Tutorial on Kicad, Solidworks for Quick Prototyping

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Editor: Son Pham
Date: 3/11/2025
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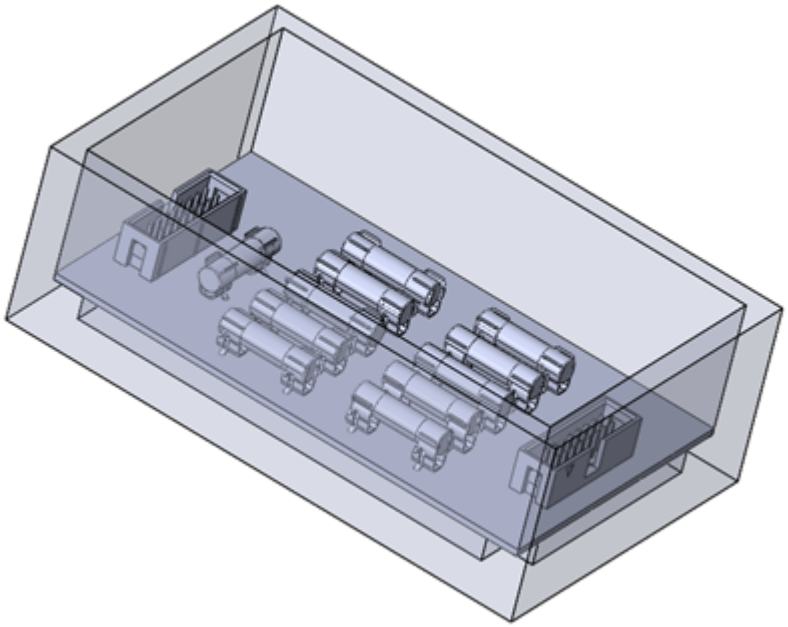
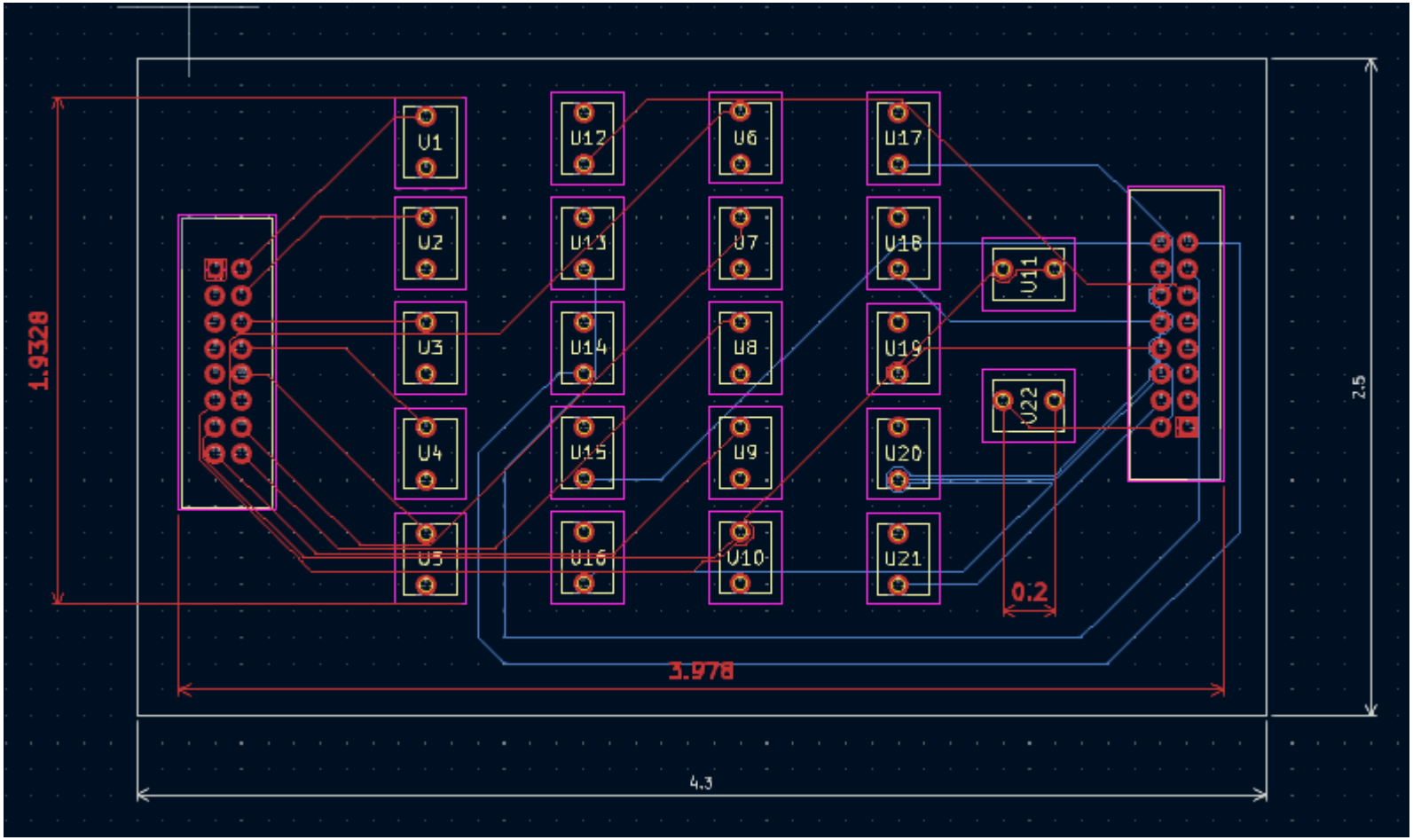
Hello, fellow UWaterloo students, I'm Son, a beginner in Kicad and Solidworks. The below steps help me get use to with Kicad or Solidworks quick. So, I hope after these basic steps you can start building simple prototype.

Final Product



Kicad



Requirement

First and foremost, we need to know what are we designing. So our goal is to design a fuse box for voltage sense lines.

We have 11 sense lines in total. The requirement is that each sense line need to have a fuse to protect end device or downstream device. Our device can handle 300mA at peak. So, I think 500mA would be a good number.

Next we will use connector and select the size for fuse and holder for fuse. Now, let go shopping.

Shopping

Here are four websites that I often use:

1. Digikey: Electronic component, sometimes it is cheaper than Amazon

2. Octopart: to get 3D model and Kicad symbol, footprint
3. Amazon: get other part that cheaper than digikey
4. McMasterCarr: great website for mechanical parts. It also has good technical information

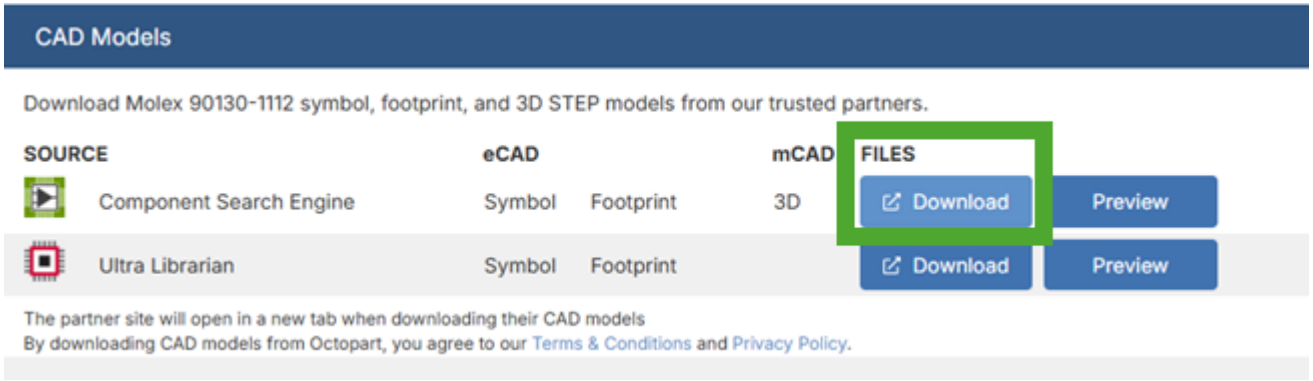
These are three components that I pick. Also, please check the pitch size to avoid ordering parts that are not compatible on our perfboard.

By standard the pitch size of perfboard is 0.1 in or 2.54mm.

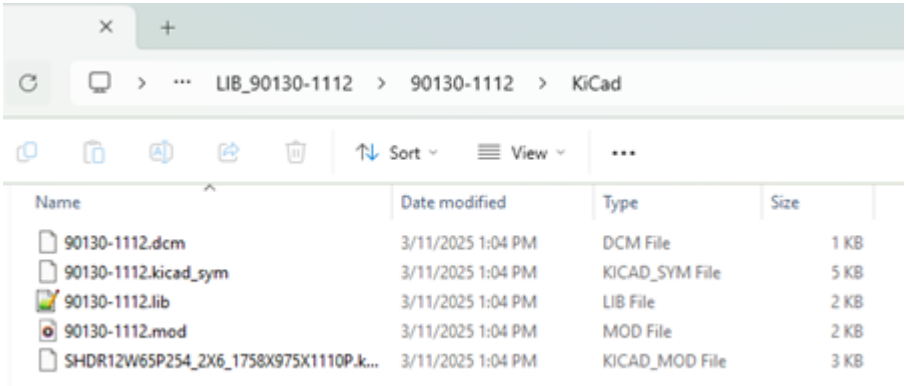
Pitch - Mating	**0.100" (2.54mm)**

Get the CAD, Symbols and Footprint files

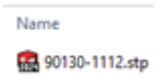
Next, I will go to octopart to download the necessary files
[Electronic Components Search Engine | Find Parts Fast | Octopart]



This is the files that I received



They also include 3D model file here

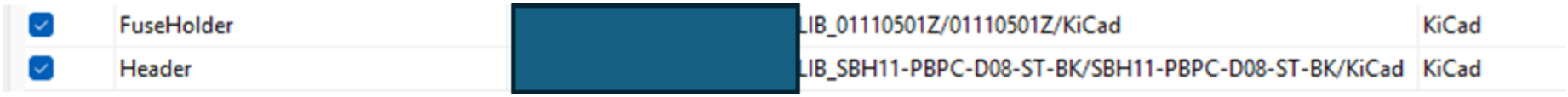


Importing Symbol and Footprint to Kicad

Let put everything in one folder so we can manage it easier
Now open kicad and create new project

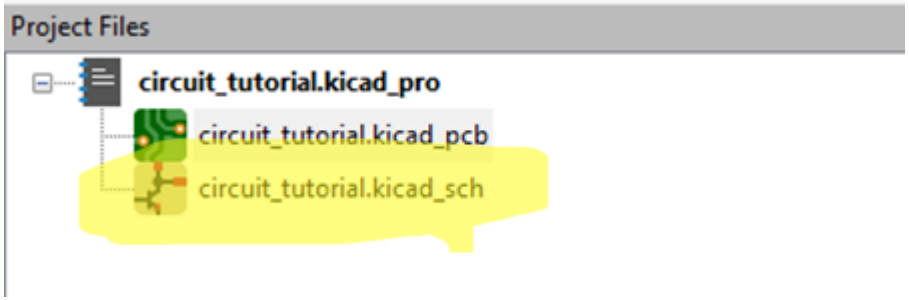
On **Preference** select Manage Symbol Libraries and add _____.kicad_sym

Now go back to **Preference** and select Manage Foot Print Library, add folder

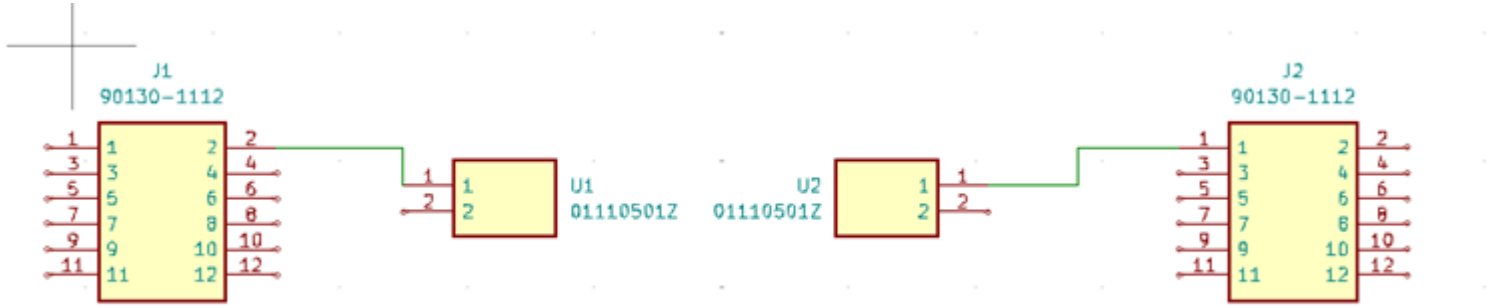


Start Building

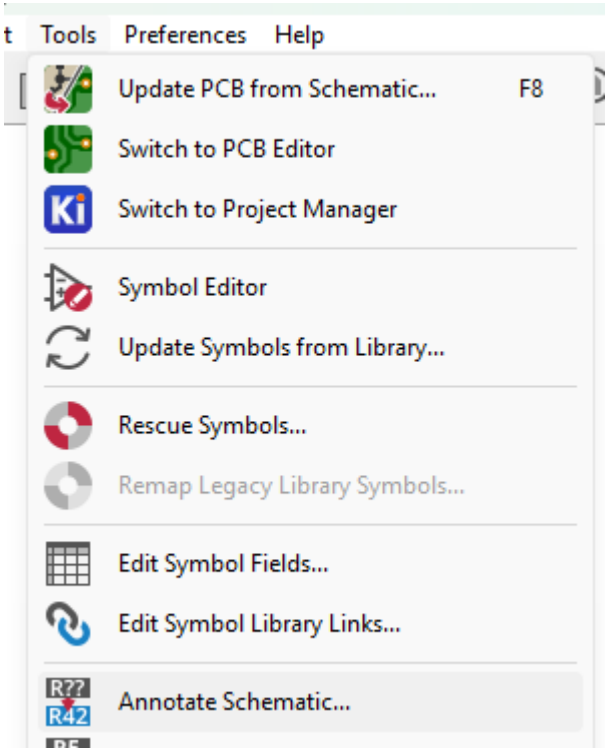
Select kicad_sch file to start editing



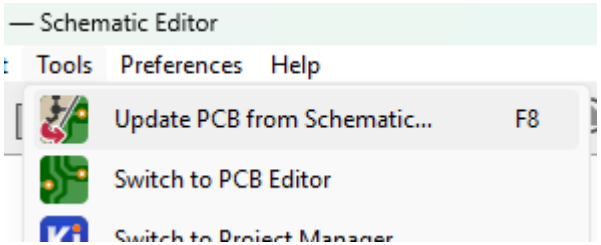
Press A to add symbol



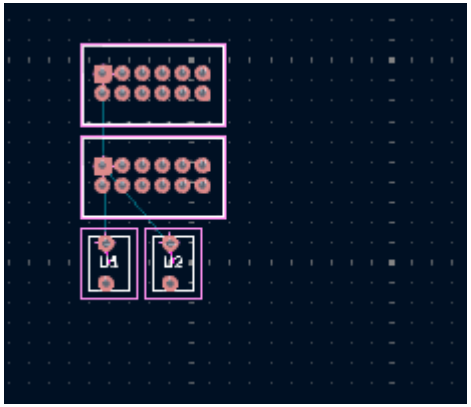
Then we go to Tool > Annotate Schematic



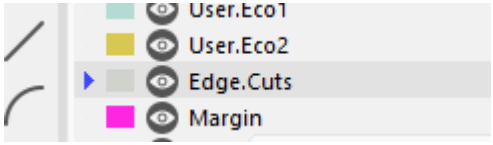
Next

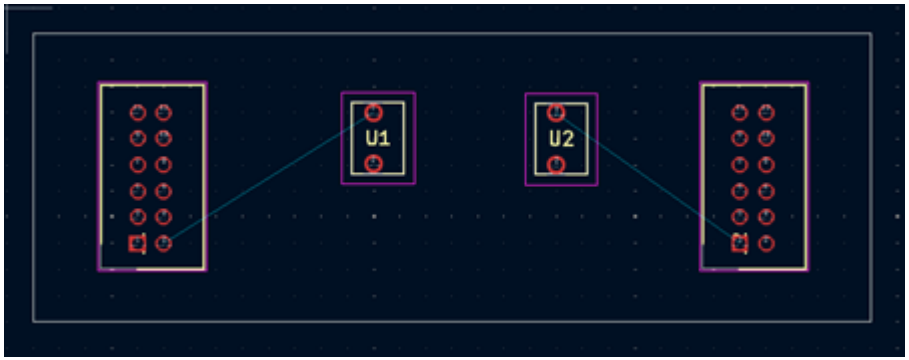


Now you can arrange components on your board, make sure fuse will fit in between two holder (0.6 in)

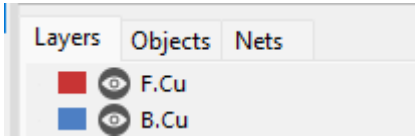


We also need to create a main board. So click on Edge.Cuts use rectangular symbol to draw the shape of your pcb board

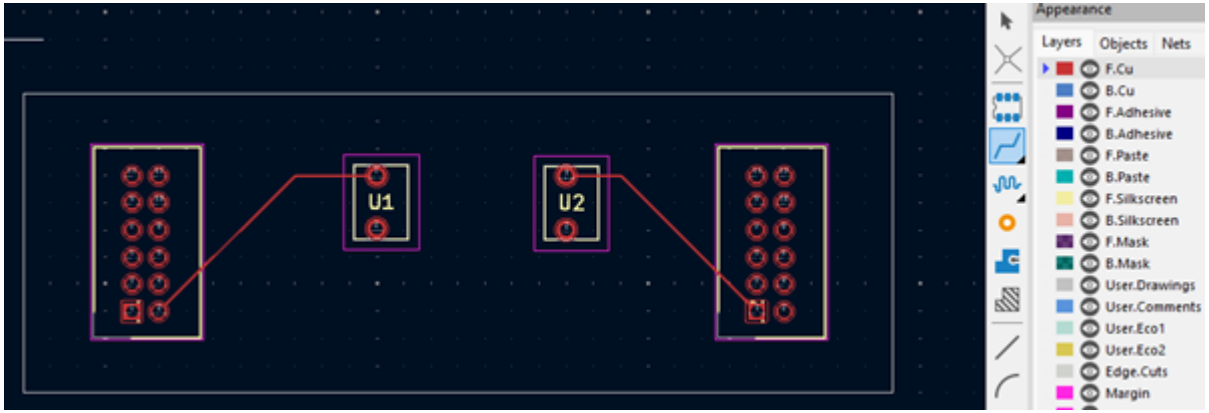




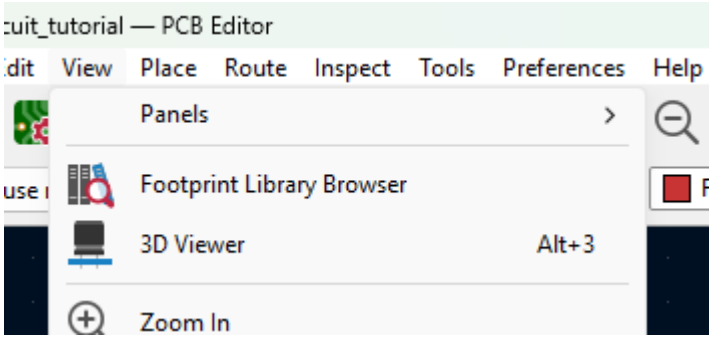
Now, we need to route copper trace. There are two layers, front and back.



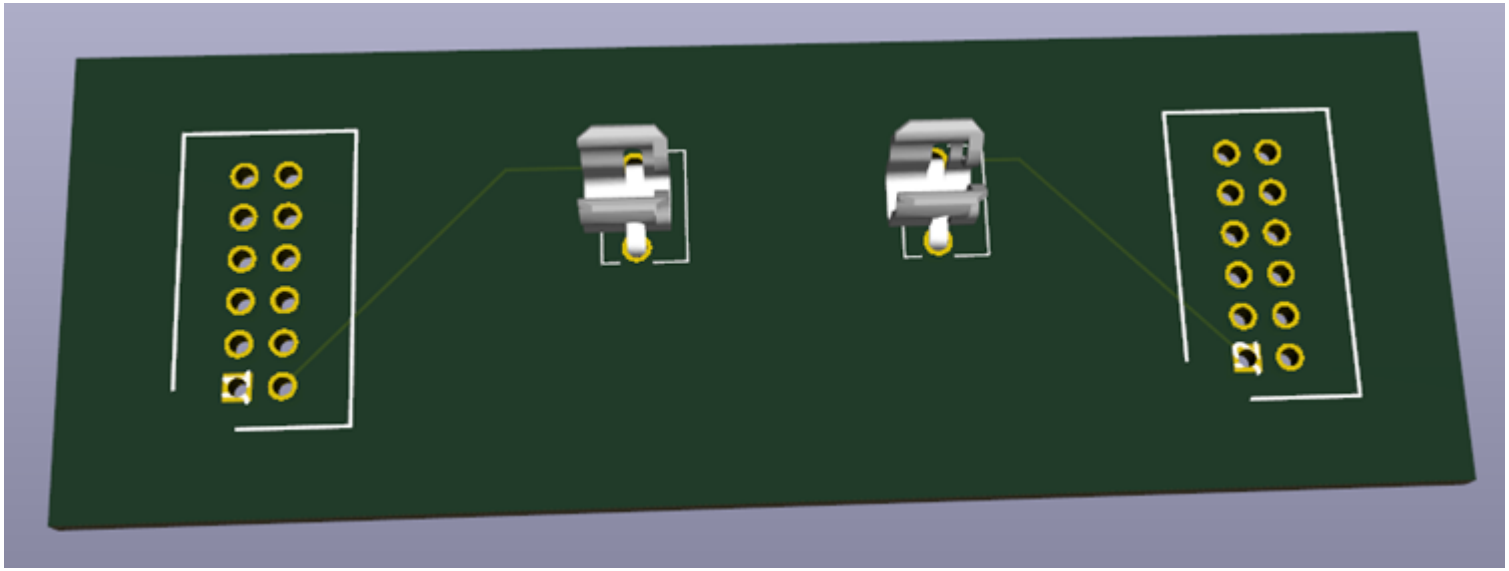
I select front and start Wiring (or press X)



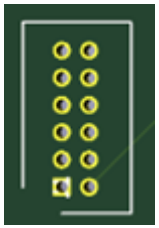
Now you can check your product by click on View > 3D Viewer

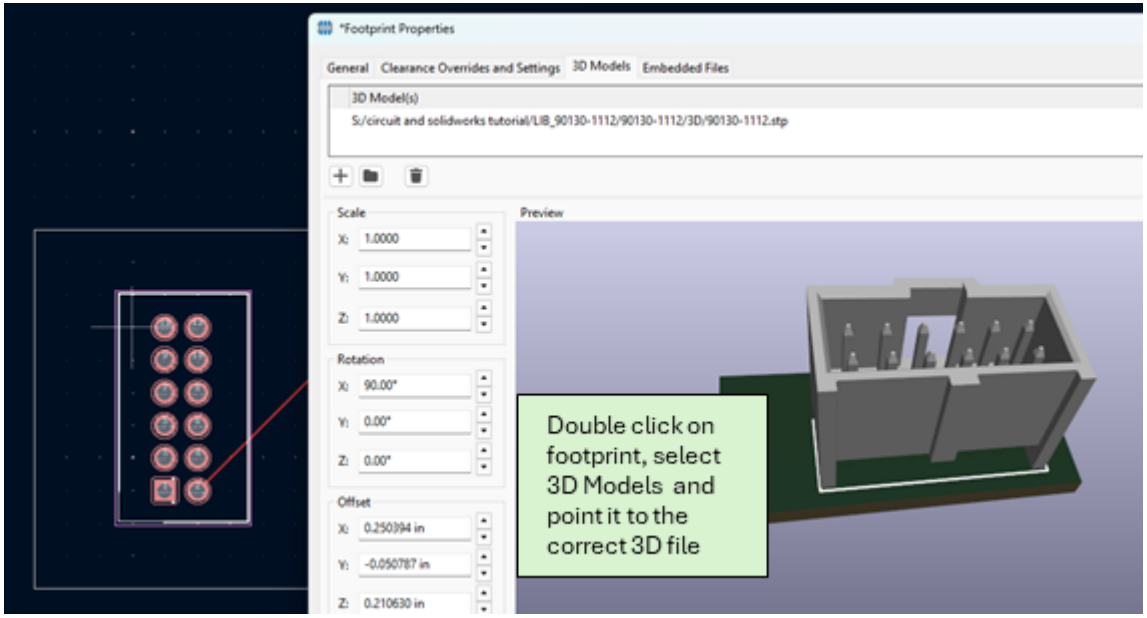


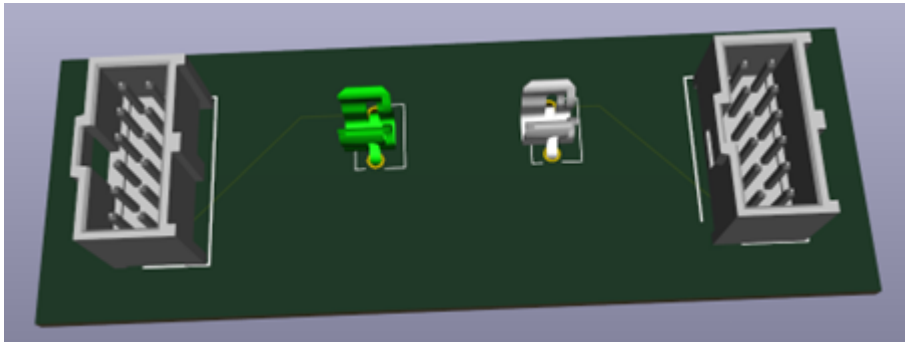
CONGRATULATION!!! you can design a PCB on your own



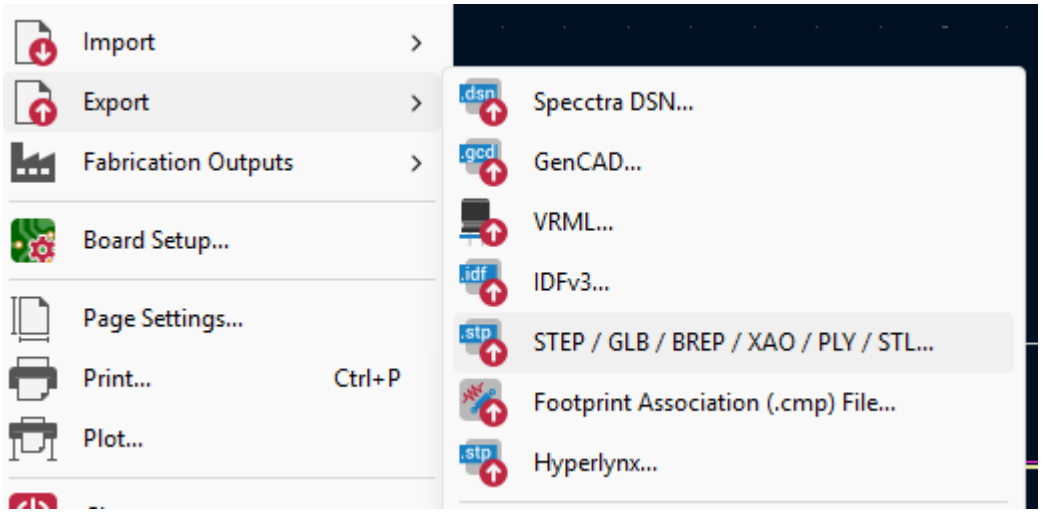
Notice that we don't see the 3D connector here, let add it







Export to Step file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Export
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Print... Ctrl+P
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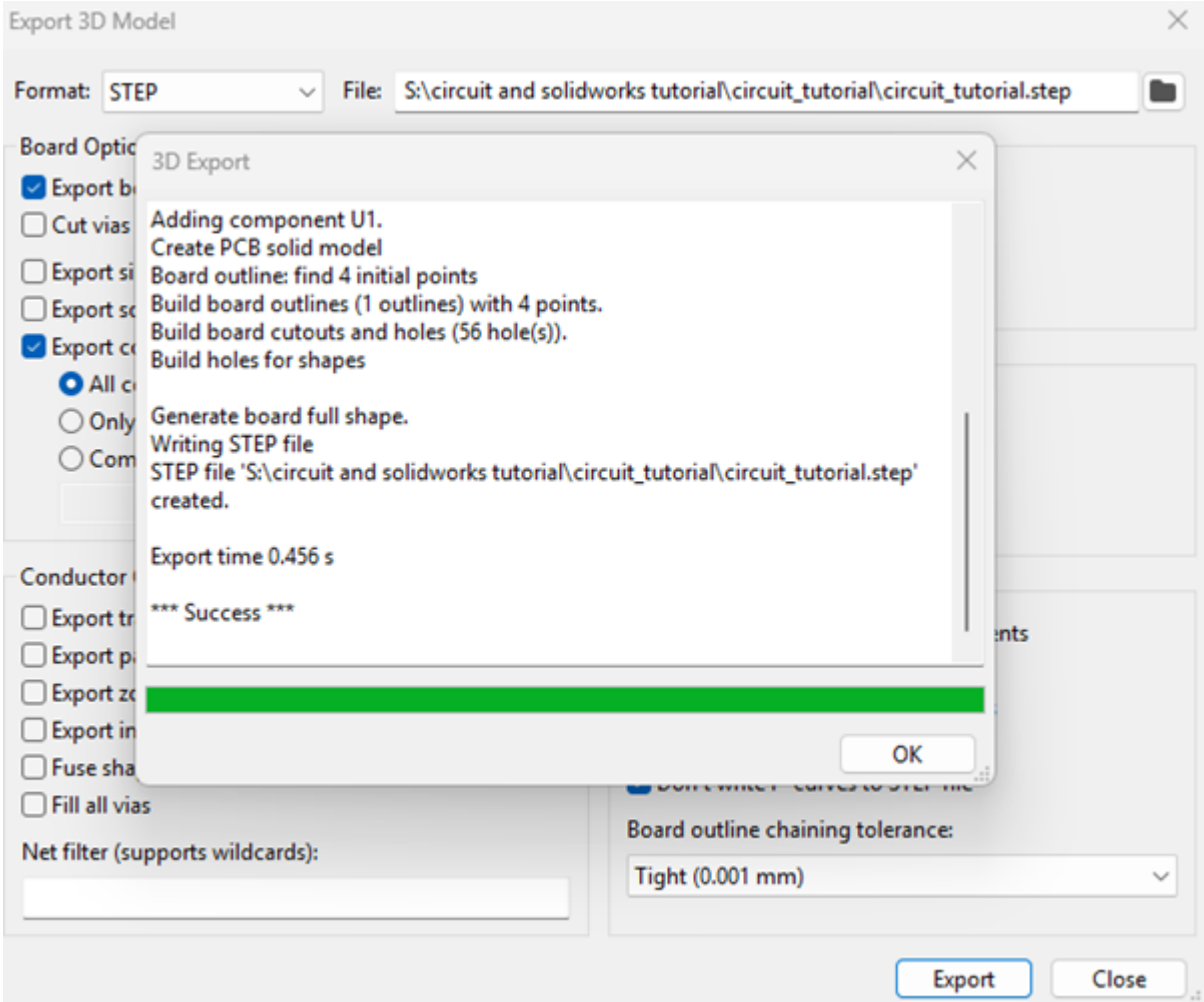
Footprint Association (.cmp) File...
Hyperlynx...



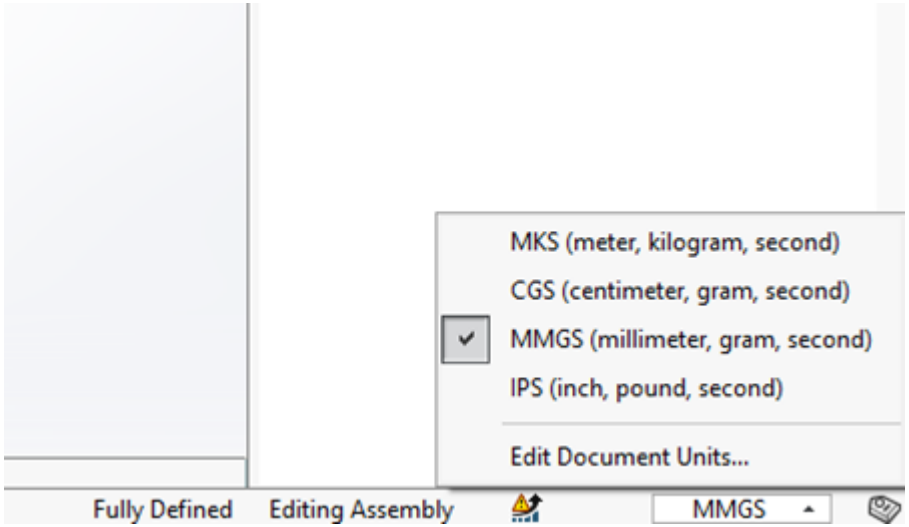
SolidWorks

Navigate SolidWorks (5 mins)

Rotate: using middle button on the mouse
Pan: or moving the design by pressing control button and middle button of the mouse
Spacebar:

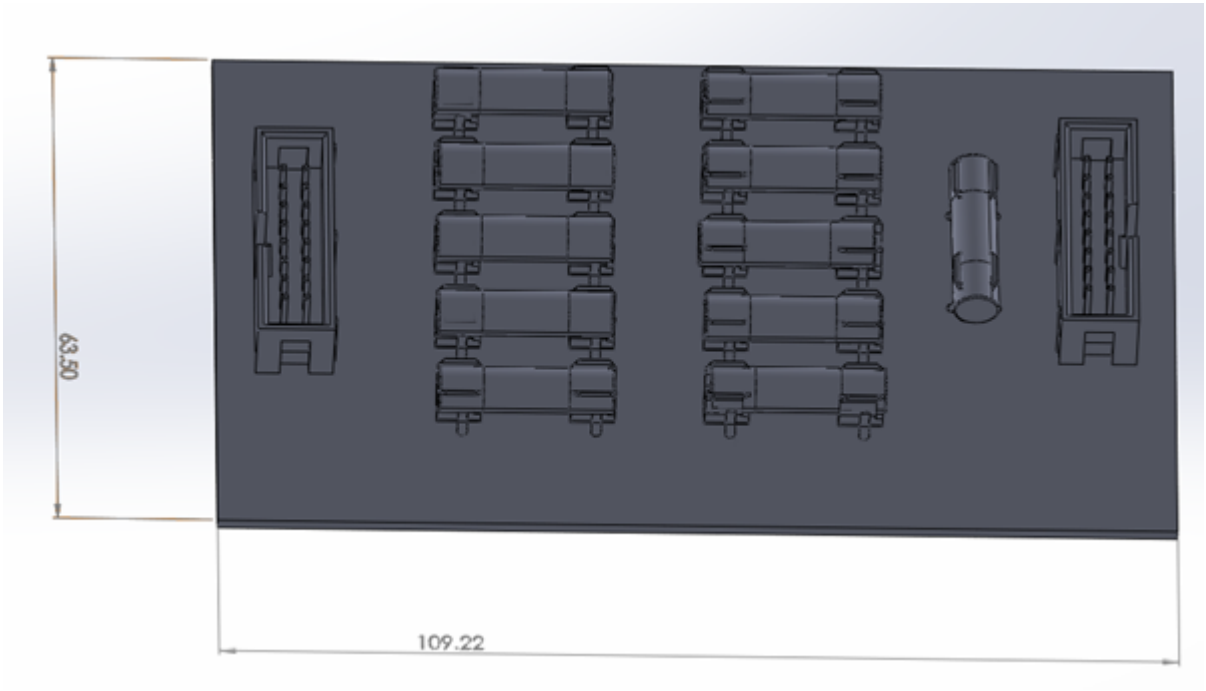
Unit in SolidWorks (1 min)

On your right-hand side, select mm as unit



Measuring

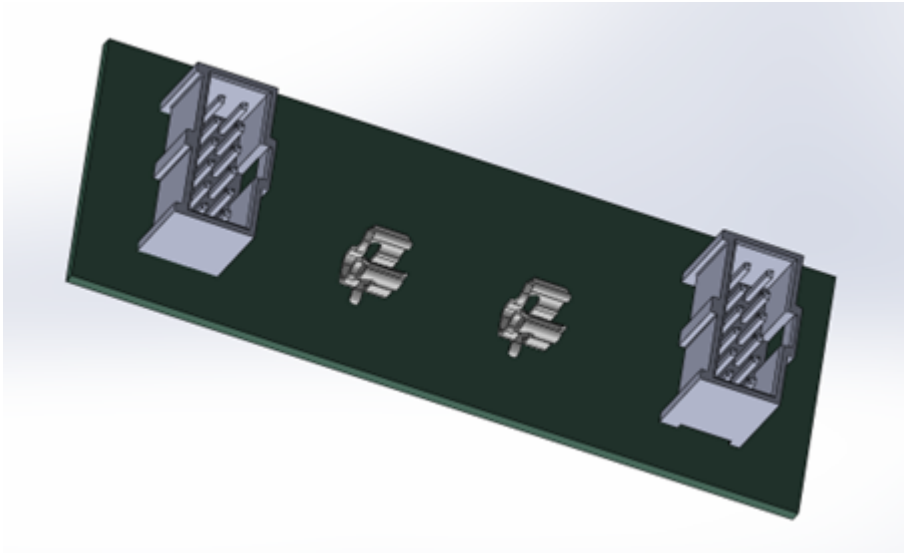
Using Smart Dimension to measure the size of an object



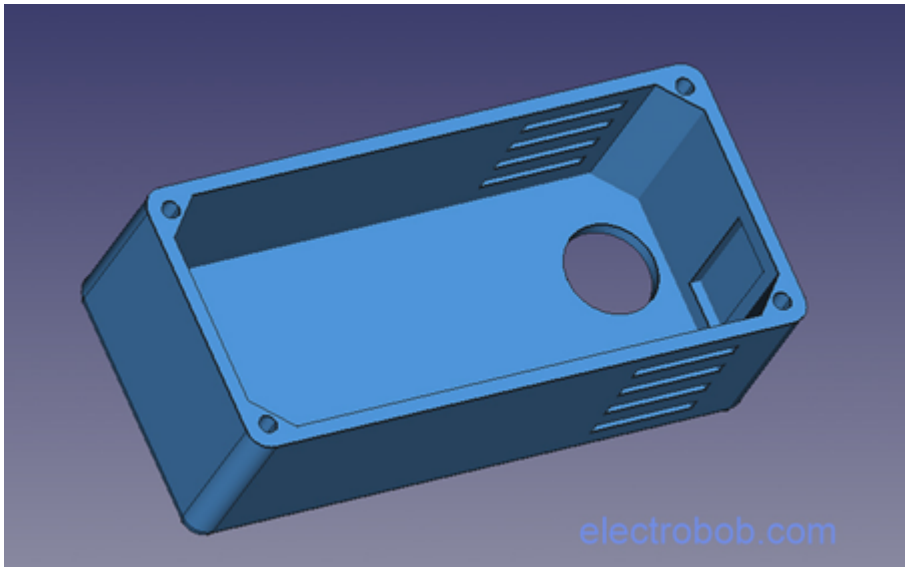
Let's Start

Import STEP file

This is the circuit we design earlier



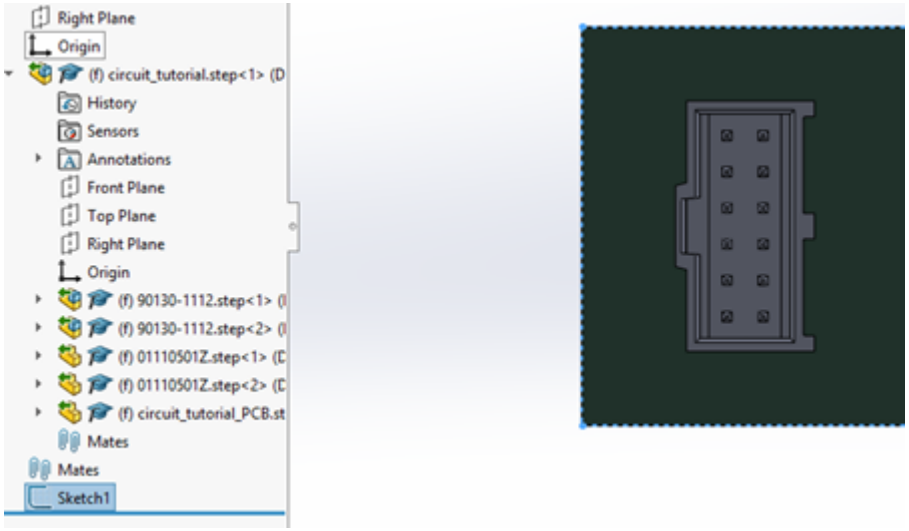
Let build a box for it; I usually search online to get an idea.



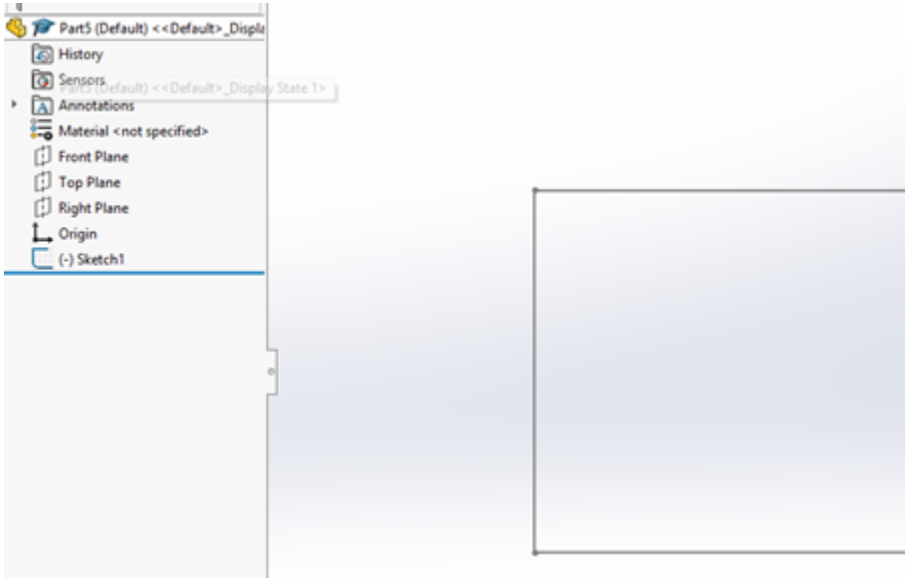
The box above looks nice but let make something simple.
I want to create a box with 5mm thick and cover the pcb boad. The box should have 4 leg with the height of 5mm to raise the board up.
The box will be 40mm height.

Create a box

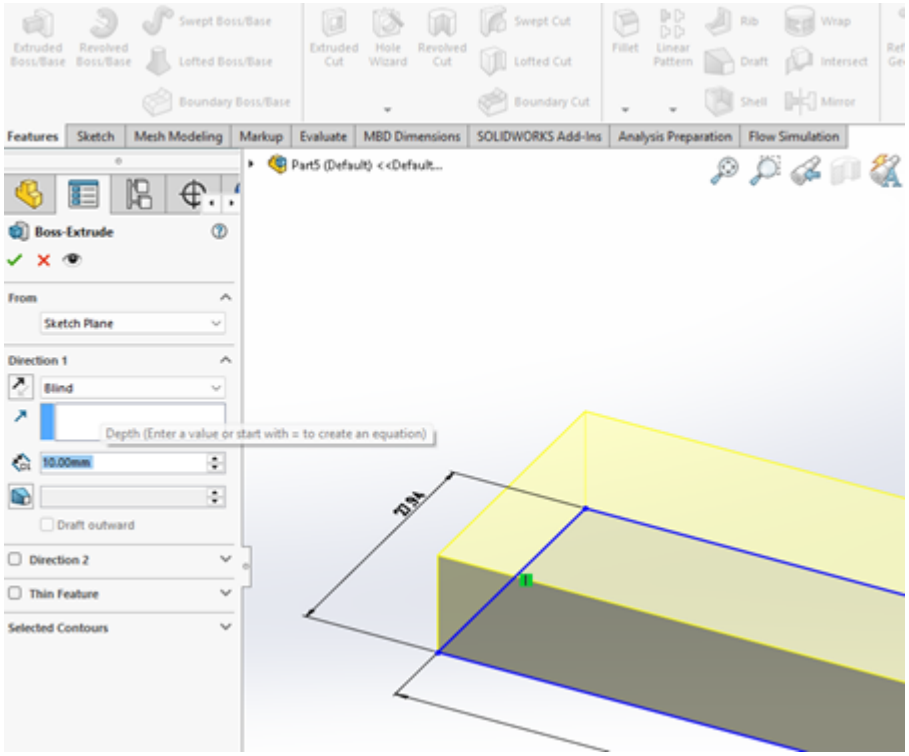
Draw a sketch around the circuit board



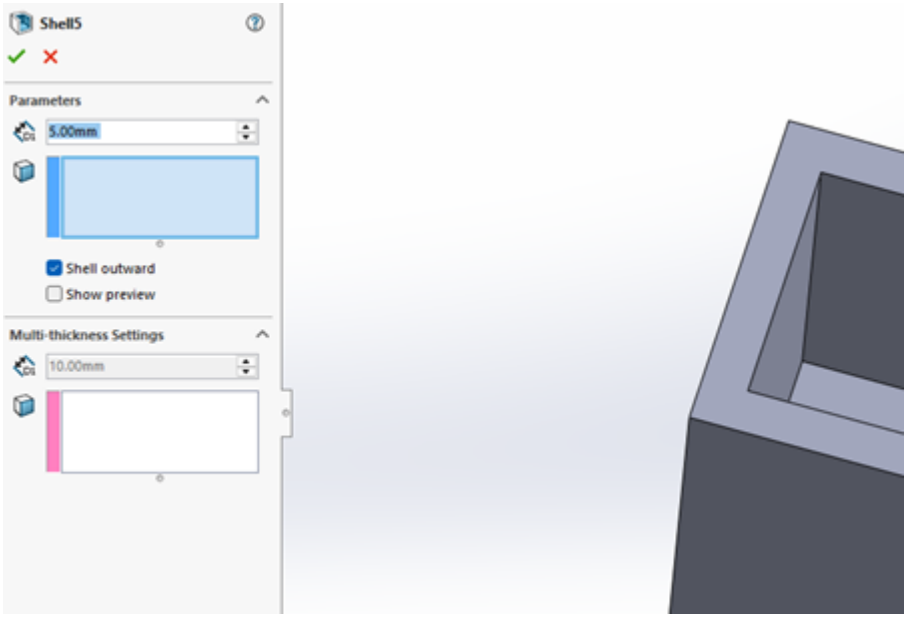
File > New part > Paste that sketch to top plane



Extrude that box for 40mm



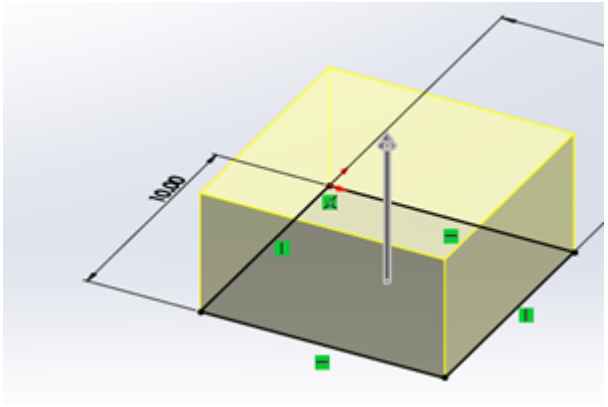
Select top surface of the box and create 5mm shell outward



Save this as box

Create a leg

File > New Part

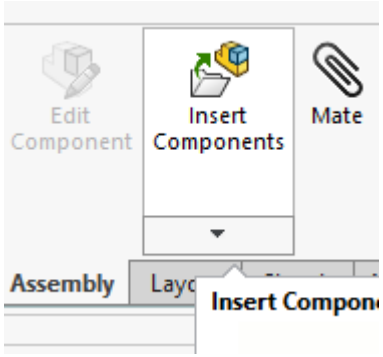


Create 10x10x 5mm object

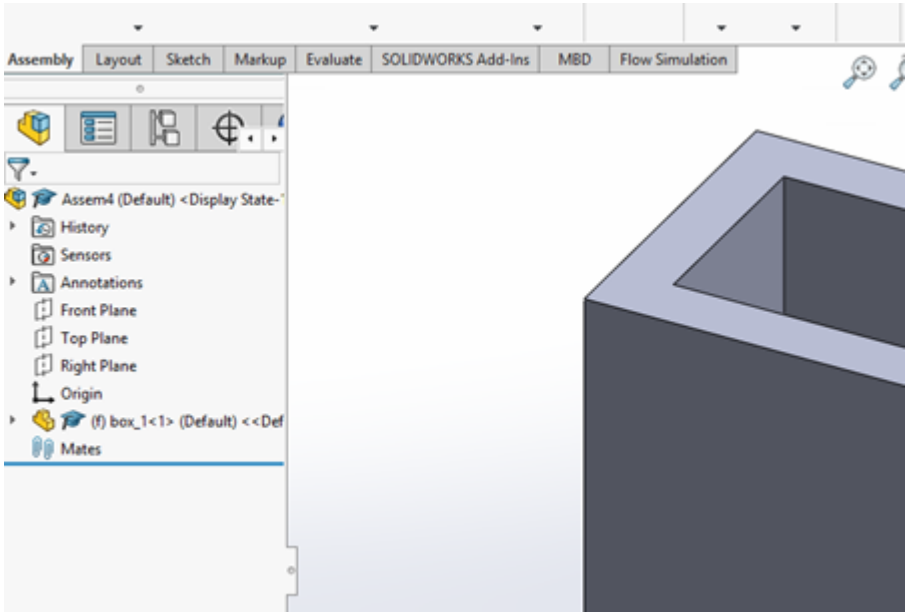
save as leg

Assembly

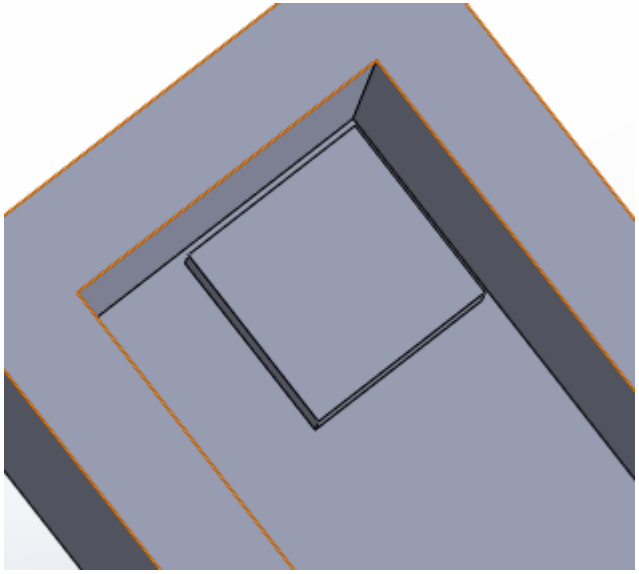
File > new Assembly



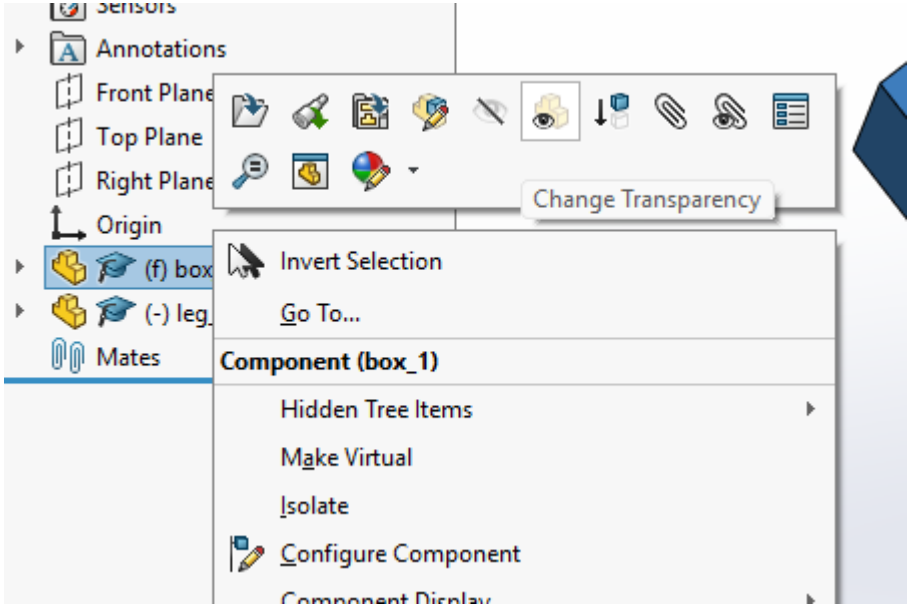
add the box



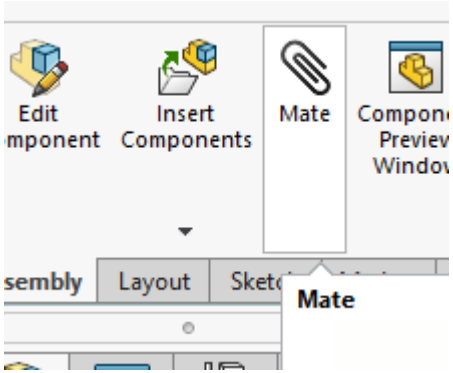
add the leg



Change transparency of the box



Using Mate function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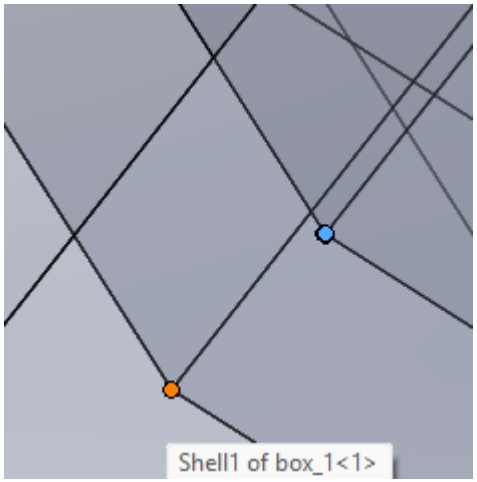
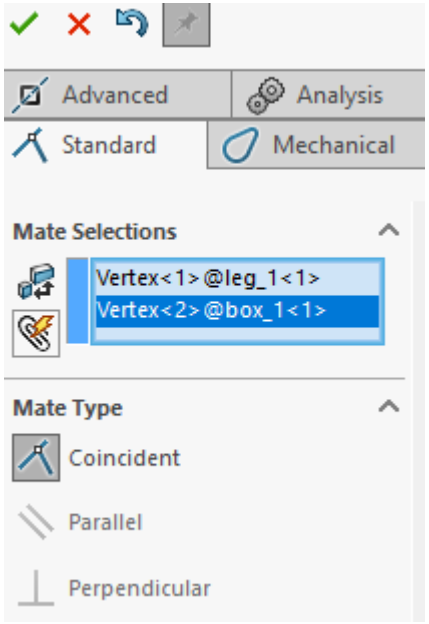

Shell1 of box_1<1>


Advanced
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Standard
Mechanical
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Vertex<2>@box_1<1>
Mate Type
Coincident
Parallel
Perpendicular