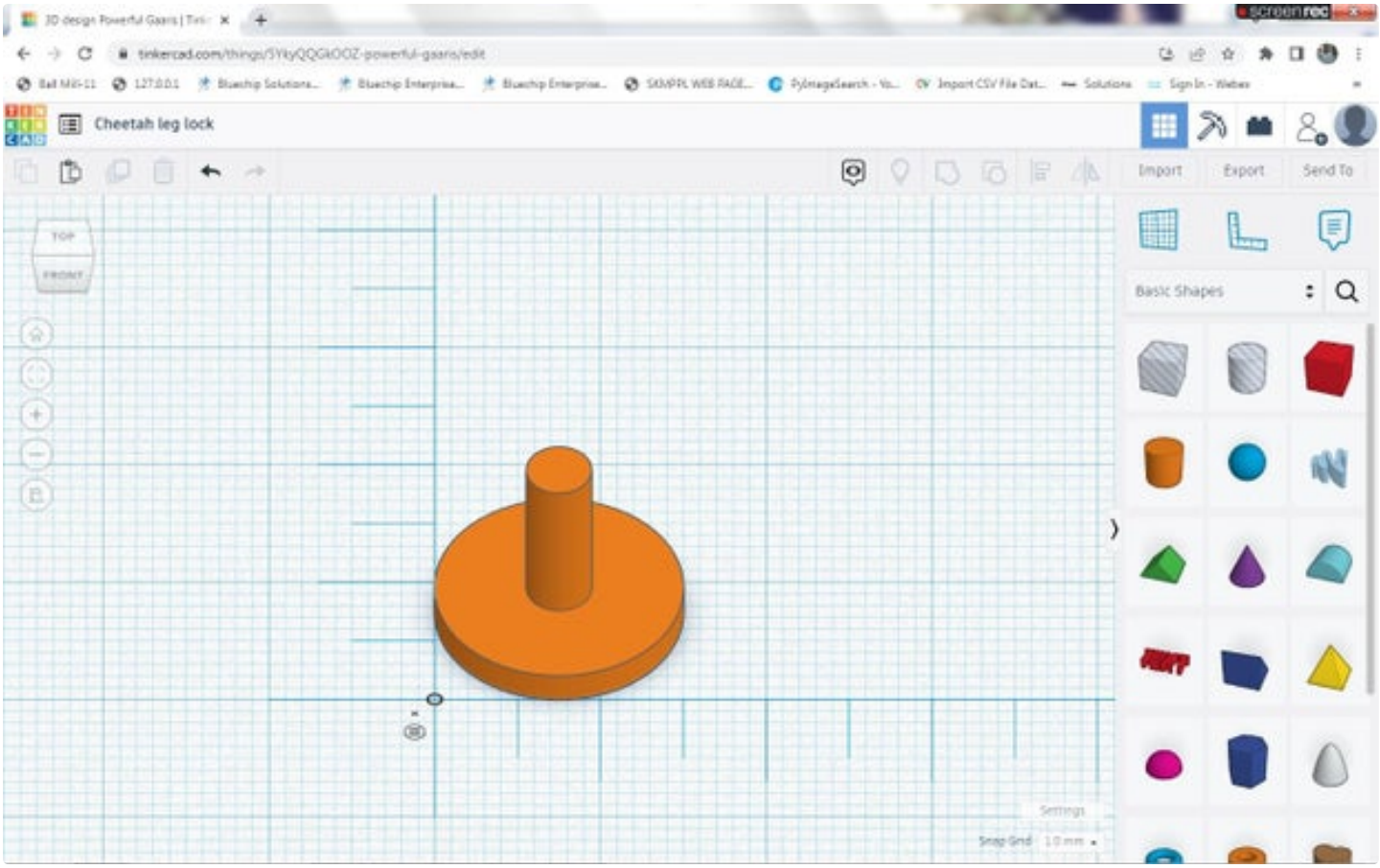
Step 16: Cheetah Leg - Lock

1) In a new 3D design create a cylinder.

2) Place another cylinder on the center of the first cylinder.

3) Group both the cylinder. We want to print 3 nos of this lock for one leg.


Cheetah leg lock
Import
Export
Send To
Cylinder
Basic Shapes
15.00
0.00
2.00
15.00
Cheetah leg lock
All changes saved
Import
Export
Send To
Cylinder
Basic Shapes
Solid
Hole
Sides
Bevel
Segments
10.00
3.90
5.55
2.00
3.90
5.55



Step 17: Tinkercad - Leg Lock

https://www.instructables.comhttps://www.tinkercad.com/embed/5YkyQQGkOOZ

Step 18: Cheetah Body

1) For body design Create a new 3d design.

2) In the settings change the length and width.

3) In the tinkercad i found a servo mount for MG90S servo. I copy that mount.

4) Draw a box and change its dimensions.

5) For one leg we need two servo mount so copy the servo mount and group it with the copy.

6) Like wise for all 4 legs create a copy.

7) Group all the mount and the body box.

8) Draw a round roof, rotate and move it.

9) Copy for the other side.

10) Group the round roof on the two sides with the object.

11) For controls wired from back to front draw a hole box on the center.

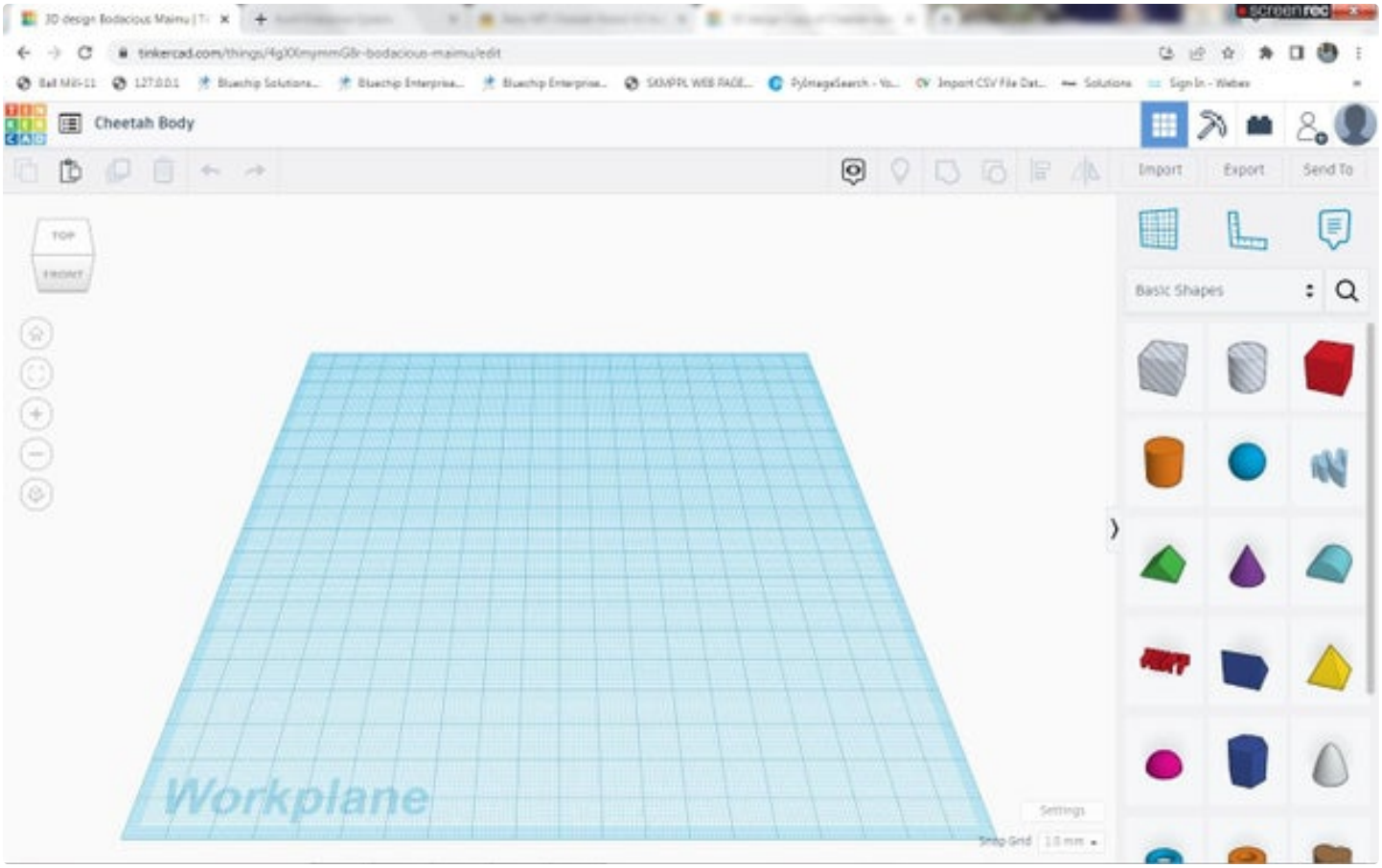
12) For Power regulator draw a hole box on back side.

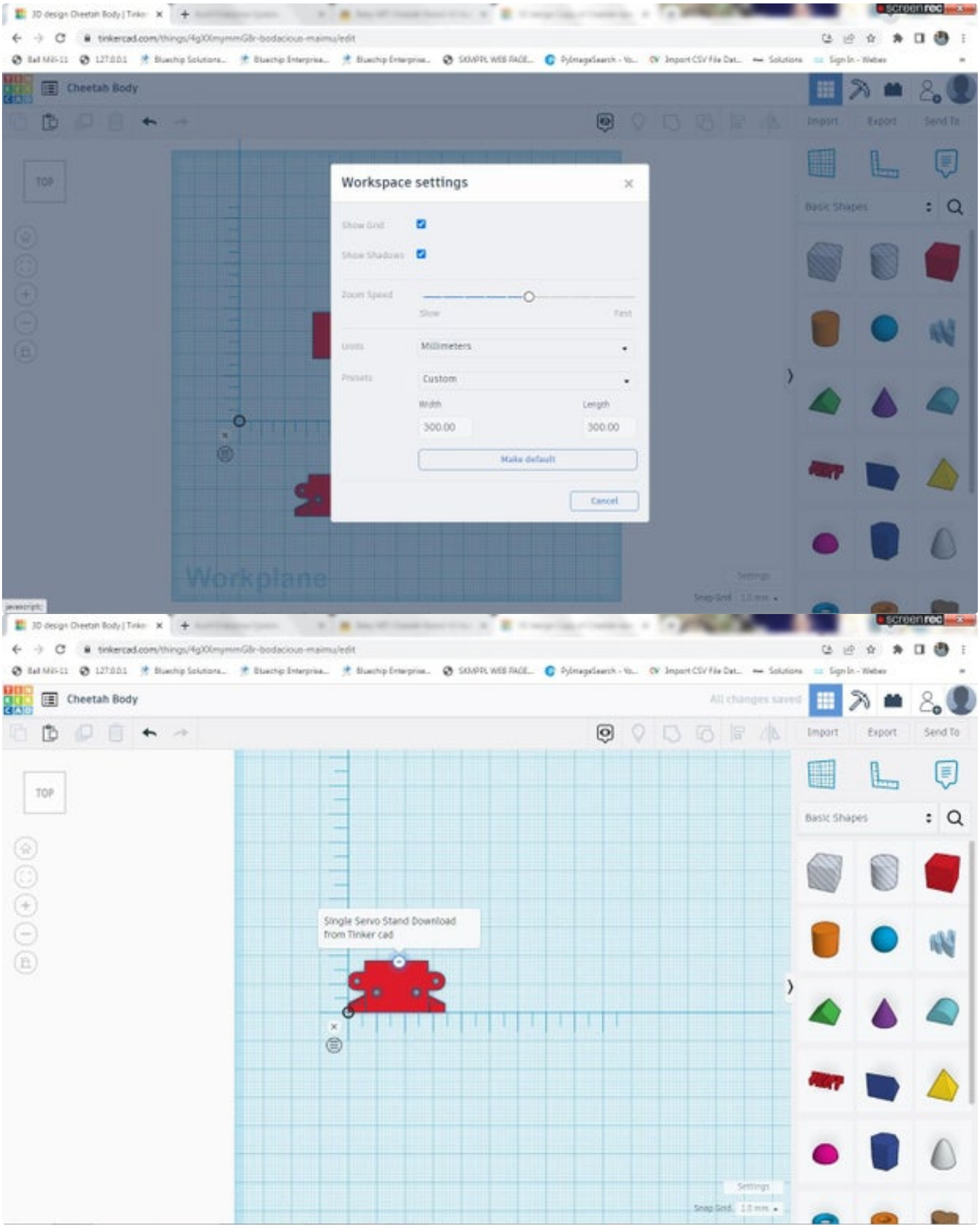
13) For head servo fitting draw two hole box and two hold cylinder on front side.

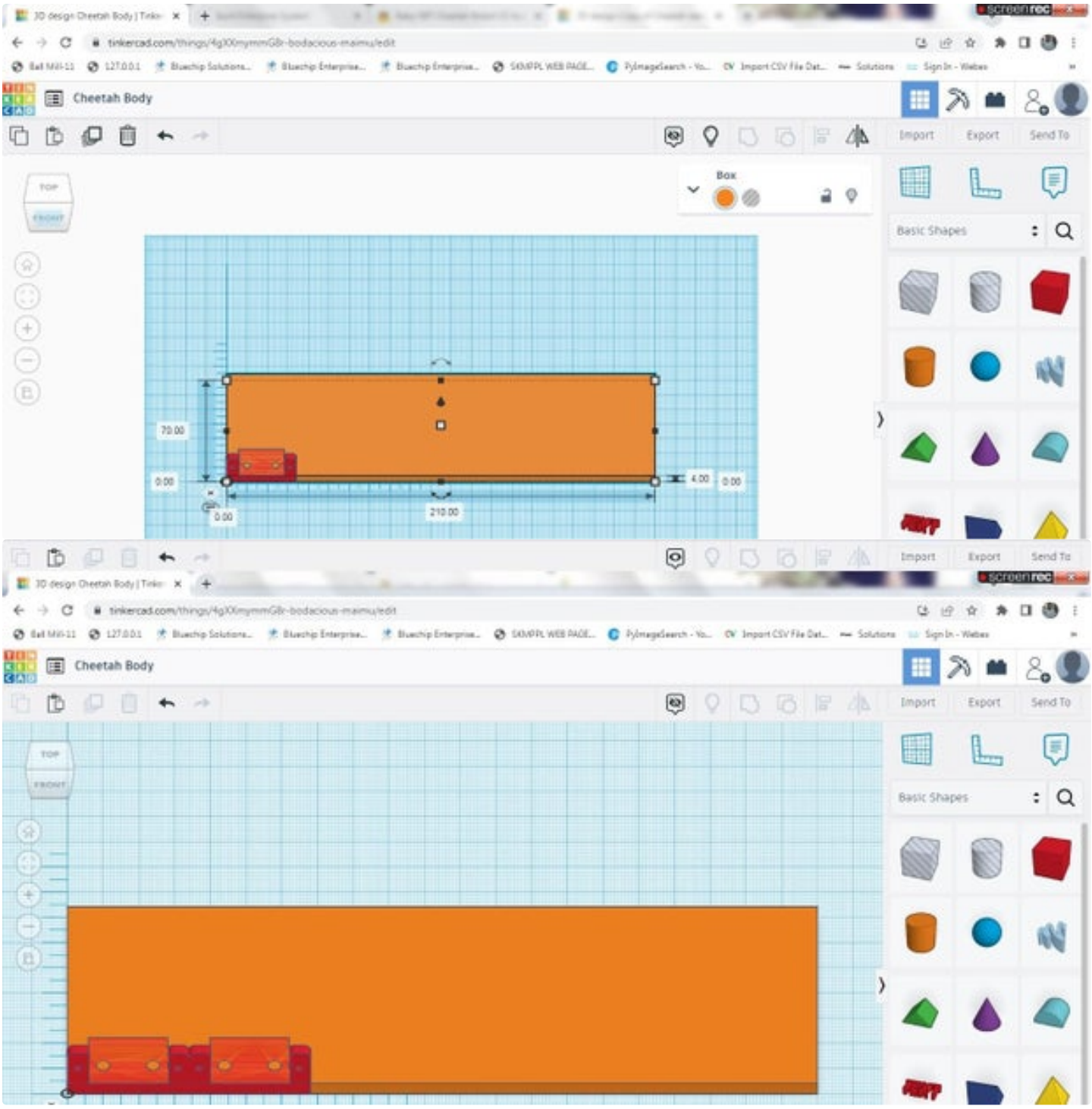
14) Hide the solid and group all the hole.

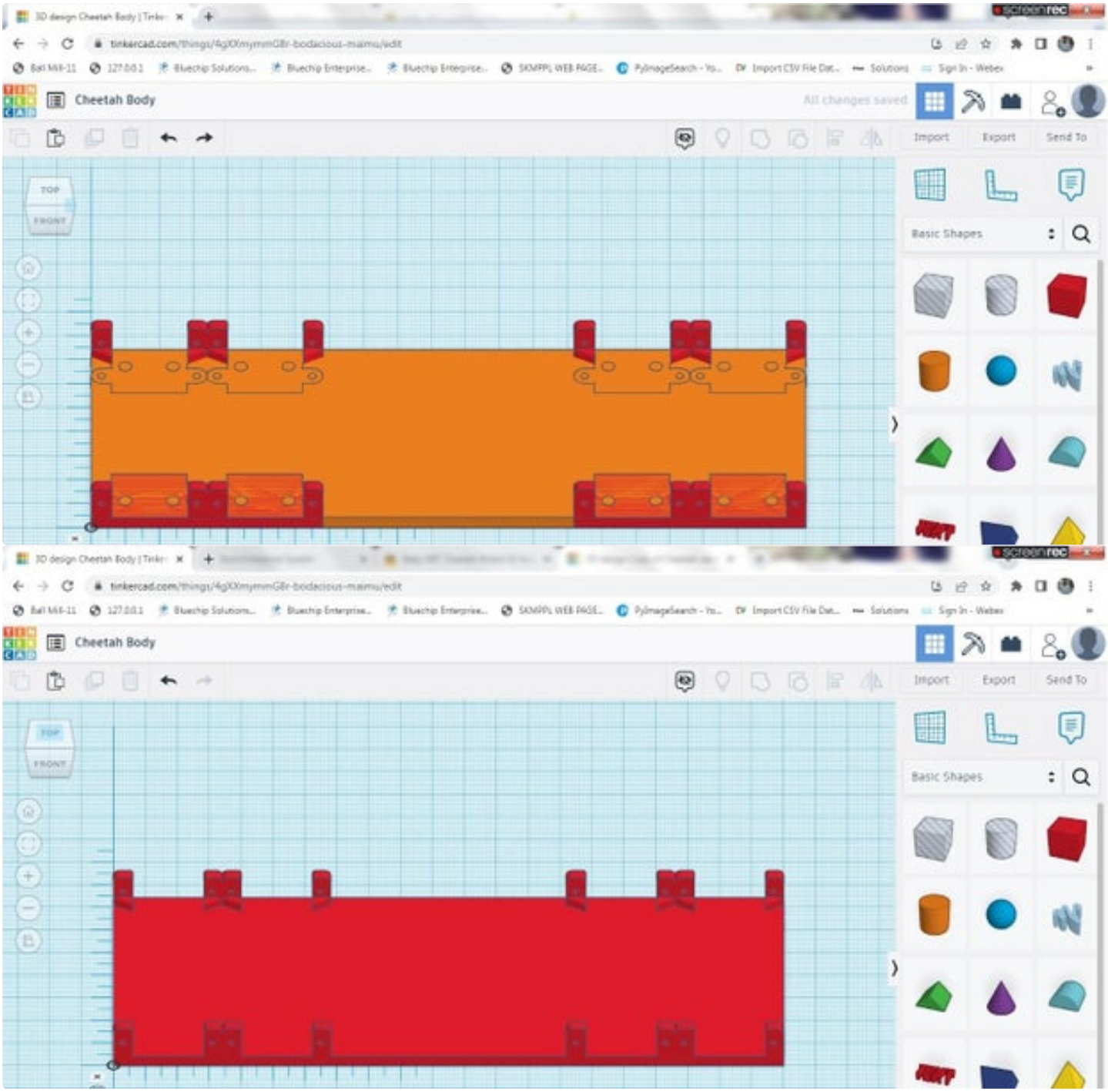
15) Group the solid and the hole. Now the body is ready.

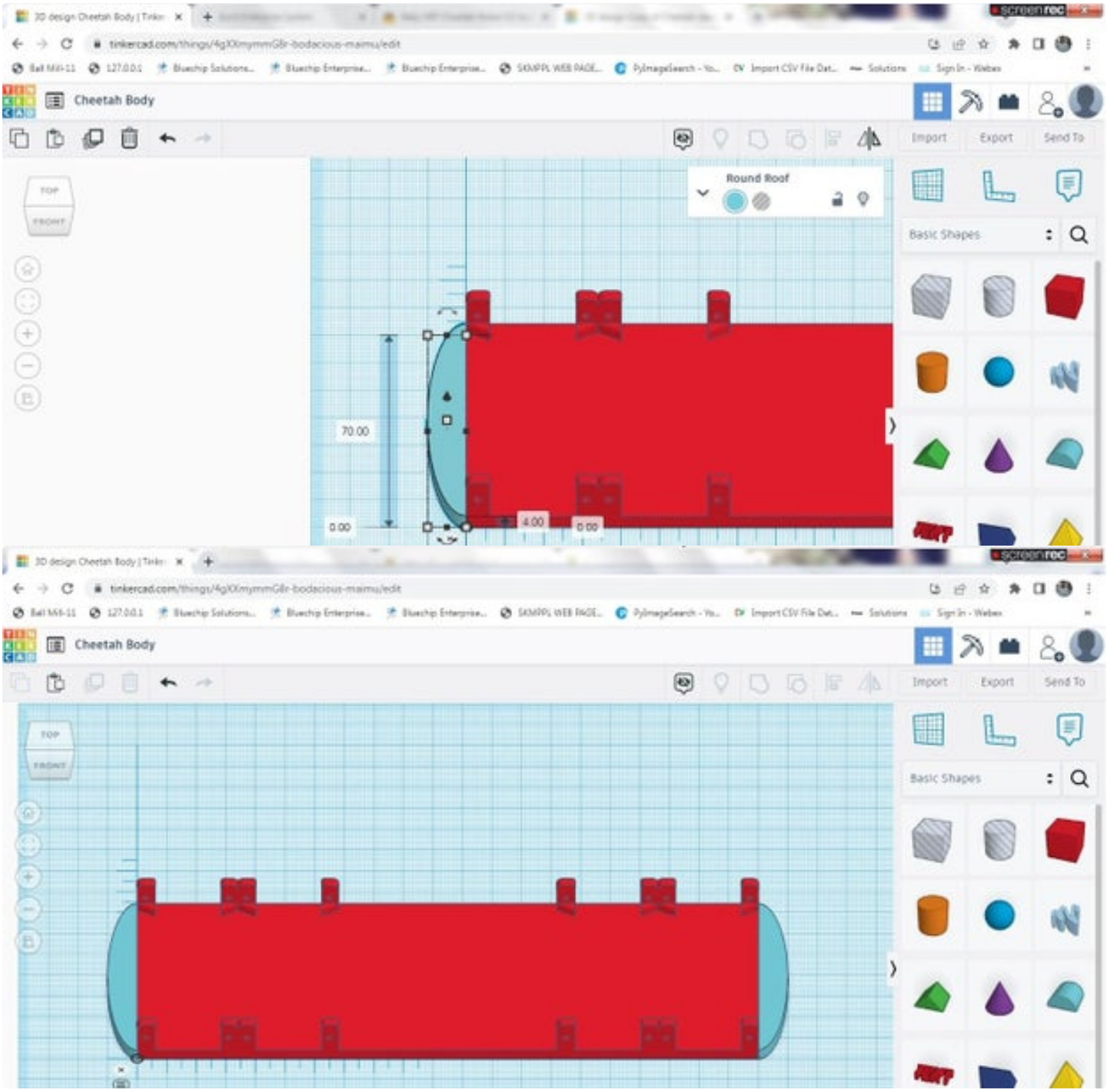
16) See the other side of the body.

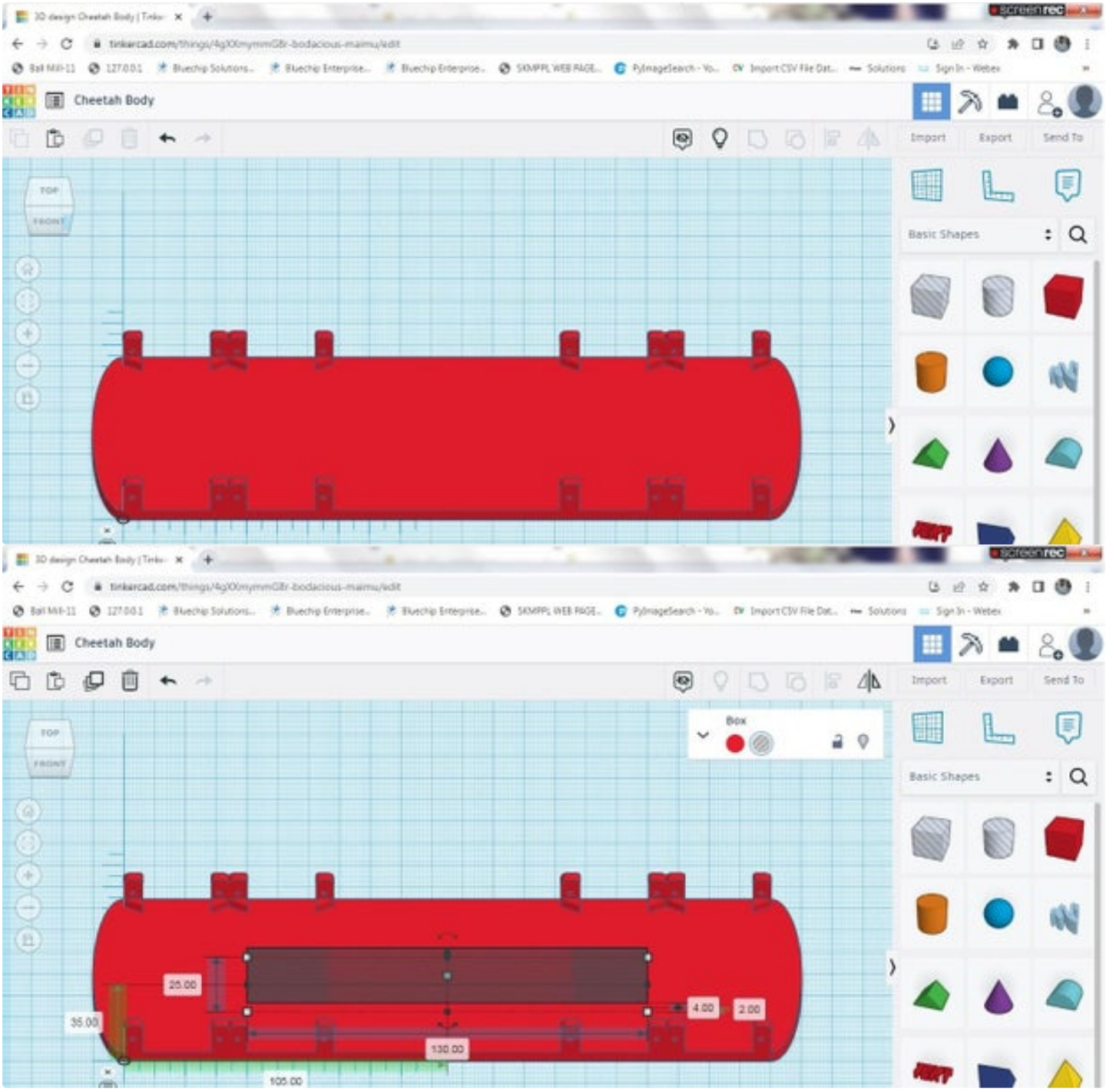


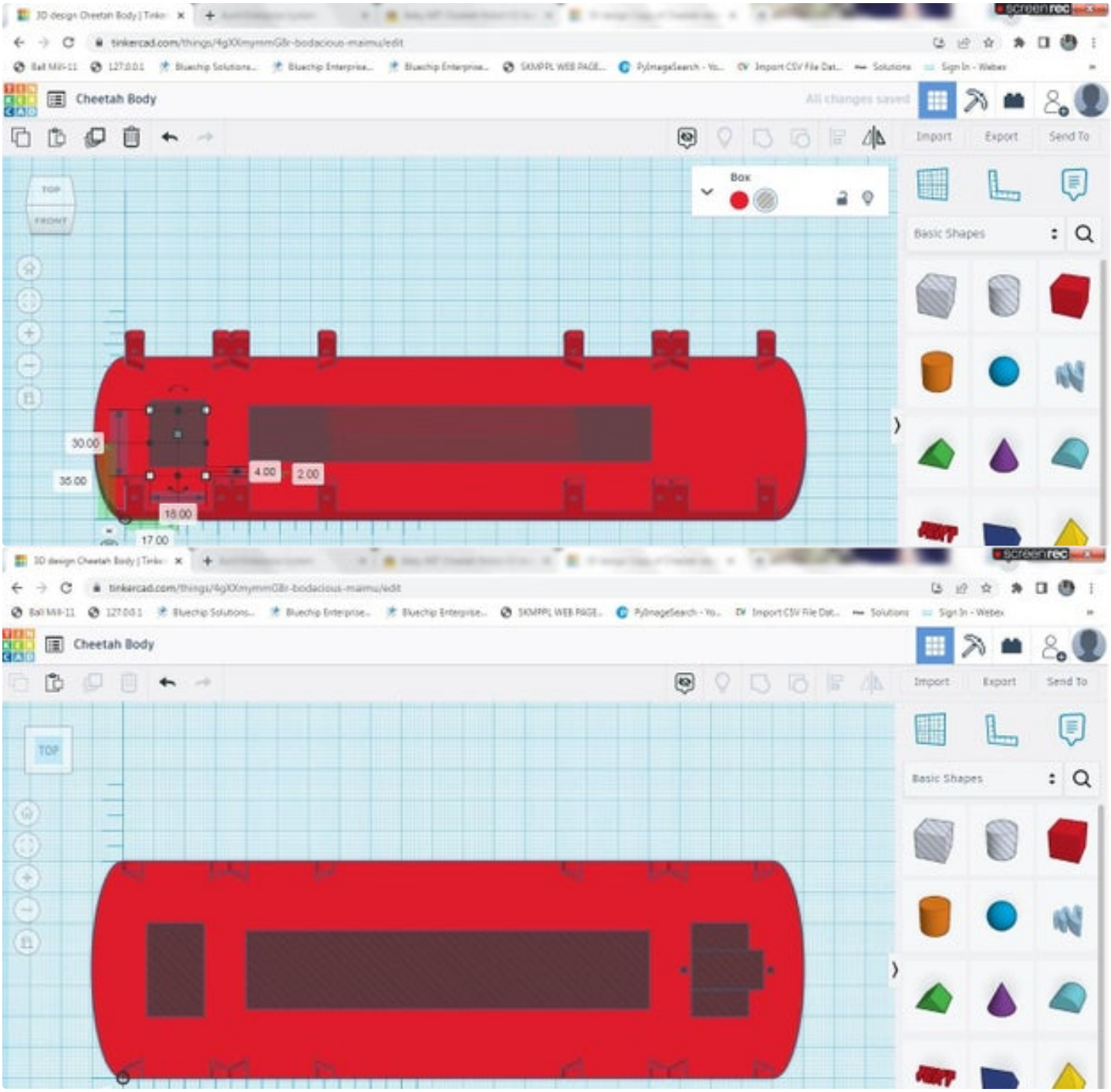

Cheetah Body
Workspace settings
Show Grid
Show Shadows
Zoom Speed
Slow
Fast
Units
Millimeters
Presets
Custom
Width
Length
300.00
300.00
Make default
Cancel
Workplane
Import
Export
Send To
Basic Shapes
TOP
Cheetah Body
All changes saved
Single Servo Stand Download from Tinker cad
Settings
Snap Grid

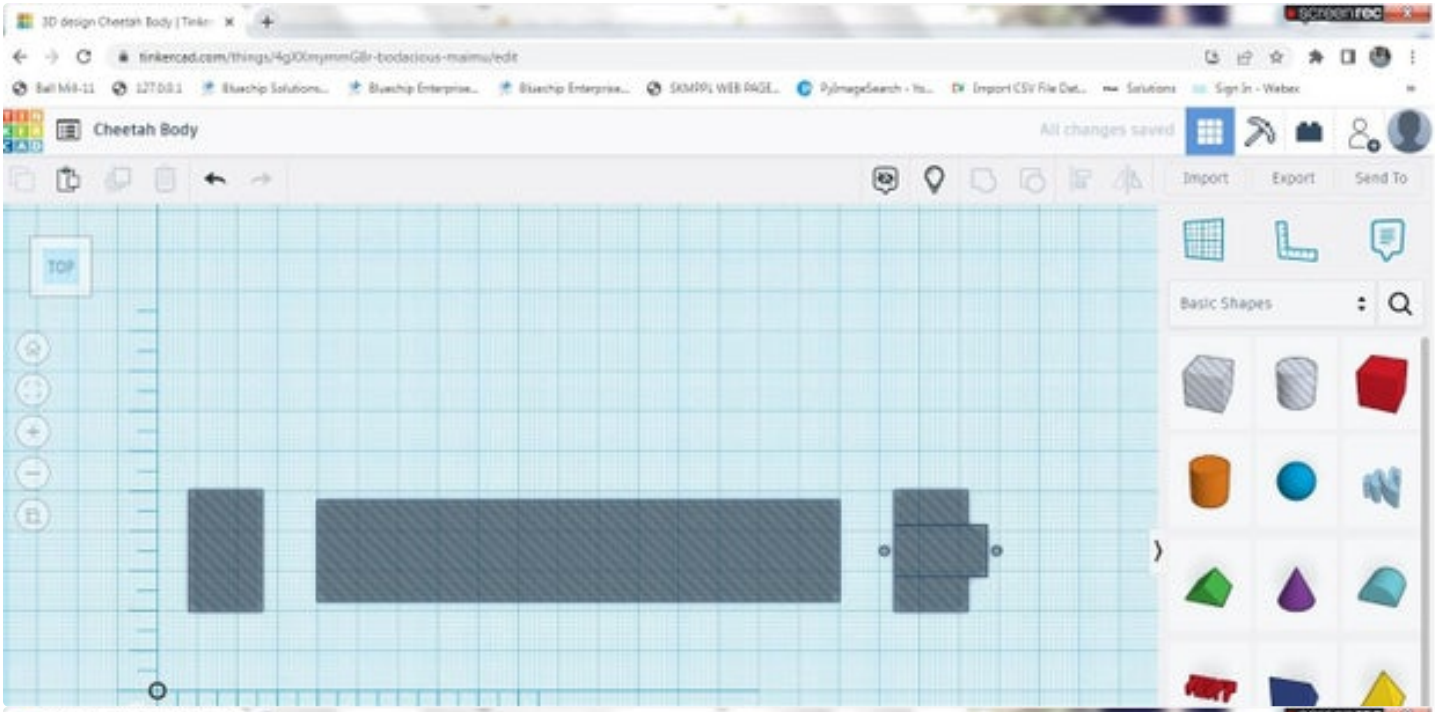

Cheetah Body
Import
Export
Send To
Box
Basic Shapes
70.00
0.00
210.00
4.00
0.00
0.00
Cheetah Body
Import
Export
Send To
Basic Shapes

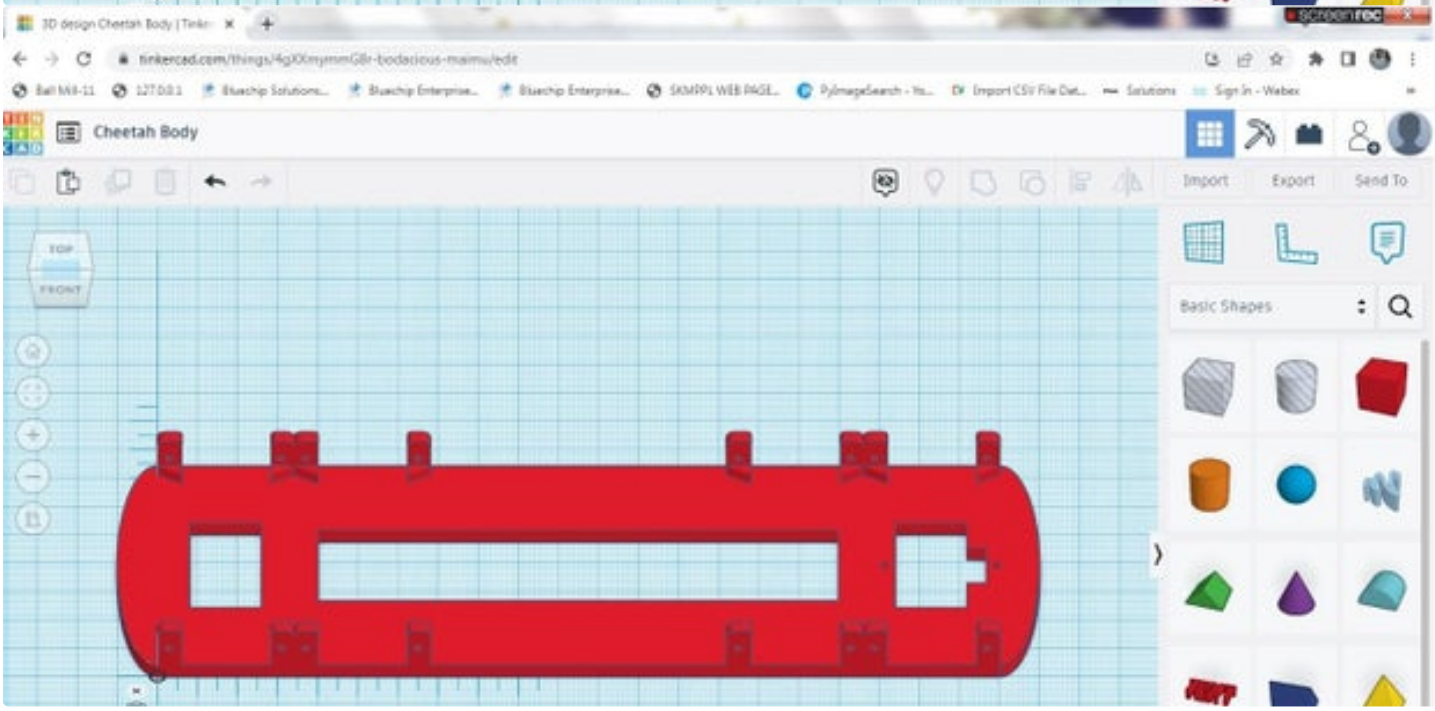

Cheetah Body
All changes saved
Import
Export
Send To
Basic Shapes
TOP
FRONT
Cheetah Body
Import
Export
Send To
Basic Shapes
TOP
FRONT

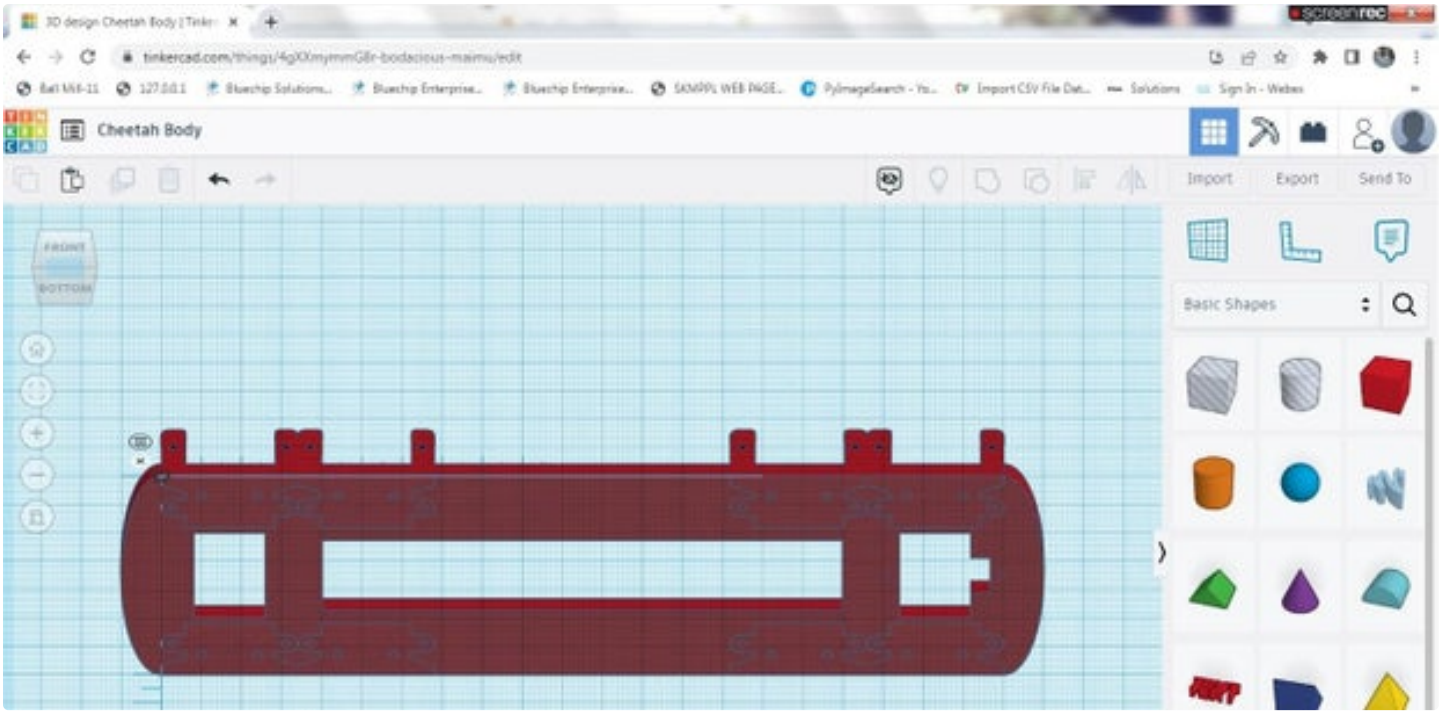

Cheetah Body
Import
Export
Send To
Round Roof
Basic Shapes
70.00
4.00
0.00
Cheetah Body
Import
Export
Send To
Basic Shapes


Cheetah Body
Import
Export
Send To
Basic Shapes
Box
25.00
35.00
4.00
2.00
130.00
105.00


Cheetah Body
Import
Export
Send To
Box
Basic Shapes
30.00
35.00
4.00
2.00
18.00
17.00
TOP
FRONT


Cheetah Body
Import
Export
Send To
TOP
Basic Shapes


Cheetah Body
Import
Export
Send To
TOP
FRONT
Basic Shapes



Step 19: Tinkercad - Cheetah Body

https://www.instructables.comhttps://www.tinkercad.com/embed/4gXXmymmG8r

Step 20: Complete the Project

Although the parts design are found very easy when you see the first design already with the Cheetah version 2 same design when ungroup you found lot of items. Because it has lot of trials of print and correction.

for details of materials used to complete project please see my old project Baby MIT Cheetah Robot V2 Autonomous and RC

Step 21: Conclusion

Even the cheetah walk sucessfully during this design time also i found some error and correct it. So in life correction is always there. Once again thank you all for sugessions and comments for my all projects to move to this bench mark 100th project.

Thank you for going through my project.

Lot more to enjoy.....Don't forgot to comment and encourage me friends.