OpenScad examples

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Document information

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Experimental repo for building openscad files into different outputs.
This is still work in progress but can already build a png and stl of each scad file in the opescad directories.
See the online or pdf versions for the images as te readme is realy only the source and right now is not WYSIWYG!

Output

Amplifier - Project

VacuumPreAmplifierBase - 3D Object

housing a retro vacuum tube china preamp.
Have a nice wooden box that is looking for some use as a housing The pre-amp is a cheap vaccum tube type sourced from aliexpress https://a.aliexpress.com/_B0MVMZ
I've created an openscad model of the Box based on some measurments with a calliper. The model is designed to help asses where to drill holes and to print a guide to drill the holes. The preamp has a power input (12v~) an in and an output (headphone jack) and a Volume potentiometer. Also the housing is to expose the Vacuum Tubes to the interested viewer. Since the lid is hinged and the relative position of the tubes to the lid, when opening, is difficult to eyeball the model was created to try out different Hole placments as well as providing a template for Drill guides.

Figure 1. image

Listing 1. Openscad source

```
box1X=105.5;
box1Y=106;
box1Z=36;
box1BaseH=3;

box2X=89;
box2Y=91;
box2Z=45.5;

box3X=83;
box3Y=85;
box3Z=50;

lidX=box1X;
lidY=box1Y;
lidZ=23;
lidDepth=20.3;
lidStampR=20;
```

```
lidHingeAngle=50;
lidAnimZ=0;

preampBoardX=77;
preampBoardY=66;
preampBoardZ=1.5;
preampTubeR=17/2;
preampTubeH=42;
preampTubeBaseH=10;
preampTubeTipH=51;
preampTubeC=[200/255,200/255,200/255];
preampKnobR=11.5;
preampKnobH=16;
preampAxleH=29;

brown=[139/255,69/255,19/255];
gold=[255/255,215/255,0/255];
Blue=[0/255,0/255,200/255];

module box(){
    color(brown)
    difference(){
        union(){
            cube([box1X,box1Y,box1Z]);
            translate([box1X/2-box2X/2,box1Y/2-box2Y/2,box1BaseH])
cube([box2X,box2Y,box2Z]);
        }
        translate([box1X/2-box3X/2,box1Y/2-box3Y/2,3])
cube([box3X,box3Y,box3Z]);
        // star the next line to see inside the box
        *translate([-.5,-.5,-.5]) cube([box1X+1,box1Y*.85+1,box1Z/2+1]);
    }
}


//lid
module lid(){
    color(gold) translate([(box1X/2),(box1Y/2),lidZ+.0001])
cylinder(h=1,r1=lidStampR,r2=lidStampR);
    color(brown) translate([0,0,0])
        difference(){
            translate([0,0,.001]) cube([lidX,lidY,lidZ]);
            translate([box1X/2-box2X/2,box1Y/2-box2Y/2,0])
cube([box2X,box2Y,lidDepth]);
    }
}

module tube () {
    union(){
        color(preampTubeC,.5) translate([0,0,preampTubeBaseH])cylinder(h=42-
preampTubeBaseH,r1=preampTubeR,r2=preampTubeR);
```

```
        color([1,1,1])cylinder(h=preampTubeBaseH,r=preampTubeR);
        translate([0,0,preampTubeH]) color(preampTubeC)
cylinder(h=preampTubeTipH-preampTubeH,r1=preampTubeR,r2=1);
    }
}

translate([(box1X-box3X)/2,((box1Y-box3Y)/2)+(box3Y-preampBoardY)-
1,box1BaseH+21])
union() {
    //board
    cube([preampBoardX,preampBoardY,preampBoardZ]);
    //tubes
    translate([15+preampTubeR,15+preampTubeR,preampBoardZ]) tube();
    translate([52+preampTubeR,15+preampTubeR,preampBoardZ]) tube();
    //Volume Knob Base
    translate([38,0,preampBoardZ]) color([0,1,0]) cube([10,10,10]);
    //volume knob
    translate([43,-(preampKnobH+preampAxleH),preampBoardZ+5]) rotate([270,0,0])
    union(){
        difference() {
            color([50/255,50/255,50/255]) cylinder(h=preampKnobH,r=preampKnobR);
            translate([0,0,-.001]) cylinder(h=1,r=(preampKnobR/100)*60);
        }
        color([255/255,255/255,255/255])cylinder(h=1,r=(preampKnobR/100)*60);
        //knob axle
        translate([0,0,preampKnobH]) color([1,1,1])cylinder(h=preampAxleH,r=3);
    }
}
//draft base
translate([15,box1Y-((box1Y-box3Y)/2)-1,box1BaseH])
color([0,0,0])cube([8,1,21]);
//enclosure
box();
translate([box1X,box1Y,(box1Z)+lidAnimZ+.5]) rotate([lidHingeAngle,0,180])
lid();
```

Axle - Project

Axle - 3D Object

required a screw and didn't have one.

Figure 2. image

Listing 2. Openscad source

```
// axle for bearing for filament roller
// had no screw printed one ...
// the free end can be melted when the axle has been inserted so that no
fastener is required
$fn=360;
cylinder (h=22,d=3.5);
cylinder (h=3,d=7);
```

Howth-cieling-spots - Project

The spots for the ceiling in Howth needed replacing and the replacement spots had a few millimeters too little radius so that they didn't cover the hole properly in all places.
The lamp ring was a quick fix that turned out quite well and looks good.

lampRing - 3D Object

This object is not very complex and it's really just a few cylinders laid on top of one another with a few holes cut out for the lamp.

Figure 3. image

Listing 3. Openscad source

```
//for LED lamps in ceiling in Howth
// the originals are wider and therefore the new ones need a spacer to cover the
hole
//colour is white
//led lamps are 105mm Diameter (4 lamps)

lampD=105;
lampH=2;
holeD=99;
coverD=125;
coverInD=99;
coverH=2;
coverRidgeW=5;
$fn=100;
```

```
//lamp
*color("white")
    translate([0,0,coverH])
        cylinder(h=2,d=lampD);

color("white") union(){
    difference(){
        cylinder(h=coverH,d=coverD);
        translate([0,0,-.1]) cylinder(h=coverH+.2,d=coverInD);
    }
    translate([0,0,coverH])
    difference(){
        cylinder(h=lampH,d=lampD+coverRidgeW);
        translate([0,0,-.1]) cylinder(h=lampH+.2,d=lampD+1);
    }
}
```

Ikea-Repair - Project

ikeabung - 3D Object

This was a replacement foot for an IKEA shelf.

The actual foot was screwed in with a bolt on the underside.

Figure 4. image

Listing 4. Openscad source

```
$fn=100;
totH=30;
baseH=6;
baseW=32;
wingW=3.5;
wingD=8;
centreD=17;

for (i = [0:360/6:360]) {
rotate([0,0,i]) translate([((baseW-2)/2)-wingD,-wingW/2,baseH])
cube([wingD,wingW,totH-baseH]);
}

difference(){
    union(){
        cylinder(h=totH,d=centreD);
        cylinder(h=6,d=32);
        translate([0,0,baseH]) cylinder(h=6,d1=baseW-2,d2=22);
```

```
        }
    translate([0,0,-.1]) cylinder(h=totH+.2,d=8.2);

    translate([0,0,-.1]) cylinder(h=8.1,d=15,$fn=6);
}
```

Liebherr - Project

fridgeDoorInterimHandle - 3D Object

Figure 5. image

Listing 5. Openscad source

```
$fn=360;
Height=100;
Diameter=18;
HolePos=(Height/2);
HoleDiam=3;
HoleDepth=10;
```

```
difference () {
    hull() {
        translate([0,0,0])
            cylinder(h=1,d2=Diameter,d1=Diameter-2);
        translate([0,0,Height])
            cylinder(h=1,d1=Diameter,d2=Diameter-2);
    }
    translate([0,0,HolePos])
        rotate([90,0,0])
            cylinder(h=HoleDepth,d=HoleDiam);
}
```

Model-Plane - Project
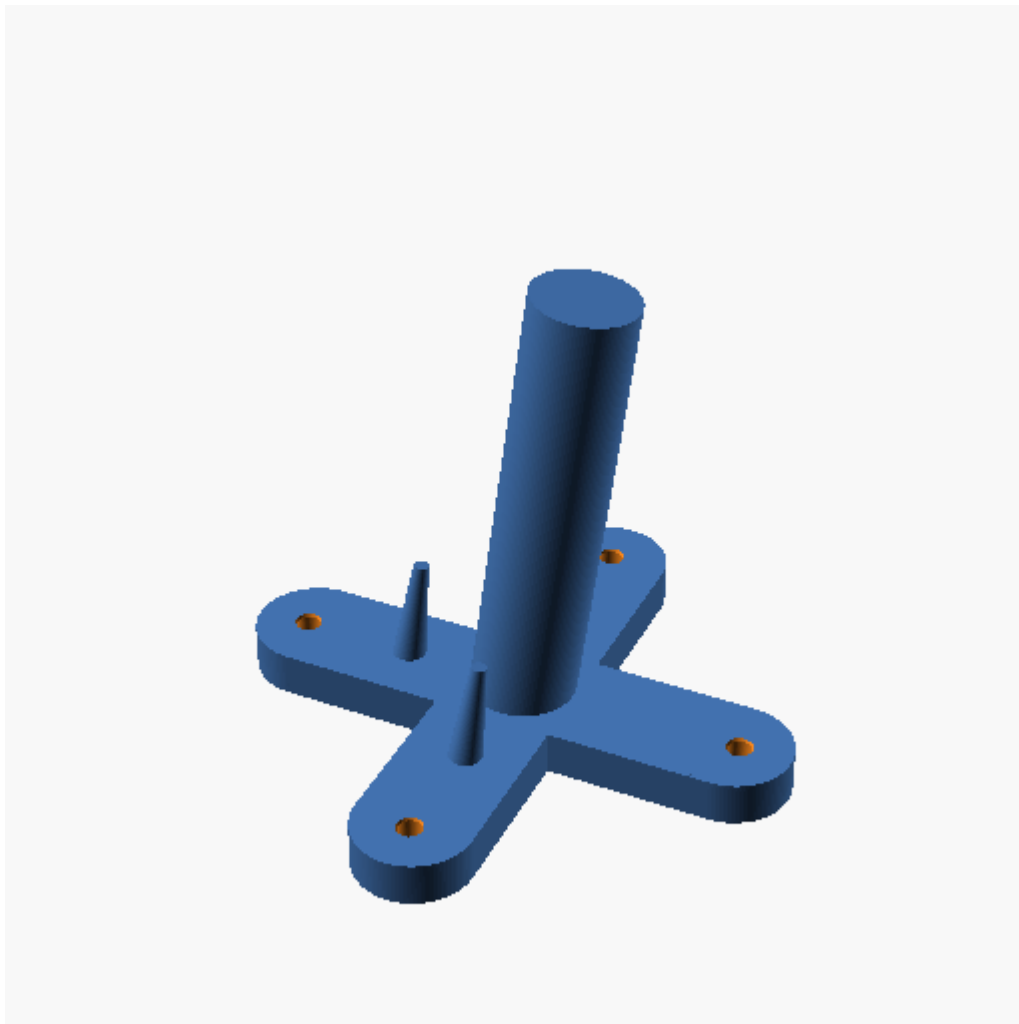
mountingplateaircraftmotor - 3D Object

Figure 6. image

Listing 6. Openscad source

```
//second attempt with rotated arms so as to save on cutting out.
//set number of faces higher so that the cylinder doesn't lok like a pentagon
$fn=100;
//global vars
//text font Arial and so far size under 1.8 didn't show in print.....
font = "Arial";
letter_size = 2.5;
letter_height = 1.5;
line1="Ser#1";
line2="VSR";
line3="V6";
//pin depth into airframe of the wooden original was 30 test prints 20 is enough
//also of note is that I had to rotate the blasted pin by 45 and 3° as I drilled
the hole wrong. guess might be 5 or 6 (angle2) and one or two (angle1) to the
side
pinheight=30;
pinangle1=2;
pinangle2=7;
//radius of the mounting holes
screwhole=.81;
holeOffset=15.5;
//radius of screw hole opening
flare=1;

module letter(l) {
    // Use linear_extrude() to make the letters 3D objects as they
    // are only 2D shapes when only using text()
    linear_extrude(height = letter_height) {
        text(l, size = letter_size, font = font);
    }
}

//this is the 4 armed mount with drill holes
module mount()
    {
    union(){
        for ( arm = [0:90:360]){
            rotate([0,0,arm])
                //arm with drill hole
                difference(){
                    union(){
                        //arm
                        translate ([0,-4,0]) cube([15,8,3] );
                        //rounded tip
                        translate ([15,0,0]) cylinder(h=3, r1=4, r2=4);
                        }
                    //  subtract drill hole plus additional
                    translate([holeOffset,0,0]) cylinder(h=3, r1=screwhole,
```

```
r2=screwhole);
                    //flaring
                    translate([holeOffset,0,2.8]) cylinder(h=.5, r1=screwhole,
r2=flare);
                    translate([holeOffset,0,0]) cylinder(h=.25, r1=flare,
r2=screwhole);
                    //central mounting hole for spindle
                    cylinder(h=1.5, r1=2.5, r2=2.1);
                }
            }
        }
    }


module mountpluspin()
{
//the mount and the pin for insertion into the aircraft body
    union(){
        mount();
        //central mounting rod should be 30 long as measured but shorter    for
test prints
        //aslo of note is that I had to rotate the blasted pin by 45 and 3° as I
drilled the hole wrong. guess is 3° might be 5 or 6
        rotate ([pinangle1,pinangle2,45]) translate ([0,0,2])
cylinder(h=pinheight, r1=3.5, r2=3.5);
        *translate ([4,1,2.2])  letter (line1);
        *rotate(90,90,90) translate ([4,-1,2.2])  letter (line2);
        *translate ([4,-3,2.2])  letter (line3);
        }
}
//add some antispin pegs.
union (){
    mountpluspin();
    translate ([0,-8,2]) rotate ([pinangle1,pinangle2,45]) cylinder(h=8, r1=1.2,
r2=.5);
    translate ([-8,0,2]) rotate ([pinangle1,pinangle2,45]) cylinder(h=8, r1=1.2,
r2=.5);
}
```

Test - Project

Test - 3D Object

Just a simple example and also used as the logo for this repo.

Figure 7. image

Listing 7. Openscad source

```
//just a simple test drawing
$fn=100;
cube([10,10,10]);
#sphere(d=12);
```

VSAGCRD-Logo - Project

vsagcrd - 3D Object

Figure 8. image

Listing 8. Openscad source

```
//Script to create a wire mesh cube with 8x8x8 empty spaces
//Virtual Space and
//Global communications research department
//logo base object with 8.2 cm side length
//consisting of the multiplied basic primitives of
//an x,y,and z axis beam iterate in one dimension in loops
//also includes the inner primitive (in 3 flavours)
$fn=100;
module x_beam(){ //just a cube with parameters in one place
    cube([82,2,2]);
}
module y_beam(){ //just a cube with parameters in one place
    cube([2,82,2]);
}
module z_beam(){ //just a cube with parameters in one place
    cube([2,2,82]);
}
module x_block(){ //primitive used for 8 points in the 3d grid
```

VSR - Un-classified

```
    *color([0,1,0]) translate ([02,02,02]) cube([8,8,8]);
    translate ([6,6,6]) sphere (r=1);
}
module vsr_cube(){ //loops for the xyz forests of beams
    union(){
        //xbeam
        for (xj=[0:10:80]){
            for (xi=[0:10:80]){
                translate([0,xi,xj])
                x_beam();
            }
        }
        //ybeam
        for (yj=[0:10:80]){
            for (yi=[0:10:80]){
                translate([yi,0,yj])
                y_beam();
            }
        }
        //zbeam
        for (zj=[0:10:80]){
            for (zi=[0:10:80]){
                translate([zi,zj,0])
                z_beam();
            }
        }
    }
}
module inner_vsr_cube(){ //the manual inner cube
    union(){
        //first set
        hull() {
            translate ([30,50,70]) x_block();
            translate ([10,10,60]) x_block();
        }
        hull() {
            translate ([70,40,50]) x_block();
            translate ([50,00,40]) x_block();
        }
        hull() {
            translate ([20,70,30]) x_block();
            translate ([00,30,20]) x_block();
        }
        hull() {
            translate ([60,60,10]) x_block();
            translate ([40,20,00]) x_block();
        }
        //second set
        hull() {
            translate ([30,50,70]) x_block();
```

```
                translate ([20,70,30]) x_block();
        }
        hull() {
                translate ([10,10,60]) x_block();
                translate ([00,30,20]) x_block();
        }
        hull() {
                translate ([70,40,50]) x_block();
                translate ([60,60,10]) x_block();
        }
        hull() {
                translate ([50,00,40]) x_block();
                translate ([40,20,00]) x_block();
        }
        //third set
        hull() {
                translate ([30,50,70]) x_block();
                translate ([70,40,50]) x_block();
        }
        hull() {
                translate ([10,10,60]) x_block();
                translate ([50,00,40]) x_block();
        }
        hull() {
                translate ([20,70,30]) x_block();
                translate ([60,60,10]) x_block();
        }
        hull() {
                translate ([00,30,20]) x_block();
                translate ([40,20,00]) x_block();
        }
    }
    //fourth full set as option
    *hull() { //hull over all 8 points in 3d space
        translate ([30,50,70]) x_block();
        translate ([10,10,60]) x_block();
        translate ([70,40,50]) x_block();
        translate ([50,00,40]) x_block();
        translate ([20,70,30]) x_block();
        translate ([00,30,20]) x_block();
        translate ([60,60,10]) x_block();
        translate ([40,20,00]) x_block();
    }
}
//paint the outer framed cube 8x8x8
vsr_cube();
//paint the inner cube either as wire or solid or points
*inner_vsr_cube();
```

VSR - Un-classified

Vacuum-rig-adapter - Project

Hose_Adaptor - 3D Object

Not one of mine:
Created by Paul Tibble - 18/7/19
* https://www.thingiverse.com/Paul_Tibble/about

Figure 9. image

Listing 9. Openscad source

```
/////////////////////////////////////////////////
// Created by Paul Tibble - 18/7/19             //
// https://www.thingiverse.com/Paul_Tibble/about     //
// Please consider tipping, if you find this useful.  //
/////////////////////////////////////////////////


$fn = 100*1;


// Outer Diameter (bottom)
```

```
outer_diameter_1 = 15;
// Wall Thickness (bottom)
wall_thickness_1 = 2;
// Rib Thickness (bottom), set to Zero to remove
barb_size_1 = 0.5;
// Length (bottom)
length_1 = 15;
// Outer Diameter (top), should be smaller than or equal to Outer Diameter
(bottom)
outer_diameter_2 = 12;
// Wall Thickness (top)
wall_thickness_2 = 1;
// Rib Thickness (top), set to Zero to remove
barb_size_2 = 0.5;
// Length (top)
length_2 = 15;
// Middle Diameter
mid_diameter = 17;
// Middle Length
mid_length = 5;


//do not change these
inner_diameter_1 = outer_diameter_1 - (wall_thickness_1*2);
inner_diameter_2 = outer_diameter_2 - (wall_thickness_2*2);

module create_profile() {
    ////////
    // Middle
    ///////

polygon(points=[[inner_diameter_1/2,length_1],[mid_diameter/2,length_1],[mid_dia
meter/2,length_1+mid_length],[inner_diameter_2/2,length_1+mid_length]]);
    //////
    //length 1
    /////
    translate([inner_diameter_1/2,0,0])square([wall_thickness_1,length_1]);
    //barb 1

translate([outer_diameter_1/2,0,0])polygon(points=[[0,0],[0,(length_1/5)],[barb_
size_1,(length_1/5)]]);
    //barb 2

translate([outer_diameter_1/2,length_1*0.25,0])polygon(points=[[0,0],[0,(length_
1/5)],[barb_size_1,(length_1/5)]]);
    //barb 3

translate([outer_diameter_1/2,length_1*0.5,0])polygon(points=[[0,0],[0,(length_1
/5)],[barb_size_1,(length_1/5)]]);
    //////
```

```
    //length 2
    /////

translate([inner_diameter_2/2,length_1+mid_length,0])square([wall_thickness_2,le
ngth_2]);
    //rib 1

translate([outer_diameter_2/2,(length_1+mid_length+length_2),0])polygon(points=[
[0,0],[0,-1*(length_2/5)],[barb_size_2,-1*(length_2/5)]]);
    //rib 2
    translate([outer_diameter_2/2,(length_1+mid_length+length_2)-
length_2*0.25,0])polygon(points=[[0,0],[0,-1*(length_2/5)],[barb_size_2,-
1*(length_2/5)]]);
    //rib 3
    translate([outer_diameter_2/2,(length_1+mid_length+length_2)-
length_2*0.5,0])polygon(points=[[0,0],[0,-1*(length_2/5)],[barb_size_2,-
1*(length_2/5)]]);
}

rotate_extrude(angle = 360, convexity = 10) create_profile();
//create_profile();
```

desk - Project

fastener - 3D Object

This is a fastener for a writing Desk.
The idea is to add a magnet to hold it up and to print it so that it does not require a bearing.

- V1 is the first prototype for a first print test and fitting test

  - fits well and axle didn't print free so need update

  - The reason was that the axle required supports winside the part to build

  - Changed the axle to 45 degree angles to negate the need for supports

- V2 added a better axle but didn't get printed

- V3 added a better cutout and is printed

  - The cutout is currently a dummy pending getting the axle to work to try it out with magnets taped into place

  - axle prints freely so moving on to screw holes, magnets, and covers

- V4 Added final OCD logo and screw caps etc.

  - Mounted and working.
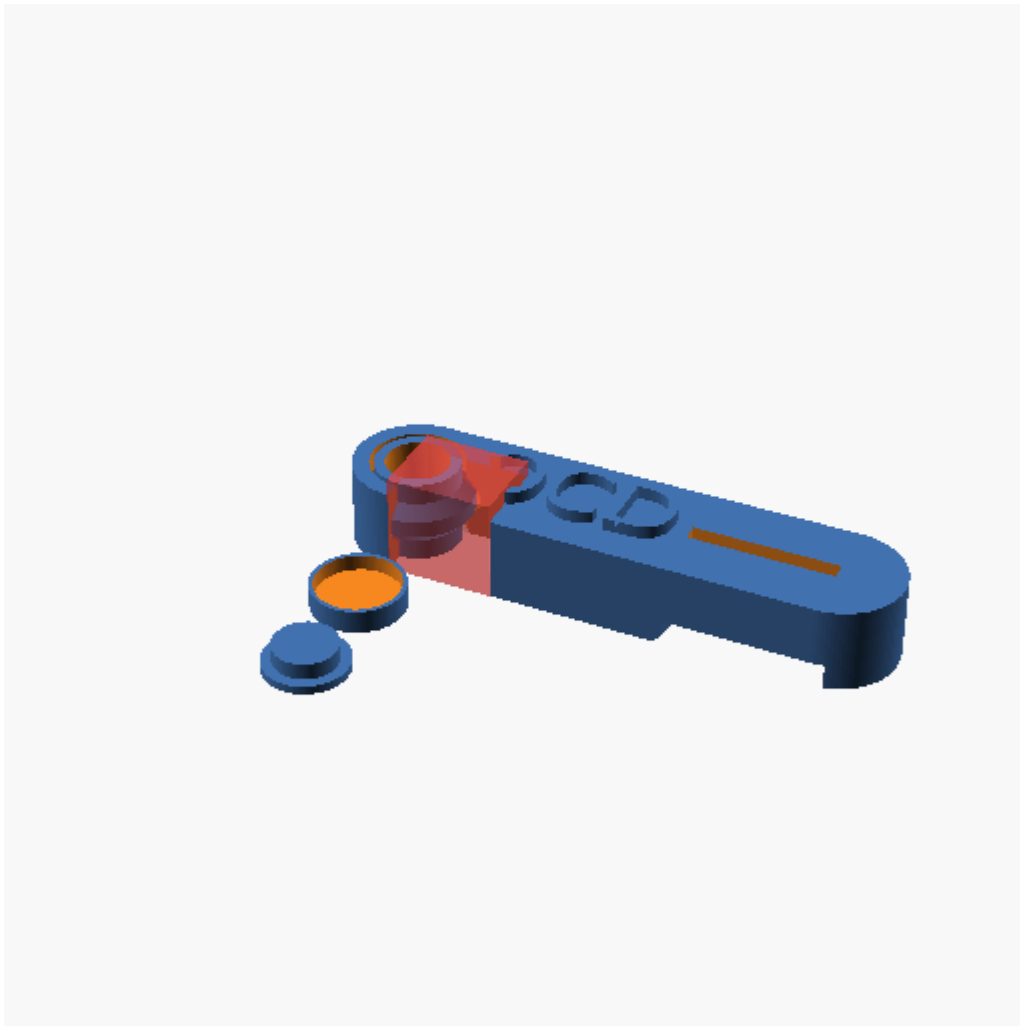
Figure 10. image

Listing 10. Openscad source

```
$fn=100;
mainLength=50;
mainD=15;
mainH=10;
axleD=10;
axleDout=axleD+3;
ringH=2;

magnetX=17;
magnetY=5;
magnetZ=2;

module axle(xxlX,xxlY) {
    translate([0,0,-xxlY/2])cylinder(h=mainH+xxlY,d=axleD+xxlX);
    translate([0,0,((mainH-ringH)/2)]) cylinder(h=ringH,d=axleDout+xxlX);
    translate([0,0,(mainH/2)-((axleDout-axleD)/2+ringH/2)])
cylinder(h=(axleDout-axleD)/2,d1=axleD+xxlX,d2=axleDout+xxlX);
    translate([0,0,(mainH/2)+(ringH/2)]) cylinder(h=((axleDout-
```

```
axleD)/2),d2=axleD+xxlX,d1=axleDout+xxlX);
}
module clip() {
    difference() {
        union(){
            hull(){
                cylinder(d=mainD,h=mainH);
                translate([mainLength,0,0]) cylinder(d=mainD,h=mainH);
            }
            translate([7,-3.5,mainH]) linear_extrude (height=1.5) {
                text("OCD",size=8);
            }
        }
        //magnet
        translate([mainLength-magnetX,-magnetZ/2,(mainH-magnetY)/2+1])
cube([magnetX,magnetZ,magnetY+10]);
        //holder
        holderW=19;
        holderRin=33;
        holderRout=holderRin+holderW;
        difference(){
            translate([0,0,-.1]) cylinder(h=3+.1,r=holderRout);
            translate([0,0,-.11]) cylinder(h=3+.22,r=holderRin);
        }
    }
}
module magnetCap(){
    //magnet cap
    difference(){
        cylinder(h=2.8,d=11);
        translate([0,0,-.1]) cylinder(h=2,d=10);
    }
}
module screwCap() {
    //screwcap axle
    cylinder(h=2,d=7.5);
    translate([0,0,2]) cylinder(h=1,d=axleD);
}

//add the clip
difference () {
    clip();
    axle(1,1);
    //REMOVE FOR PRINT!!!! JUST A CUTOUT FOR DEMO
    #translate ([0,-mainD/2-.1,-.01]) cube([mainLength/4,mainH,12]);
}

//add the axle and drill a hole in it for a srew
difference(){
    axle(0,0);
```

```
    translate([0,0,-.05]) cylinder(h=mainH+.1,d=4);
    translate([0,0,mainH/2]) cylinder(h=(mainH/2)+.1,d=7.5);
    //next two lines just a visual
    //#translate([0,0,mainH+2]) screwCap();
    //#translate([42,0,-.5]) magnetCap();
}
translate([0,-27,3]) rotate([0,180,0]) screwCap();
translate([0,-15,3]) rotate([0,180,0]) magnetCap();
```

fritzring - Project

fritzcolaadapter - 3D Object

Figure 11. image

Listing 11. Openscad source

```
$fn=300;
//35mm measured fromn the 3 initial rings plus 2 mm
height=35;
```

```
//following testing only
height=5;
innerD=61.8 ;
// outerD=66 is good enough for the upper 1/3 part of the zoe can holder
// outerD=65 is good enough for the middle 1/3 part of the zoe can holder
// inner D 61 sticks just a slight bit on the fritzcola bottles but works
// turns out that while innerD 61.2 is fine for the one bottle I tested with the
others are wider
// testing with .5mm extra
// and exchange upper and lower D to make it grow thinnner upwards
// should probably add three indents to make it fit even better but hey....
iterative :-)
// 61.7 sticks just slightly so adding.1mm
lowerOuterD=64;
upperOuterD=66.5;
module flange () {
    difference(){
        translate([0,0,.5]) cylinder(d2=lowerOuterD,d1=upperOuterD,h=height);
        cylinder(d=innerD,h=height+1);


    }
}
flange();
```

geo-test - Project

geoTest - 3D Object

This is not one of mine and I just kiked it as a good example.
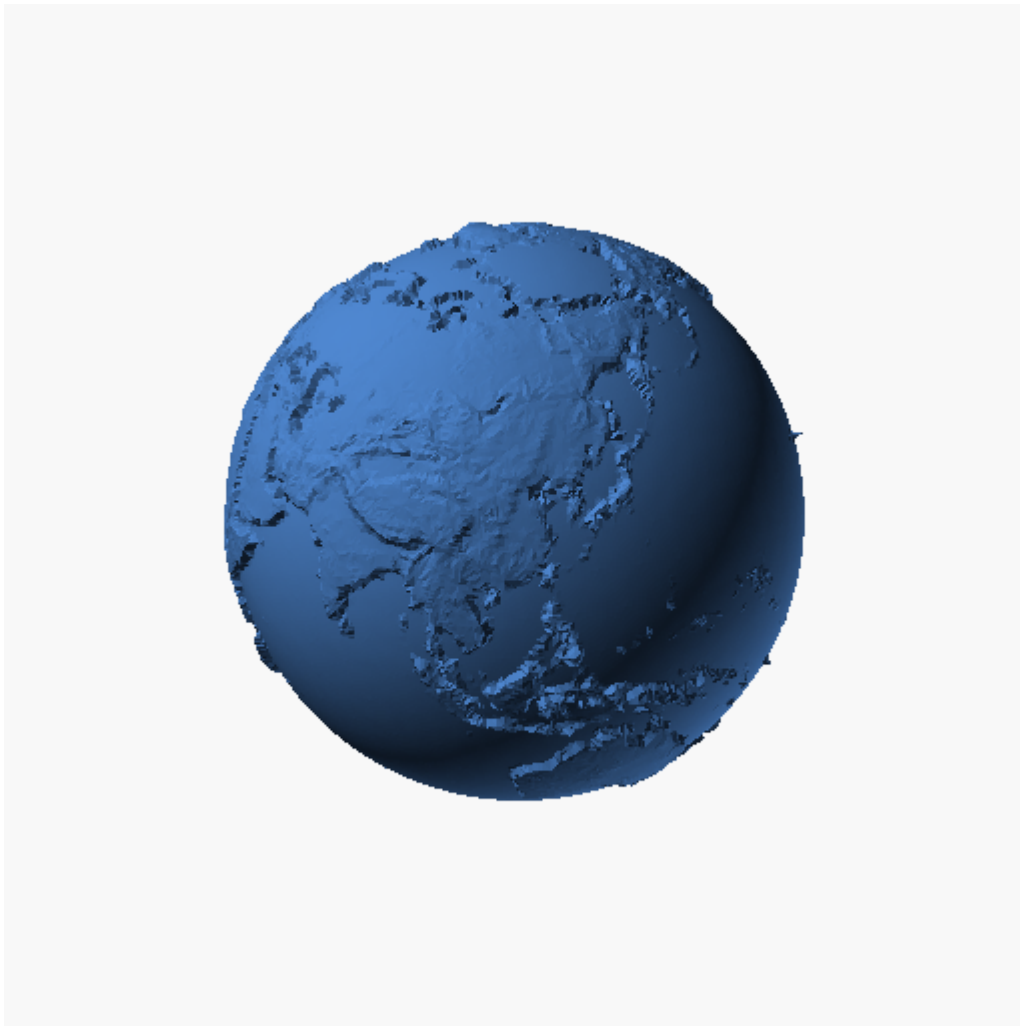I did correct some mistakes in it though.

Figure 12. image

Listing 12. Openscad source

```
// Geody Planet 1 - SCAD
// Geody - https://www.geody.com/
// OpenSCAD - http://www.openscad.org/

wwrad=40; // Radius of the Planet
wrad=wwrad/20; // Radius of the Spot
wradp=wwrad-wrad/2; // Distance of the Spot from the center of the Planet
wres=50; // Resolution of the Spot

latx=48.782345; lonx=9.180819;

rotate(a=[0,0,270]) { import("geody_earthmap.stl", convexity=4); }
// download from https://www.geody.com/geody_earthmap.stl
// sphere(r=wwrad, $fn=wres); // Test Planet

translate([(-wradp)*cos(latx)*cos(lonx),(-
wradp)*cos(latx)*sin(lonx),wradp*sin(latx)]){sphere(r=wrad, $fn=wres);}
```

VSR - Un-classified

kitchen-door - Project

KitchenDoorHoleStopper - 3D Object

Figure 13. image

Listing 13. Openscad source

```
//plug for door hinge mounting hole (WHITE)
// door replaced by sliding glass door 27/11/2021
totDepth=15;
insertDiameter=7;
lidDiameter=14;
lidHeight=1;
$fn=100;
color ([1,1,1]) {
    cylinder(h=totDepth,d=insertDiameter);
    cylinder(h=lidHeight,d2=lidDiameter,d1=lidDiameter-lidHeight);
}
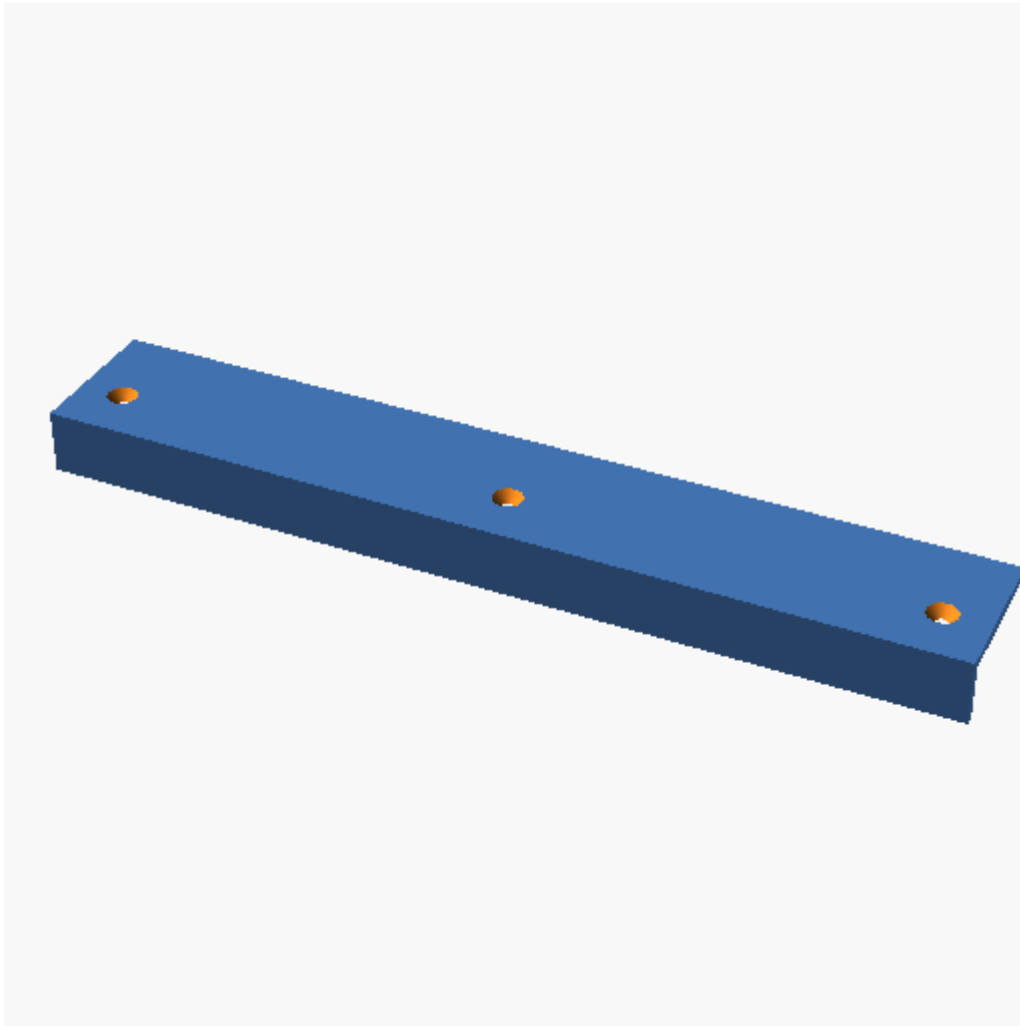```

## strikeplate - 3D Object



*Figure 14. image*

*Listing 14. Openscad source*

```
$fn=100;
SPlength=170;
SPwidth=28;
SPmaterialStrength=2;
;
module strikePlate () {
    cube ([SPlength,SPwidth,SPmaterialStrength]);
    translate ([0,0,-10])
        cube ([SPlength,SPmaterialStrength,10]);
}

module screw () {
    *cylinder(h=8,d=3);
    cylinder(h=3,d1=2,d2=7);
}
```

VSR - Un-classified

```
difference(){
    strikePlate();
    translate([8.5,10.5,-0.1]) screw();
    translate([85,10.5,-0.1]) screw();
    translate([SPlength-8.5,10.5,-0.1]) screw();
}
;
```
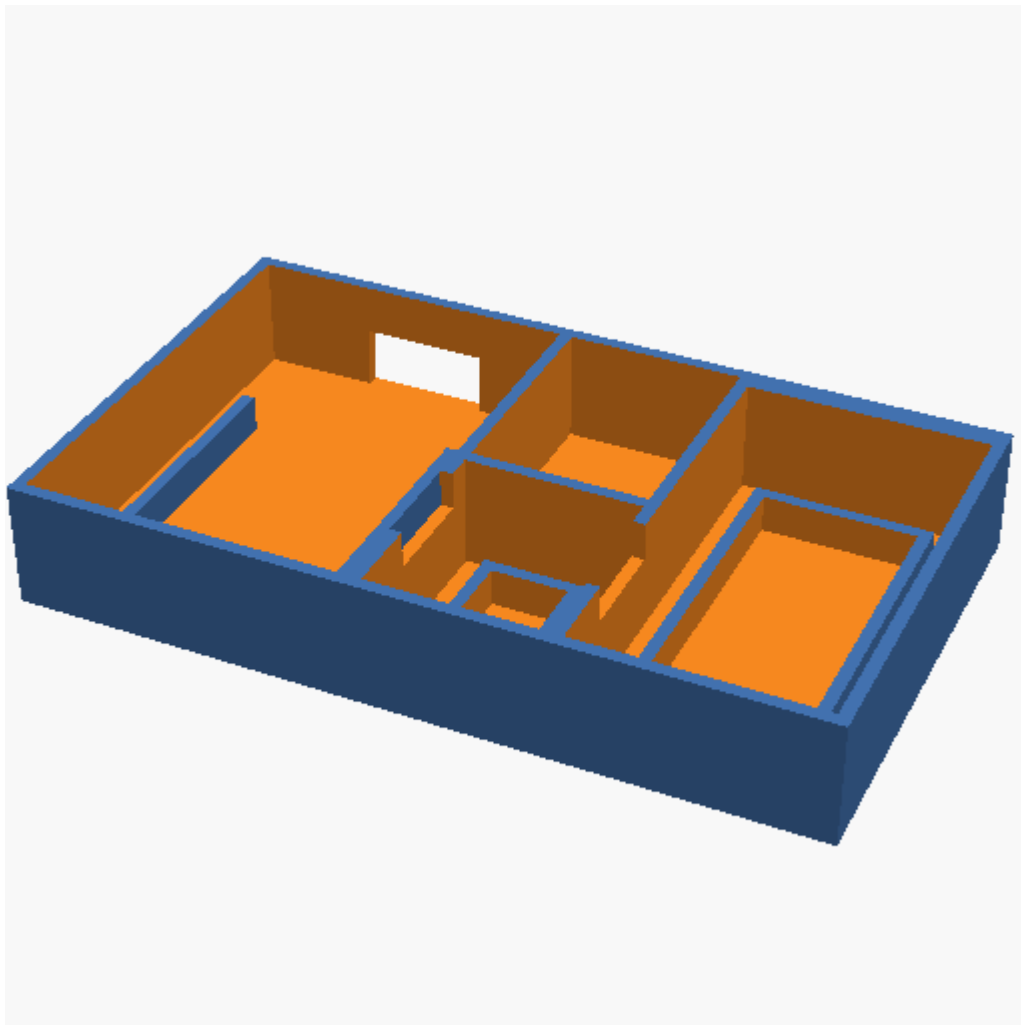
led-Casing - Project

CasingLED - 3D Object

Figure 15. image

Listing 15. Openscad source

```
// OPENSCA Model for encloser for Tine's table
// Curently 3 devices Waatuino, 3.3v to 5v and esp wemos d1 mini
$fn=100;
wiggle=0.01;
```

```
module wemos(){
    difference(){
        union(){
            //wemos d1 mini 26mmx35mm h7mm
            cube([26,35,10]);
            translate([9,32,0]) cube([10,5,5]);
        }
        translate([3,5,-wiggle]) cube([1,20,3+wiggle]);
        translate([21,5,-wiggle]) cube([1,20,3+wiggle]);
    }
}
module v5v3(){
    union(){
        difference(){
            //volatege level shifter 5v 3v 14mmx16mm h7mm
            cube([14,16,10]);
            translate([3,3,-wiggle]) cube([8,10,3+wiggle]);
        }
        translate([4,4,0]) cube([6,8,3+wiggle]);
    }
}
module blanker(){
    //volatege level shifter 5v 3v 14mmx16mm h7mm
    cube([14,18,10]);
}
module wattuino(){
    //wattuino arduino 5v clone 22mmx32mm h7mm
    union(){
        difference(){
            cube([19,34,10]);
            translate([2.5,4,-wiggle]) cube([14,26,3+wiggle]);
        }
        translate([3.5,5,0]) cube([12,24,3+wiggle]);
    }
}
module casing(){
    //outer casing
    cube([63,37,10]);
}
module cabling(){
    //cabling boom
    cube([50,8,3.01]);
}
module enclosure(){
    //outer casing and substract
    difference(){
        casing();
        translate([1,1,1]) wemos();
        translate([28,1,1]) v5v3();
        translate([43,1,1]) wattuino();
```

```
        translate([28,18,1]) blanker();
        translate([7,7,7]) cabling();
        }
}

enclosure();
```

midleton - Project

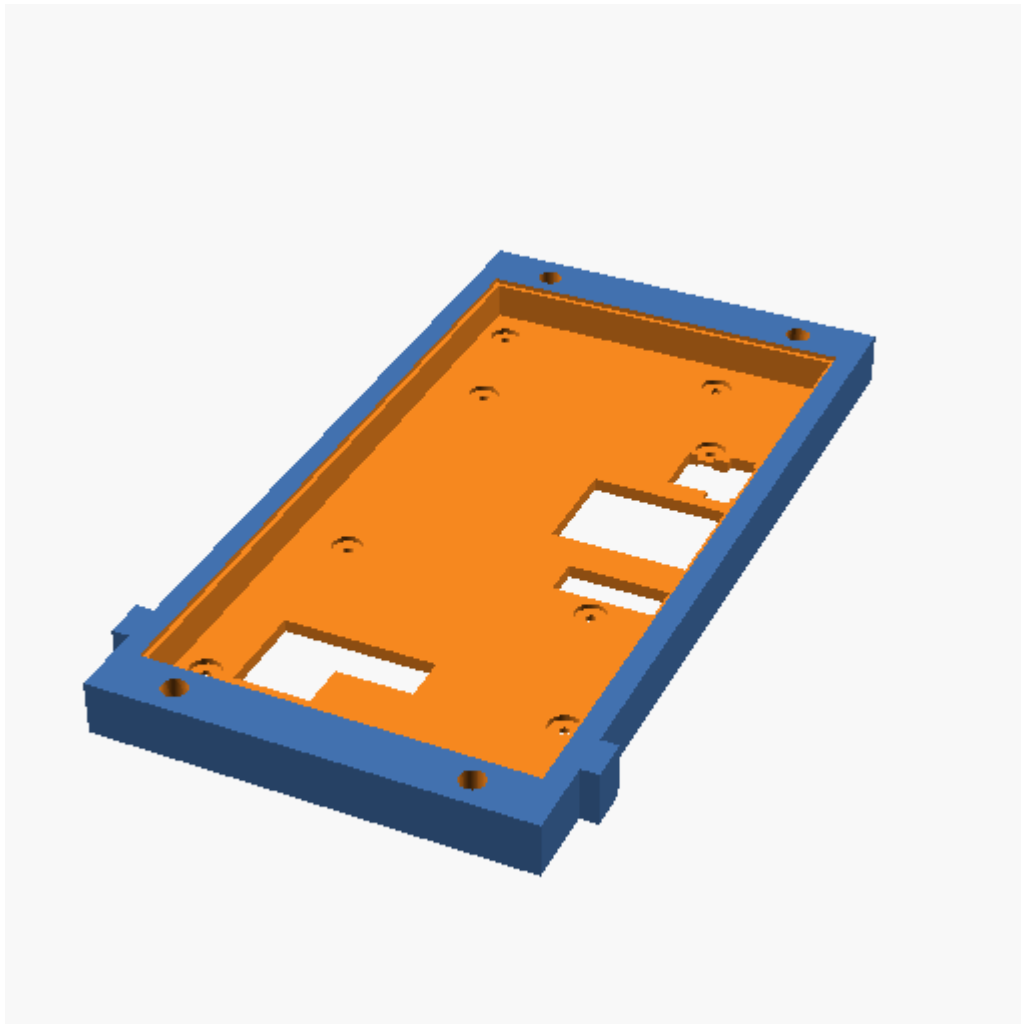## midletoninset - 3D Object

Figure 16. image

Listing 16. Openscad source

```
//This is an inlet for a whiskey presentation box from Midleton
$fn=50;
//Lower Notches
LowerNotchDepth=3.5;
LowerNotchLength=8;
LowerRNotchLengthOffset=15;
```

```
LowerLNotchLengthOffset=14.3;
module LLnotch(LowerLNotchLengthOffset){
    //Lower Left Notch
    translate([-LowerNotchDepth,LowerLNotchLengthOffset,0])
        cube([LowerNotchDepth,LowerNotchLength,BoxHeight]);
}
module LRnotch(LowerRNotchLengthOffset){
    //Lower Right Notch
    translate([BoxWidth,LowerRNotchLengthOffset,0])
        cube([LowerNotchDepth,LowerNotchLength,BoxHeight]);
}

//Variables for screen
ScreenTopY=75;
ScreenTopX=141;
ScreenTopZ=1;
ScreenEdge=1;
ScreenMaxDepth=7;
module waveshareHDMIscreen(wiggle){
    //full hd screen top face
    //and yes it has rounded corners but let's just start simple.
    union(){
        //Screen dimensions
        cube([ScreenTopY,ScreenTopX,ScreenTopZ+wiggle]);
        translate([ScreenEdge,ScreenEdge,-ScreenMaxDepth])
            cube([ScreenTopY-(2*ScreenEdge),ScreenTopX-
(2*ScreenEdge),ScreenMaxDepth+wiggle]);
        //connecting cable at the edge.
        translate([57,0,-ScreenMaxDepth]) cube([7,7,ScreenMaxDepth]);
        //USB for touch with offseted connector - wiggle through
        translate([12,19,-ScreenMaxDepth-10])
            cube([30,9,ScreenMaxDepth+10]);
        translate([12,10,-ScreenMaxDepth-10])
            cube([15,12,ScreenMaxDepth+10]);
        //USB for power - wriggle thrrough
        translate([65,95,-ScreenMaxDepth-10])
            cube([5,15,ScreenMaxDepth+10]);
        translate([57,97,-ScreenMaxDepth-10])
            cube([17,11,ScreenMaxDepth+10]);
        //HDMI connector - Wriggle through might not work... might have to make
hole larger
        translate([44,72,-ScreenMaxDepth-10])
            cube([30,20,ScreenMaxDepth+10]);
        //Audio?
        translate([51,56.75,-ScreenMaxDepth-4])
            cube([23,7.5,ScreenMaxDepth+4]);
        //The screw holes
        Standoffs();
        //The mounting holes for the displaycover
        translate([0+10,0-5,-ScreenMaxDepth-6])
```

```
            cylinder(h=20,d=4.8);
        translate([0+10,ScreenTopX+5,-ScreenMaxDepth-6])
            cylinder(h=20,d=4.8);
        translate([ScreenTopY-10,0-5,-ScreenMaxDepth-6])
            cylinder(h=20,d=4.8);
        translate([ScreenTopY-10,ScreenTopX+5,-ScreenMaxDepth-6])
            cylinder(h=20,d=4.8);
    }
}
StandoffDepth=9;
StandoffSpace=1;
StandoffScrewHead=2;
module HolePeg(offset1){
    //standoff
    translate([0,0,-StandoffDepth+1]+offset1)
        cylinder(h=StandoffDepth-1,r=3.05);
    //screwwshaft
    translate([0,0,-StandoffDepth-StandoffSpace+1]+offset1)
        cylinder(h=StandoffDepth+StandoffSpace-1,r=1);
    //Screw head
    translate([0,0,-StandoffDepth-StandoffSpace-StandoffScrewHead+1]+offset1)
        cylinder(h=StandoffScrewHead,r=3);
}
module Standoffs(){
    //Outside holes
    //one
    *HolePeg([6,9,0]);
    HolePeg([6.5,9.75,0]);
    //the rest
    HolePeg([69,22,0]);
    HolePeg([6,132.5,0]);
    HolePeg([53,132.5,0]);

    //inside holes
    HolePeg([11.5,52.5,0]);
    HolePeg([60.5,52.5,0]);
    HolePeg([60.5,110.5,0]);
    HolePeg([11.5,110.5,0]);
}

// Midleton box measurements
//Real total Height
//BoxHeight=61;
//Display inset Height
BoxHeight=10.5;
//testprint
//BoxHeight=8.5;
BoxWidth=83.8;
LowerPartLength=162.5;
//testing value
```

```
//LowerPartLength=50;
LowerPartWallThickness=1.5;
LowerPartFloorThickness=1.5;
module Displaymodule() {
    //Lower part of the box
    difference(){
        //Outercube
        cube([BoxWidth,LowerPartLength,BoxHeight]);
        //subtract for inner space

*translate([LowerPartWallThickness,LowerPartWallThickness,LowerPartFloorThicknes
s])
            cube([BoxWidth-2*LowerPartWallThickness,LowerPartLength,BoxHeight-
(2*LowerPartFloorThickness)]);
    }
    LLnotch(LowerLNotchLengthOffset);
    LRnotch(LowerRNotchLengthOffset);
}
//Displaymodule();
//Standoffs();
//waveshareHDMIscreen();

// put it all together
difference(){
    Displaymodule();
    //Screen
    translate([(BoxWidth-ScreenTopY)/2,(BoxWidth-ScreenTopY)/2+6,BoxHeight-
ScreenTopZ])
        waveshareHDMIscreen(.1);
    //for testprint only
    *translate([-10,10,2.5])cube([100,130,15]);
    *translate([10,-10,2.5])cube([65,160,15]);
}
//remove for print... only for animation
*translate([((BoxWidth-ScreenTopY)/2),(BoxWidth-ScreenTopY)/2+6,(BoxHeight-
ScreenTopZ)+30*(1-$t)]) waveshareHDMIscreen(0);
```

midleton2 - Project

internal-volume - 3D Object

the internal Volume of a presentation box to test ideas on.
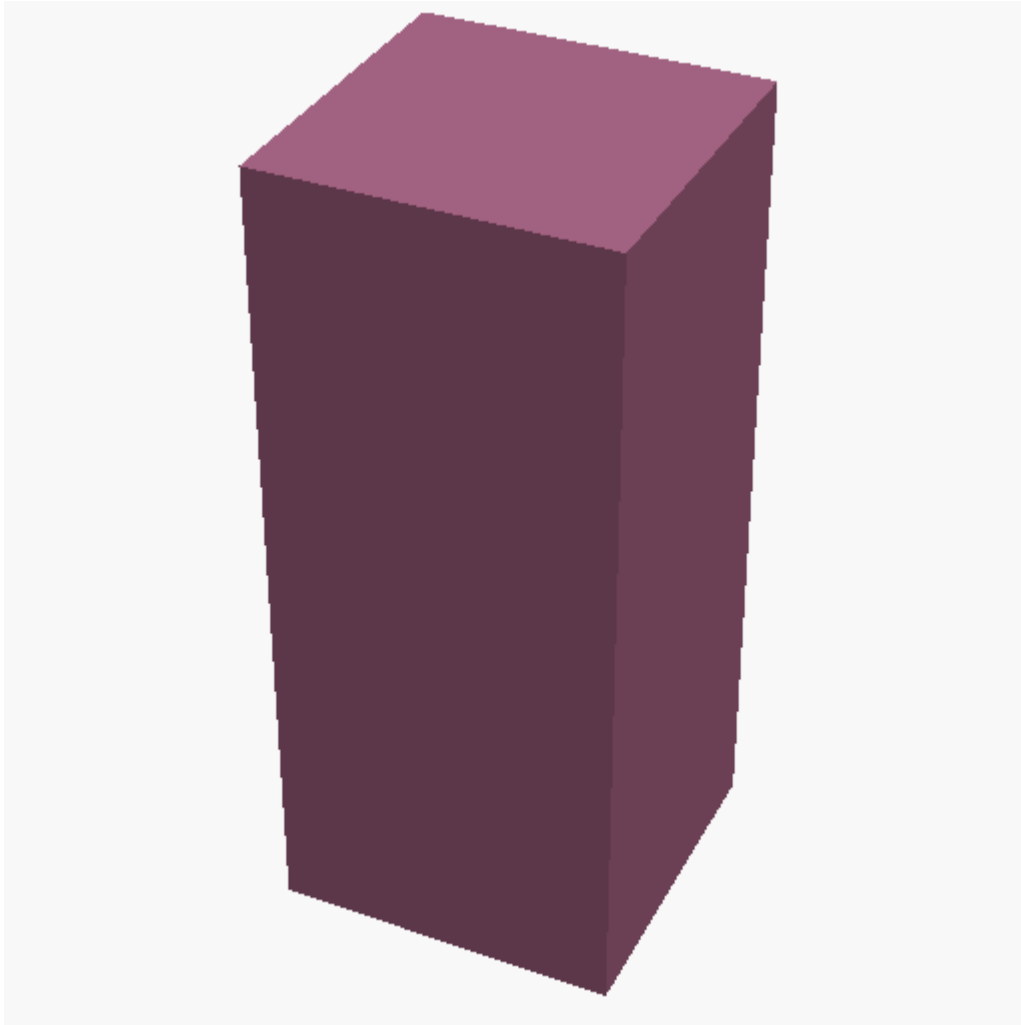
Figure 17. image

Listing 17. Openscad source

```
//inside of midleton wooden box with double doors
height=260;
width=111.1;
depth=108.5;

#cube([width,depth,height]);
```

modelTruckRepair - Project

steeringaxle - 3D Object

Figure 18. image

Listing 18. Openscad source

```
$fn=50;

module tabbedCylinder(){
    difference(){
        union (){
            cylinder(h=2,d1=3,d2=3);
            cylinder(h=4.6,d1=1.8,d2=1.8);
            translate ([0,0,3.4]) cylinder(h=1.2,d1=2.2,d2=1.8);
        }
        translate ([0,0,3.5]) cube([.6,2.5,2.5],center=true);
    }
}
module EndCylinder(){
        union (){
            cylinder(h=2,d1=3,d2=3);
            cylinder(h=4.6,d1=1.8,d2=1.8);
        }
}
```

```
module steeringAxle(){
    //axis
    translate ([1.5,0,0]) cube([34,3,2]);
    //connector
    translate ([1.5,1.5,0]) EndCylinder();
    //connector
    translate ([35.5,1.5,0]) EndCylinder();
}

steeringAxle();
translate([0,15,0]) tabbedCylinder();
```

monitor - Project

buttonBack - 3D Object

Button backing for the monitor.

Figure 19. image

Listing 19. Openscad source

```
$fn=100;
holeEndD=16.1;
holeLength=120.1;
buttonHolderHeight=.5;

hull(){
    cylinder(h=buttonHolderHeight,d=holeEndD);
    translate([holeLength-holeEndD,0,0])
cylinder(h=buttonHolderHeight,d=holeEndD);
}
```

screen_mounting_tabs - 3D Object

Figure 20. image

Listing 20. Openscad source

```
$fn=100;
tab_height=.3;
```

```
tab2bottom=2.4;

plus=.1; // this is to make parts larger than the hole they are to make
plusH=plus/2;

hole_d=2;
tab1_hole_spacing=8;
tab2_hole_spacing=6;
shim_height=tab2bottom-tab_height;
shim_depth=6;
shim_width=18;

module tab1(spacing){
    difference(){
        cube([shim_width,shim_depth,shim_height]);
        translate([shim_width/2-spacing/2,(shim_depth/2),-plusH])
            union() {
                cylinder(h=shim_height+plus,d=hole_d);
                translate([spacing,0,0]) cylinder(h=shim_height+plus,d=hole_d);
            }
    }
}

//for the bottom tabs
//tab1(tab1_hole_spacing);

//for the top tabs
tab1(tab2_hole_spacing);
```

odroid-case - Project

Library-container - 3D Object

This is the Library for the case.
I sourced the methods out so as to be able to re-use them better.

Figure 21. image

Listing 21. Openscad source

```
module nibLeft(x,y,z,nibR) {
    translate([x,y/10,0]) cylinder(h=z,r=nibR);
    translate([x,9*(y/10),0]) cylinder(h=z,r=nibR);
}
module nibRight(x,y,z,nibR) {
    translate([0,y/10,0]) cylinder(h=z,r=nibR);
    translate([0,9*(y/10),0]) cylinder(h=z,r=nibR);
}
module nibBottom(x,y,z,nibR) {
    translate([x/10,0,0]) cylinder(h=z,r=nibR);
    translate([9*(x/10),0,0]) cylinder(h=z,r=nibR);
}
module nibTop(x,y,z,nibR) {
    translate([x/10,y,0]) cylinder(h=z,r=nibR);
    translate([9*(x/10),y,0]) cylinder(h=z,r=nibR);
}
module containerOpenLid(x,y,z,rimThick,bottomThick,nibYN,nibR) {
rimR=rimThick/2;
```

```
//all 8 corners defined first
//corners should be AROUND the contained cube defined by x y z
corner000=[0,0,0];
corner0=[-rimR,-rimR,-(rimR+bottomThick)];
corner0x=[x+rimR,-rimR,-(rimR+bottomThick)];
corner0y=[-rimR,y+rimR,-(rimR+bottomThick)];
corner0xy=[x+rimR,y+rimR,-(rimR+bottomThick)];
corner0z=[-rimR,-rimR,z];
corner0xz=[x+rimR,-rimR,z];
corner0yz=[-rimR,y+rimR,z];
corner0xyz=[x+rimR,y+rimR,z];    //draw the debug contents
translate([0,0,-bottomThick]) cube([x,y,bottomThick]);
module corner0() {
    translate(corner0) sphere(r=rimR);
}
module corner0x() {
    translate(corner0x) sphere(r=rimR);
}
module corner0y() {
    translate(corner0y) sphere(r=rimR);
}
module corner0xy() {
    translate(corner0xy) sphere(r=rimR);
}
module corner0z() {
    translate(corner0z) sphere(r=rimR);
}
module corner0xz() {
    translate(corner0xz) sphere(r=rimR);
}
module corner0yz() {
    translate(corner0yz) sphere(r=rimR);
}
module corner0xyz() {
    translate(corner0xyz) sphere(r=rimR);
}
if (nibYN=="nibY") {
    nibBottom(x,y,z,nibR);
    nibLeft(x,y,z,nibR);
    nibRight(x,y,z,nibR);
    nibTop(x,y,z,nibR);
}
union(){
    //floor
    hull(){
        corner0();
        corner0x();
        corner0y();
        corner0xy();
    }
```

```
        //left
        hull(){
            corner0();
            corner0z();
            corner0y();
            corner0yz();
        }
        //right
        hull(){
            corner0x();
            corner0xy();
            corner0xyz();
            corner0xz();
        }
        //top
        hull(){
            corner0y();
            corner0yz();
            corner0xyz();
            corner0xy();
        }
        //bottom
        hull(){
            corner0();
            corner0z();
            corner0x();
            corner0xz();
        }
    }
}

// example
//caseRim=1.5;
//$fn=100;
//odH=10;
//odW=156;
//odD=73;
//odJSH=6;
//#containerOpenLid(odW,odD,odH,caseRim,odJSH-caseRim,"nibY",.6);
//cube([odW,odD,odH]);

module containerVertSlot(x,y,z,rimThick,bottomThick,nibYN,nibR) {
    rimR=rimThick/2;
    //all 8 corners defined first
    //corners should be AROUND the contained cube defined by x y z
    corner000=[0,0,0];
    corner0=[-rimR,-rimR,-(rimR+bottomThick)];
    corner0x=[x+rimR,-rimR,-(rimR+bottomThick)];
    corner0y=[-rimR,y+rimR,-(rimR+bottomThick)];
    corner0xy=[x+rimR,y+rimR,-(rimR+bottomThick)];
```

```
    corner0z=[-rimR,-rimR,z];
    corner0xz=[x+rimR,-rimR,z];
    corner0yz=[-rimR,y+rimR,z];
    corner0xyz=[x+rimR,y+rimR,z];    //draw the debug contents
    translate([0,0,-bottomThick]) cube([x,y,bottomThick]);
    module corner0() {
        translate(corner0) sphere(r=rimR);
    }
    module corner0x() {
        translate(corner0x) sphere(r=rimR);
    }
    module corner0y() {
        translate(corner0y) sphere(r=rimR);
    }
    module corner0xy() {
        translate(corner0xy) sphere(r=rimR);
    }
    module corner0z() {
        translate(corner0z) sphere(r=rimR);
    }
    module corner0xz() {
        translate(corner0xz) sphere(r=rimR);
    }
    module corner0yz() {
        translate(corner0yz) sphere(r=rimR);
    }
    module corner0xyz() {
        translate(corner0xyz) sphere(r=rimR);
    }
    if (nibYN=="nibY") {
        nibLeft(x,y,z,nibR);
        nibRight(x,y,z,nibR);
    }
    union(){
        //floor
        hull(){
            corner0();
            corner0x();
            corner0y();
            corner0xy();
        }
        //left
        hull(){
            corner0();
            corner0z();
            corner0y();
            corner0yz();
        }
        //right
        hull(){
```

```
            corner0x();
            corner0xy();
            corner0xyz();
            corner0xz();
        }
    }
}
// example
//caseRim=1.5;
//$fn=100;
//odH=10;
//odW=15;
//odD=73;
//odJSH=6;
//containerVertSlot(odW,odD,odH,caseRim,odJSH-caseRim,"nibY",.6);
//cube([odW,odD,odH]);

if (library) {} else  {
    echo("trying to compile a library!");
    linear_extrude(height = 4) {
        text("trying to compile a library!");
        }
    }
```

case - 3D Object

A case for an odroid handgeld console and accessories.

The edges are rounded and there are cutouts for the parts that protrude from the console.
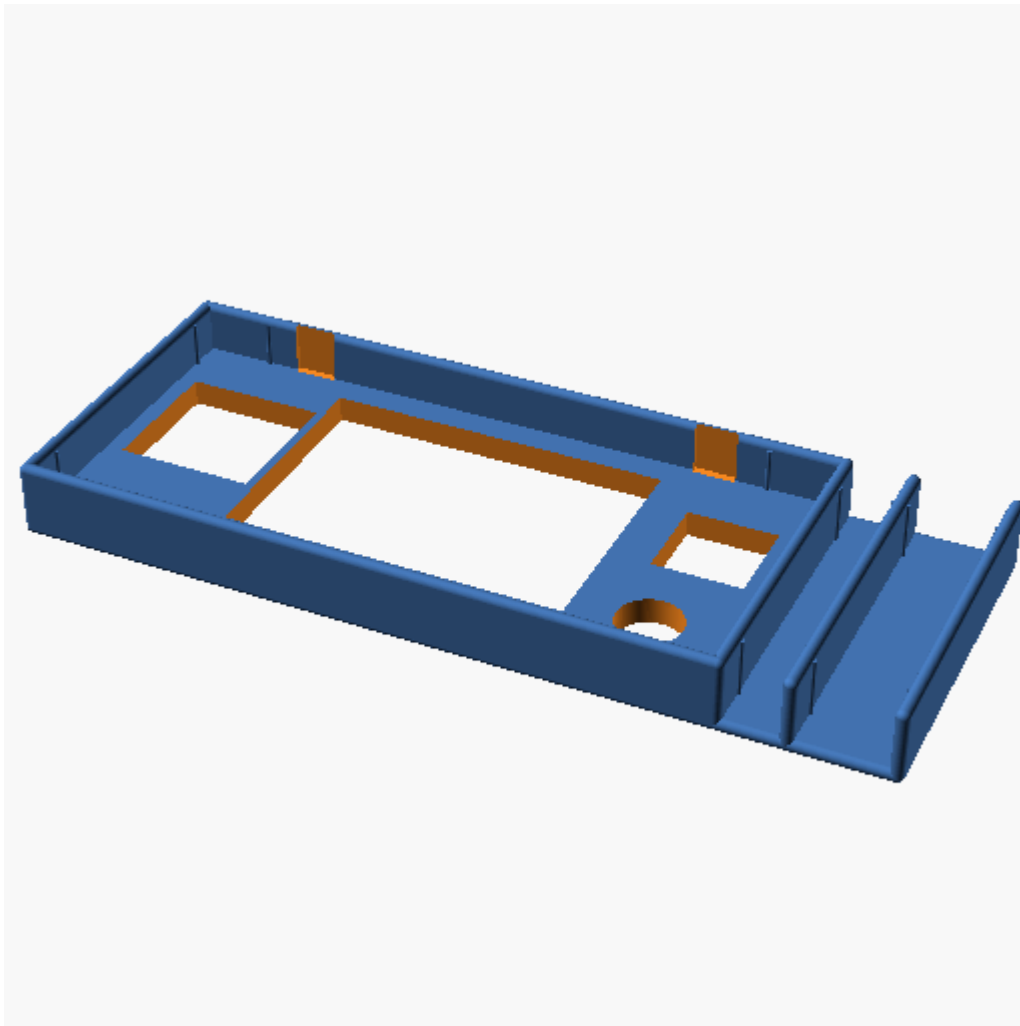
Figure 22. image

Listing 22. Openscad source

```
include <Library-container.scad>
caseRim=3;
holdersR=.7;
$fn=100;
kbD=82;
kbW=210;
kbH=7;
library=true;

odH=10;
odW=156;
odD=73;

odJSW=28-13;
odJSR=odJSW/2;
odJSoffX=13;
odJSoffY=11;
```

```
odJSH=6;
odBRW=118-38;
odBRD=12-5;
odBRoffX=38;
odBRoffY=5;
odCRW=28-7;
odCRD=58-37;
odCRoffX=7;
odCRoffY=37;
odTBW=152-120;
odTBD=61-27;
odTBoffX=120;
odTBoffY=27;
odTLoffX=23;
odTLoffY=odD;
odTLW=33-23;
odTLD=2;
odTH=20;
odTRoffX=123;
odTRoffY=odD;
odTRW=odTLW;
odTRD=odTLD;
odDPW=odBRW;
odDPD=67-14;
odDPoffY=14;
odDPoffX=odBRoffX;

//the odroid travel case with cutouts for buttons etc
difference(){
    //the container itself
    translate([caseRim/2,caseRim/2,odJSH])
containerOpenLid(odW,odD,odH,caseRim,odJSH-caseRim,"nibY",.6);
    offset=.01;
    //the cutouts
    translate([1.5,.75,-offset/2]) union() {
        translate([odW-odJSR*2-odJSoffX,odJSoffY,0]+[odJSR,odJSR,0])
cylinder(h=odJSH+offset,r=odJSR);
        translate([odW-odBRW-odBRoffX,odBRoffY,0])
cube([odBRW,odBRD,odJSH+offset]);
        translate([odW-odCRW-odCRoffX,odCRoffY,0])
cube([odCRW,odCRW,odJSH+offset]);
        translate([odW-odTBW-odTBoffX,odTBoffY,0])
cube([odTBW,odTBW,odJSH+offset]);
        translate([odW-odTLW-odTLoffX,odTLoffY,odJSH-.1])
cube([odTLW,odTLD,odTH+offset]);
        translate([odW-odTRW-odTRoffX,odTRoffY,odJSH-.1])
cube([odTRW,odTRD,odTH+offset]);
        translate([odW-odDPW-odDPoffX,odDPoffY,0])
cube([odDPW,odDPD,odJSH+offset]);
    }
```

```
}
//add on some slots for peripherals
floorDepth=0;
//microuter slot
translate([caseRim/2+caseRim+odW,caseRim/2,floorDepth])
    containerVertSlot(12,odD,odH+odJSH,caseRim,floorDepth-caseRim,"nibY",.6);
//micro USB 3 Port Hub
translate([caseRim/2+2*caseRim+odW+12,caseRim/2,floorDepth])
    containerVertSlot(19.5,odD,odH+odJSH,caseRim,floorDepth-caseRim,"nibY",.6);
```

openai - Project

I decided to have a go to see where openAI's chatGPT has its limits.
And it does have limits.
It's intersting to see that while it seems to know what an object might consist of it has a very hard time making the onject in any way accurate.
In any case it's Interesting.

esp8266case-chatgpt - 3D Object

This one is also interesting in that it does some difference etc but it's really not a model of a case.
It looks like it get's the basic premise of subtracting one thing from another etc.
On the other hand it doesn't seem to have a clue about dimensions.
Either way an interesting experimt which shows up the limitations of GPT models.
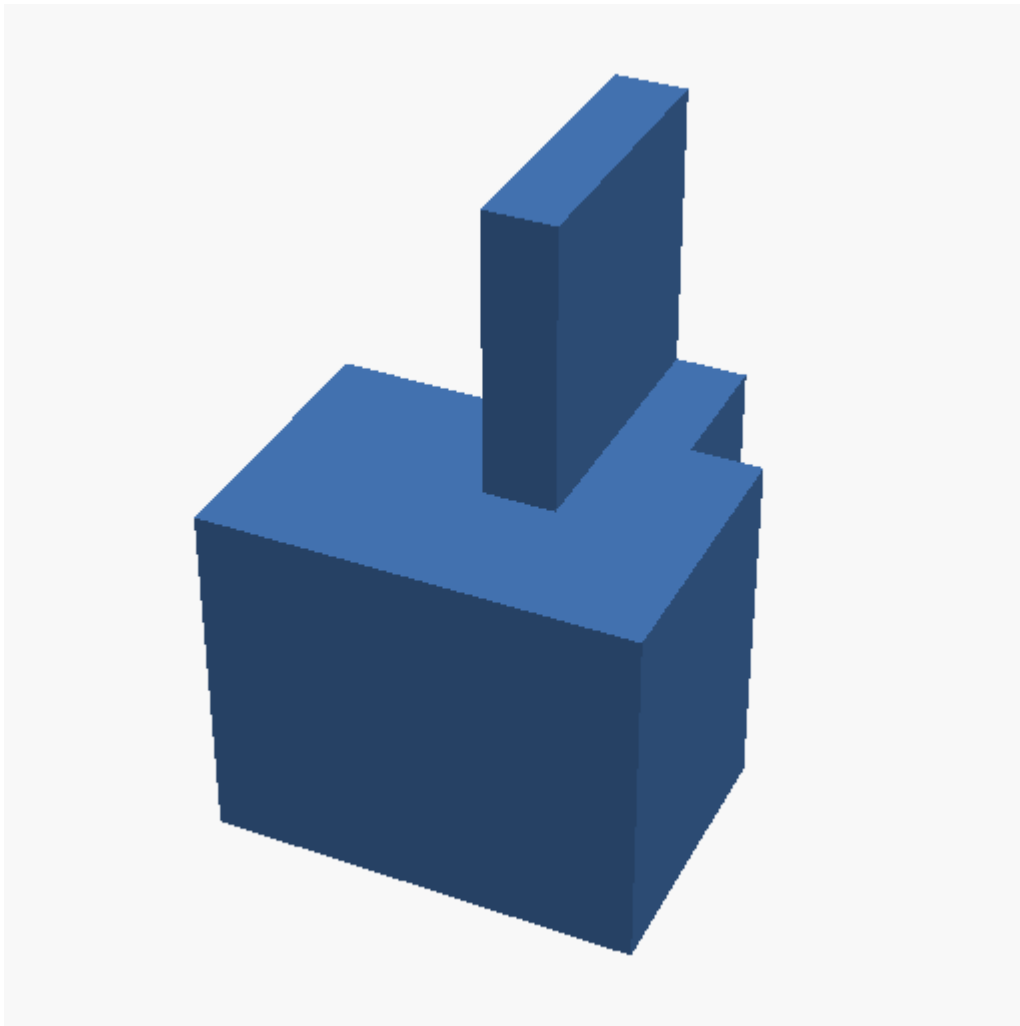
Figure 23. image

Listing 23. Openscad source

```
// Create the base of the case
translate([0, 0, 5]) {
  cube([30, 20, 10]);
}


// Create the sides of the case
translate([0, 0, 15]) {
  cube([30, 20, 10]);
  translate([15, 10, 15]) {
    rotate([0, 90, 0]) {
      cube([30, 20, 10]);
    }
  }
}

// Create the lid of the case
translate([0, 0, 25]) {
```

```
  cube([30, 20, 5]);
  translate([15, 10, 25]) {
    rotate([0, 90, 0]) {
      cube([30, 20, 5]);
    }
  }
}

// Create the opening for the ESP8266
translate([15, 10, 30]) {
  rotate([0, 90, 0]) {
    cube([20, 15, 5]);
  }
}
```

solar-generator-chatgpt - 3D Object

This is also an interesting experiment.

I asked chatGPT to make a solar generator openscad model and this came out.

On the other hand it seems to be good at figuring out what should be part of a solar generator.

I'll have to take closer look of what it did here and how hard it is to fix it.

This could be promising in total but right now it more or less seems to have hit a brick wall that seems to relate to dimensions etc.

In other words it's good at creating a structure but not so good at understanding the physics of what it made.
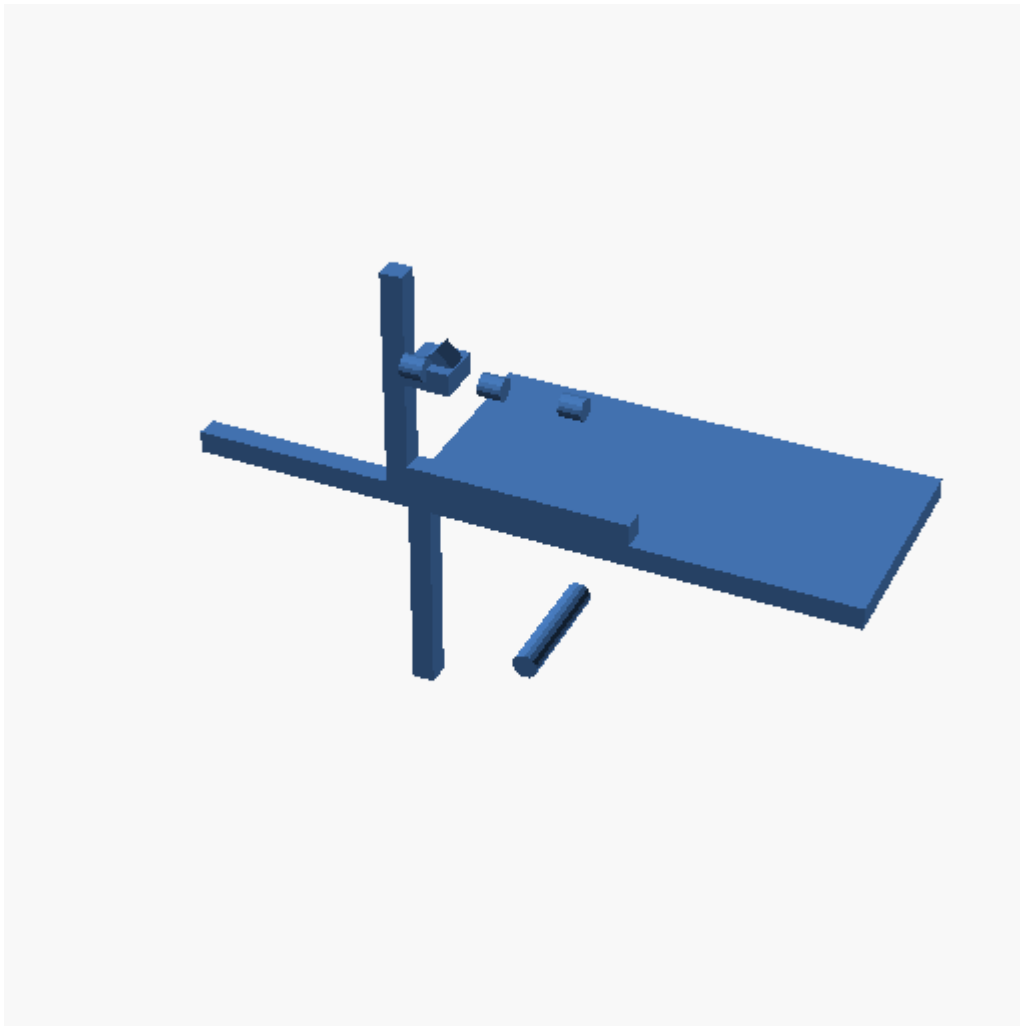
Figure 24. image

Listing 24. Openscad source

```
// Create the base of the solar generator
translate([0, 0, 5]) {
  cube([200, 100, 10]);
}

// Create the solar panels of the solar generator
translate([0, 0, 15]) {
  for (i = [0:3]) {
    rotate([0, i * 90, 0]) {
      cube([100, 10, 10]);
    }
  }
}

// Create the handle of the solar generator
translate([100, -50, 25]) {
  rotate([90, 0, 0]) {
    cylinder(r=5, h=50);
```

VSR - Un-classified

```
    }
  }

// Create the control panel of the solar generator
translate([0, 0, 65]) {
  cube([20, 20, 10]);
  translate([5, 5, 10]) {
    rotate([0, 45, 0]) {
      cube([10, 10, 10]);
    }
  }
}

// Create the outlets of the solar generator
translate([0, 0, 75]) {
  for (i = [0:2]) {
    translate([i * 35, 0, 0]) {
      rotate([0, 90, 0]) {
        cylinder(r=5, h=10);
      }
    }
  }
}
```

teacup-chatgpt - 3D Object

What chatGPT thinks a teacup could look like in openscad.
It's interesting to see that it's sructured and syntacticly more or less correct but is also not a tea cup.

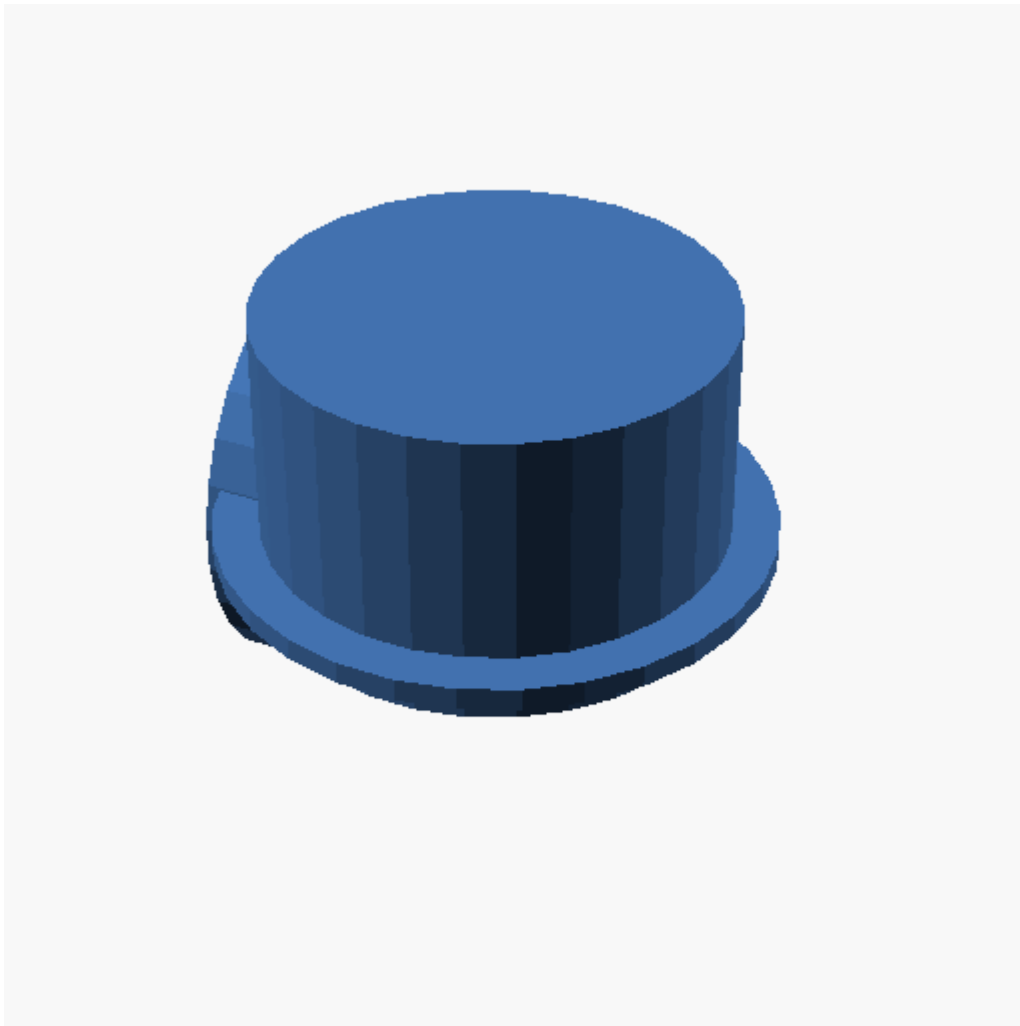*Figure 25. image*

Listing 25. Openscad source

```
// Create the base of the tea cup
cylinder(r=50, h=10);

// Create the handle of the tea cup
translate([-60, 30, 0]) {
  rotate([0, 90, 0]) {
    cylinder(r=10, h=30);
  }
}

// Create the rim of the tea cup
translate([0, 0, 10]) {
  cylinder(r=60, h=5);
}

// Create the body of the tea cup
translate([0, 0, 15]) {
  cylinder(r=50, h=50);
```

```
  }

// Cut out the handle from the body of the tea cup
translate([-60, 30, 0]) {
  rotate([0, 90, 0]) {
    difference() {
      cylinder(r=50, h=50);
      cylinder(r=10, h=30);
      }
      }
      }
```

piZero - Project

- Required for a rpi zero cluster

- need to add a few extra parts

    ◦ a holder for a USB hub

    ◦ A holder for the PSU

    ◦ some extra stuff

RPI_zero_Cluster_mounting_bracket - 3D Object

Figure 26. image

Listing 26. Openscad source

```
$fn = 100;

module mount(x, y, z)
{
    mount_h = 7;
    mount_h2 = 3;

    difference()
    {
        union()
        {
            translate([-29, 11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
center=true); }
            translate([ 29,-11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
center=true); }
            translate([-29,-11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
center=true); }
            translate([ 29, 11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
```

VSR - Un-classified

```
center=true); }

            translate([x+29, y, z + 3/2]) { cube([4, 23.0, mount_h2],
center=true); }
            translate([x-29, y, z + 3/2]) { cube([4, 23.0, mount_h2],
center=true); }

            translate([x, y - 11.5, z + mount_h2/2]) { cube([58, 4.0, mount_h2],
center=true); }
            translate([x, y + 11.5, z + mount_h2/2]) { cube([58, 4.0, mount_h2],
center=true); }


            delta=2.1;
            translate([x+35-delta, y-17.5+delta, z + mount_h/2]) rotate([0, 0,
45]) {{ cube([4, 12.0, mount_h], center=true); }}
            translate([x+35-delta, y+17.5-delta, z + mount_h/2]) rotate([0, 0,-
45]) {{ cube([4, 12.0, mount_h], center=true); }}


            translate([x-35+delta, y-17.5+delta, z + mount_h/2]) rotate([0, 0,-
45]) {{ cube([4, 12.0, mount_h], center=true); }}
            translate([x-35+delta, y+17.5-delta, z + mount_h/2]) rotate([0, 0,
45]) {{ cube([4, 12.0, mount_h], center=true); }}


        }
        union()
        {
            translate([ 29, 11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
            translate([-29, 11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
            translate([-29,-11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
            translate([ 29,-11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
        }
    }


}

module stack_joins(x, y, z)
{
    mount_h = 20;
    Ro=4;
    Ri=2.5;

    difference()
    {
        union()
```

VSR - Un-classified

```
        {
            translate([-39, 21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }
            translate([ 39,-21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }
            translate([-39,-21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }
            translate([ 39, 21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }

            translate([ 39, 21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([-39, 21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([-39,-21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([ 39,-21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Ri, center=true); }


            translate([ 39, 21.5, mount_h + mount_h * 0.35]) { sphere(r=Ri,
center=true); }
            translate([-39, 21.5, mount_h + mount_h * 0.35]) { sphere(r=Ri,
center=true); }
            translate([-39,-21.5, mount_h + mount_h * 0.35]) { sphere(r=Ri,
center=true); }
            translate([ 39,-21.5, mount_h + mount_h * 0.35]) { sphere(r=Ri,
center=true); }
        }
        union()
        {
            translate([ 39, 21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([-39, 21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([-39,-21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([ 39,-21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
        }
    }
}

module model()
{
    mount(0, 0, 0);
    stack_joins(0, 0, 0);
}

model();
```

VSR - Un-classified

RPI_zero_Cluster_mounting_bracket_v2 - 3D Object

Figure 27. image

Listing 27. Openscad source

```
$fn = 100;

module mount(x, y, z)
{
    mount_h = 7;
    mount_h2 = 3;

    difference()
    {
        union()
        {
            translate([-29, 11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
center=true); }
            translate([ 29,-11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
center=true); }
            translate([-29,-11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
```

```
center=true); }
            translate([ 29, 11.5, mount_h/2]) { cylinder(h=mount_h, r=2,
center=true); }

            translate([x+29, y, z + 3/2]) { cube([4, 23.0, mount_h2],
center=true); }
            translate([x-29, y, z + 3/2]) { cube([4, 23.0, mount_h2],
center=true); }

            translate([x, y, z + mount_h2/2]) { cube([58, 5.0, mount_h2],
center=true); }


            delta=2.1;
            translate([x+35-delta, y-17.5+delta, z + mount_h/2]) rotate([0, 0,
45]) {{ cube([4, 12.0, mount_h], center=true); }}
            translate([x+35-delta, y+17.5-delta, z + mount_h/2]) rotate([0, 0,-
45]) {{ cube([4, 12.0, mount_h], center=true); }}


            translate([x-35+delta, y-17.5+delta, z + mount_h/2]) rotate([0, 0,-
45]) {{ cube([4, 12.0, mount_h], center=true); }}
            translate([x-35+delta, y+17.5-delta, z + mount_h/2]) rotate([0, 0,
45]) {{ cube([4, 12.0, mount_h], center=true); }}

        }
        union()
        {
            translate([ 29, 11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
            translate([-29, 11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
            translate([-29,-11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
            translate([ 29,-11.5, mount_h/2 + mount_h * 0.15]) {
cylinder(h=mount_h, r=2.70/2, center=true); }
        }
    }


}

module stack_joins(x, y, z)
{
    mount_h = 20;
    Ro=4;
    Ri=2.5;
    Rp=Ri-0.4;

    difference()
    {
```

```
        union()
        {
            translate([-39, 21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }
            translate([ 39,-21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }
            translate([-39,-21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }
            translate([ 39, 21.5, mount_h/2]) { cylinder(h=mount_h, r=Ro,
center=true); }

            translate([ 39, 21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Rp, center=true); }
            translate([-39, 21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Rp, center=true); }
            translate([-39,-21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Rp, center=true); }
            translate([ 39,-21.5, mount_h/2 + mount_h * 0.35]) {
cylinder(h=mount_h, r=Rp, center=true); }

            translate([ 39, 21.5, mount_h + mount_h * 0.35]) { sphere(r=Rp); }
            translate([-39, 21.5, mount_h + mount_h * 0.35]) { sphere(r=Rp); }
            translate([-39,-21.5, mount_h + mount_h * 0.35]) { sphere(r=Rp); }
            translate([ 39,-21.5, mount_h + mount_h * 0.35]) { sphere(r=Rp); }
        }
        union()
        {
            translate([ 39, 21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([-39, 21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([-39,-21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
            translate([ 39,-21.5, mount_h/2 - mount_h * 0.15]) {
cylinder(h=mount_h, r=Ri, center=true); }
        }
    }
}

module model()
{
    mount(0, 0, 0);
    stack_joins(0, 0, 0);
}

model();
```

RPi_zero_mount - 3D Object

This also is NOT one of mine but I've cleaned it up a bit as it wasn't displaying correctly. I needed it for a pi cluster and as it's quite good I didn't reinvent the wheel here.
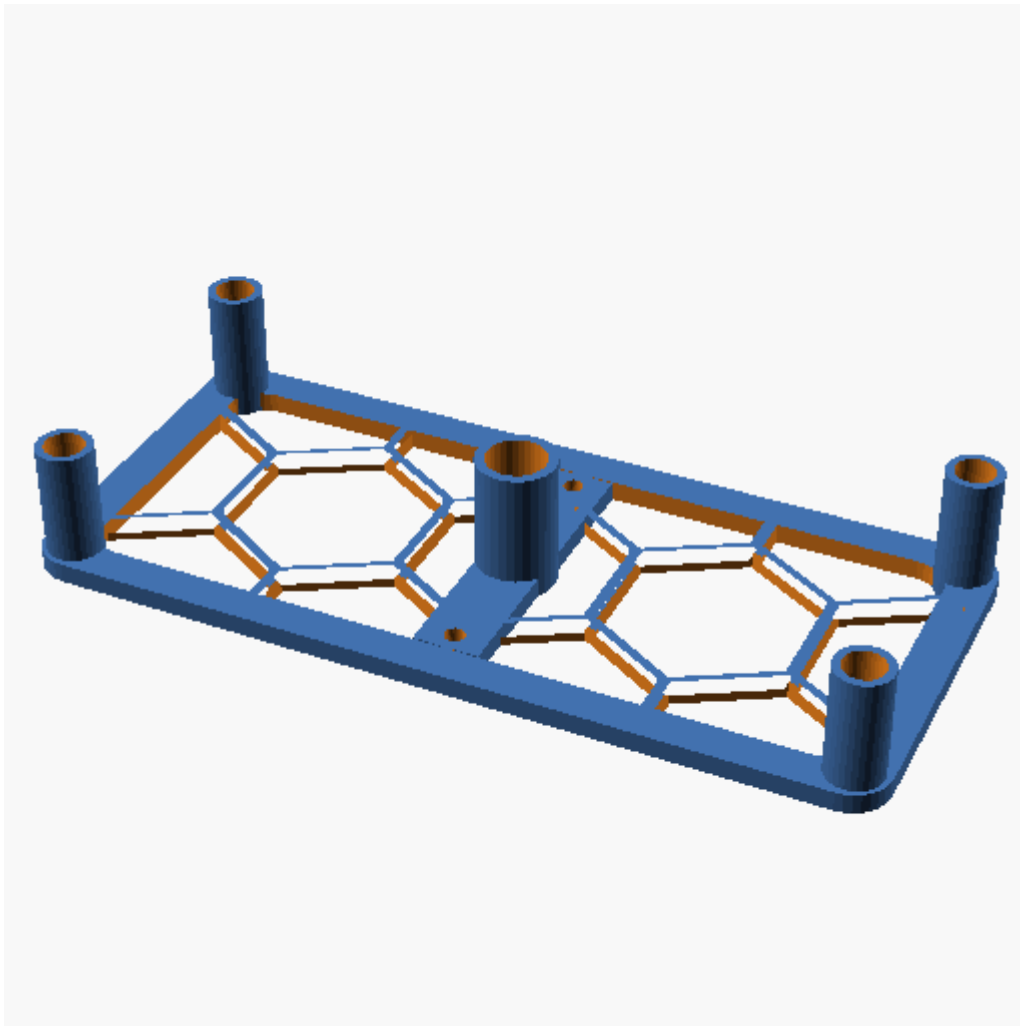

Figure 28. image

Listing 28. Openscad source

```
/* [Base] */
//type = 1; //[1:"Hexagon Grid",2:"Skeleton"]

/* [Hidden] */
$fn = 32;
zero_x = 64;
zero_y = 29;
zero_z = 1.5;

mounts_z = 8.5;
mounts_radius = 2.1;
screwholes = 2.6;
screwholes_radius = 1.5;
screwholes_depth = 10.7;
```

```
base_x = zero_x - 2*3.0;
base_y  = zero_y  - 2*3.0;
base_z = zero_z;
mount_x = zero_x/2 - screwholes;
mount_y = zero_y/2 - screwholes;
mount_z = zero_z + mounts_z;
screwhole_base_z = mount_z - screwholes_depth;

module baseplate(){
    translate([-zero_x/2+3,-zero_y/2+3,0])
        minkowski(){
            cube([base_x,base_y,base_z/2]);
            cylinder(r=3.0,h=base_z/2);
    }
}

module mounts(){
    translate([0,0,0]) cylinder(r=3.0,h=mount_z);
    translate([-mount_x, -mount_y, 0]) cylinder(r=mounts_radius,h=mount_z);
    translate([-mount_x, +mount_y, 0]) cylinder(r=mounts_radius,h=mount_z);
    translate([+mount_x, -mount_y, 0]) cylinder(r=mounts_radius,h=mount_z);
    translate([+mount_x, +mount_y, 0]) cylinder(r=mounts_radius,h=mount_z);
}

module hexagon (radius=8,latticeWidth=8,latticeLength=16,spacing=1,height=2){
    linear_extrude(height) {
        for(j = [0:latticeWidth-1]) {

translate([((sqrt(3)*radius)+spacing)/2*(j%2),sqrt((pow(((sqrt(3)*radius)+spacin
g),2))-(pow((((sqrt(3)*radius)+spacing))/2,2)))*j,0]) {
                for(i = [0:latticeLength-1]) {
                    translate([(sqrt(3)*radius*i)+spacing*i,0,0]) {
                        rotate([0,0,30]) {
                            circle(radius, $fn = 6);
                        }
                    }
                }
            }
        }
    }
}

module hex_border(){
    difference(){
        baseplate();
        holes();
        translate([0,0,-.01]) scale([0.9,0.8,1.02]) baseplate();
    }
}
```

```
module holes(){
    translate([0,0,screwhole_base_z+0.4]) {
        translate([0,0,0]) cylinder(r=screwholes_radius*1.5,h=screwholes_depth);
        translate([-mount_x,-mount_y,0])
cylinder(r=screwholes_radius,h=screwholes_depth);
        translate([-mount_x,+mount_y,0])
cylinder(r=screwholes_radius,h=screwholes_depth);
        translate([+mount_x,-mount_y,0])
cylinder(r=screwholes_radius,h=screwholes_depth);
        translate([+mount_x,+mount_y,0])
cylinder(r=screwholes_radius,h=screwholes_depth);
    };
}

module result(){
    difference(){
        translate([-2.5,-base_y/2,0]) cube([5,base_y,base_z]);
        translate([0,10,-3]) cylinder(d=1.5,h=10);
        translate([0,-10,-3]) cylinder(d=1.5,h=10);
        holes();
    }
    translate([0,0,0])
    hex_border();
    difference(){
        translate([0,0,0]) cylinder(r=3.0,h=mount_z);
        holes();
    }
    difference(){
        mounts();
        holes();
    }
    difference(){
        baseplate();
        holes();
        translate([-zero_x/2-5,-zero_y/2+1.5,-0.1]) hexagon();
    }
}

difference(){
    result();
    translate([0,10,-3]) cylinder(d=1.5,h=10);
    translate([0,-10,-3]) cylinder(d=1.5,h=10);
}
```

rePhone - Project

- rephone components and case design

- Stl files added from thingiverse

VSR - Un-classified

- Scad file also as holder for stls from thingiverse

- Reference material only for now
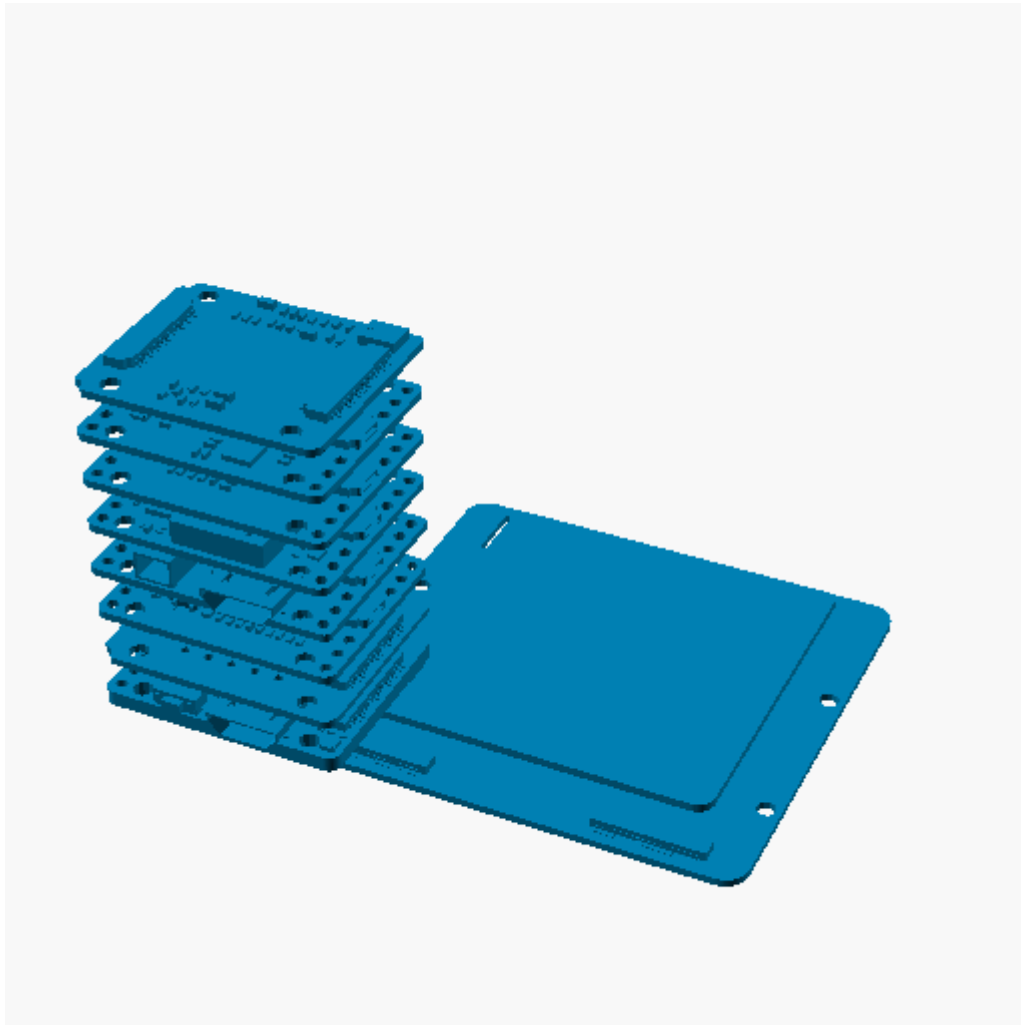
RePhone_ALL - 3D Object

Figure 29. image

Listing 29. Openscad source

```
cube([1,1,1]);
// The Rephone modules as modules and aligned over mounting holes

color_def = [0,0.5,0.7];

//----------------------------------
// The modules
module GSM_BLE(color=color_def) {
    color(color)
    translate([0.65,-0.61,5])
        import("Xadow_GSM_BLE_v1_collapsed.stl");
}
module GSM_Breakout(color=color_def) {
```

```
        color(color)
        translate([0,0,10])
            import("Xadow___GSM_Breakout_v1_collapsed.stl");
    }
    module Basic_Sensors(color=color_def) {
        color(color)
        translate([-11.4,-22.8,15])
            import("Xadow_Basic_Sensors_v1_collapsed.stl");
    }
    module Duino(color=color_def) {
        color(color)
        translate([43.85,9.55,20])
        rotate([0,0,180])
            import("Xadow_Duino_v1_collapsed.stl");
    }
    module GPS(color=color_def) {
        color(color)
        translate([-12.05,-10.77,25])
            import("Xadow_GPS_v2_collapsed.stl");
    }
    module LED_5x7(color=color_def) {
        color(color)
        translate([-3.28,-15.98,30])
            import("Xadow_LED_5x7_v1_collapsed.stl");
    }
    module NFC(color=color_def) {
        color(color)
        translate([-12.05,-10.77,35])
            import("Xadow_NFC_v2_collapsed.stl");
    }
    module 1_54_Touhscreen(color=color_def) {
        color(color)
        translate([-50,0,-5])
            import("Xadow_1_54_Touhscreen_collapsed.stl");
    }
    module Audio(color=color_def) {
        color(color)
        translate([-91.42,-45.06,40])
            import("Xadow_Audio_v1.stl");
    }


    //----------------------------
    // Line them up :)

    GSM_BLE();
    GSM_Breakout();
    Basic_Sensors();
    Duino();
    GPS();
```

```
LED_5x7();
NFC();
Audio();
1_54_Touhscreen();
```

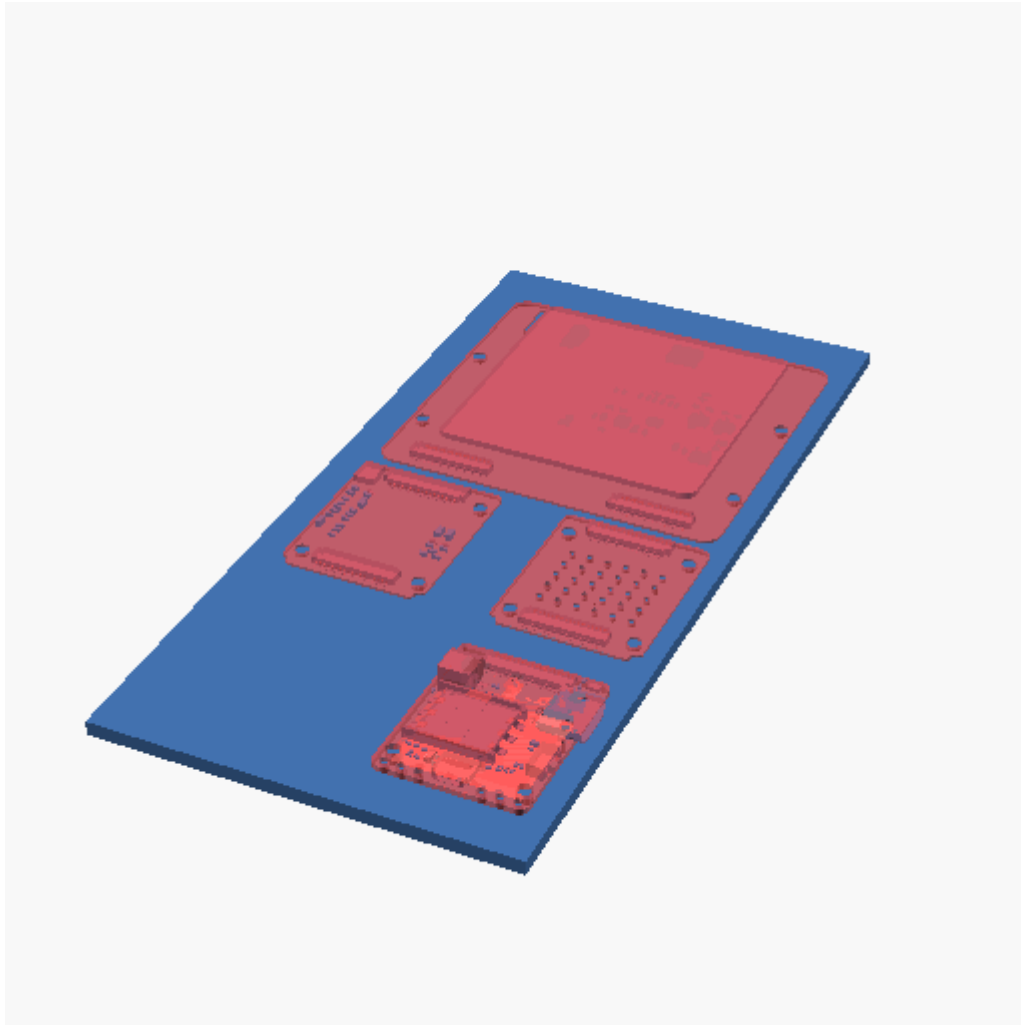## RePhone_handset - 3D Object

Figure 30. image

Listing 30. Openscad source

```
// The Rephone modules as modules and aligned over mounting holes

color_def = [0,0.5,0.7];

//----------------------------------
// The modules
module 1_54_Touhscreen(color=color_def) {
    color(color)
        translate([-50,0,0])
            import("Xadow_1_54_Touhscreen_collapsed.stl");
```

```
    }
module GSM_BLE(color=color_def) {
    color(color)
        translate([0.65,-0.61,0])
            rotate([0,0,90])
                import("Xadow_GSM_BLE_v1_collapsed.stl");
}
module GSM_Breakout(color=color_def) {
    color(color)
        rotate([0,0,90])
            translate([0,0,0])
                import("Xadow___GSM_Breakout_v1_collapsed.stl");
}
module Audio(color=color_def) {
    color(color)
        rotate([0,0,90])
            translate([-91.42,-45.06,0])
                import("Xadow_Audio_v1.stl");
}
difference(){
    translate([-5,-65,-2]) cube([58,120,2]);
    #union(){
        1_54_Touhscreen();
        translate ([39.5,-15,0]) GSM_Breakout();
        translate ([9.5,-15,0]) Audio();
        translate ([39,-45,0]) GSM_BLE();
    }
}
```
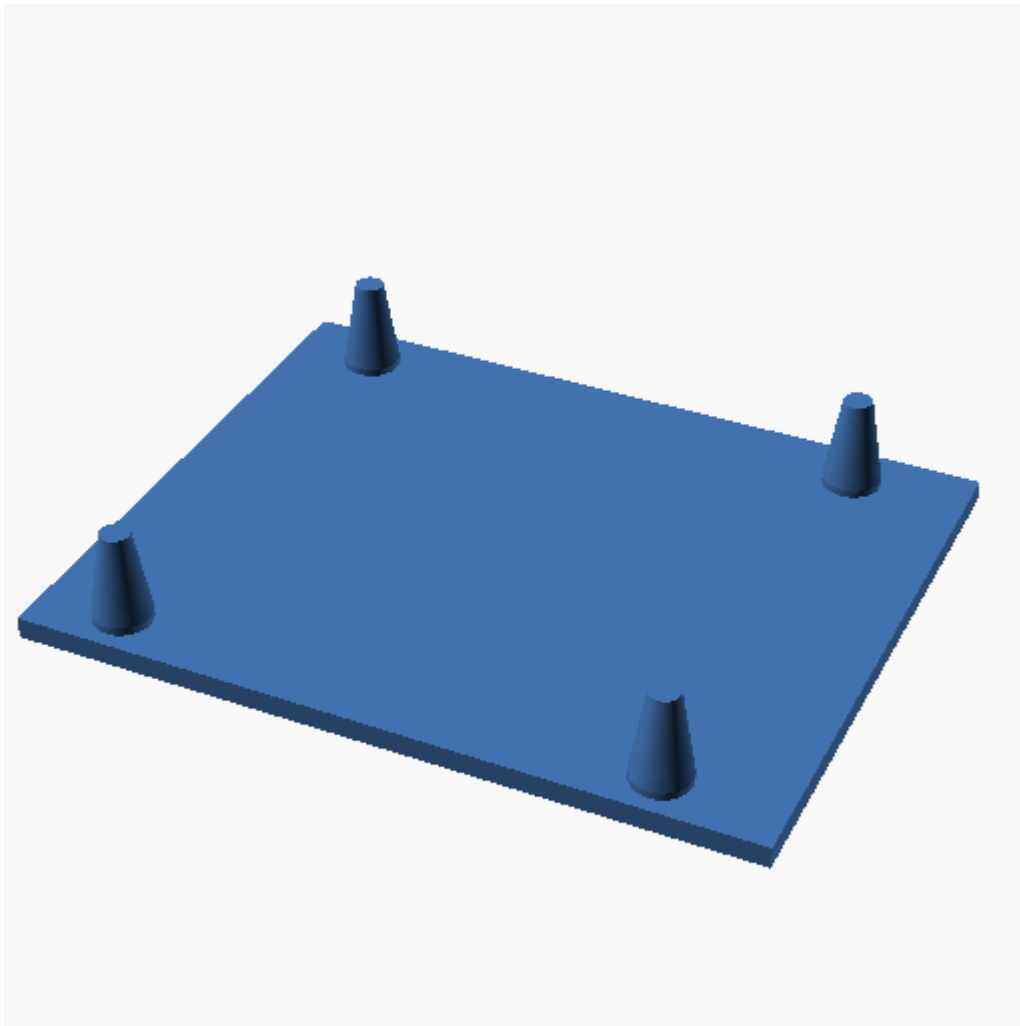
xadow - 3D Object

Figure 31. image

Listing 31. Openscad source

```
$fn=100;
module xadow_pin(){
    union(){
        translate([0,0,0]) cylinder(h=1,r1=1,r2=1);
        translate([0,0,1]) cylinder(h=3,r1=1,r2=.5);
    }
}
module xadow_gsm(){
    difference(){
    union(){
            //Xadow madule
            //turns out the GSM module has exactly  25.37mm X 20.30mm / 1'' X
0.8''
            //approx 2mm hole 17.5mm x18mm
            cube([25.4,20.3,.75]);
            translate([3,1.5,0]) xadow_pin();
            translate([21.4,1.5,0]) xadow_pin();
            translate([3,18.5,0]) xadow_pin();
```

```
            translate([21.4,18.5,0]) xadow_pin();
        }
        *translate([25.4,20.3,0]) cylinder(h=1,r1=1,r2=1);
    }
}

xadow_gsm();
```

schuko - Project

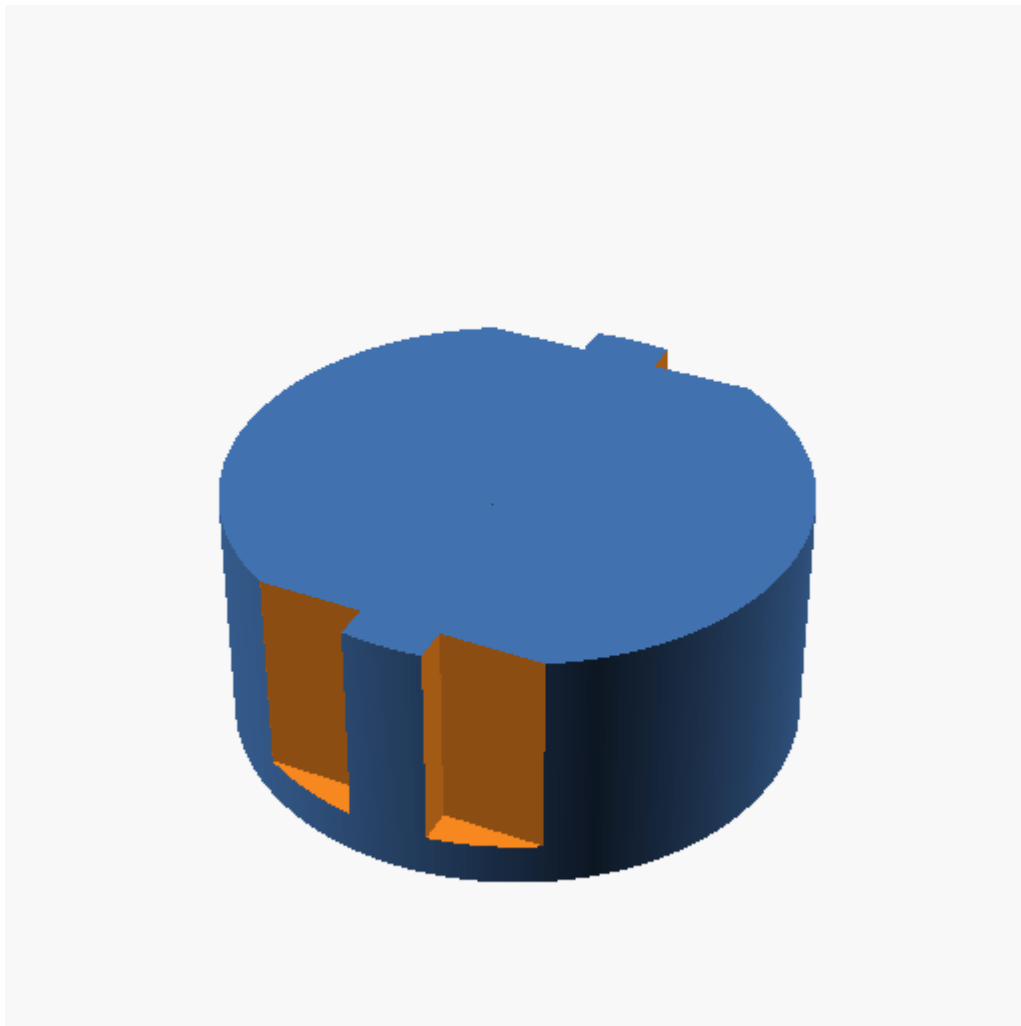## schuko - 3D Object

Figure 32. image

Listing 32. Openscad source

```
/*
 Parametric Schuko CEE 7/3 socket

 Copyright 2017 Anders Hammarquist <iko@iko.pp.se>
 Licensed under Creative Commons - Attribution - Share Alike
```

```
 Made using a negative "profile punch" that can be extracted
 and used to "punch" a schuko socket into any sufficiently large solid.
*/

// Diameter of cover
coverdiameter = 50; // [50:100]

// Thickness of cover
coverthickness = 4.8; // [2:0.2:15]

// Center screw offset (extreme values disables screw hole)
screwoffset = 0; // [-11:0.5:11]
// This is the socket punch. Includes cut-out for
// earthing contacts and holes for pins and center screw.
// Maximum screw offset from center is 10mm (use a larger
// value to remove the hole for the screw).
module schuko(screwoffset=0, screwdia=3.5, screwhead=6.5, screwsink=3)
{
    module earthing()
    {
        intersection() {
            union() {
                translate([-22,-2,3])
                    cube([6,4,20]);
                translate([-19,-2,17.5])
                    rotate([0,-30,0])
                        cube([15, 4, 4]);
            }
            translate([-22,-3,3])
                cube([22,6,20]);
        }
    }

    difference() {
        union() {
            translate([0,0,-1])
                cylinder(r=39/2, $fn=300, h=18.5);

            // Earthing cutouts
            color([1,1,1]) {
                earthing();

                rotate([0,0,180])
                    earthing();

            }

            // Power pins
            translate([0,10,0])
```

```
            cylinder(r=7/2, $fn=300, h=30);
        translate([0,-10,0])
            cylinder(r=7/2, $fn=300, h=30);

        if (abs(screwoffset) <= 10) {
            // Center screw
            translate([screwoffset,0,0])
                cylinder(r=screwdia/2, $fn=300, h=30);
            translate([screwoffset,0,0])
                cylinder(r=screwhead/2, $fn=300, h=17.5+screwsink);
        }
    }

    // Side key profile
    translate([5.4/2,16.9,3])
        cube([7,3,20]);
    translate([-5.4/2-7,16.9,3])
        cube([7,3,20]);
    translate([5.4/2,-20.4,3])
        cube([7,3.5,20]);
    translate([-5.4/2-7,-20.4,3])
        cube([7,3.5,20]);
    }
}
difference () {

difference () {
    cylinder(r=39/2, $fn=300, h=17.5);
translate ([-27.3/2,-27.8/2,0]) cube([27.3,27.8,10]);
rotate([0,0,0]){
    difference(){
        union() {
            translate([0,0,0])
                cylinder(r=44/2, $fn=300, h=21.5);
            // Lip
            rotate_extrude($fn=100) {
                polygon(points=[[0,0], [coverdiameter/2,0],
                [coverdiameter/2+0.2*coverthickness,coverthickness],
                [0,coverthickness]]);
            }

            // Pin guard: 9.5 x 28.5 x 3mm (rounded ends)
            translate([-4.75,-14.25,21.5])
                cube([9.5, 28.5, 3]);

            // center screw standoff: 6 x 2.5 (above pin guard) x 2 - 3
            // ( 8mm inside, 14 - 12.2 mm outside)
            translate([-7.25, -3, 21.5])
                cube([2.5, 6, 5.5]);
            translate([4.75, -3, 21.5])
```

```
            cube([2.5, 6, 5.5]);

        }
        schuko(screwoffset=screwoffset);
    }
  }
  }

  }
```

spool-holder - Project

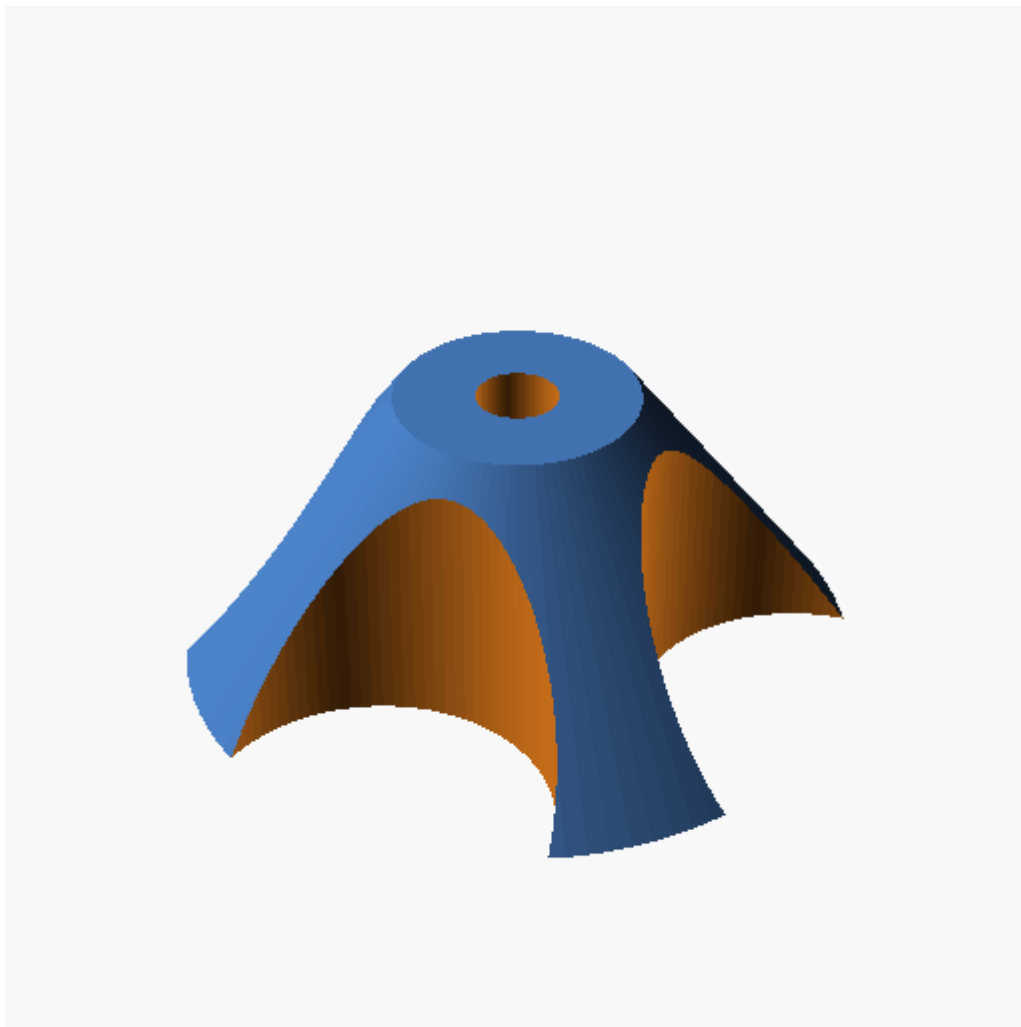## spool - 3D Object

Figure 33. image

Listing 33. Openscad source

```
coneH=30;      //height of the cone
coneDin=25;    //smallest diameter of the cone
coneDout=70;   //widest diameter of cone
```

VSR - Un-classified

```
axleD=8;        //axle diameter of the axle for the 608 bearing - we;ll add for
printer tolerance
$fn=100;        //make things round
bearingH=7;    //608 skateboard bearing height
bearingD=22;  //608 skateboard bearing diameter we'll add amillimeter or two
later to account for the fitting ring
fittingD=bearingD+7;  //outer diameter of the fitting ring for the bearing
nubAngle=360/8;  //the fitting nubs for the bearing at x degree rotation
printerRadTol=.2; //add this value to the radius
nubRad=.5;     //the nub radius for the bearing fitting ring

module cone(height,inD,outD) {
    cylinder(h=coneH , r2=(inD/2) , r1=(outD/2) );
    }

module axle(height,diameter,tol) {
    translate([0,0,-.1]) cylinder(h=height,r=(diameter/2)+tol); //axle
}
module bearing(height,diameter,tol) {
    translate([0,0,-.1]) cylinder(h=height+.1,r=(diameter/2)+tol); //bearing
}

//subtract for quicker print
module removeCyls(bearingD,coneDout,coneH){
    translate([-((bearingD/2)+(coneDout/4)+4),0,-.1])
cylinder(h=coneH,r=coneDout/4);
    translate([+((bearingD/2)+(coneDout/4)+4),0,-.1])
cylinder(h=coneH,r=coneDout/4);
    translate([0,+((bearingD/2)+(coneDout/4)+4),-.1])
cylinder(h=coneH,r=coneDout/4);
    translate([0,-((bearingD/2)+(coneDout/4)+4),-.1])
cylinder(h=coneH,r=coneDout/4);
    }

module ring(inRad,outRad,height,tol) {
  difference(){
    cylinder(h=height,r=outRad+tol);
    translate([0,0,-.1]) cylinder(h=height+.2,r=inRad+tol);
    }
}

module fittingNubsCircle(nubRad,height,inRad,angle,tol) {
    rad=inRad+nubRad+tol;
    for (pos=[0:angle:360]) {
        *echo(pos);
        rotate ([0,0,pos]) translate([rad,0,0]) cylinder(h=height,r=nubRad);
    }
}
//
difference(){
```

```
    union(){
        difference(){
            cone(coneH,coneDin,coneDout);
            translate([0,0,-.1]) bearing(bearingH+.1,fittingD,printerRadTol);
            translate([0,0,-.1]) axle(coneH+.5,axleD,printerRadTol);
        }//
        ring( (bearingD/2)+nubRad, (fittingD/2) , bearingH , printerRadTol );
        fittingNubsCircle( nubRad , bearingH , bearingD/2 , nubAngle ,
printerRadTol );
    }//
    removeCyls(bearingD,coneDout,coneH);
}
```

tesa - Project
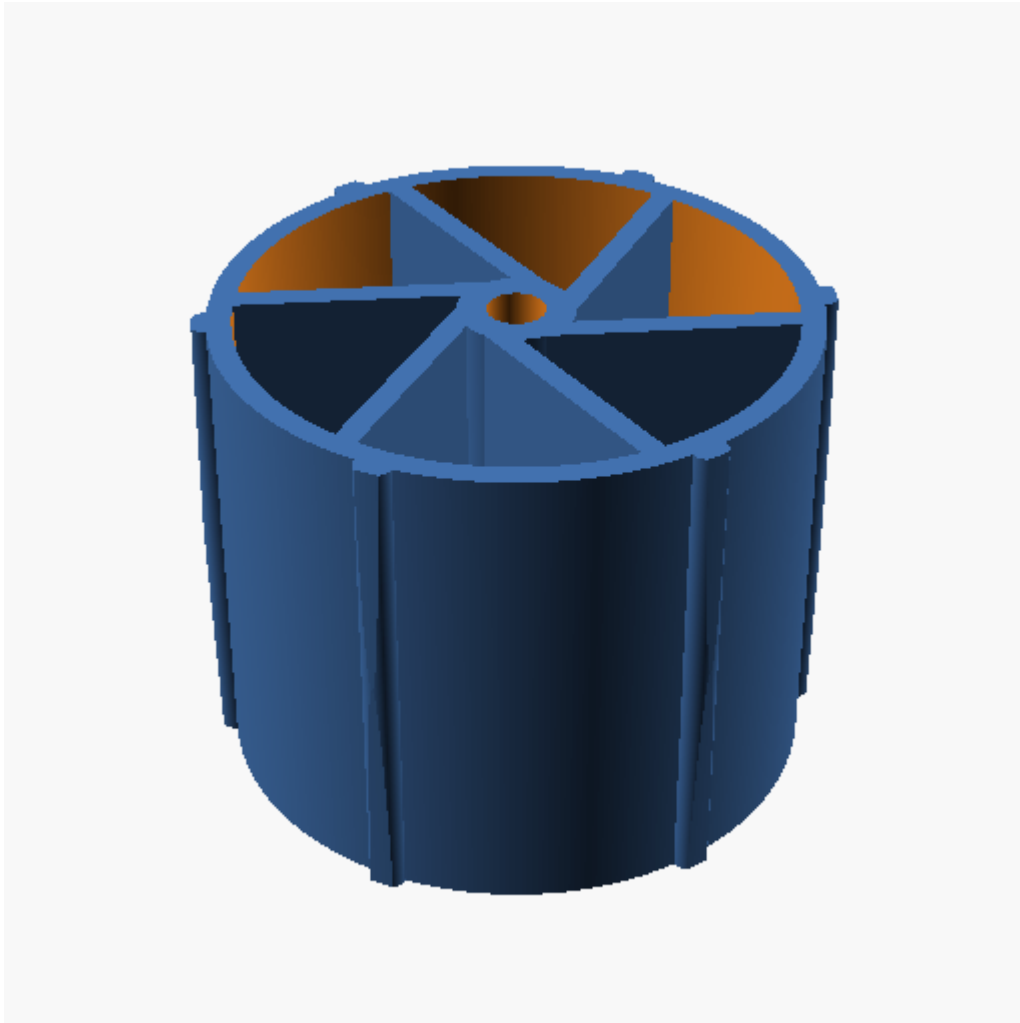
tesa - 3D Object

Figure 34. image

Listing 34. Openscad source

```
//Tesa roller ersatzroller
//celotape roller

$fn=360;
height=20;
outsideD=24.5;
outsideDepth=2;
axleD=2.4;
hubD=axleD*2;
nubR=.75;
module taper(){
difference(){
union(){
    translate([0,0,-.1]) cylinder(h=height+.2,d=outsideD+2+nubR);
}
union(){
    translate([0,0,-
.11])cylinder(h=height/2+.22,d1=outsideD+1.5*nubR,d2=outsideD+2*nubR);
    translate([0,0,height/2+.1])
cylinder(h=height/2+.1,d1=outsideD+2*nubR,d2=outsideD+1.5*nubR);
}
}
}
difference(){
union(){
    //outside
    difference(){
        cylinder(h=height,d=outsideD);
        translate([0,0,-.1])cylinder(h=height+.2,d=outsideD-outsideDepth);
    }
    //HUB
    difference(){
        cylinder(h=height,d=hubD);
        translate([0,0,-.1])cylinder(h=height+.2,d=axleD);
    }
    //nubs
    for (i = [0:5]) {
        translate([sin(360*i/6)*outsideD/2, cos(360*i/6)*outsideD/2, 0 ])
        rotate([0,0,0])cylinder(h = height/2, r=nubR);
    }
    for (i = [0:5]) {
        translate([sin(360*i/6)*outsideD/2, cos(360*i/6)*outsideD/2, height/2 ])
        cylinder(h = height/2, r=nubR);
    }
    //spokes
    for (i = [0:360/6:360]) {
        rotate([0,0,i])translate([1.2,0,0])cube([1,(outsideD/2)-
(axleD/2.4),height]);
```

```
    }
}
taper();
}
```

thumb-screw - Project
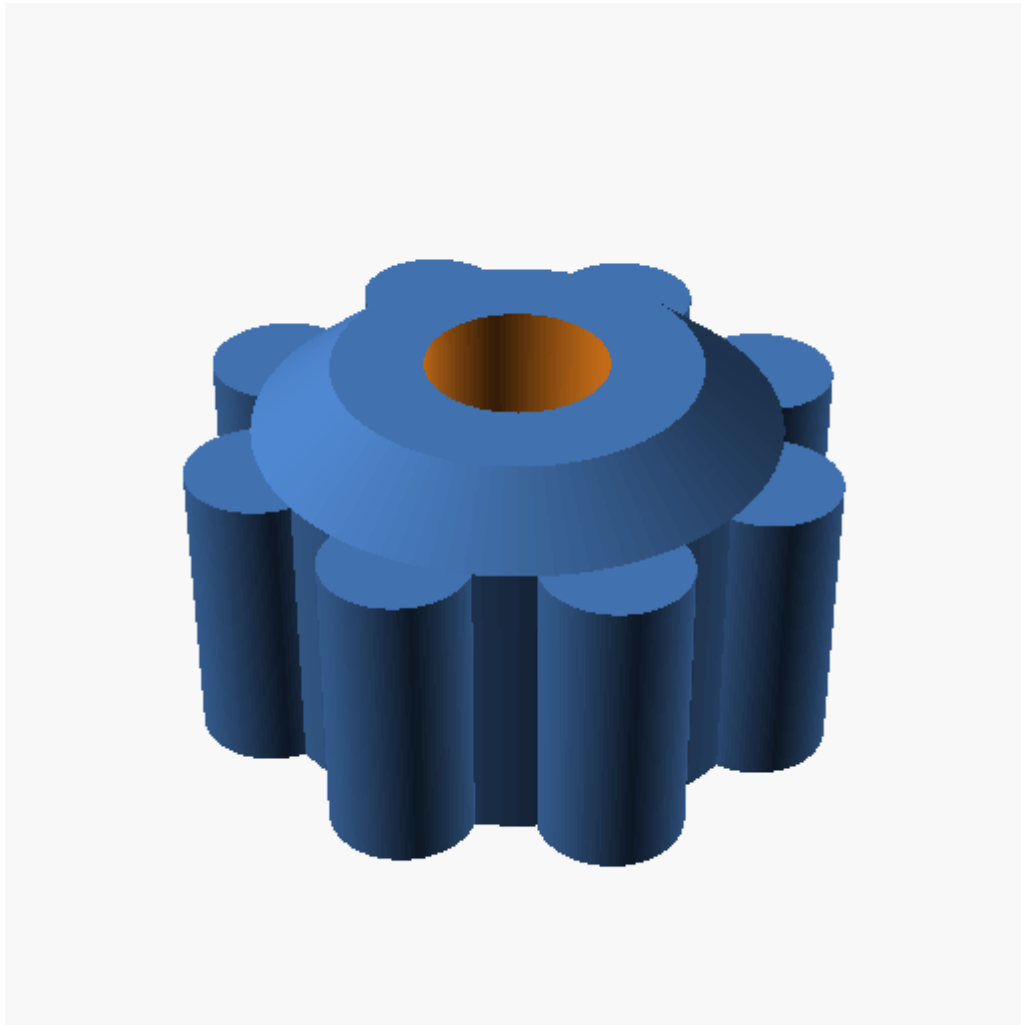
Knurl - 3D Object

Figure 35. image

Listing 35. Openscad source

```
diam=9;
diamOut=14.4;
holeDiam=5;
height=8.2;
$fn=100;
knurlNum=8;
knurlInc=360/knurlNum;
```

```
knurlDiam=4;
insetHeight=5;
insetDiam=5;
totalHeight=10;


module knob() {
difference(){
    union(){
        cylinder(h=height, d=diamOut);
        translate([0,0,height]){
        cylinder(h=totalHeight-height,r1=7.2,r2=5);
        }
    }
    translate([0,0,-.5])
        cylinder(h=totalHeight+1, d=holeDiam);
    translate([0,0,-.5]){
        cylinder(h=totalHeight-insetHeight+.5,d1=holeDiam+5,d2=holeDiam);
    }
    }

for(i=[0: knurlInc: 360]){
   rotate([0,0,i])
        translate([diamOut/2,0,0])
            cylinder(h=height, d=knurlDiam);
}
    }


knob();
```

Appendix A: To do

Right now the github source is not perfect as the readme does not display the images when viewed in github.

☐ Add a readme in the directories or fix asciidoc to deal with asciidoc not showing in github

☐ Split the build scruipts to handle scad/plantuml/asciidoc in separate steps depending on changes

    ☑ The scad build already ony builds scad files that exist and is fed by find

        ☐ Feed with a list of changed scad files instead of the more simple find

☐ Add further process steps for the images like meshlabserver to do furhter processing:

    ◦ Stuff (glass rendering, wireframe, mesh magic, stats, etc.)

☑ Need to add subdirectories to pool projects together

☑ build index for subdirs

☑ need to make the scad build fit to the subdir model

☑ add check for empty directory (no scad files)

☑ only build scad files and only run container with scad files (empties ignored)

☐ Add further optional scad steps

☐ Need to add view parameters as options

☐ Need to add animation options

☑ Need to add text display option for each item

☐ Allow adding photos to the objects or projects to show makes

☐ investigate including a js or similar stl viewer for html