



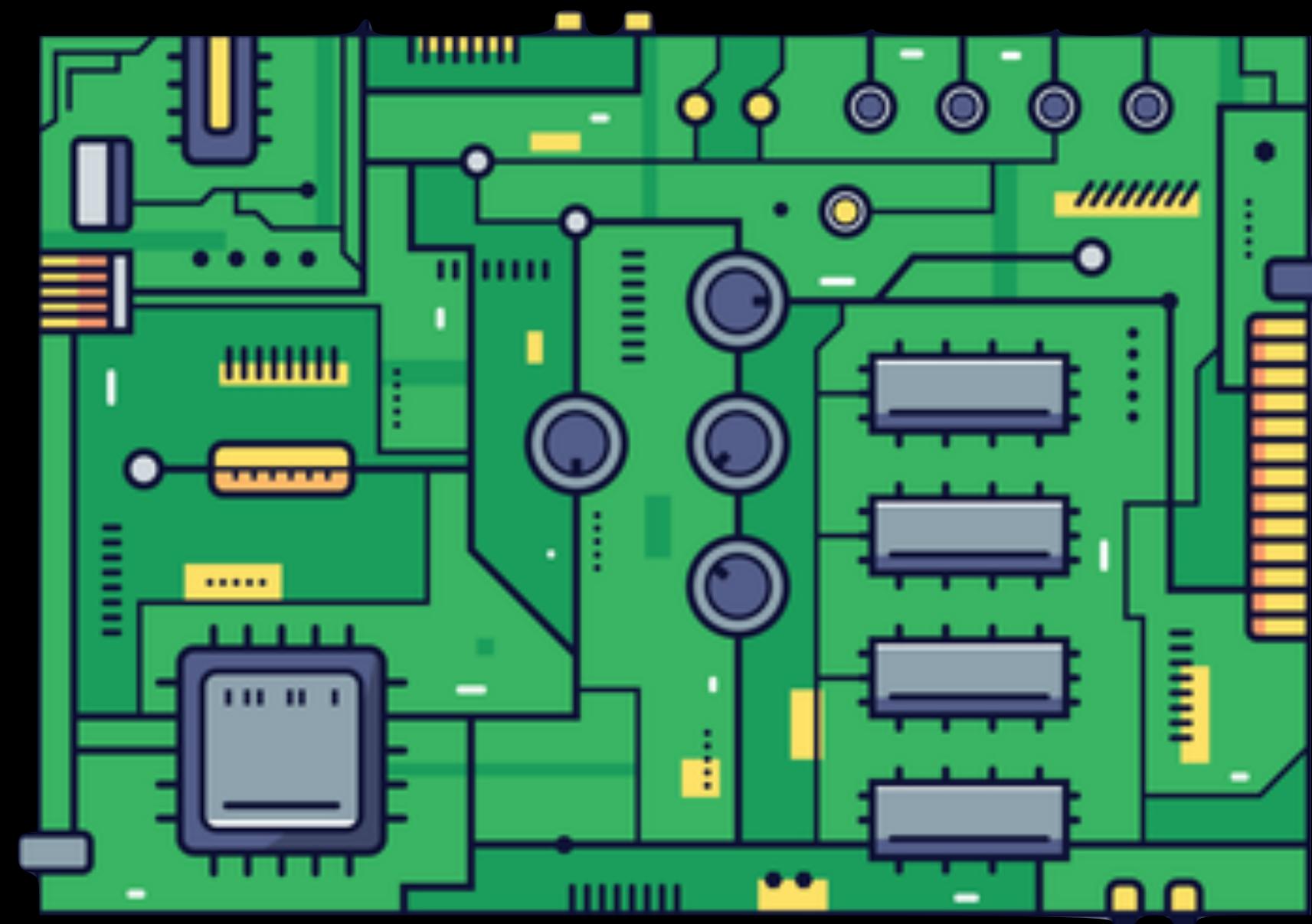
Projeto 09

Coisas Bonitinhas – Teoria

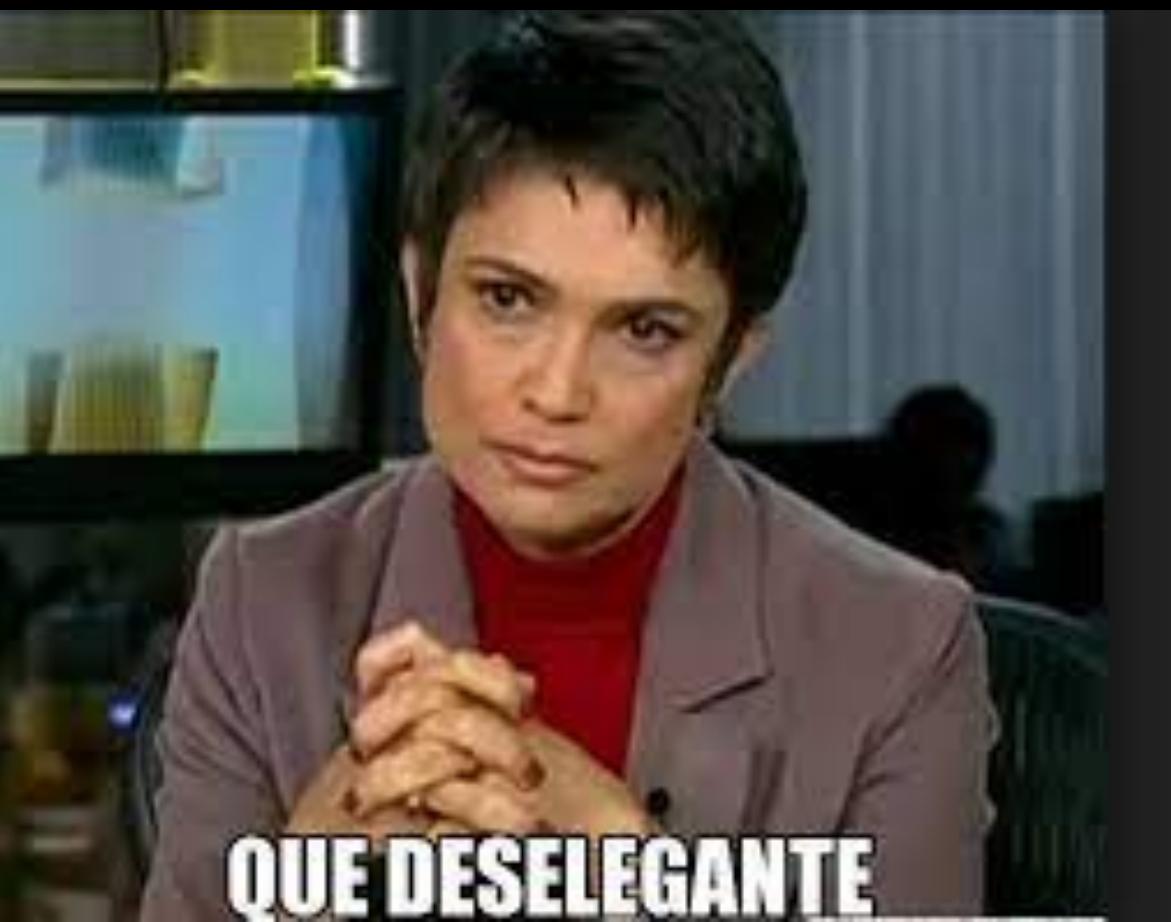
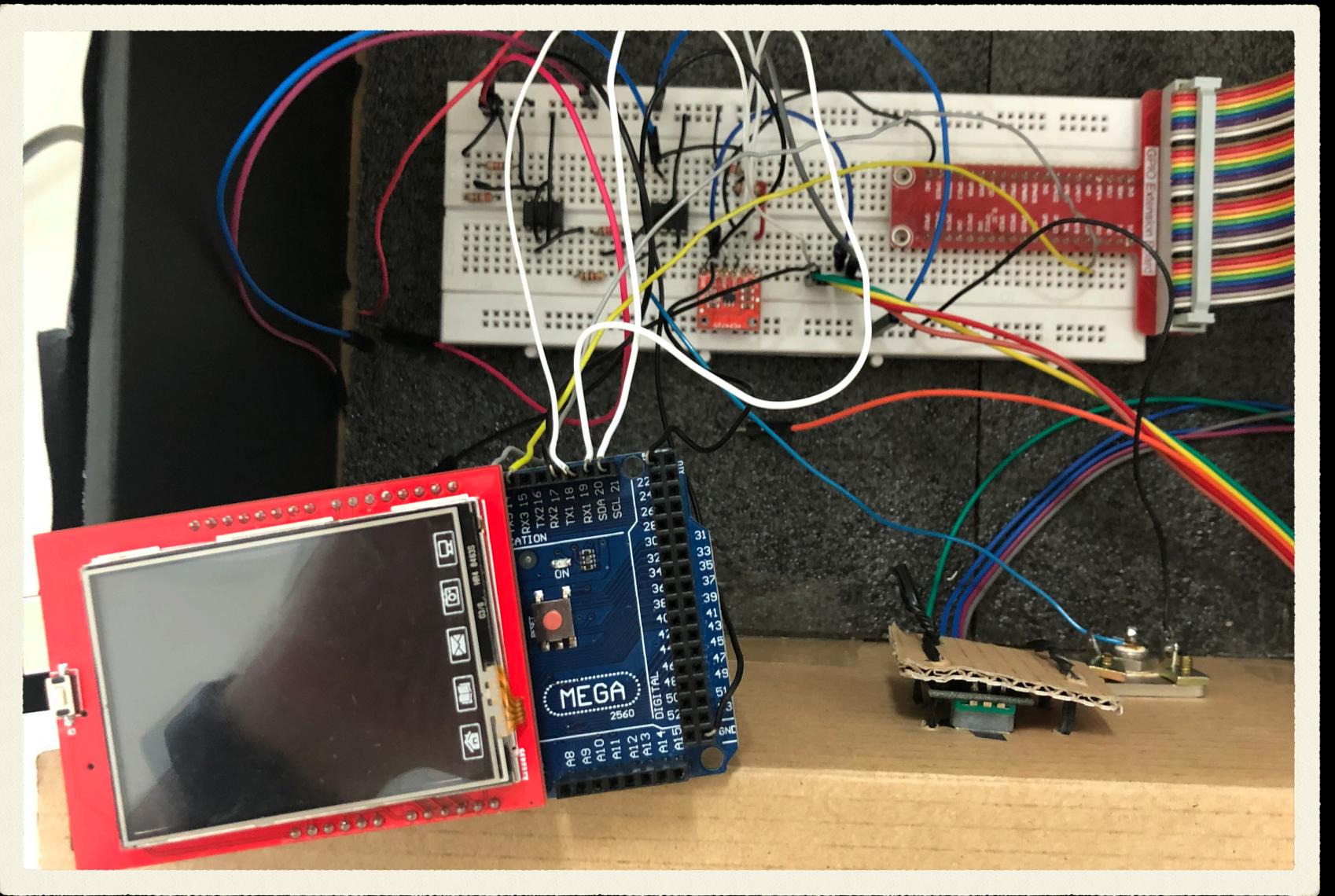
Jan K. S. – janks@puc-rio.br

ENG4051 – Projeto Internet das Coisas

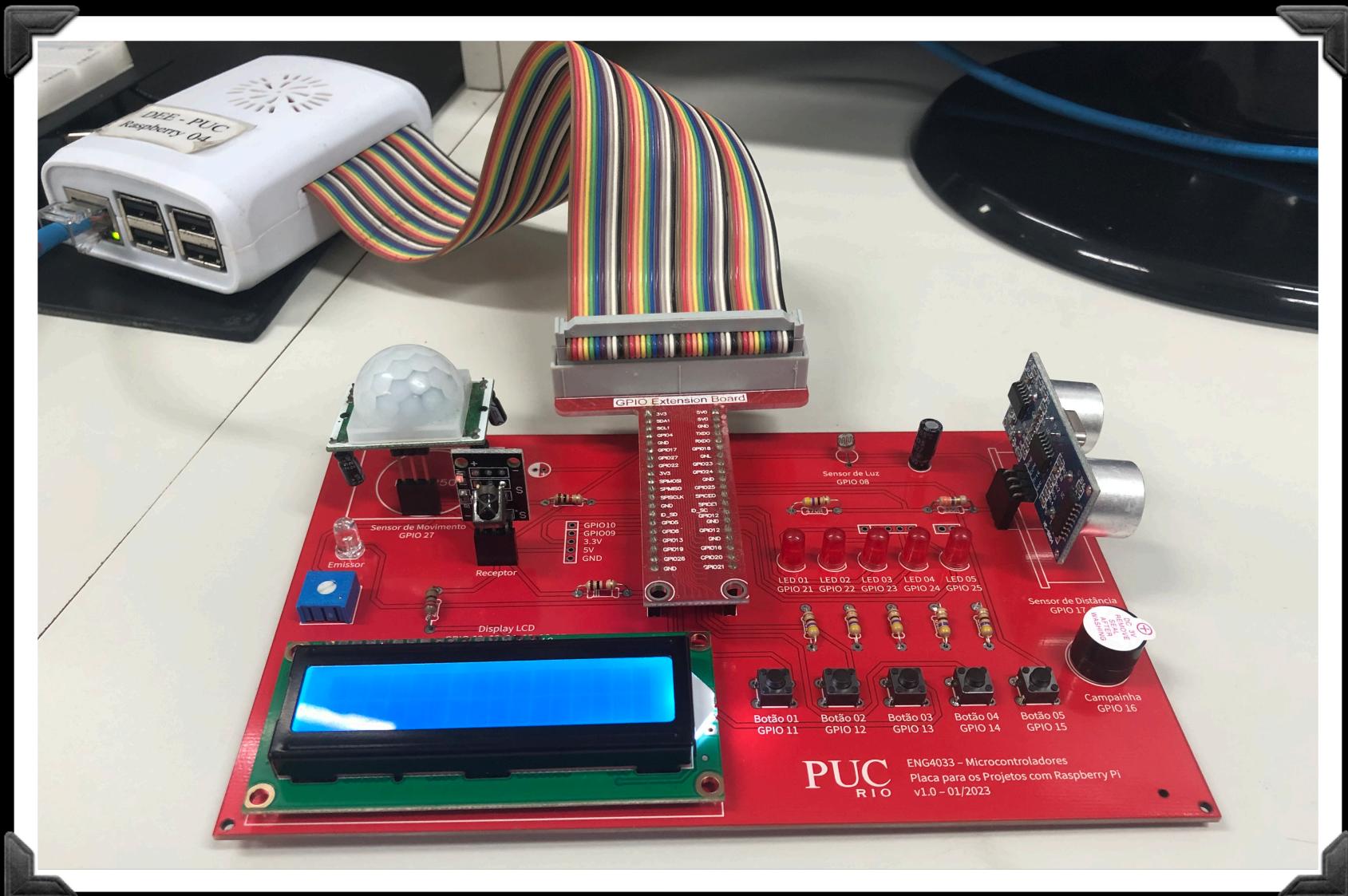
Coisas



Placas de Circuito Impresso



QUE DESELEGANTE



CHIQUE NO URTIMO

Protopboard Cheia de Fios x Circuitos Impressos



PROTEUS



LibrePCB

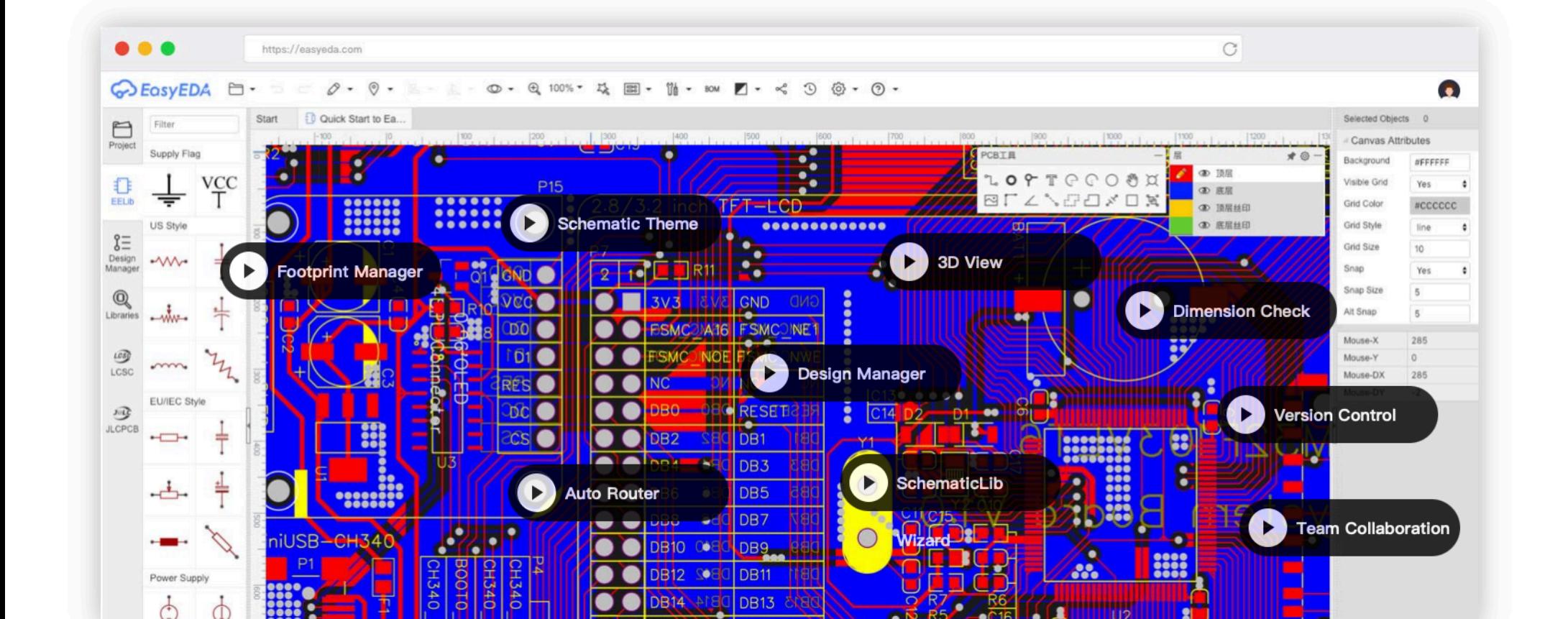


Softwares para Desenhar Circuitos Impressos



The Next Generation of PCB Design Tool

Schematic Capture PCB Design Libraries Design Project Management Team Collaboration



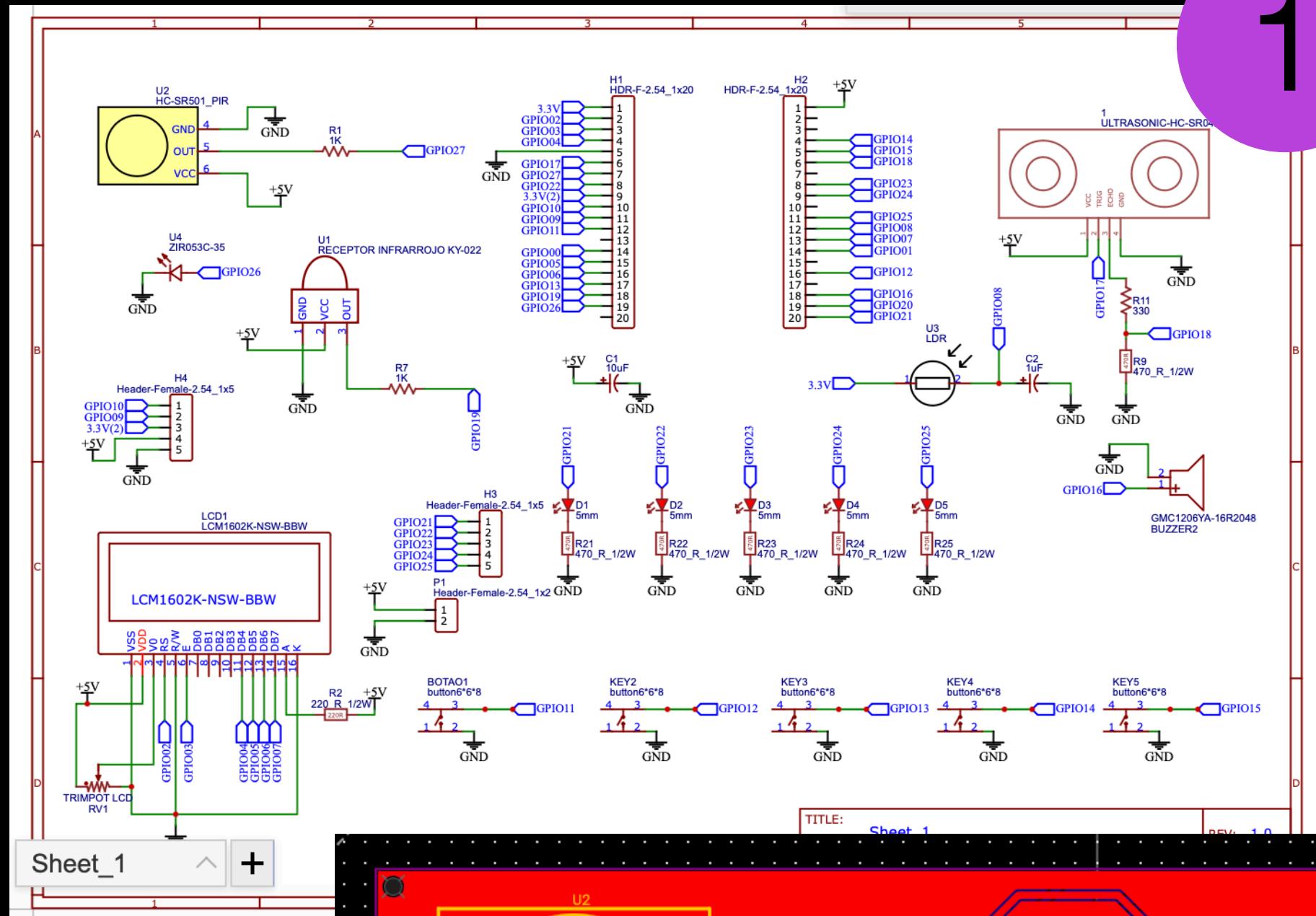
More Than 5 Million Free Libraries

More than 5 million and continue creating components,
letting you focus on the design, and you can create or import your own common libraries.

Aplicativo Web EasyEDA

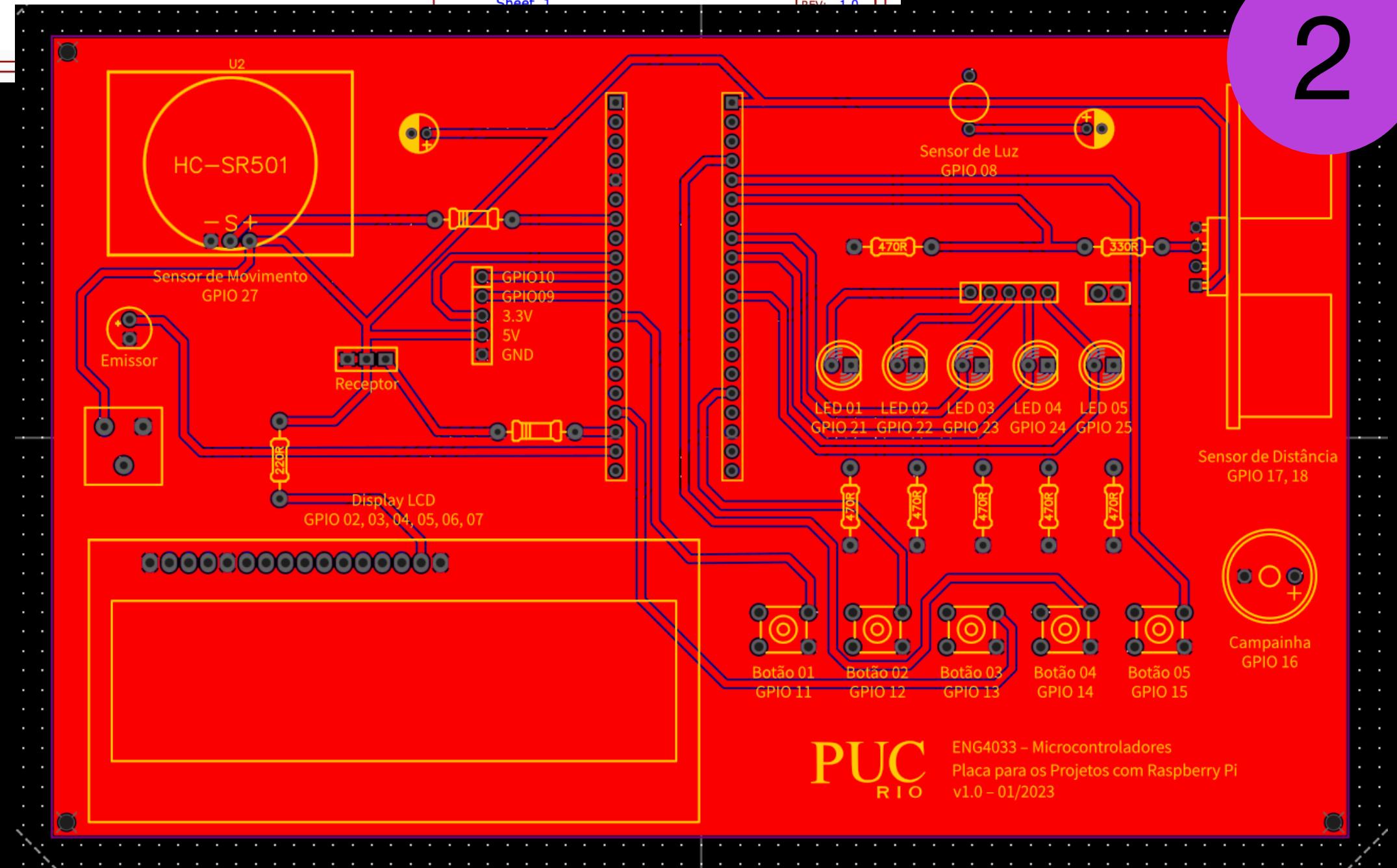
1

Esquemático dos Componentes



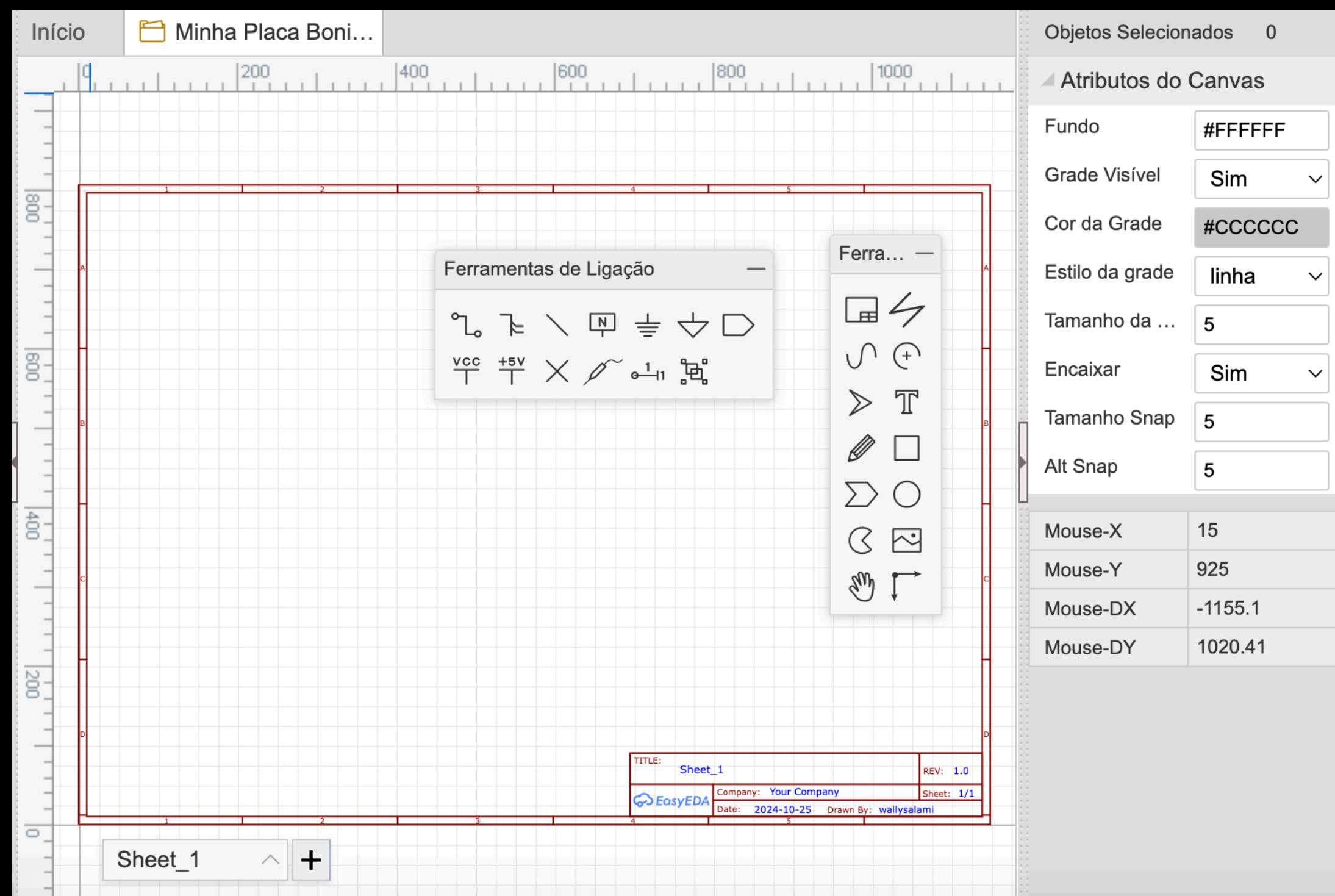
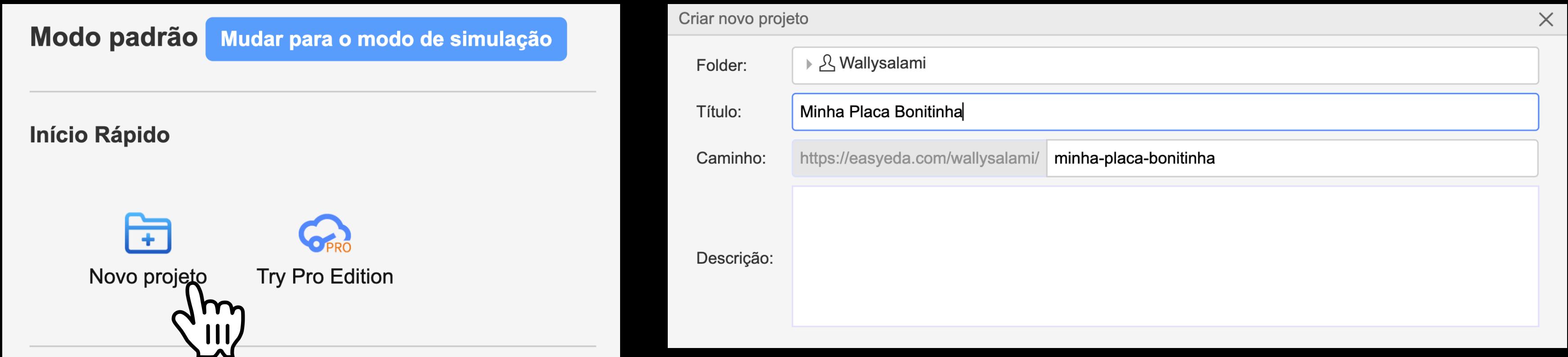
2

Desenho da Placa

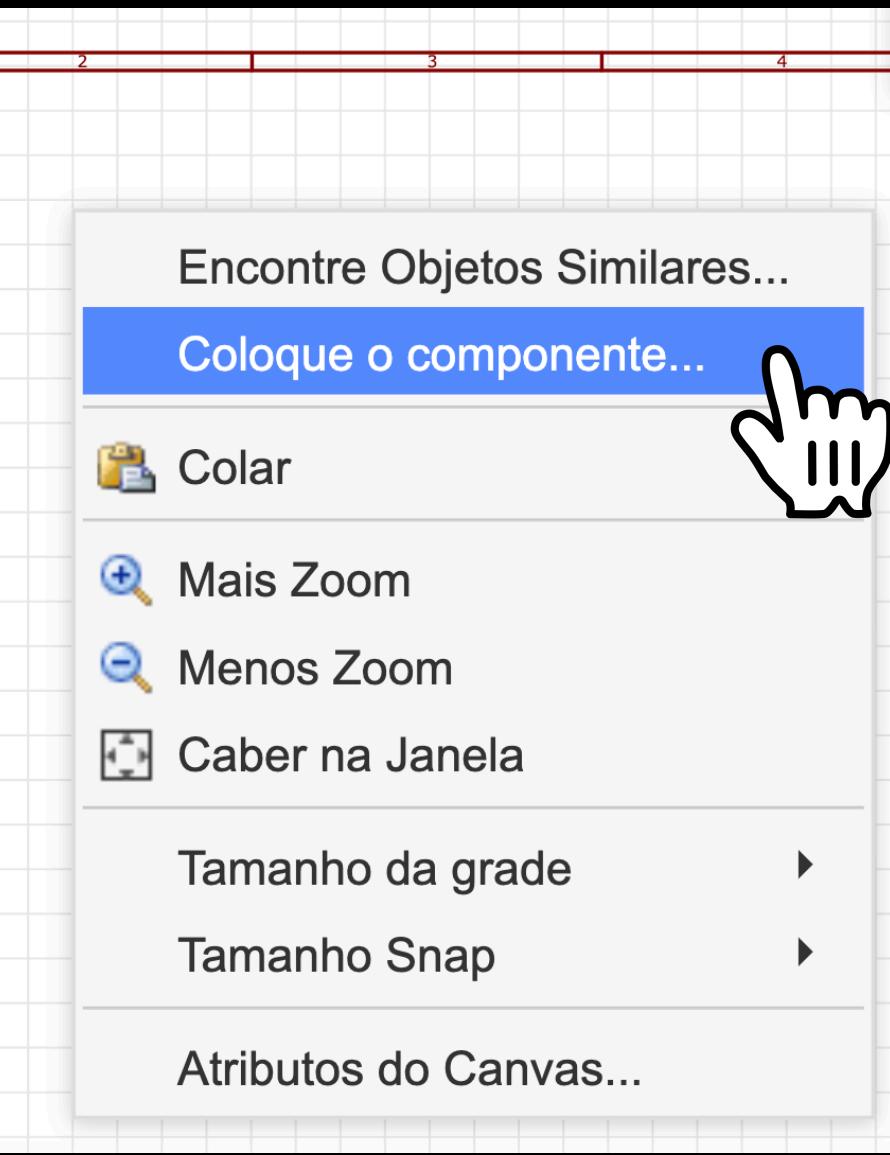


Etapas para o Desenho do Circuito Impresso

Demonstração...



Criação de um Novo Projeto



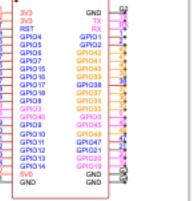
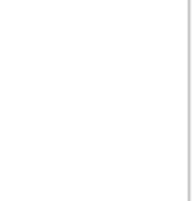
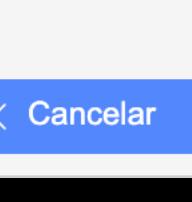
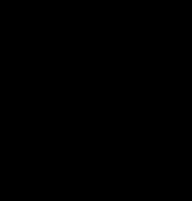
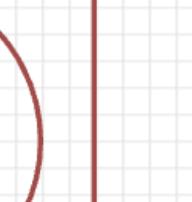
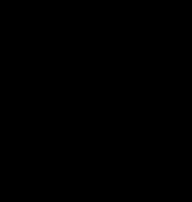
Biblioteca

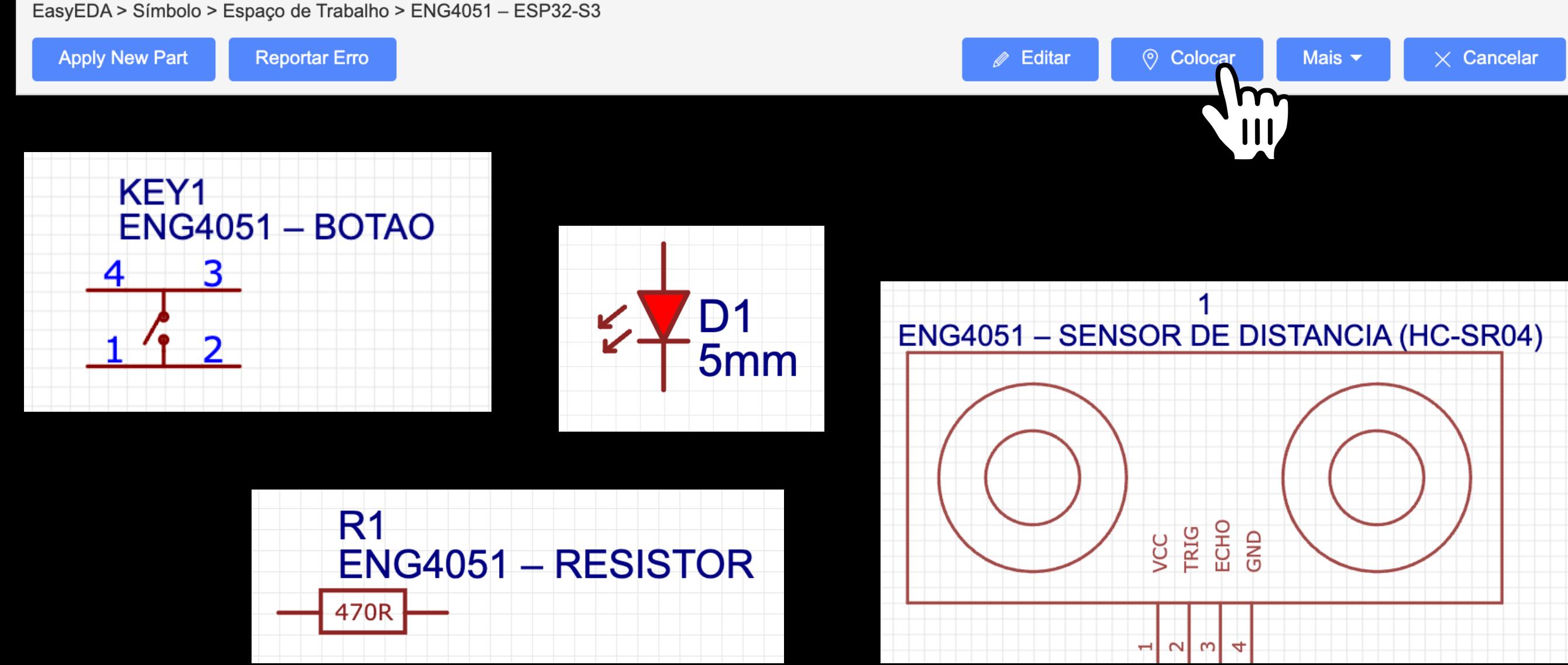
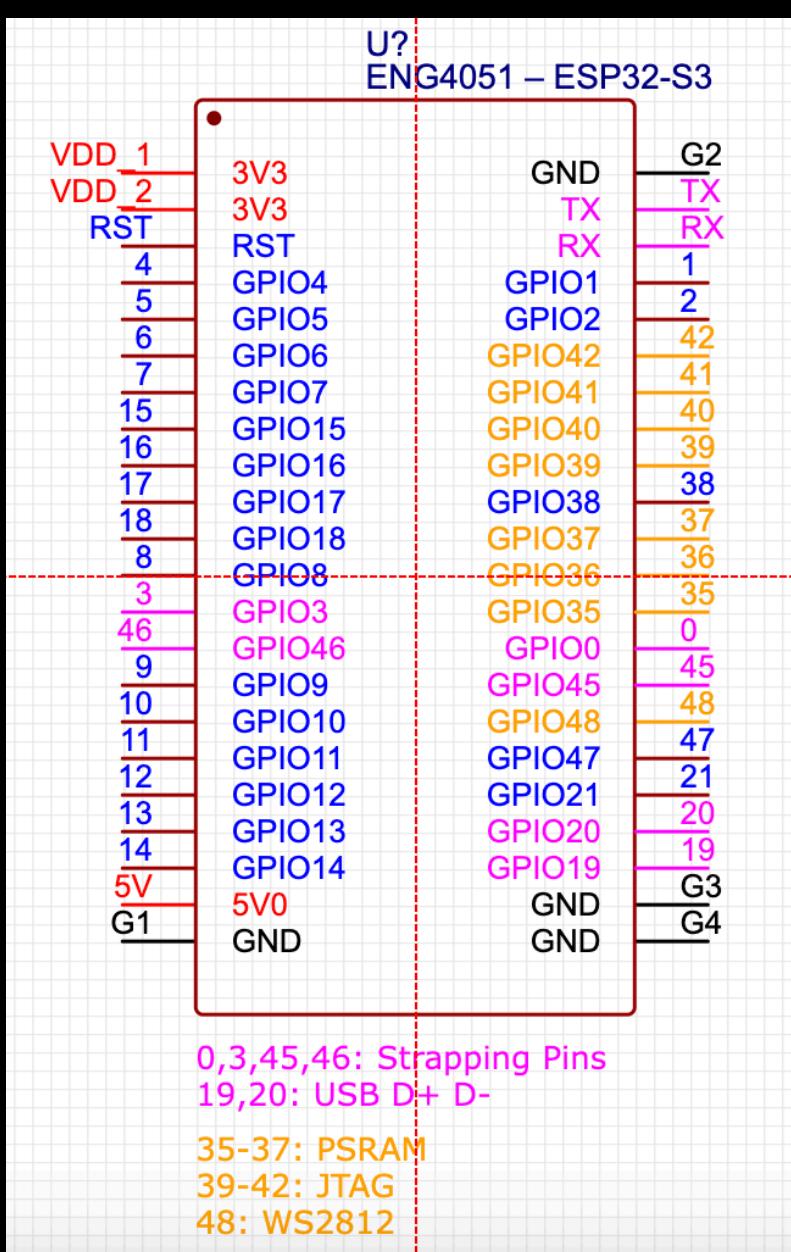
Motor de Busca: EasyEDA | LCSC NEW

Tipos: Símbolo **Símbolo** Pegada Símbolo Spice Módulo Módulo PCB Modelo 3D

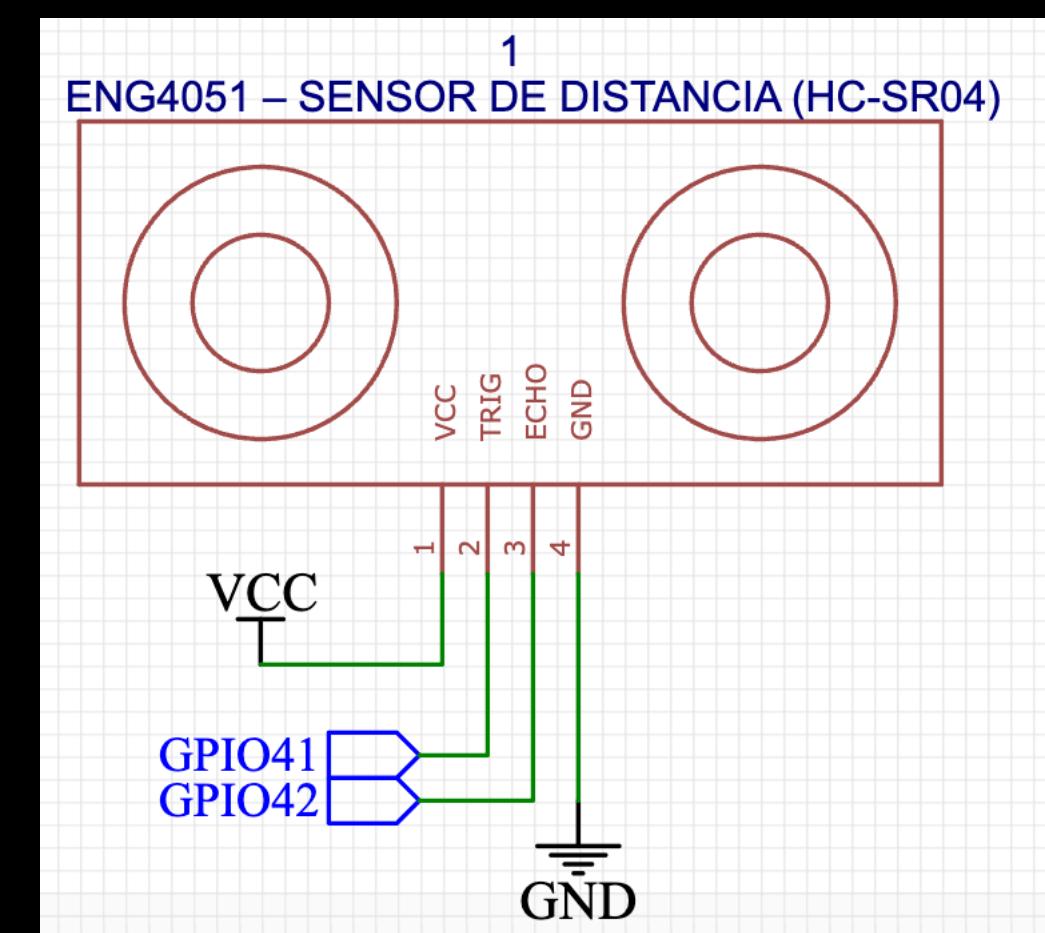
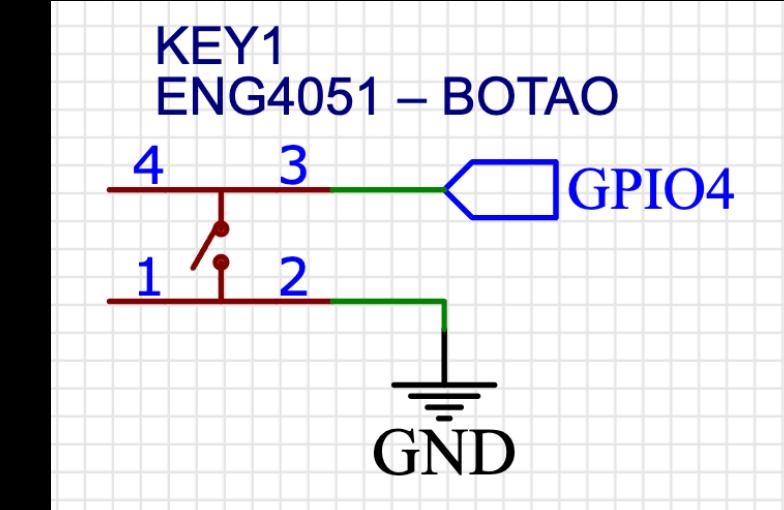
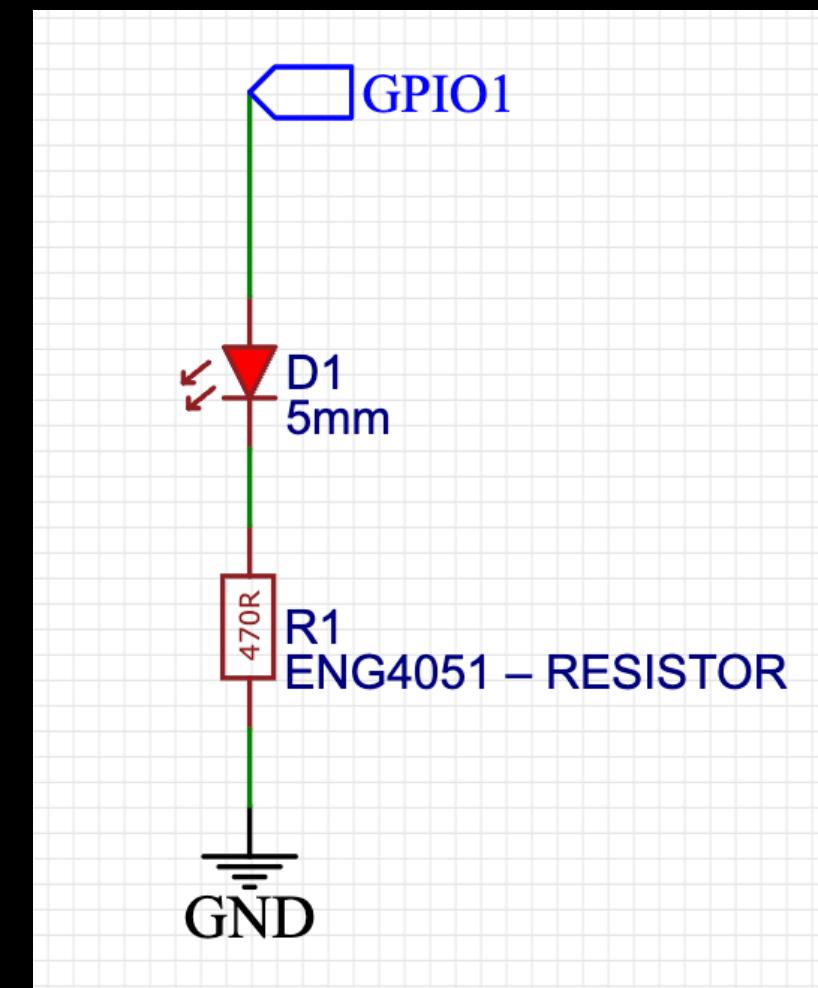
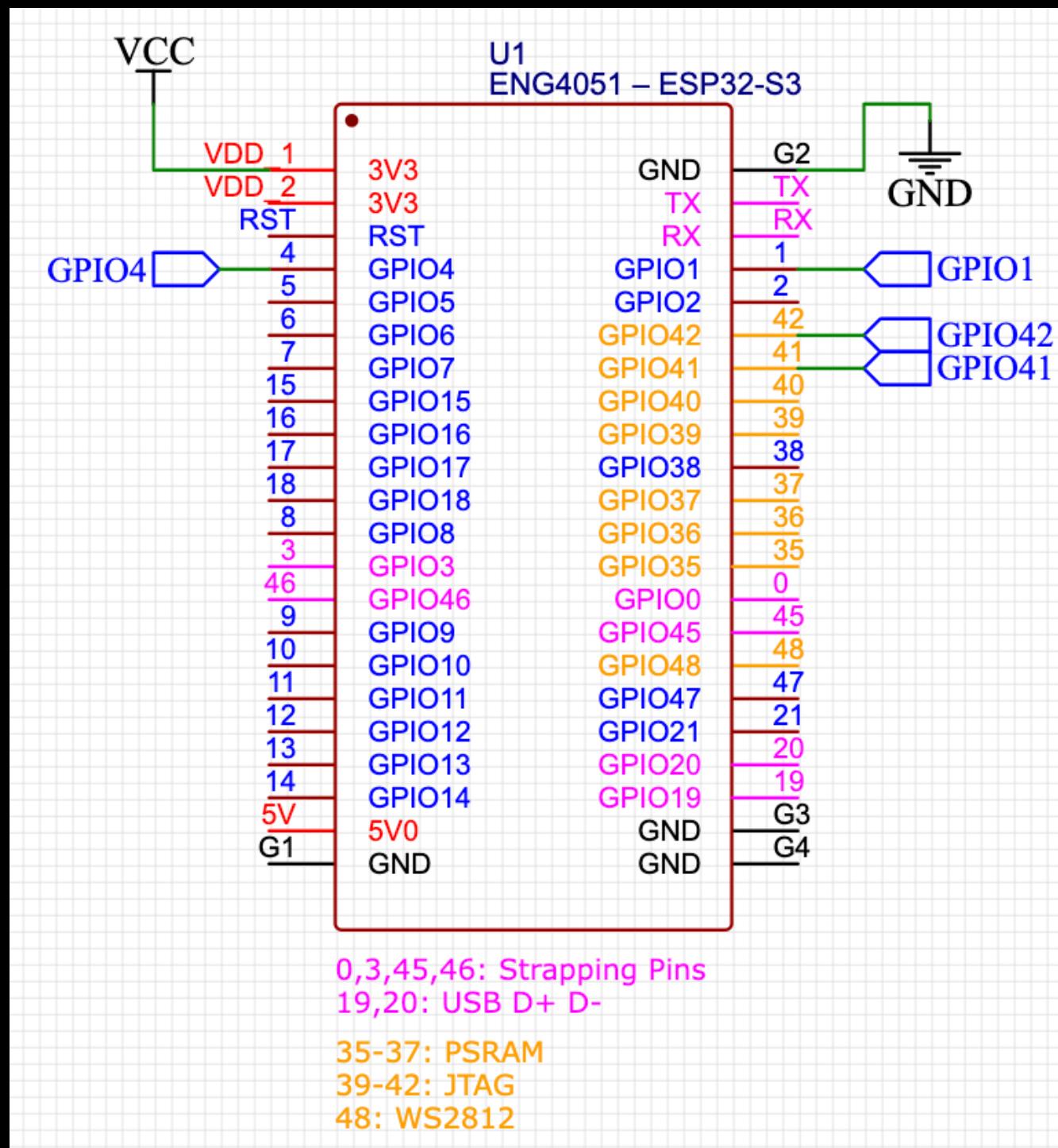
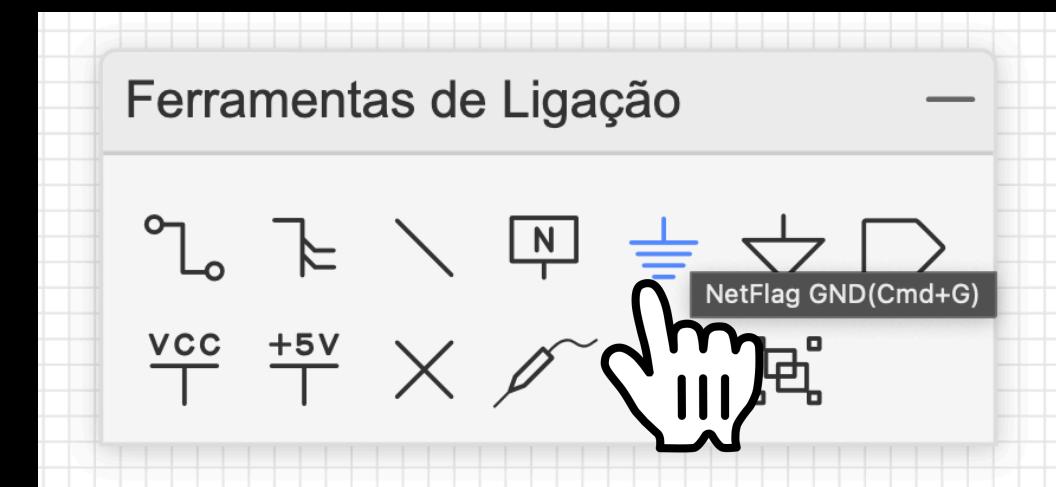
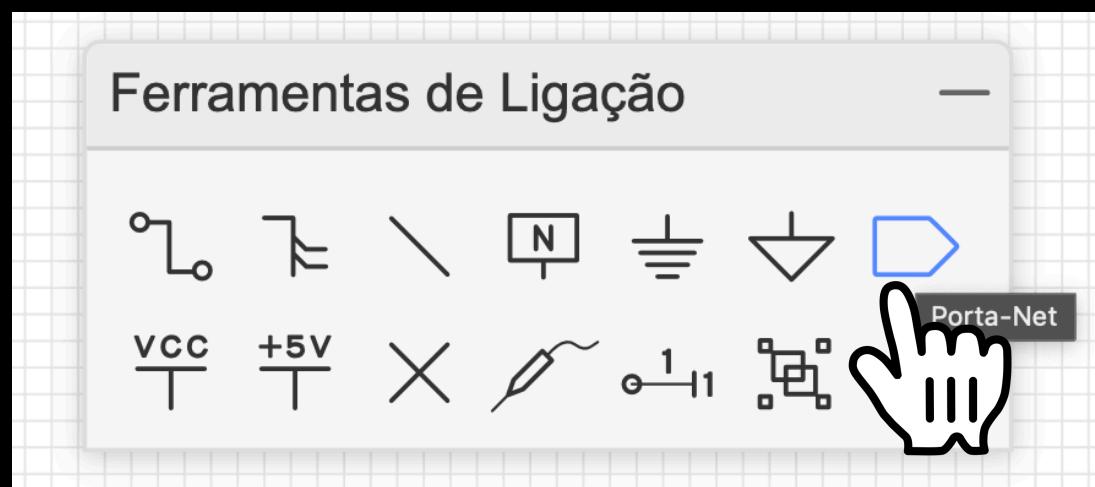
Classes: Espaço de Trabalho(10) LCSC(0) JLCPCB montado(0) Sistema(0) Seguir(0) Contribuído por Usuários(0)

ENG4051

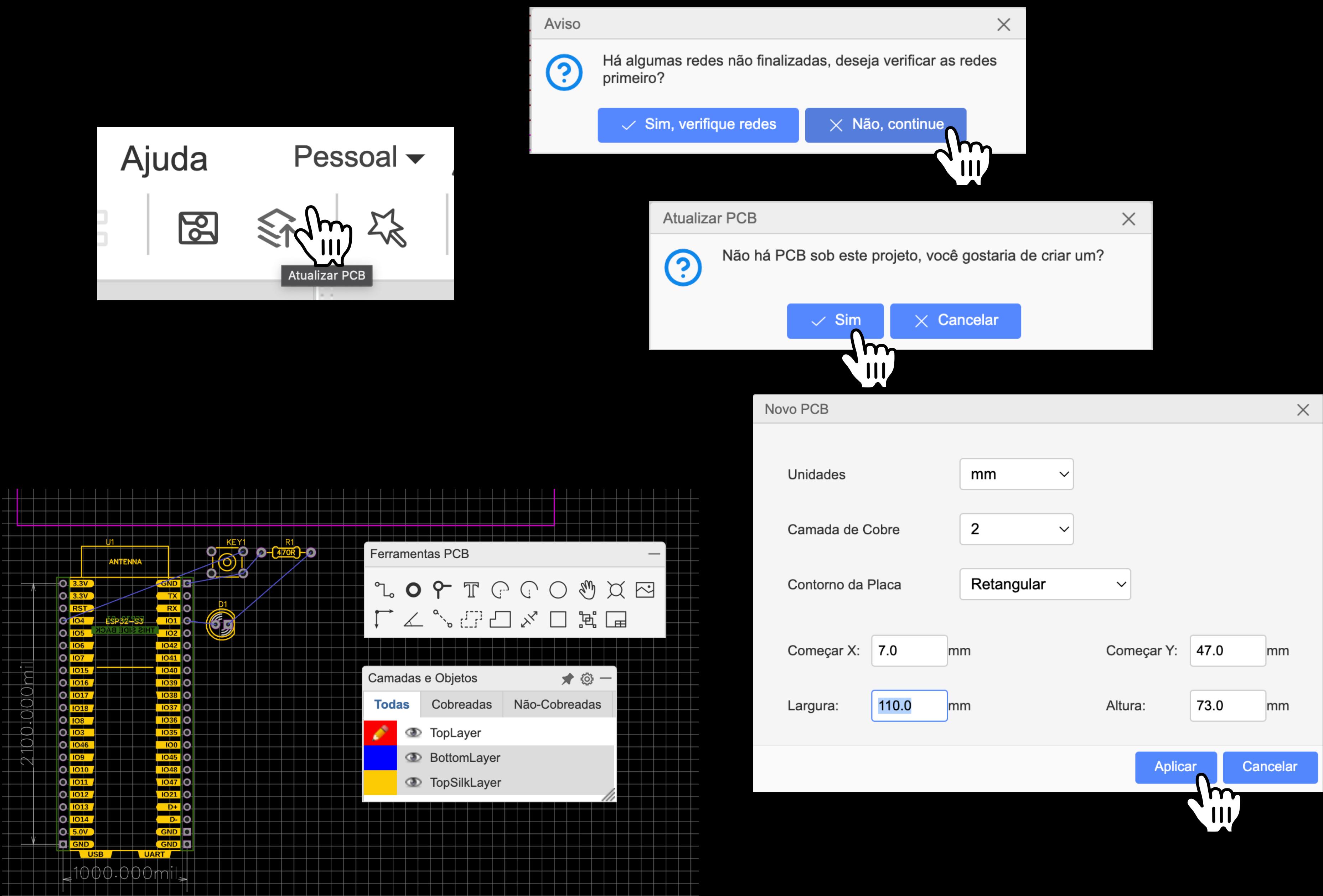
Título (PartNO)	Pegada	JLCPCB
ENG4051 – SENSOR DE DISTANCIA (HC-SR04)	ULTRASONIC-HC-SR04#V	
ENG4051 – SOQUETE 1X8	HDR-F-2.54_1X8	
ENG4051 – SENSOR DE MOVIMENTO (HC-SR501)	HC-SR501	
ENG4051 – SOQUETE 1X5	HDR-F-2.54_1X5	
ENG4051 – ESP32-S3	ESP32S3-DEVKIT-C1-V10	
ENG4051 – RESISTOR	470R RESISTOR 1/2W	
ENG4051 – SOQUETE 1X4	HDR-F-2.54_1X4	
ENG4051 – BME680 (TEMPERATURA, PRESSÃO, UMIDADE, GÁS)	BME680 BOARD	
ENG4051 – LED	PKG-LED-5MM-RED	
ENG4051 – CAMPAINHA (BUZZER) <small>SMT</small>	BUZ-TH_BD12.0-P6.50-D0.8-FD	



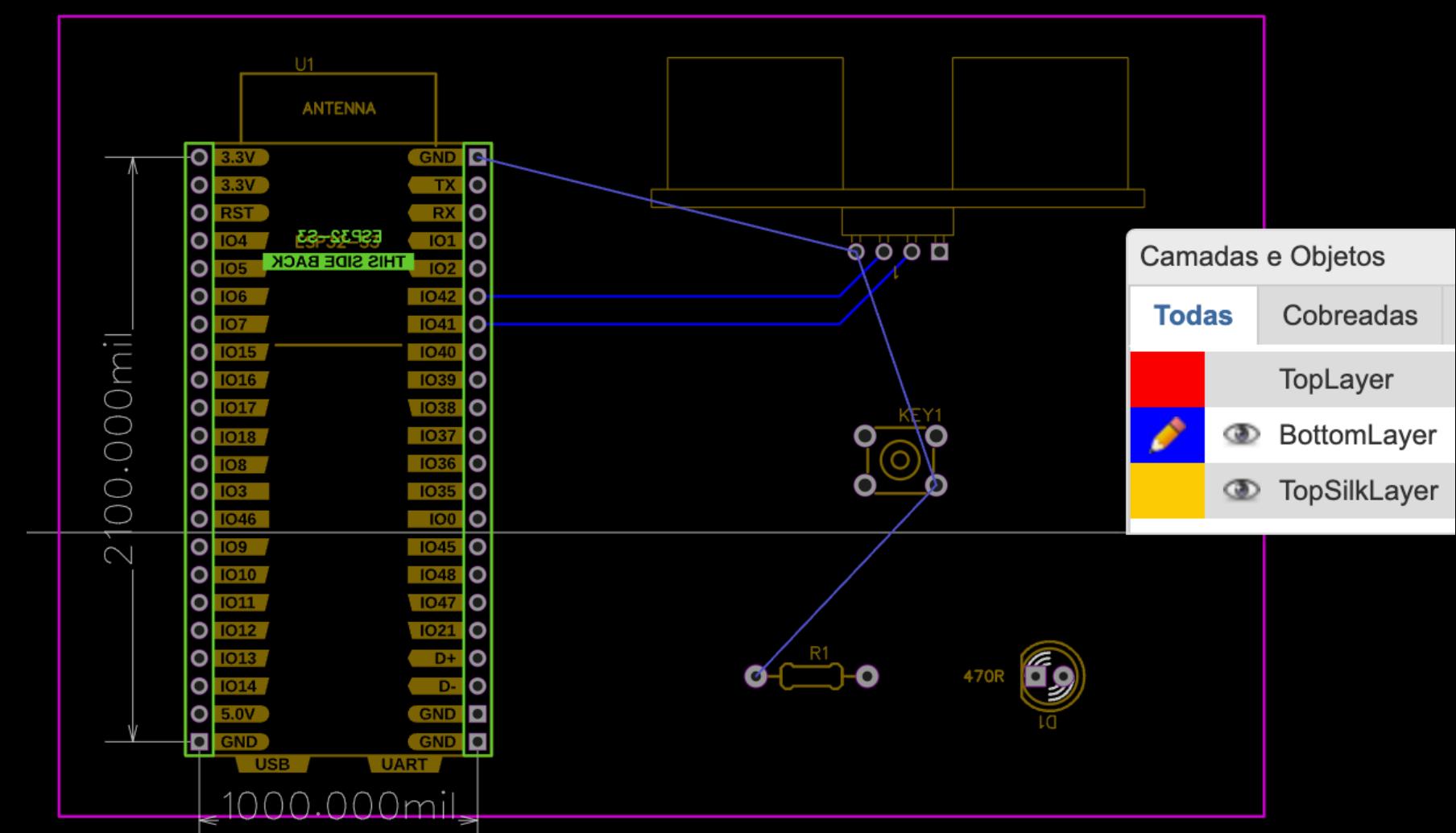
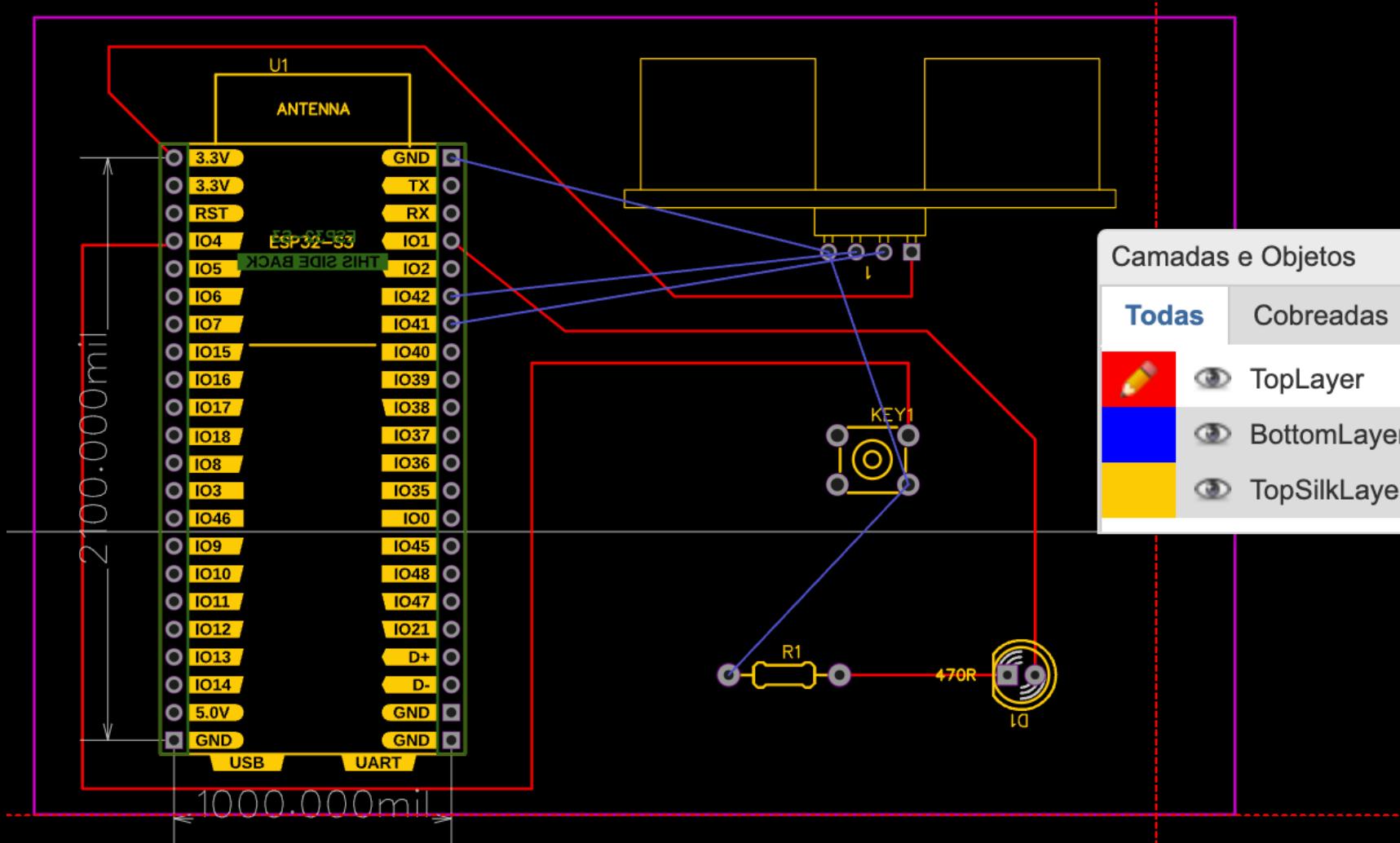
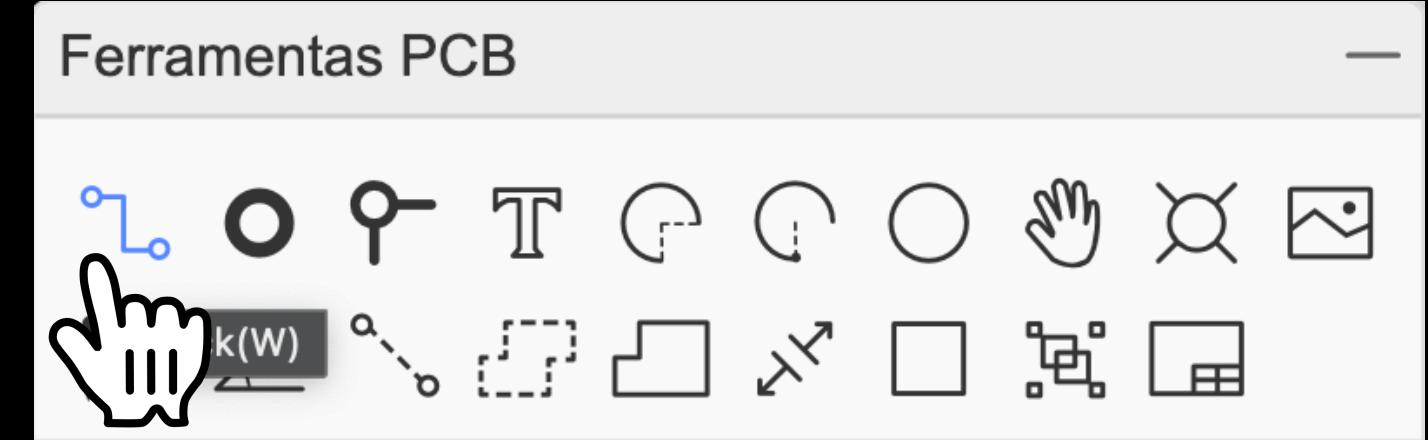
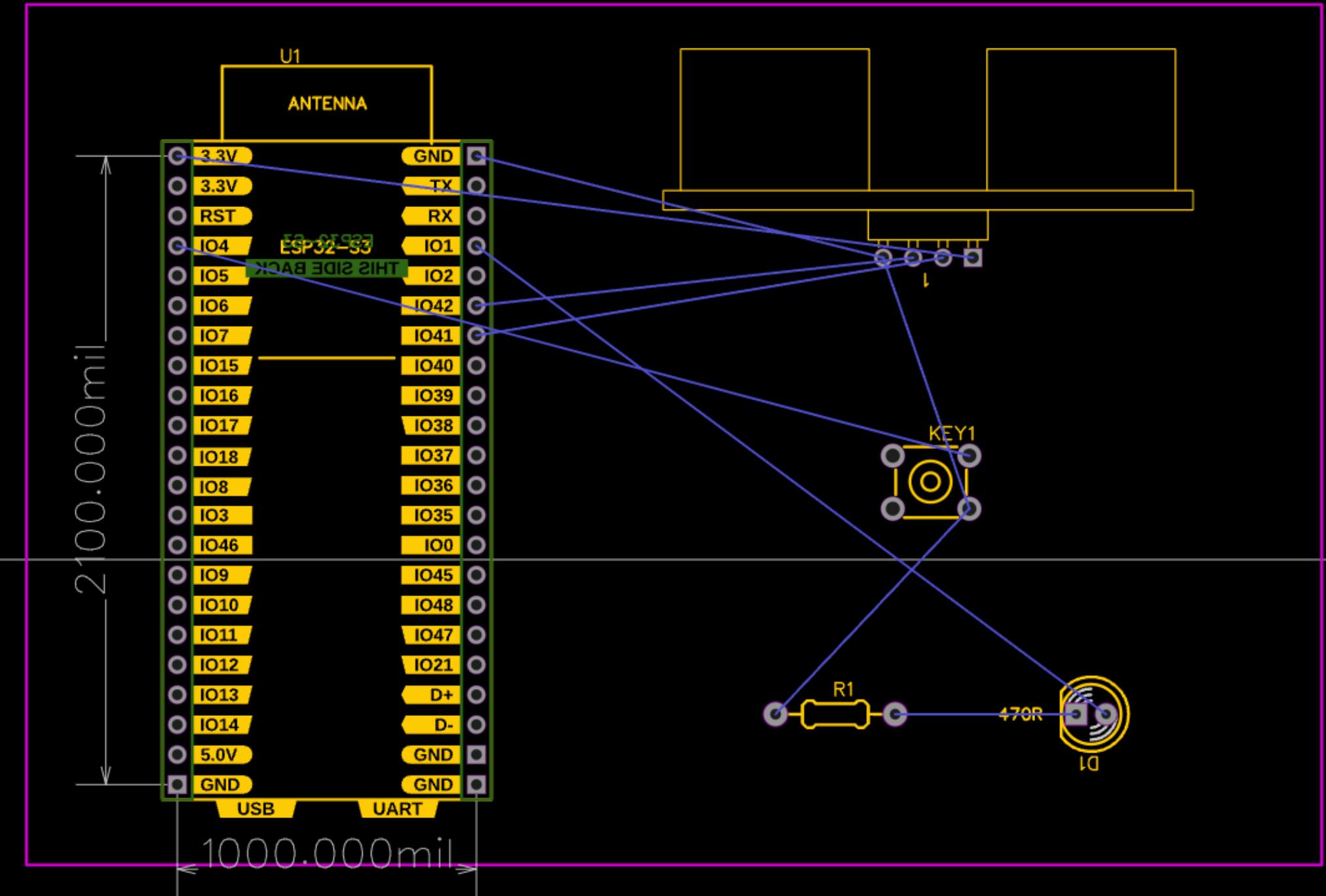
Adição de Símbolos no Esquemático



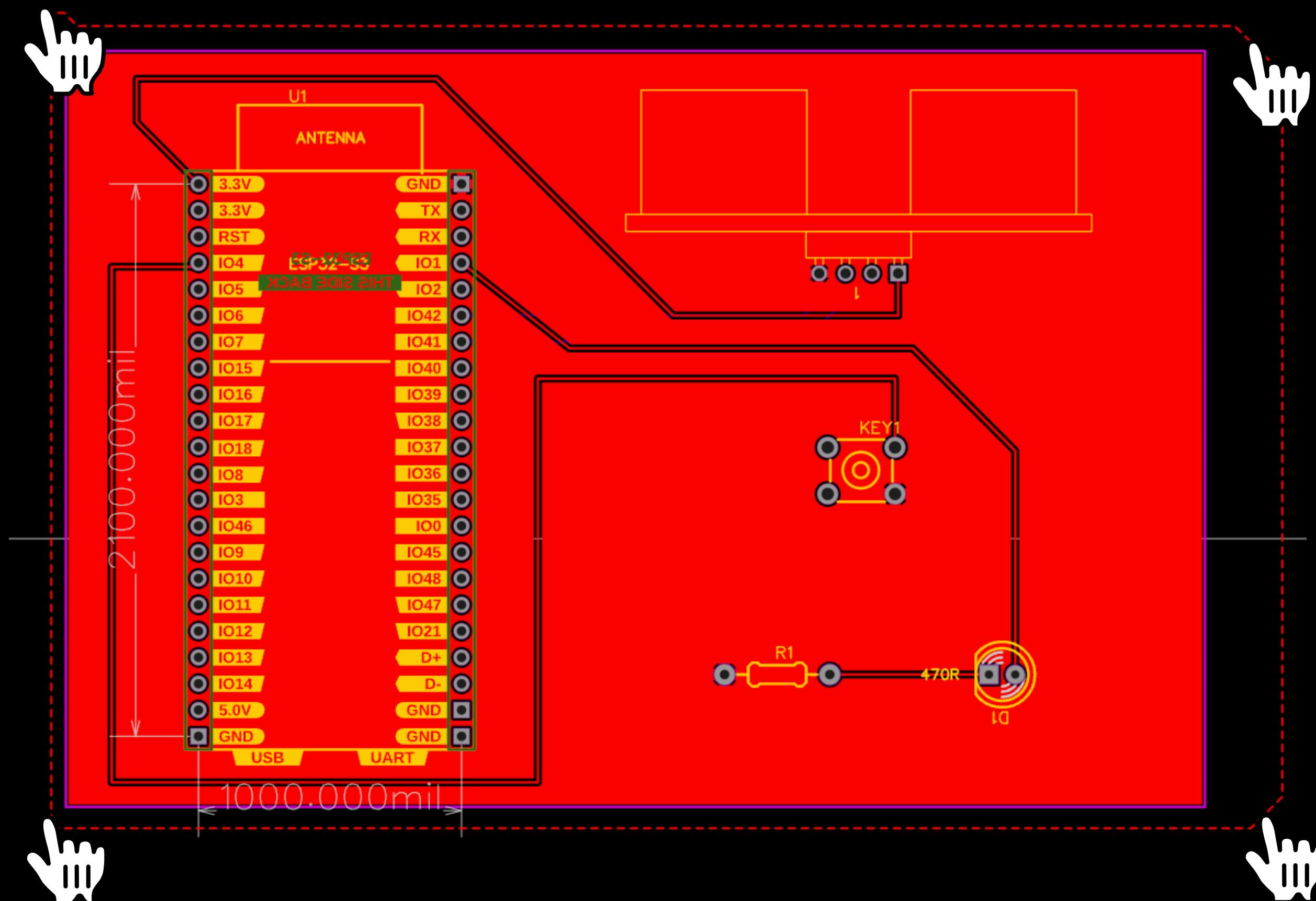
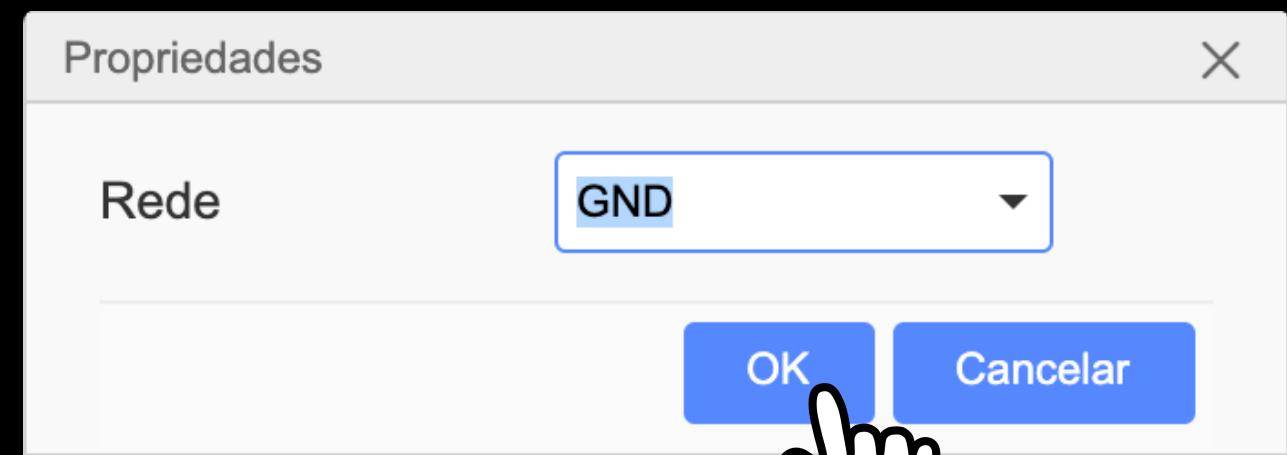
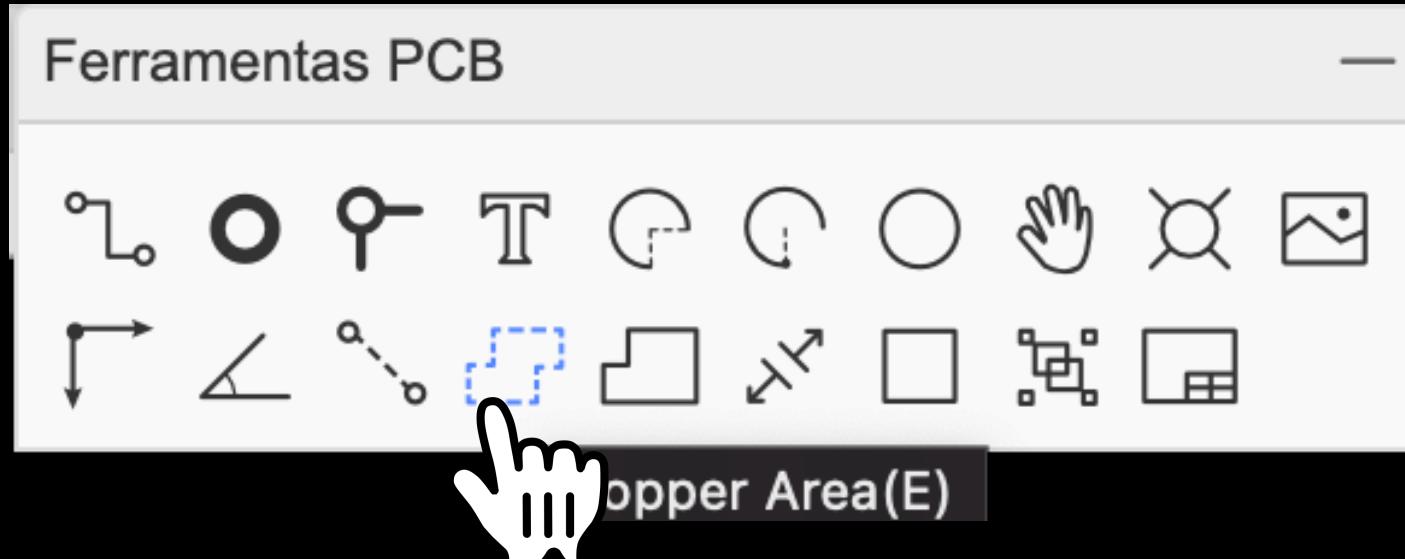
Conexão de Símbolos



Passagem para o Desenho do Circuito Impresso



Desenho das Trilhas nas Camadas Superior e Inferior



Configuração da Camada de Cobre como Terra

Ferramentas Fabricação Avançado

Cross Probe

Shift+X

Cor da Rede...

Gerenciador de Camadas

Gerenciamento da Área de Cobre...

Gerenciador de Modelo 3D...

Definir contorno da placa...

Teardrop...

Panelize...

Batch Vias for Copper...



Gerenciador de Modelo 3D

Lista de Componentes

Filtrar por palavra-chave

- X U1_ULTRASONIC-HC-SR04
- X U1_ESP32S3-DEVKIT-C1-V
- ✓ D1_PKG-LED-5MM-RED
- ✓ KEY1_KEY-TH_4P-L6.0-W
- ✓ R1_470R RESISTOR 1/2W

Search 3D Model Select 3D Model

eng4051

Palavra chave: eng4051

Classes: Espaço de Tral

wallysalami ENG4051 - ESP32-S3

Ajuste

Auto

Largura: 64.024mm

Altura: 27.95mm

X: 12.7mm

Y: 23.9mm

Z: 7mm

Rotação em Z: 270

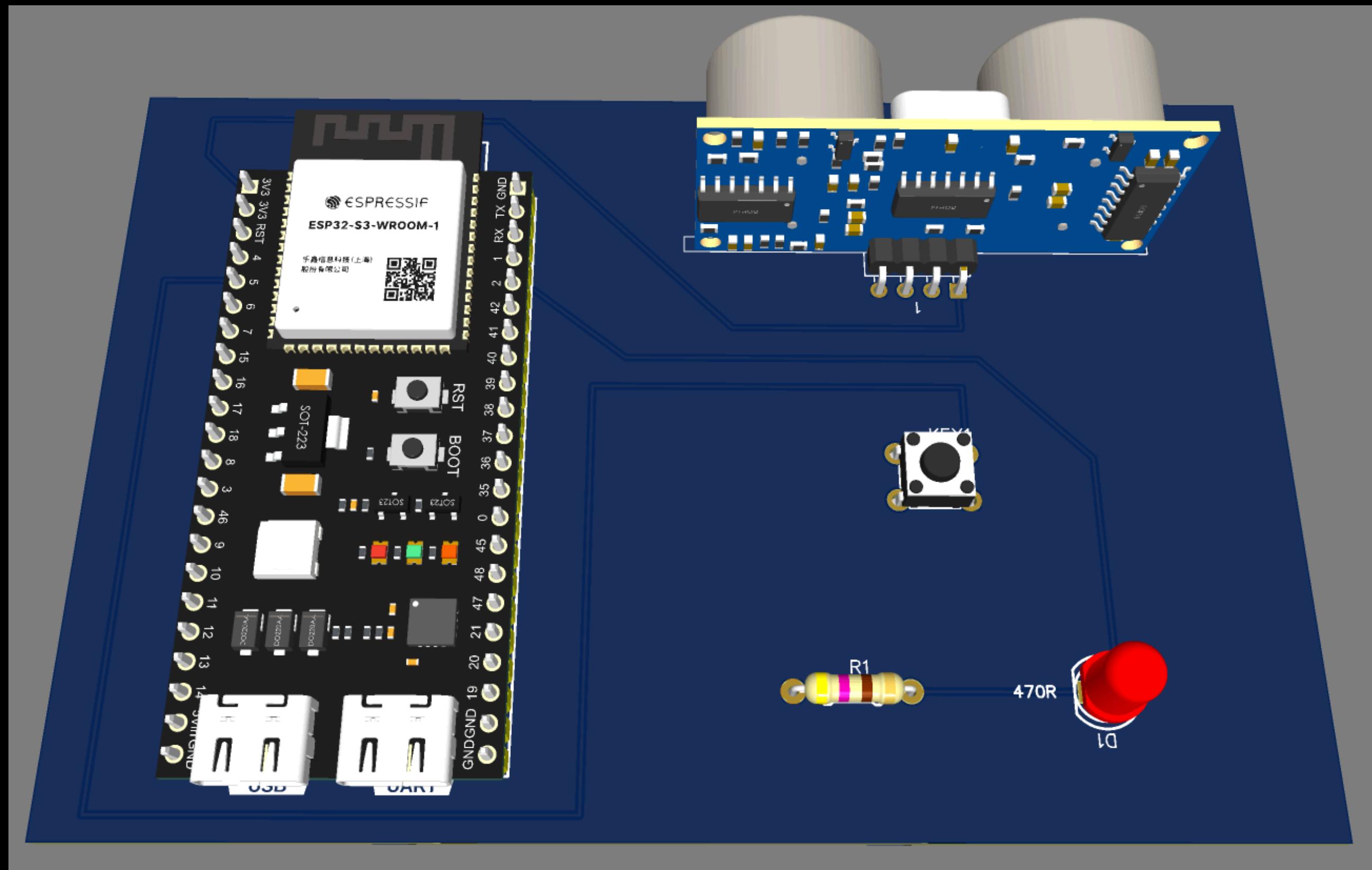
Rotação em X: 0

Rotação em Y: 180

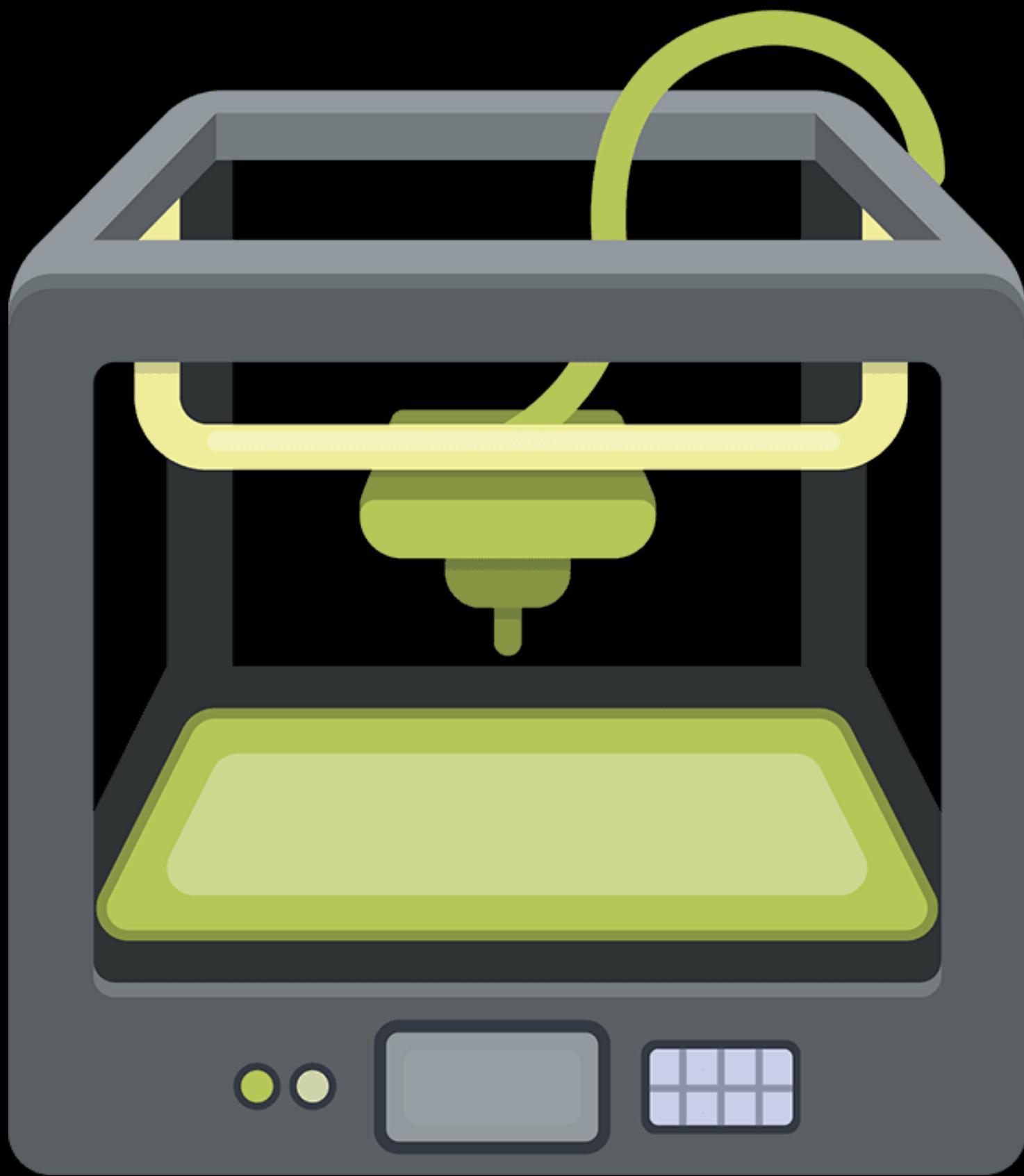
Pré-visualização do Modelo 3D

✓ Update 3D Model Cancelar ?

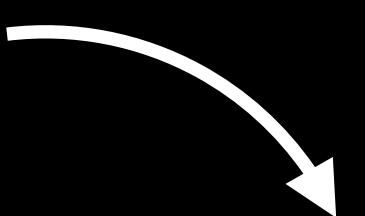
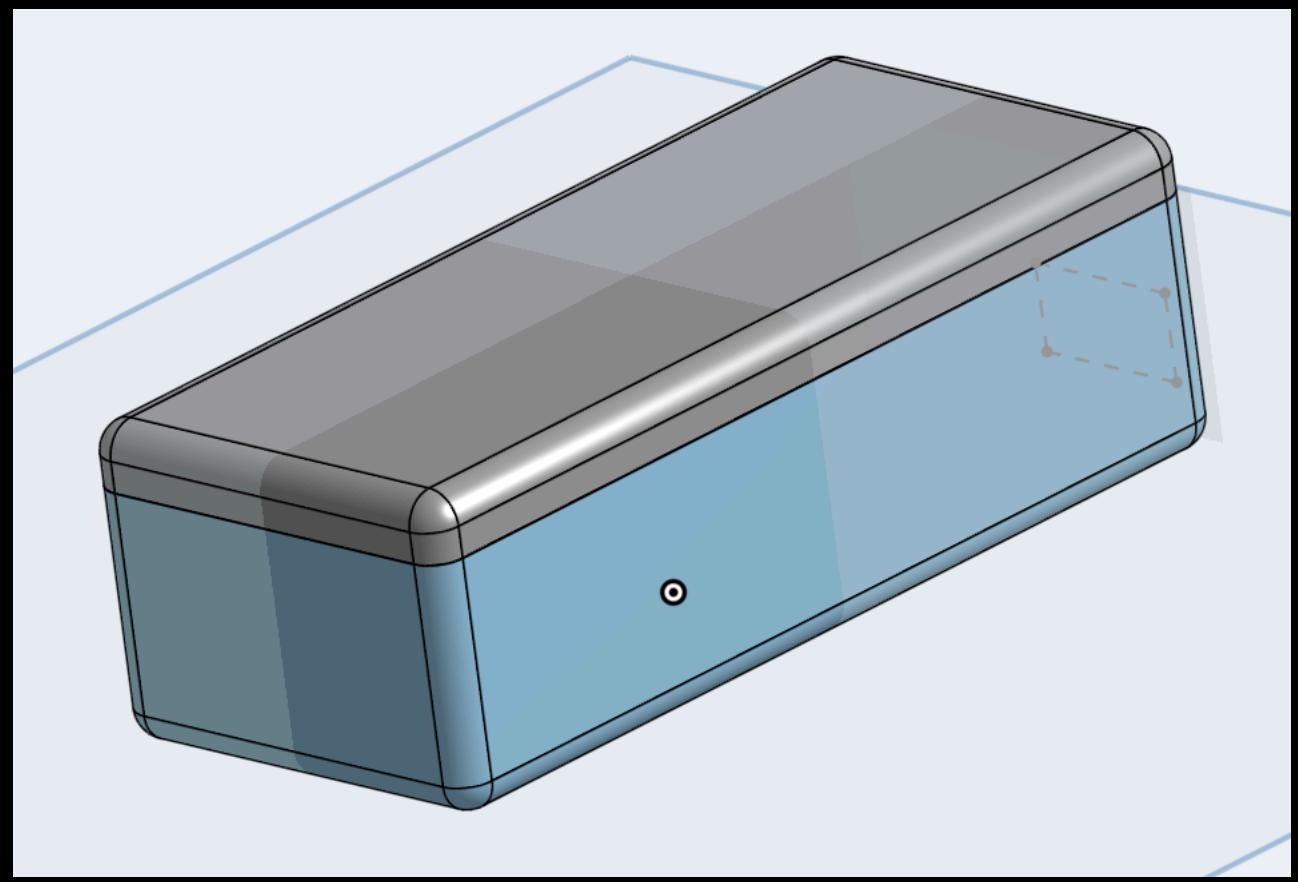
Adição de Modelos 3D



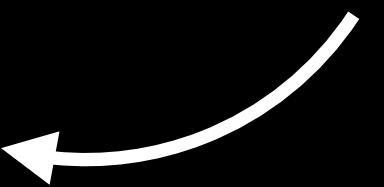
Visualização 3D Final



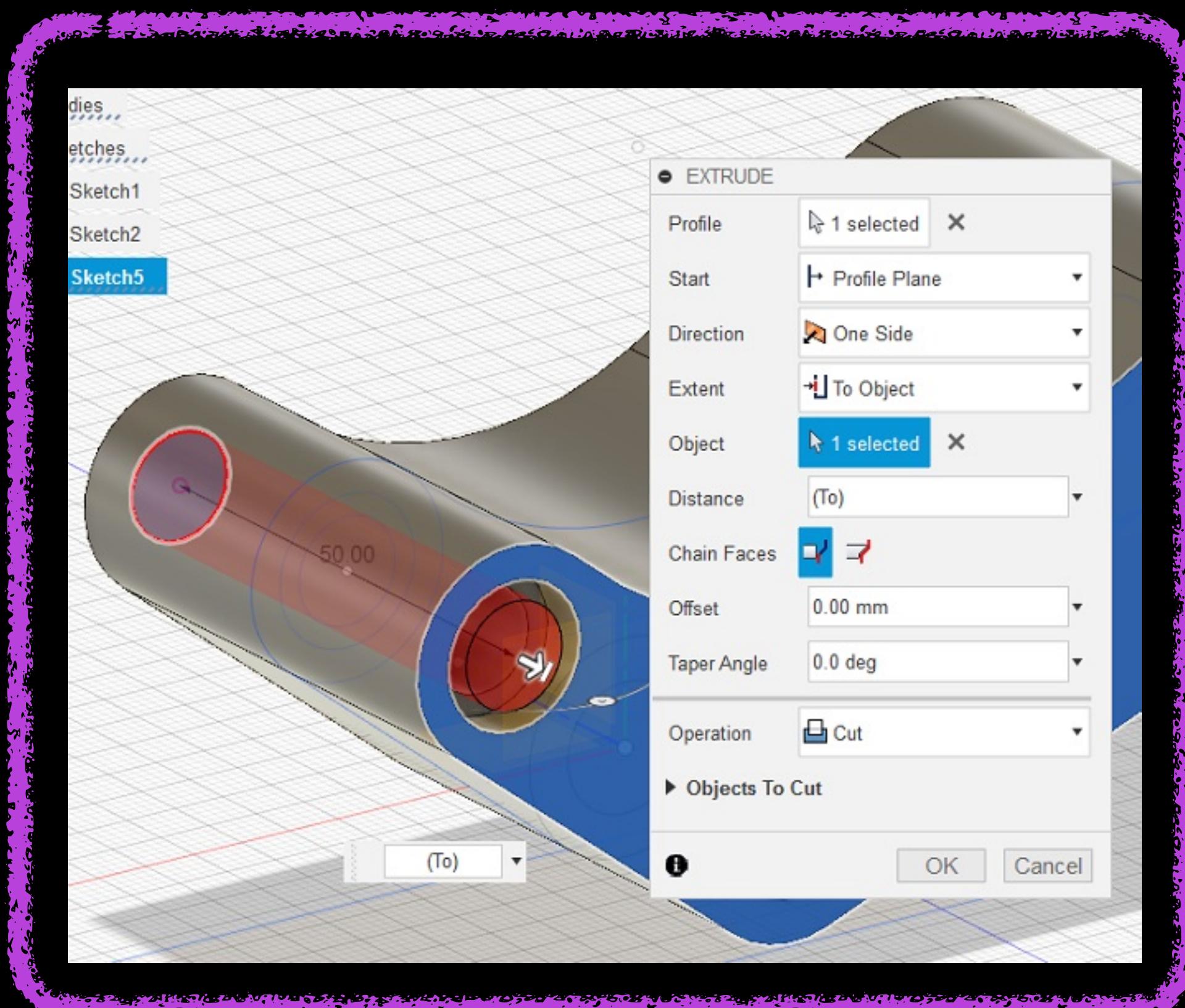
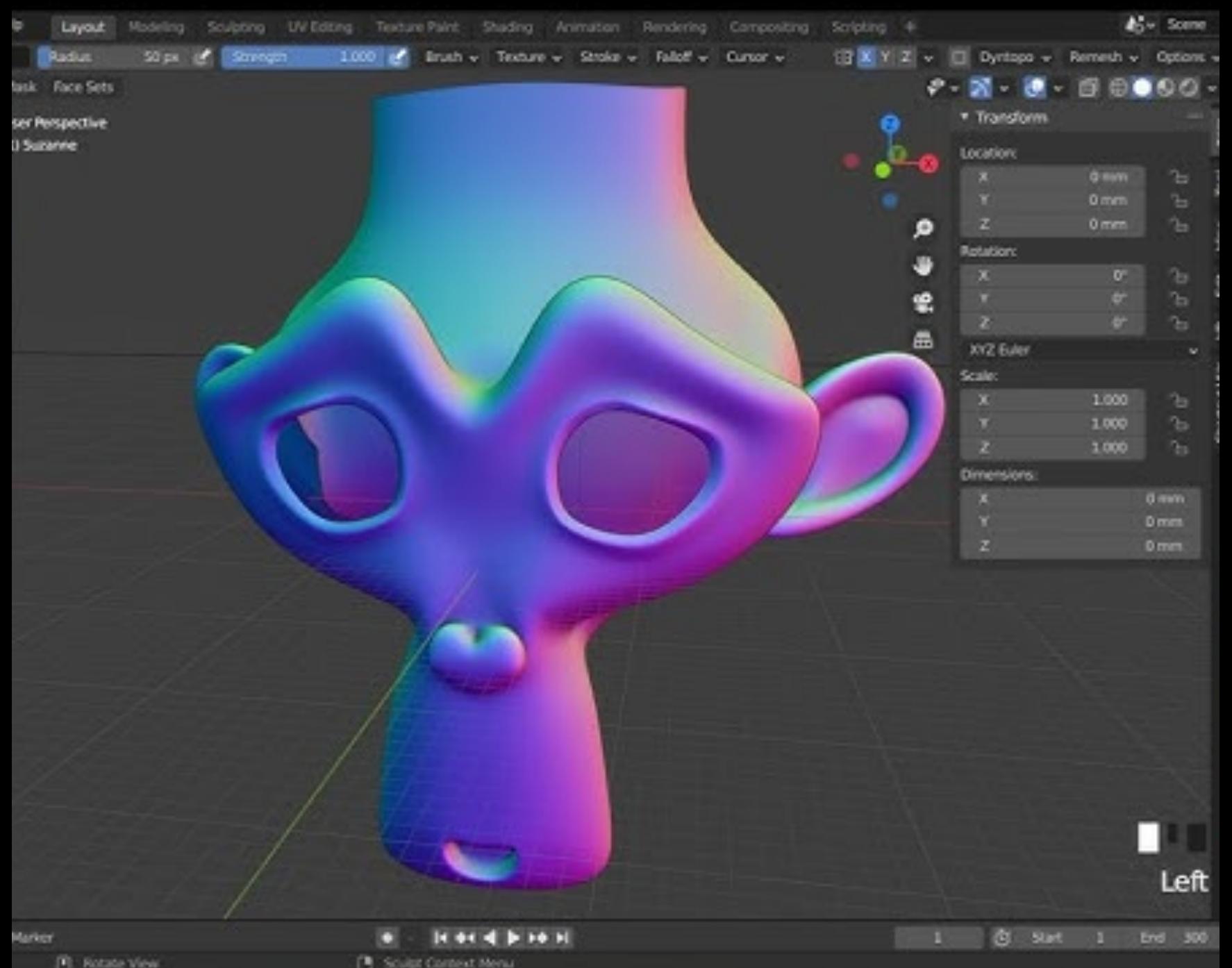
Modelagem 3D + Impressão 3D



The screenshot shows the Bambu Lab software interface. At the top, there are tabs for Home, Prepare, Preview (which is selected), Device, Project, Calibration, Upload, Slice plate, Print plate, Color Scheme, and Line Type. The main area displays a 3D model of a box labeled "testeCaixa". On the left, there's a sidebar for "Printer" settings, including "Bambu Lab A1 0.4 nozzle" and "Textured PEI Plate". Below that are sections for "Filament" (with four entries: Generic PLA 1, 2, 3, 4) and "Process" (set to "0.28mm Extra Draft @BBL A1"). On the right, the 3D model is shown with a red print path. A vertical green scale bar on the right indicates height values of 36, 10.00, 1, 0.20, and 0.04. A green progress bar at the bottom is labeled "904".



Etapas da Impressão 3D



Modelagem 3D Artística x CAD



AUTODESK
Fusion 360



Exemplos de Software de CAD 3D



onshape®

onshape Testador de Fios Main [🔗](#)

Sketch | [Extrude](#) [Plane](#) [Mirror](#) [Sketch](#) [Chamfer](#) [Diameter](#) [Offset](#) [Intersection](#) [Section](#) [Trim](#) [Unite](#) [Split](#) [Boolean](#) [Copy](#) [Paste](#) [Search tools...](#) [C](#)

Features (32) [Filter by name or type](#)

- Extrude 8
- Plane 1
- Mirror 1
- Sketch 12
- Extrude 10**
- Chamfer 1
- Sketch 13
- Extrude 11

Parts (3)

- Part 1
- Part 2
- Part 3

Extrude 10

Solid Surface Thin

New Add Remove Intersect

Faces and sketch regions to extrude
Faces of Sketch 12

Blind

Depth 7 mm

Direction

Starting offset

Symmetric

Draft

Second end position

Merge with all

Merge scope
Part 2

Poor connection...

Front Top Left Right

Assembly 1

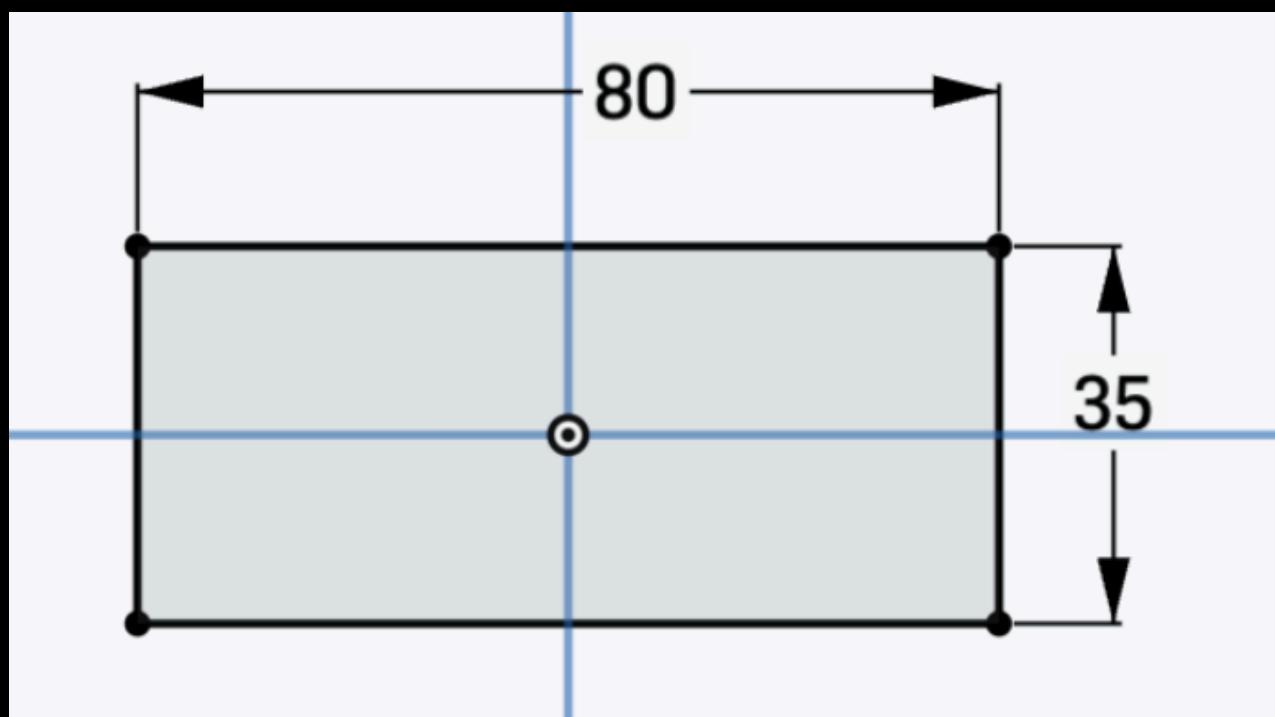
The screenshot shows the Onshape web-based CAD interface. The main workspace displays a 3D model of a wire tester part, which is a rectangular block with a central cavity and a small protrusion. A coordinate system (Front, Top, Left, Right) is shown to the right of the model. The left sidebar lists 'Features (32)' and 'Parts (3)'. A detailed 'Extrude 10' dialog box is open in the center, showing settings for extruding 'Faces of Sketch 12' by 7 mm. The sketch itself is visible as a yellow outline on the top face of the part. The bottom navigation bar includes tabs for 'Part Studio 1' and 'Assembly 1'.

Aplicativo Web OnShape



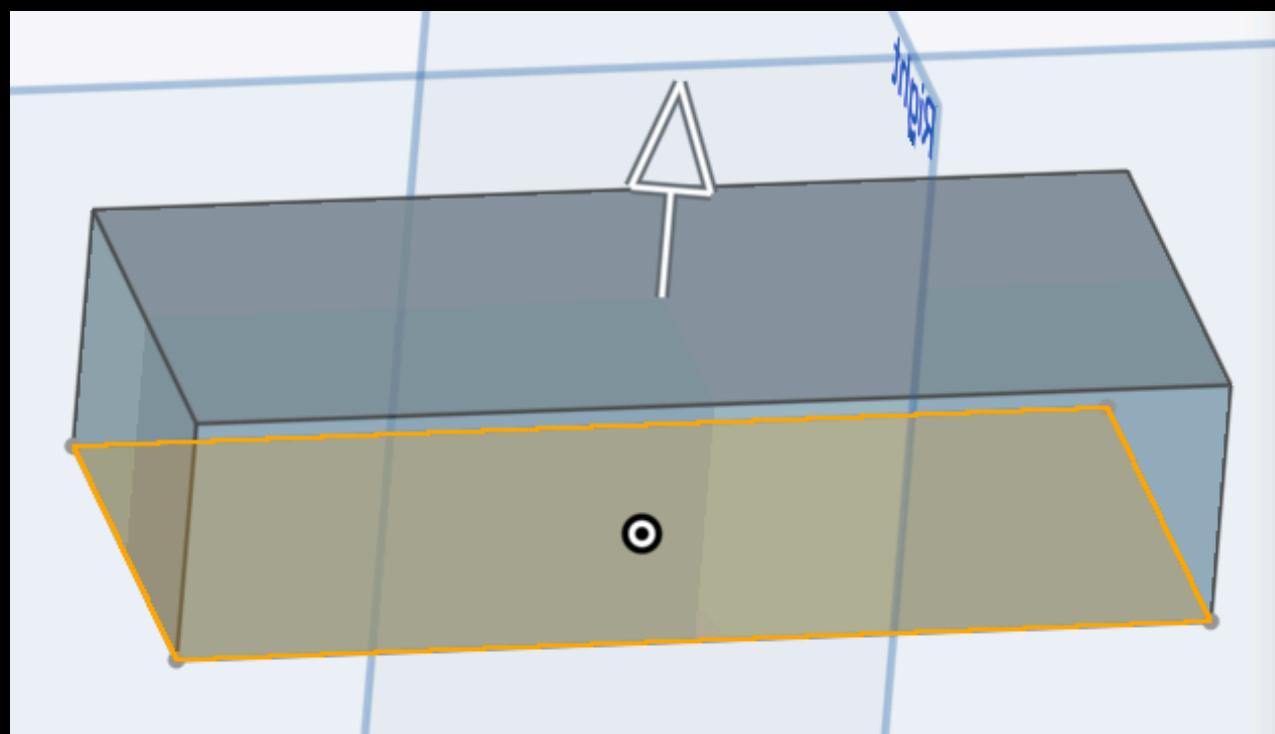
1

Desenho do Esboço



2

Definição Exata das Dimensões



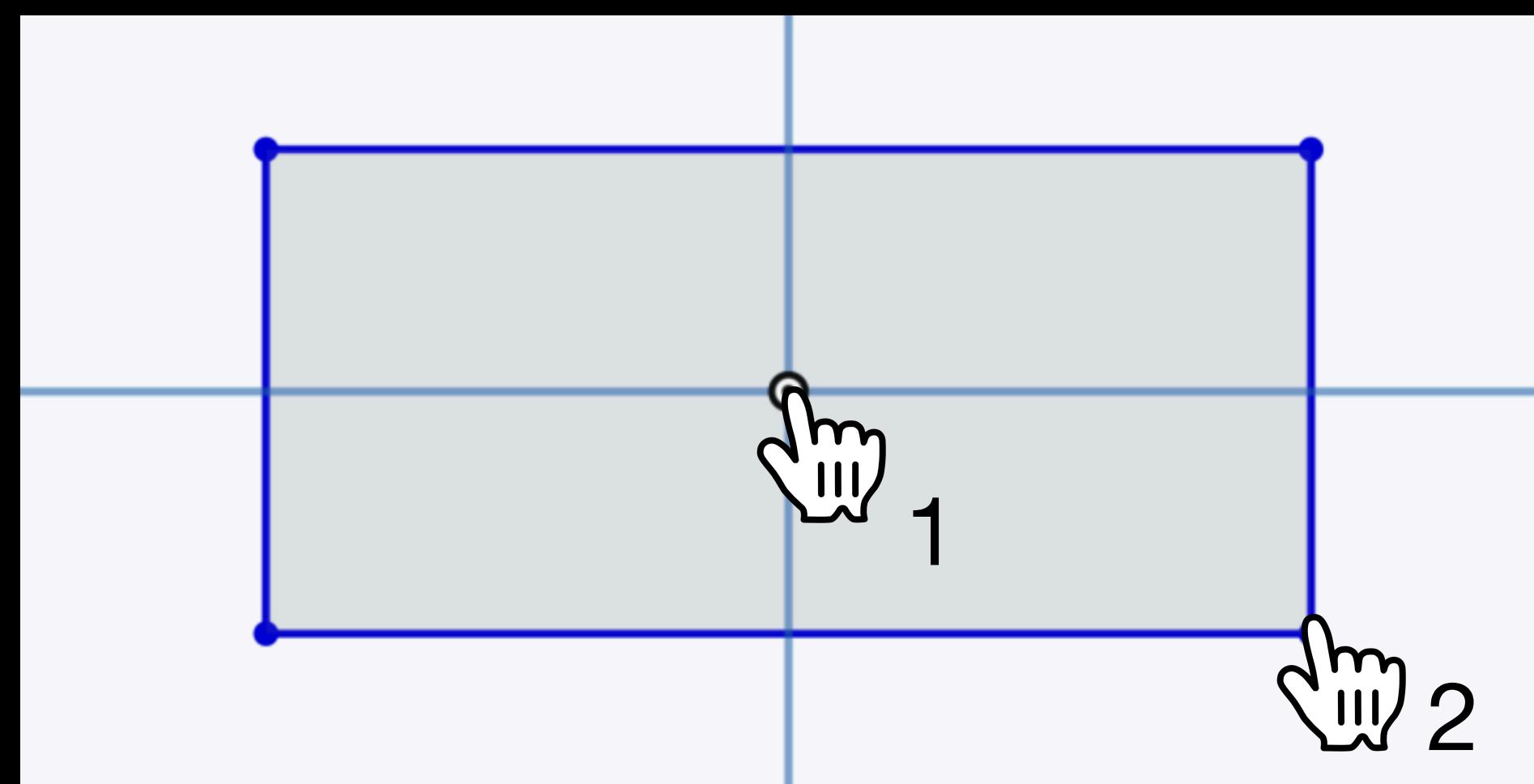
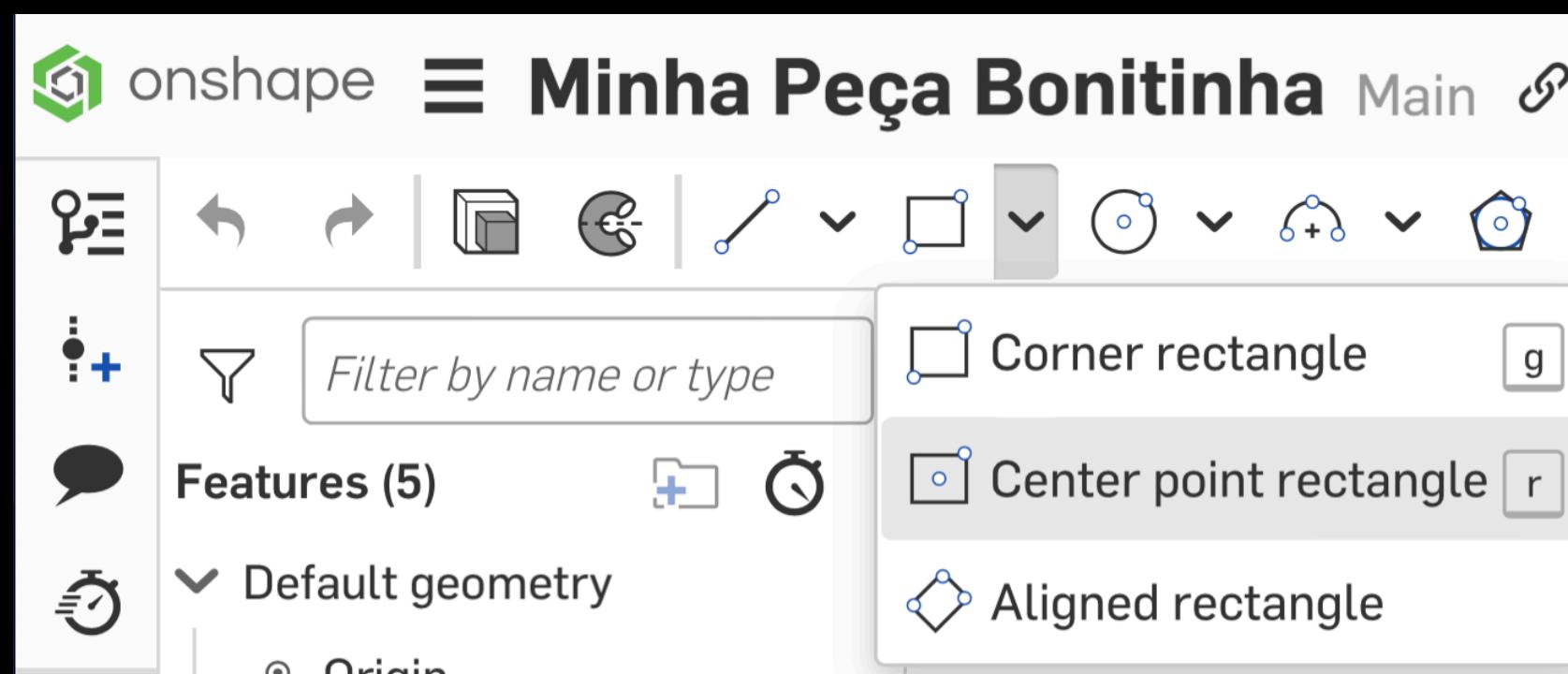
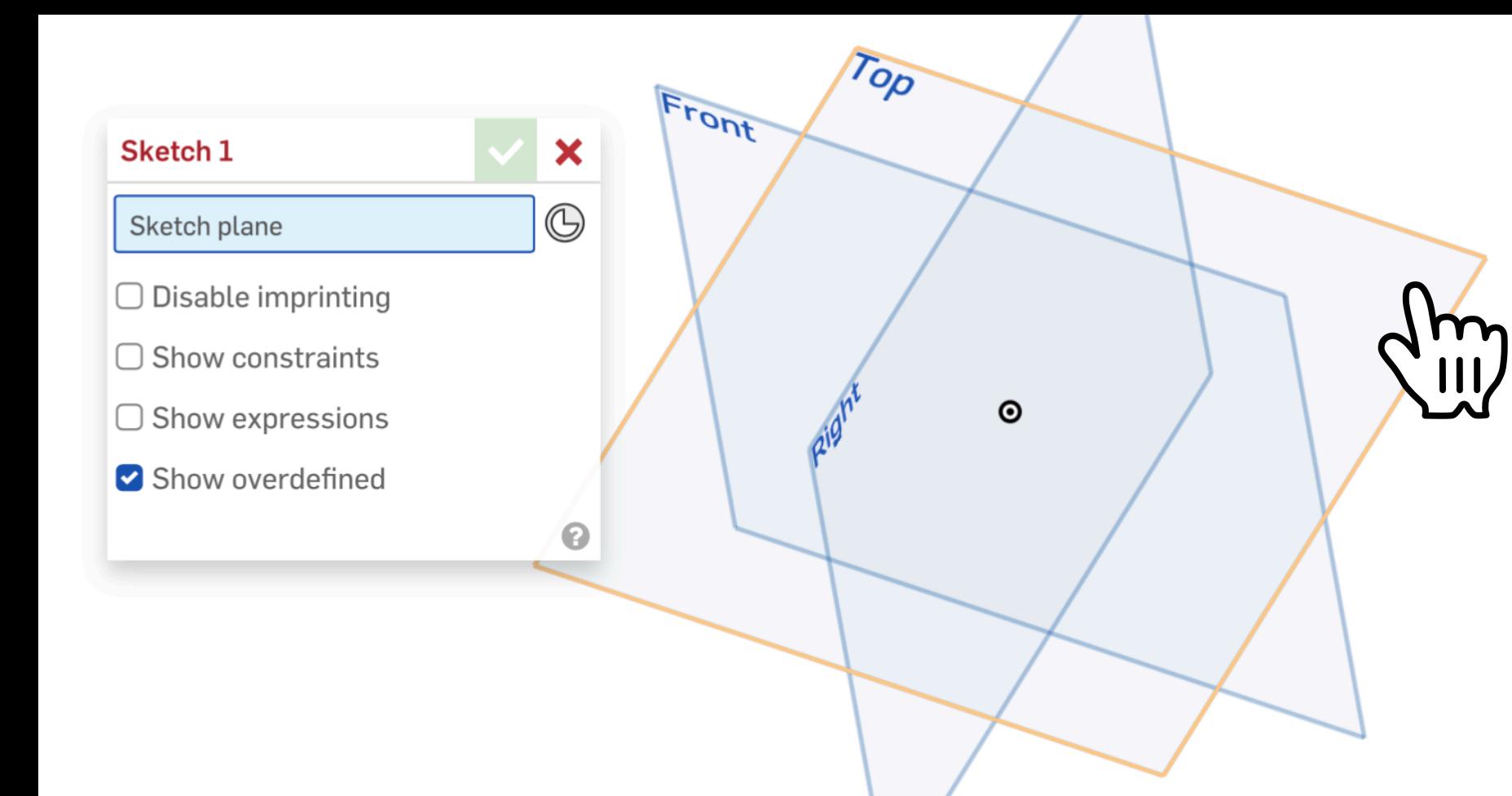
3

Projeção para 3D

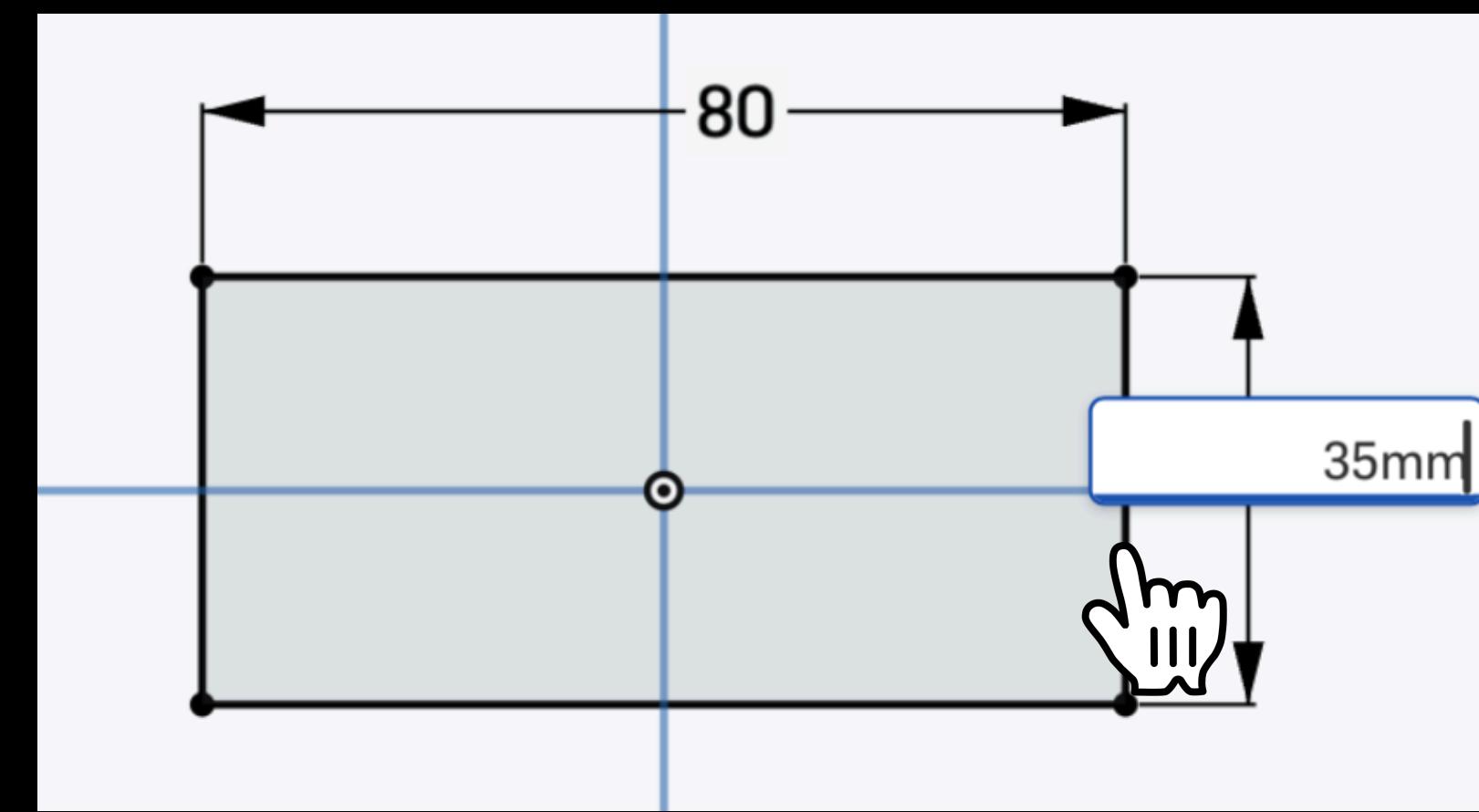
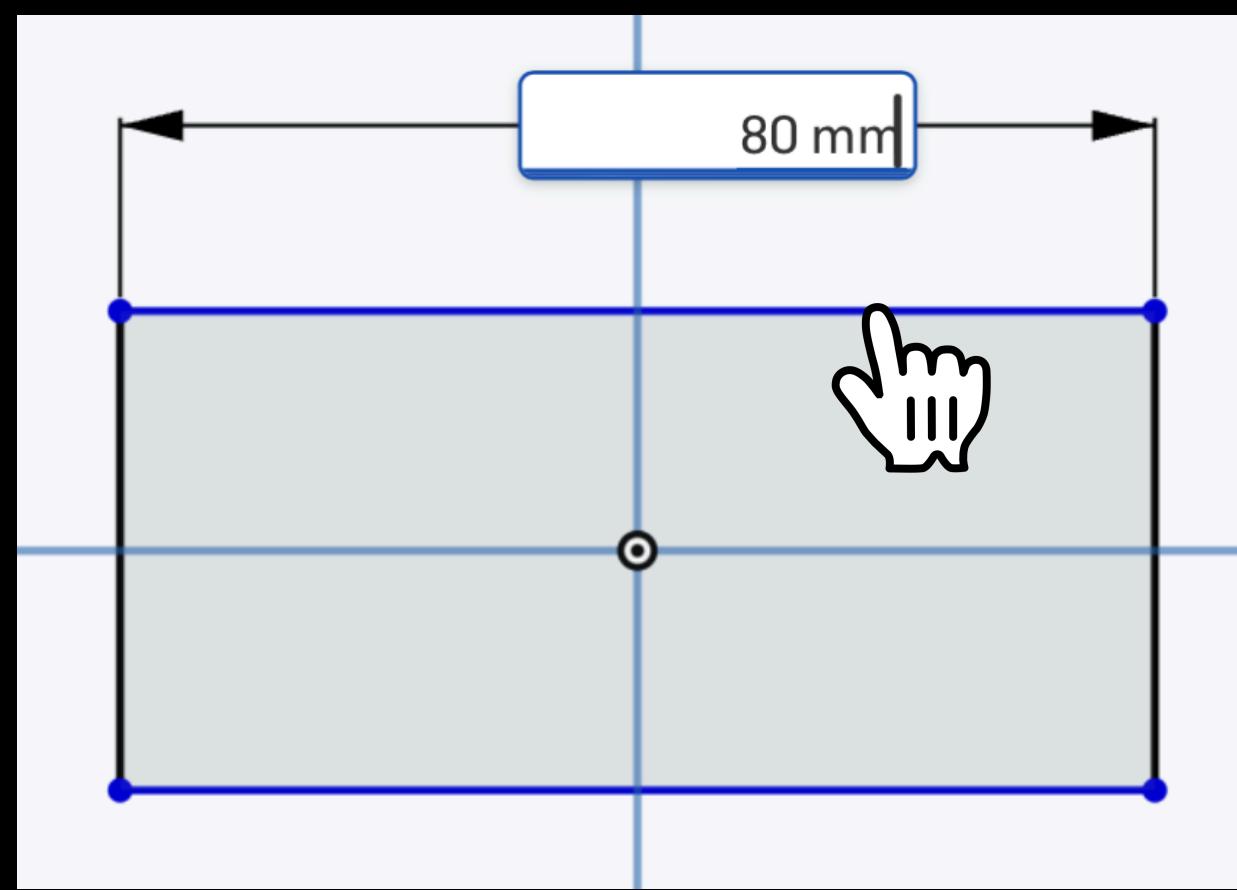
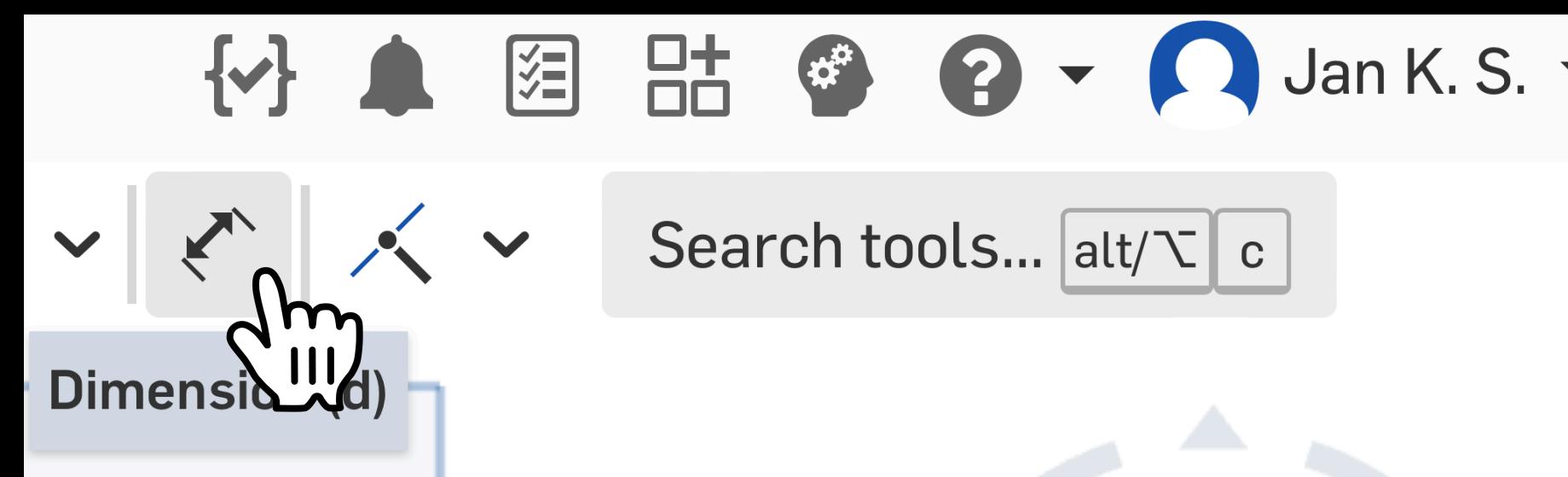
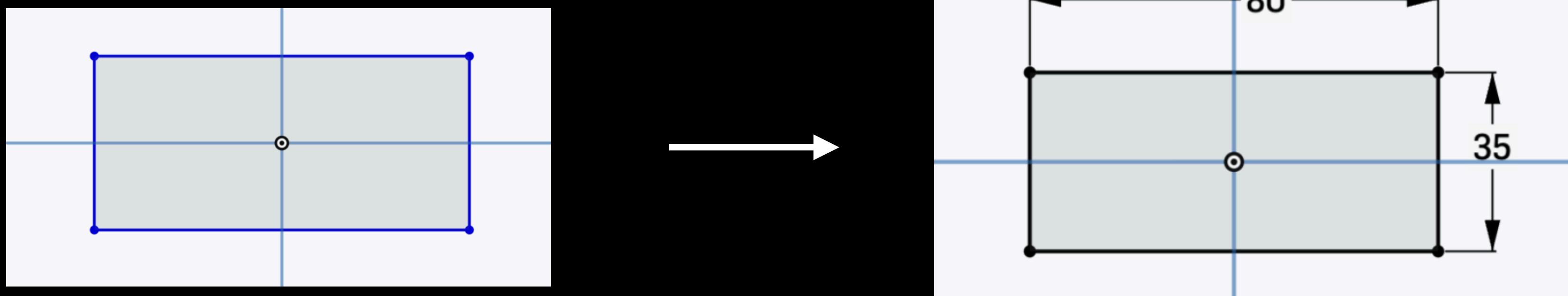
Etapas Básicas da Modelagem 3D

Demonstração...

onshape ≡ Minha Peça Bonitinha Main



Criação do Esboço (Sketch) num Plano

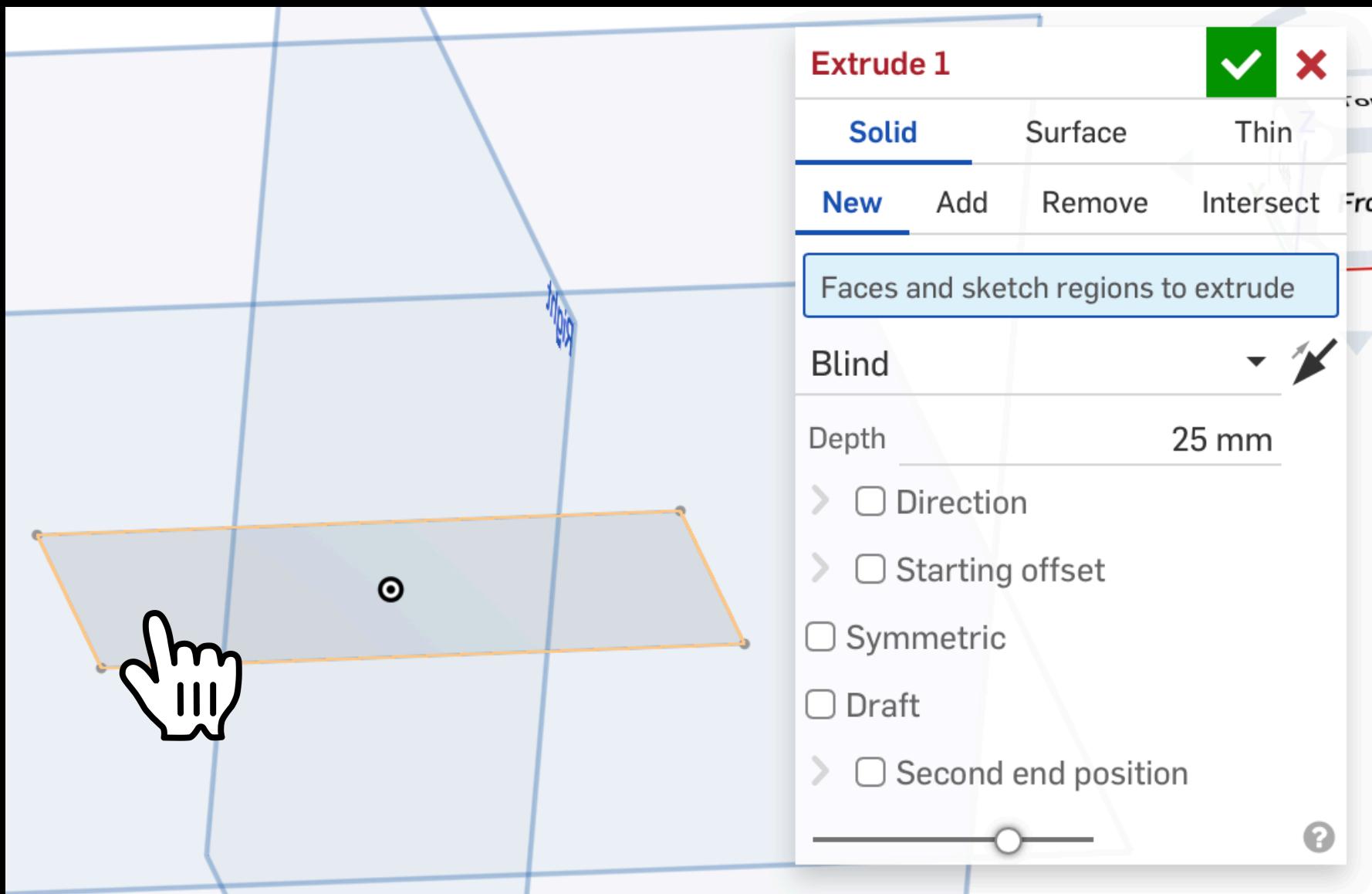
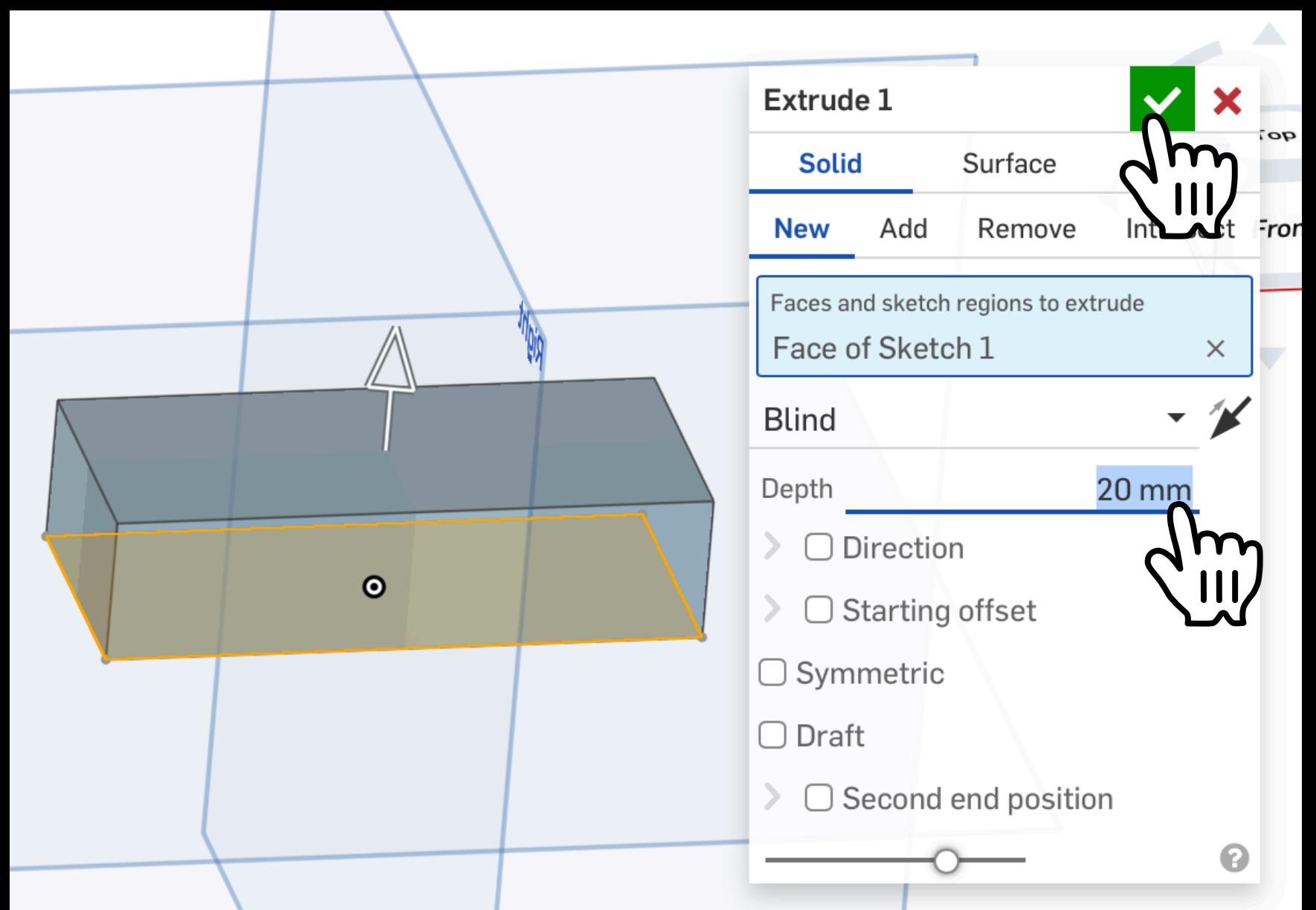
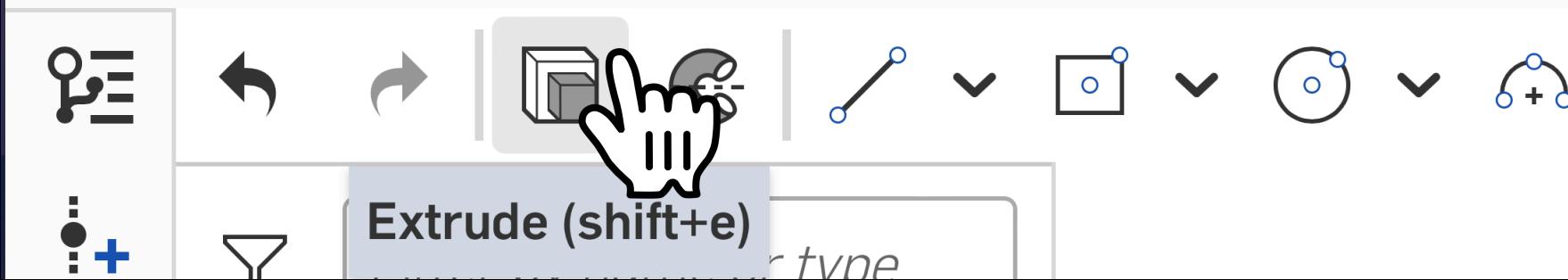


Definição Exata das Dimensões e Restrições



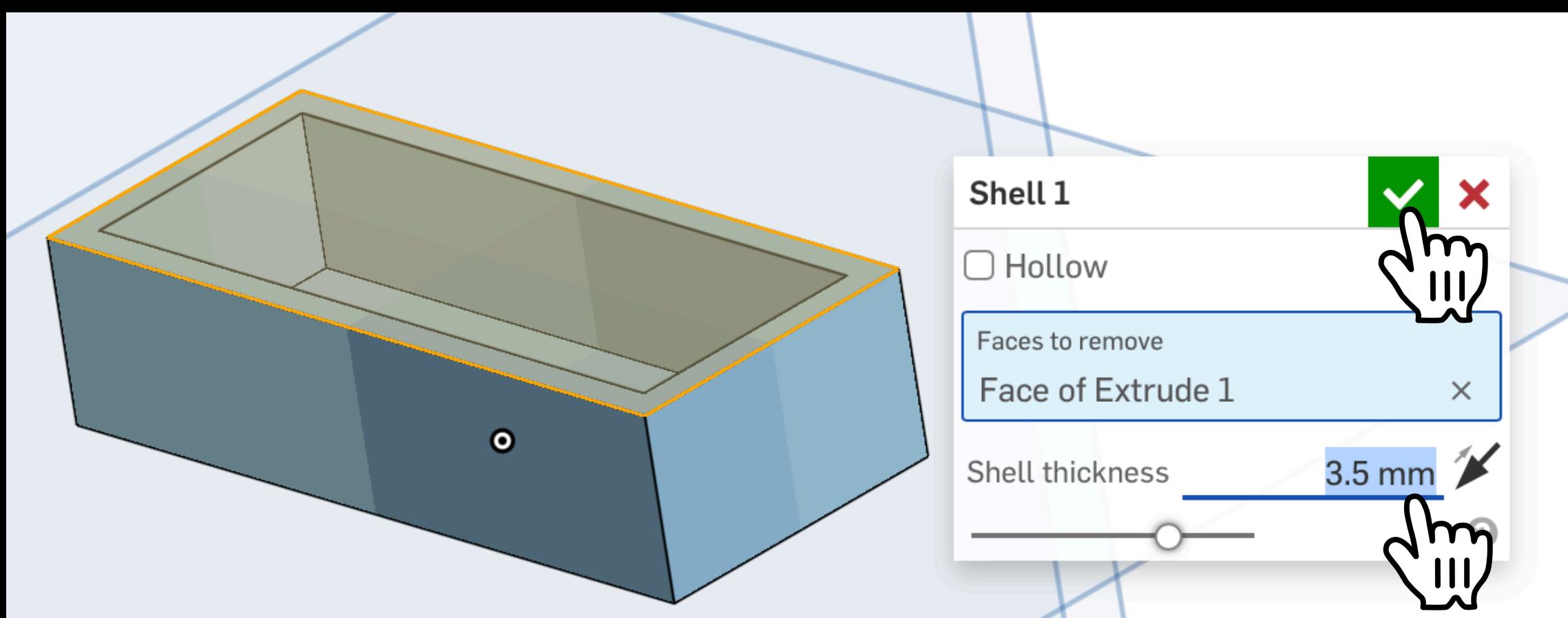
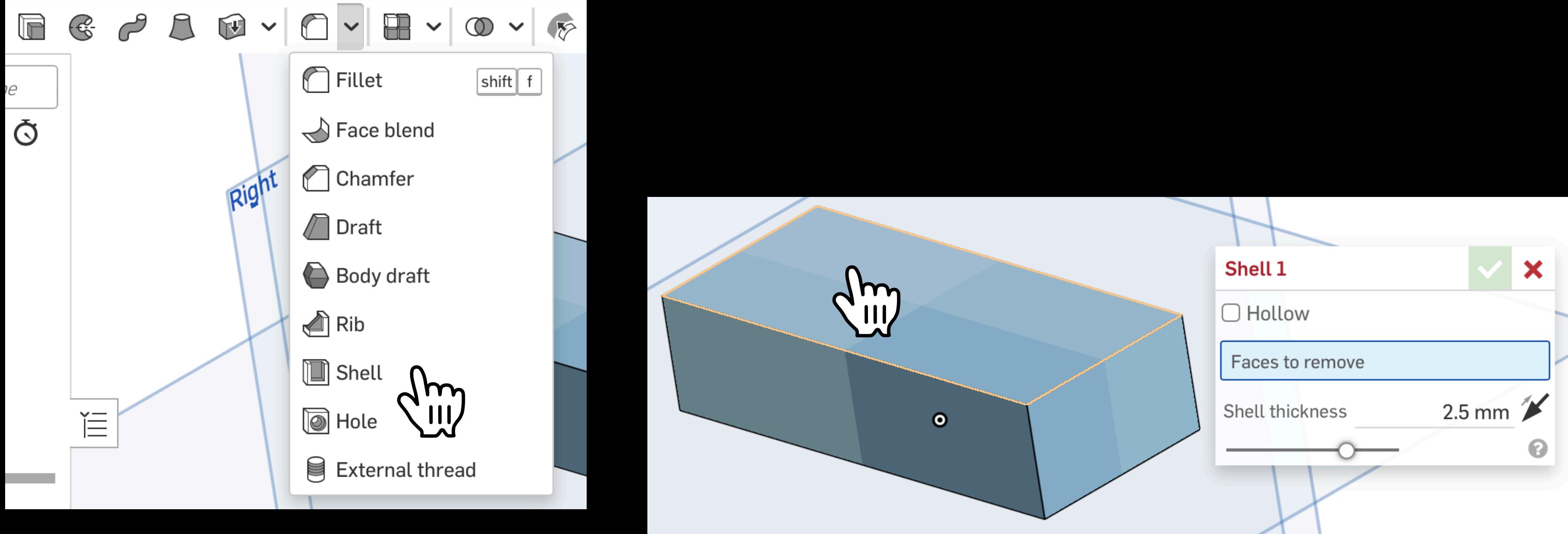
onshape

Minha Peça Bonitinha

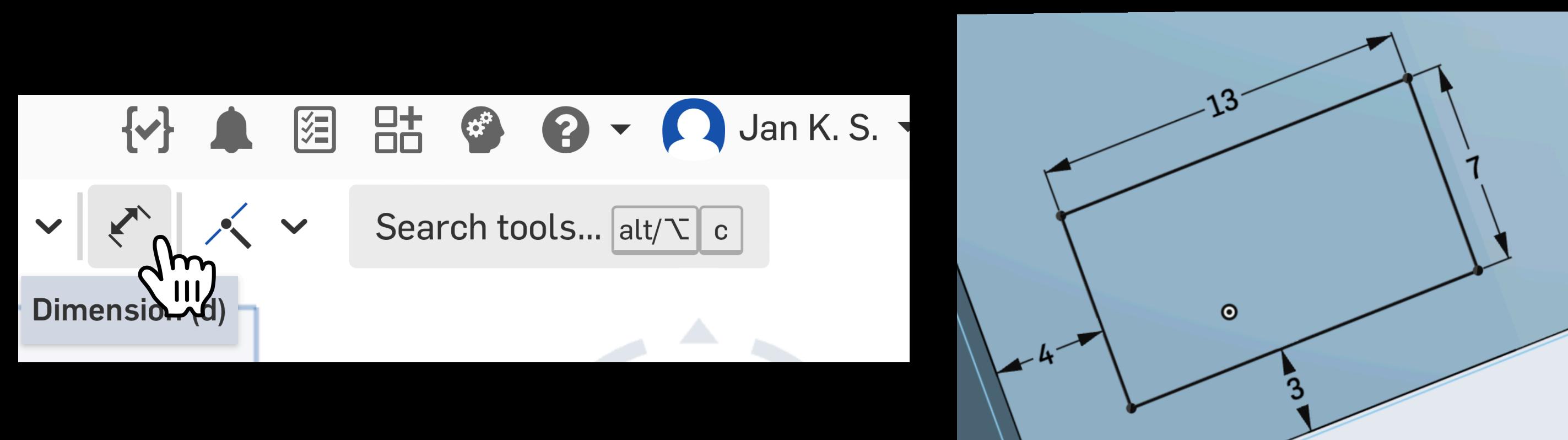
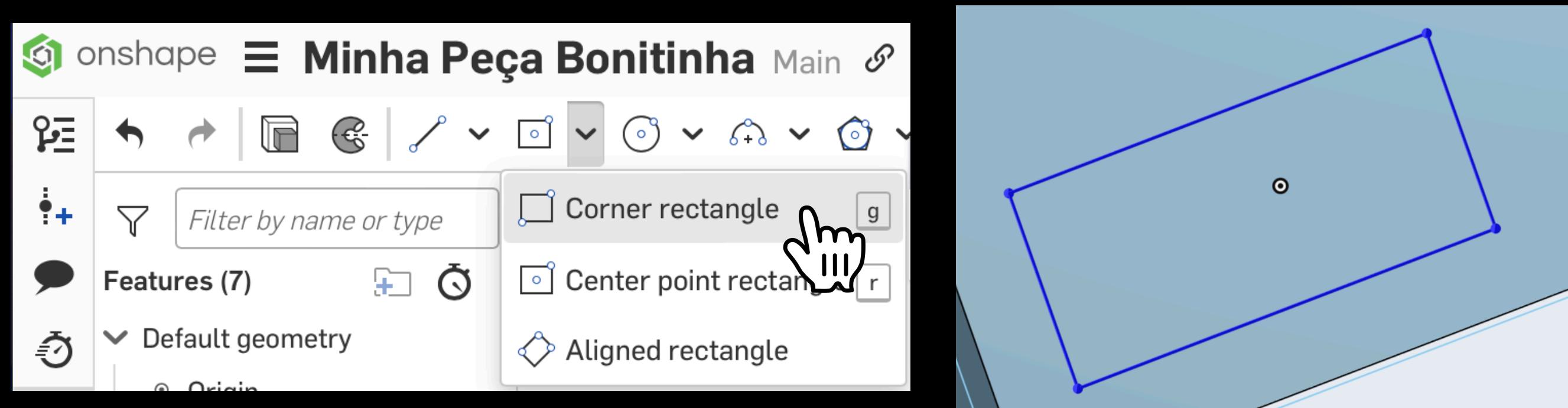
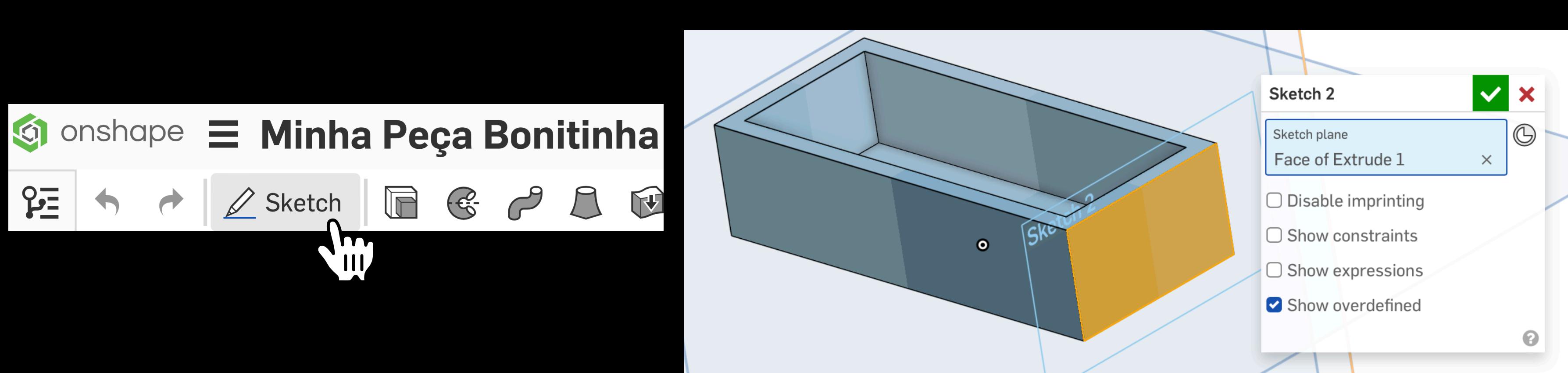


Extrusão do Esboço para 3D

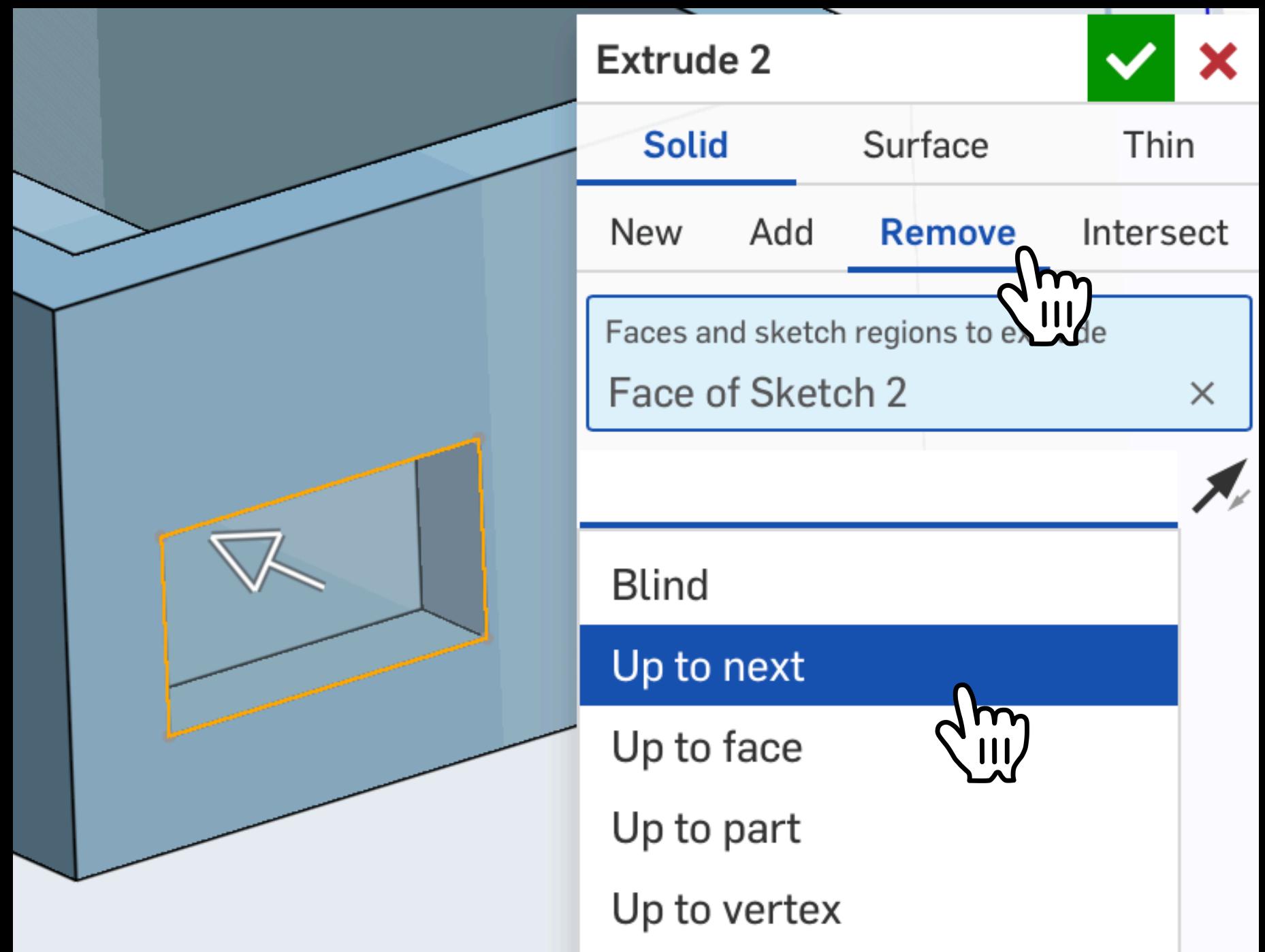
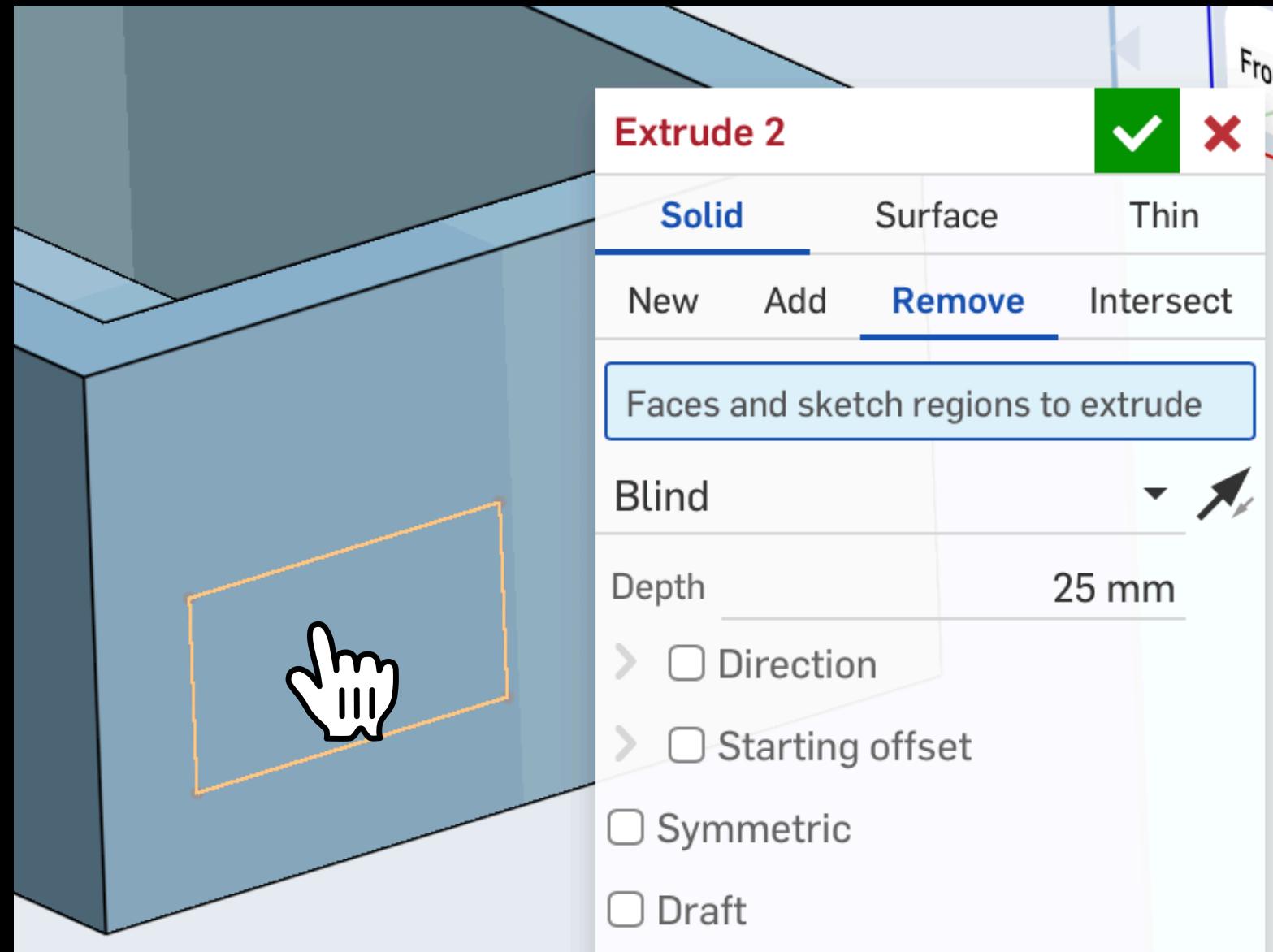
Peça Bonitinha Main



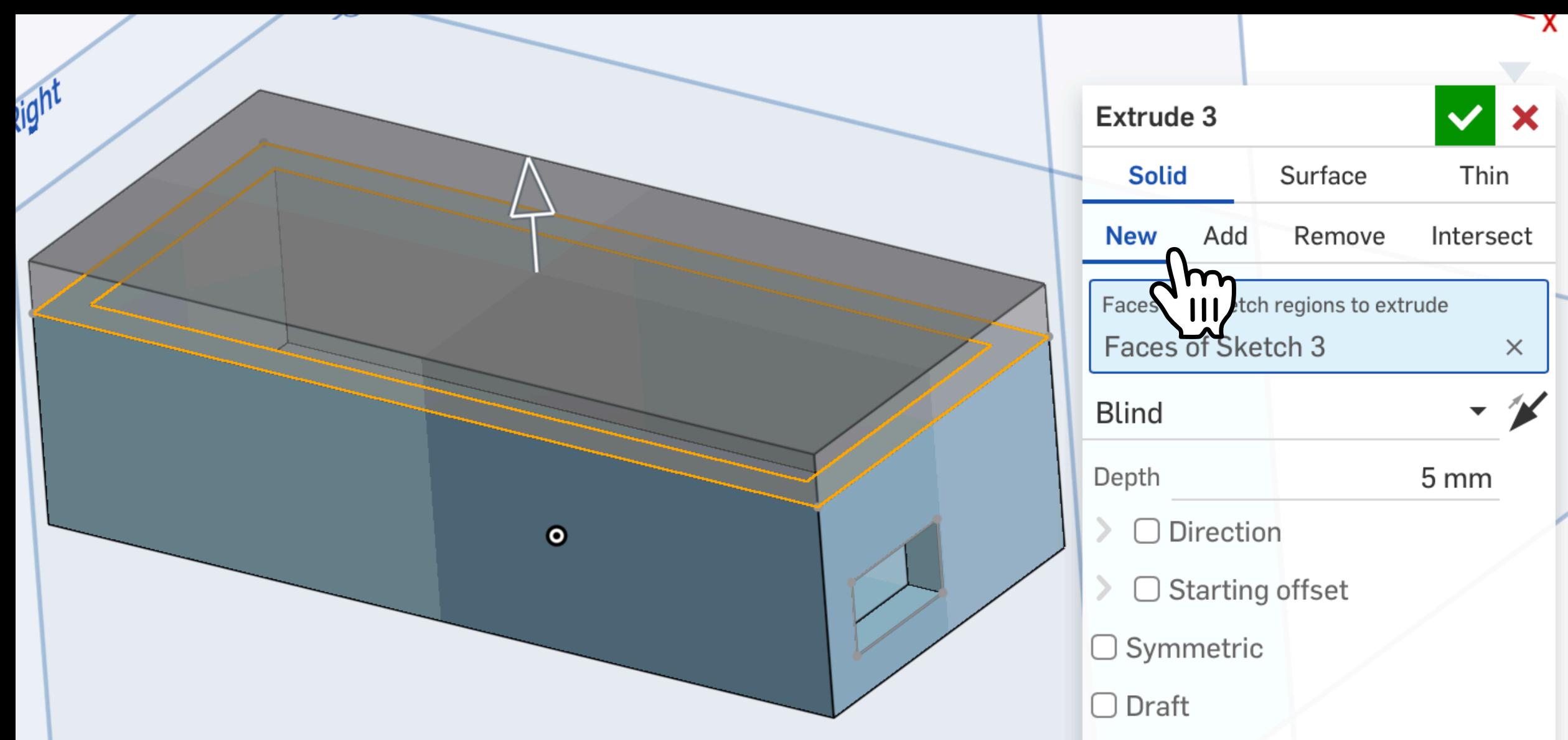
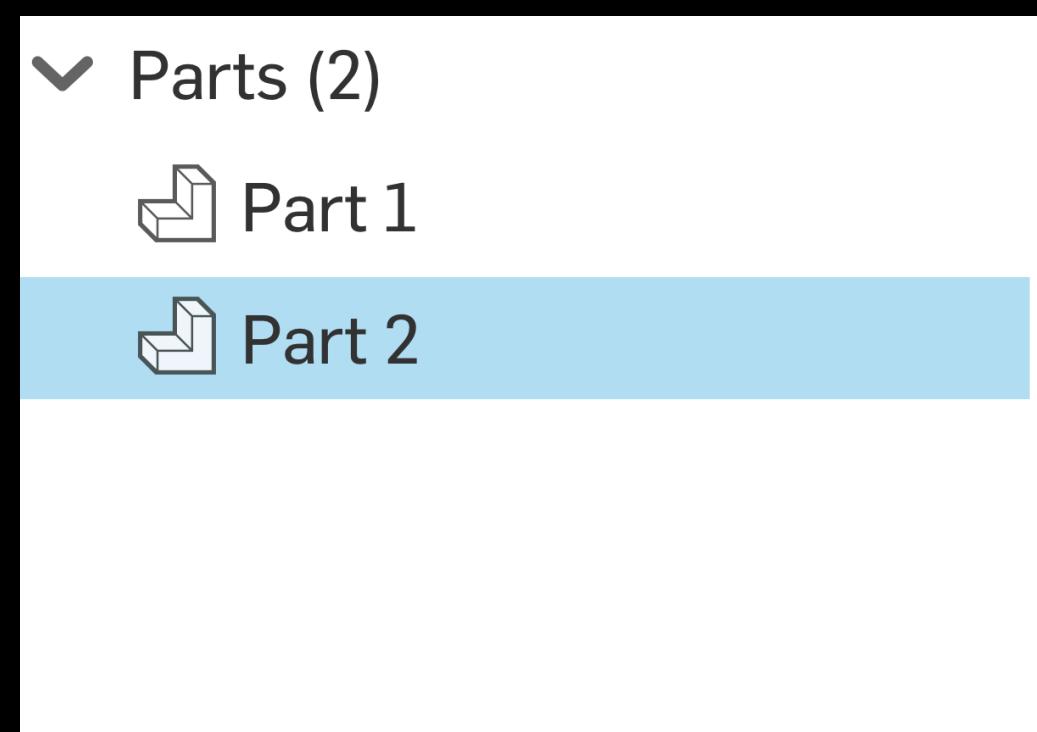
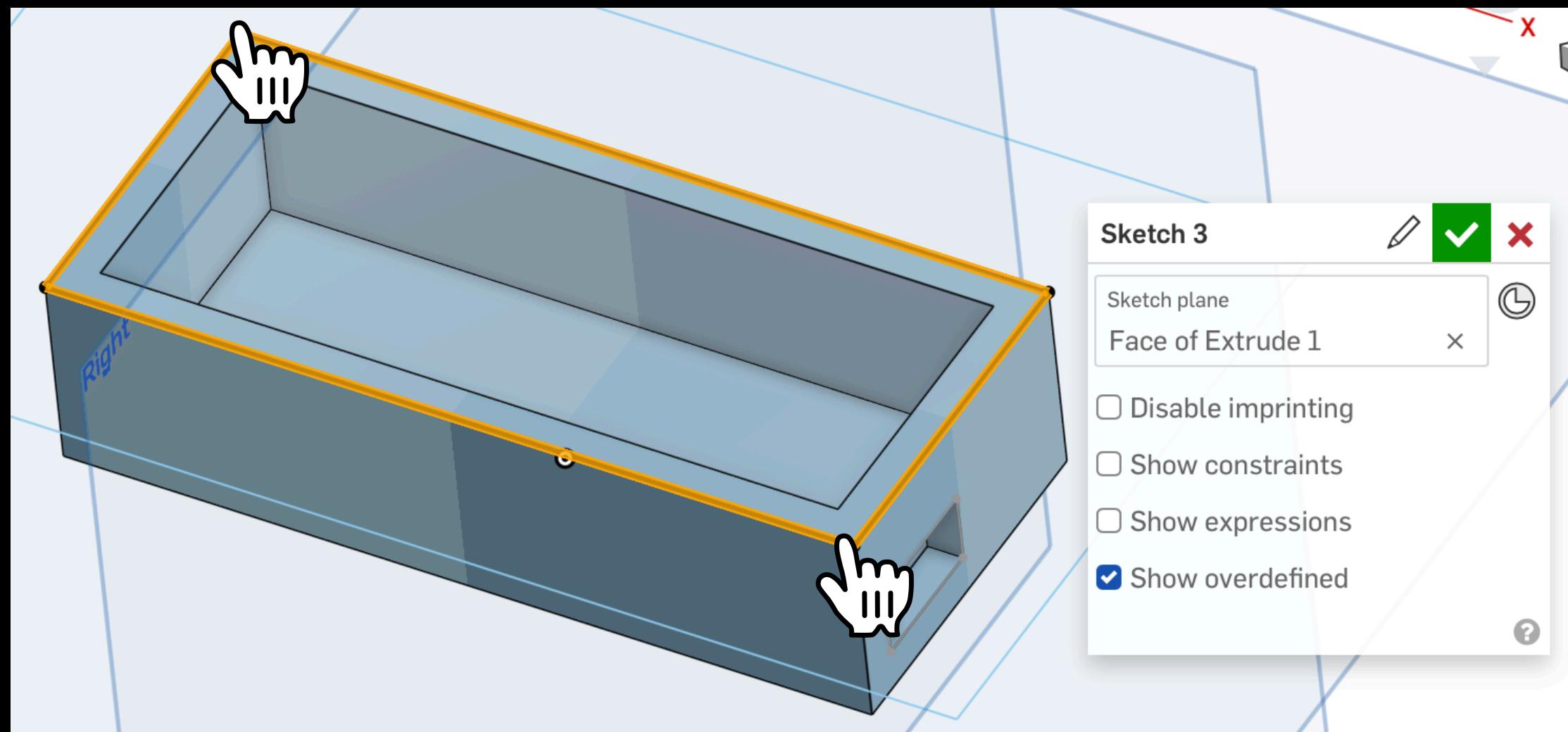
Casca (Shell)



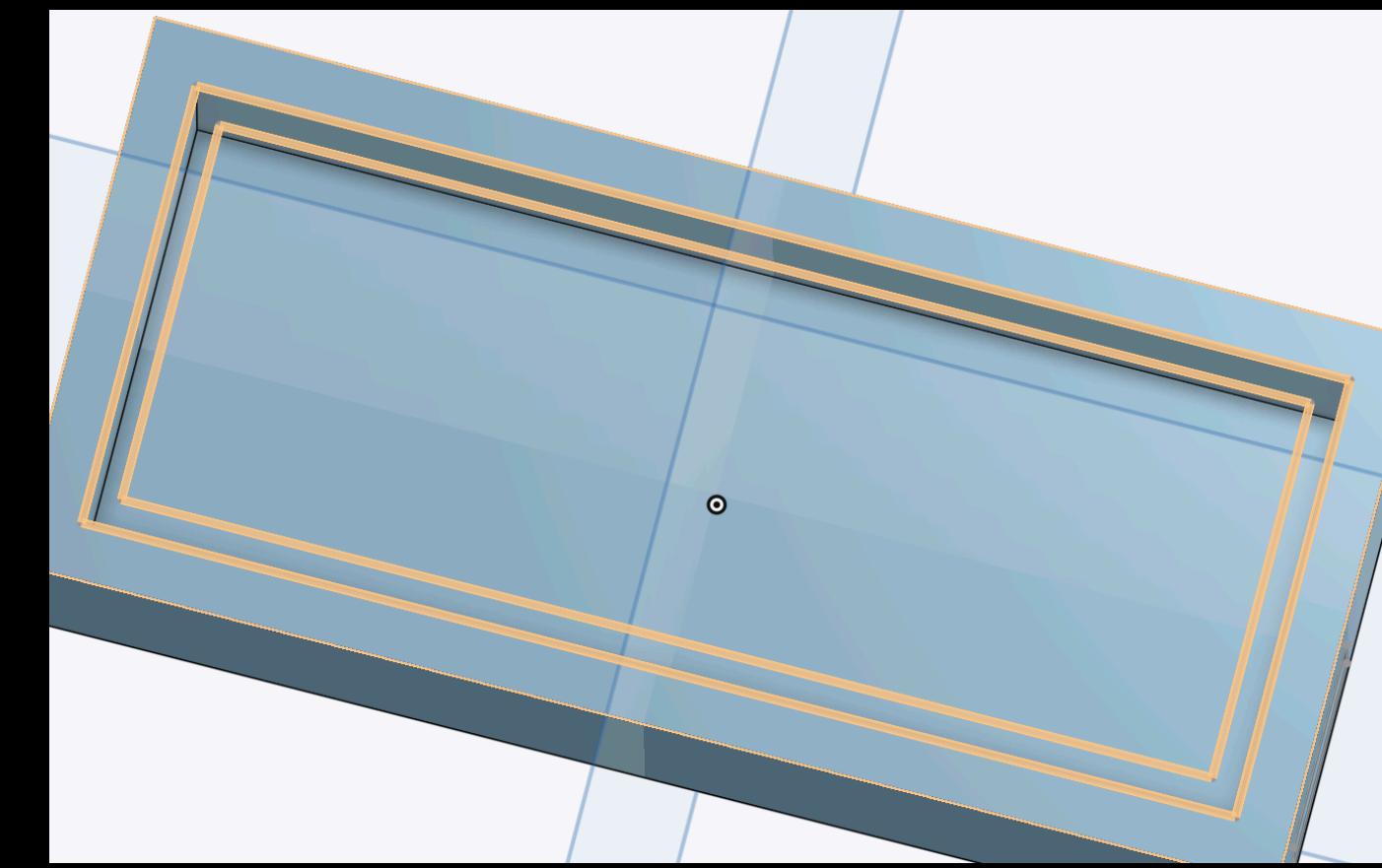
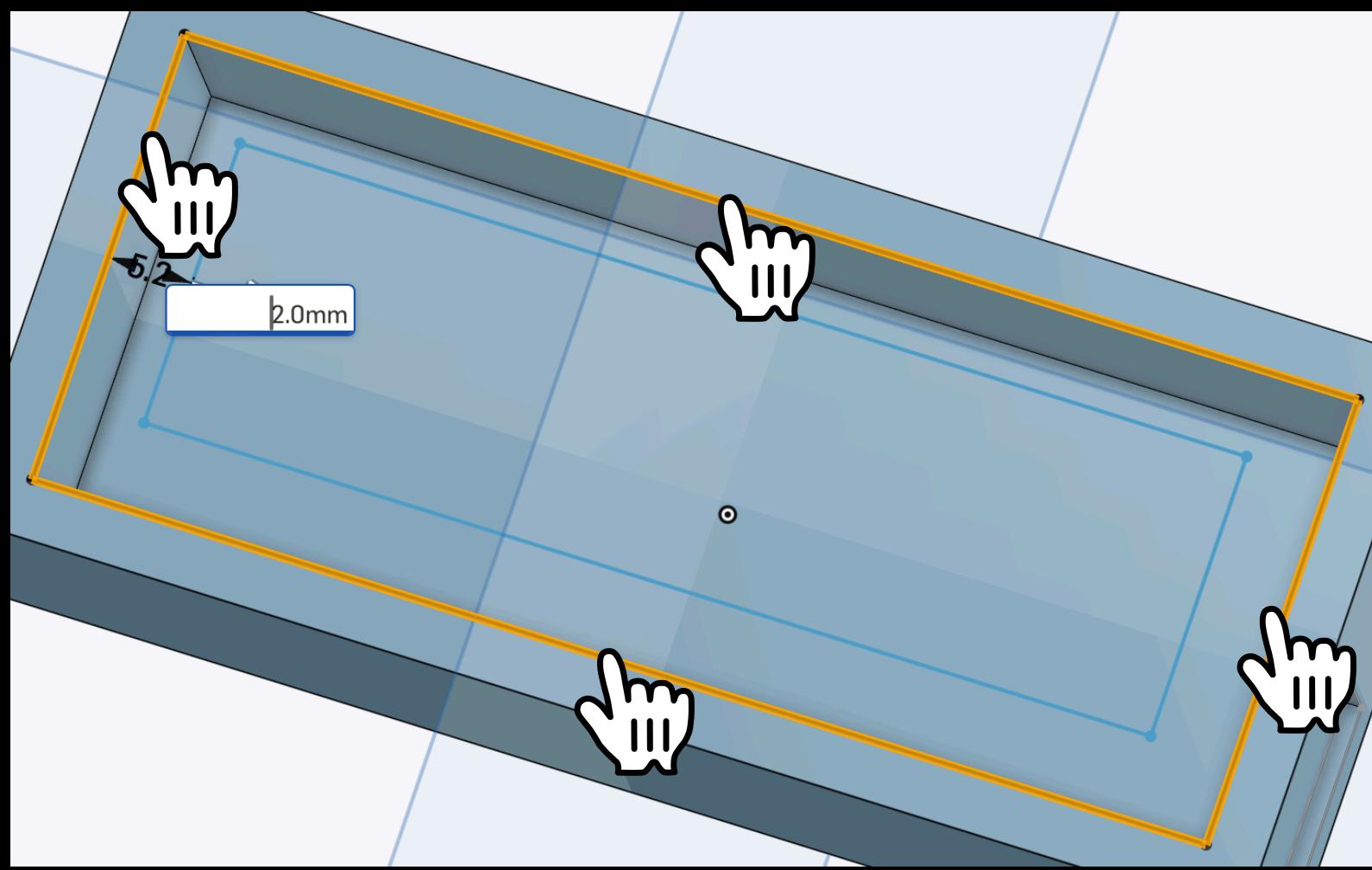
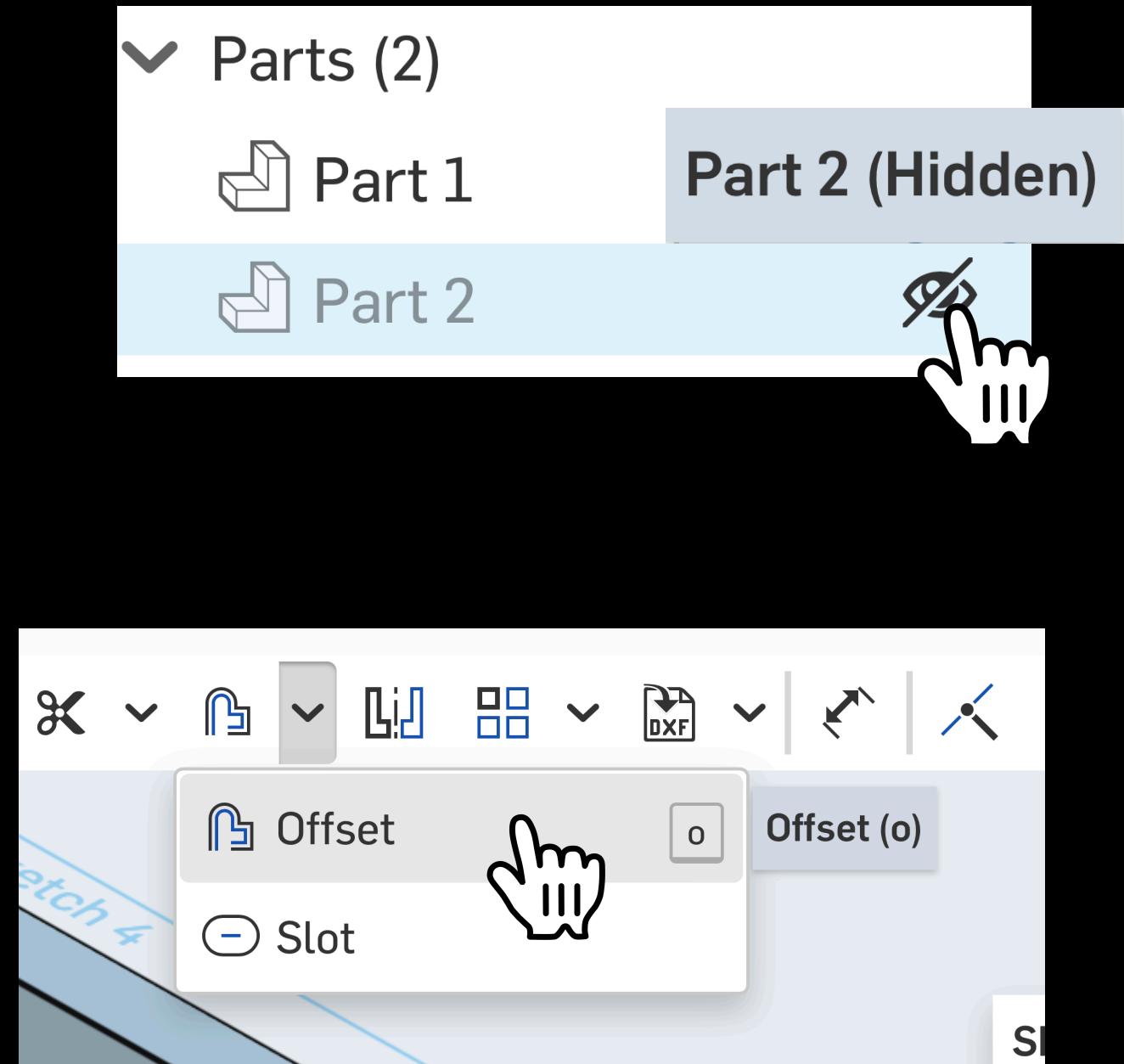
Criação do Esboço numa Face



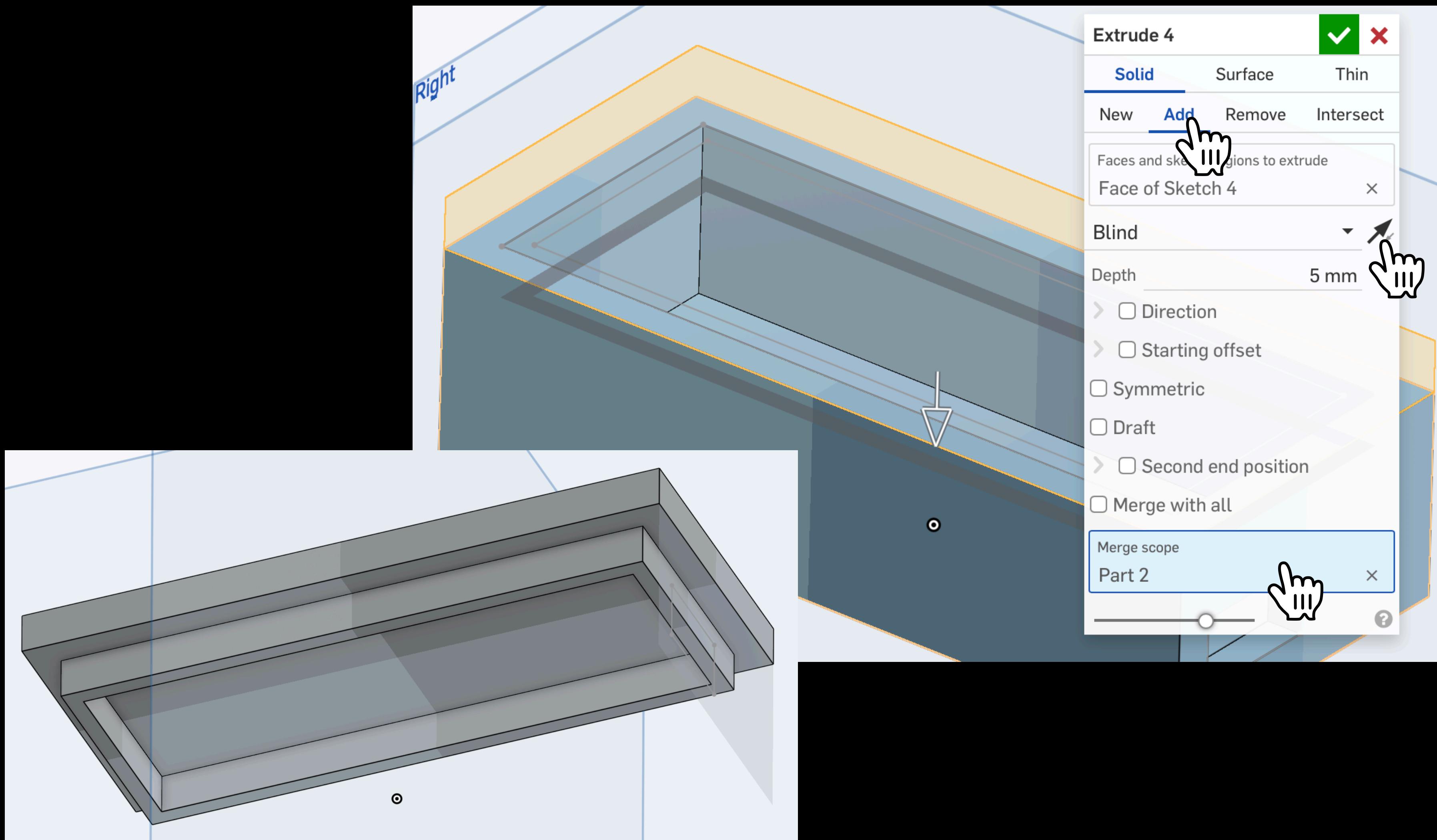
Extrusão para Remoção de um Retângulo



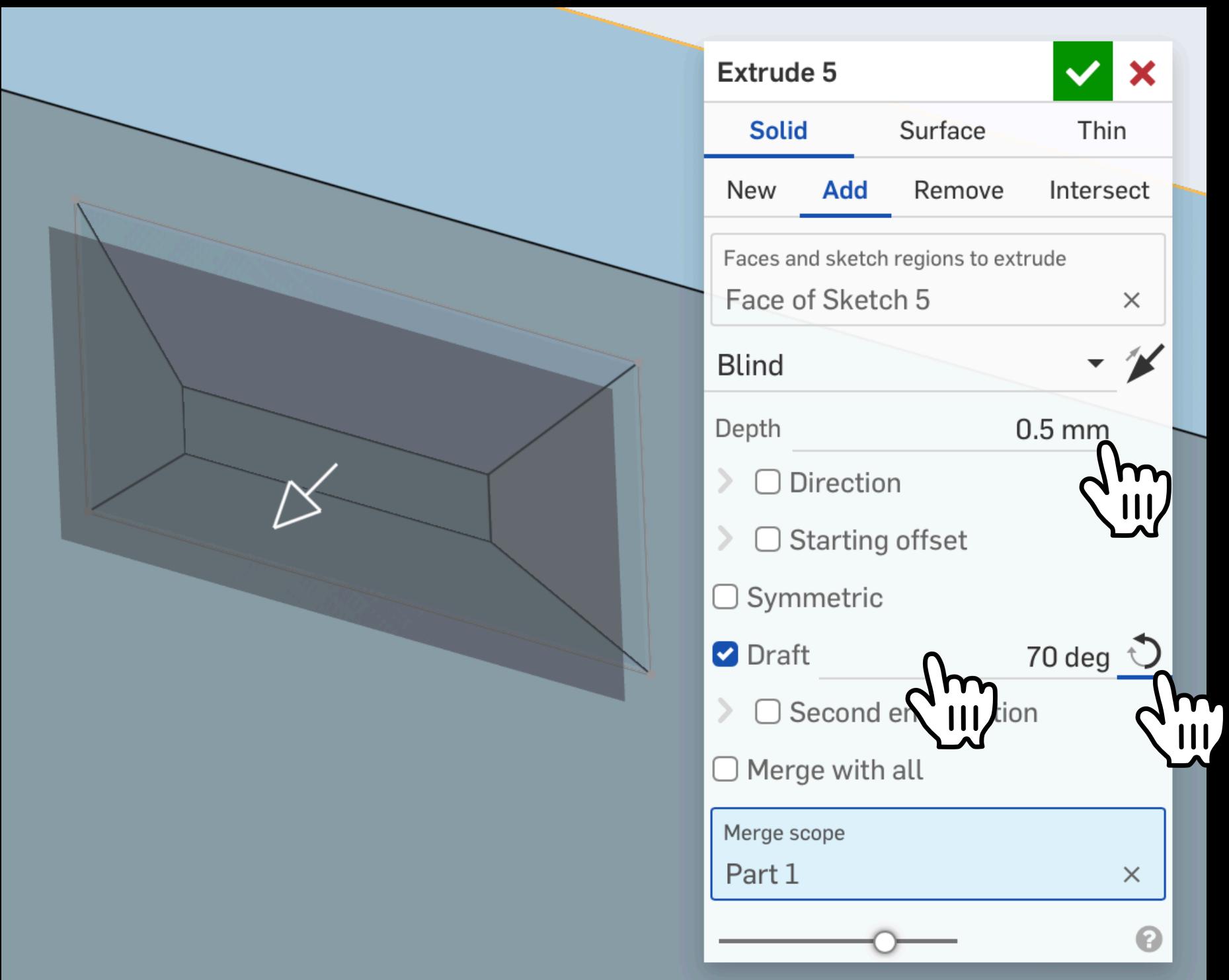
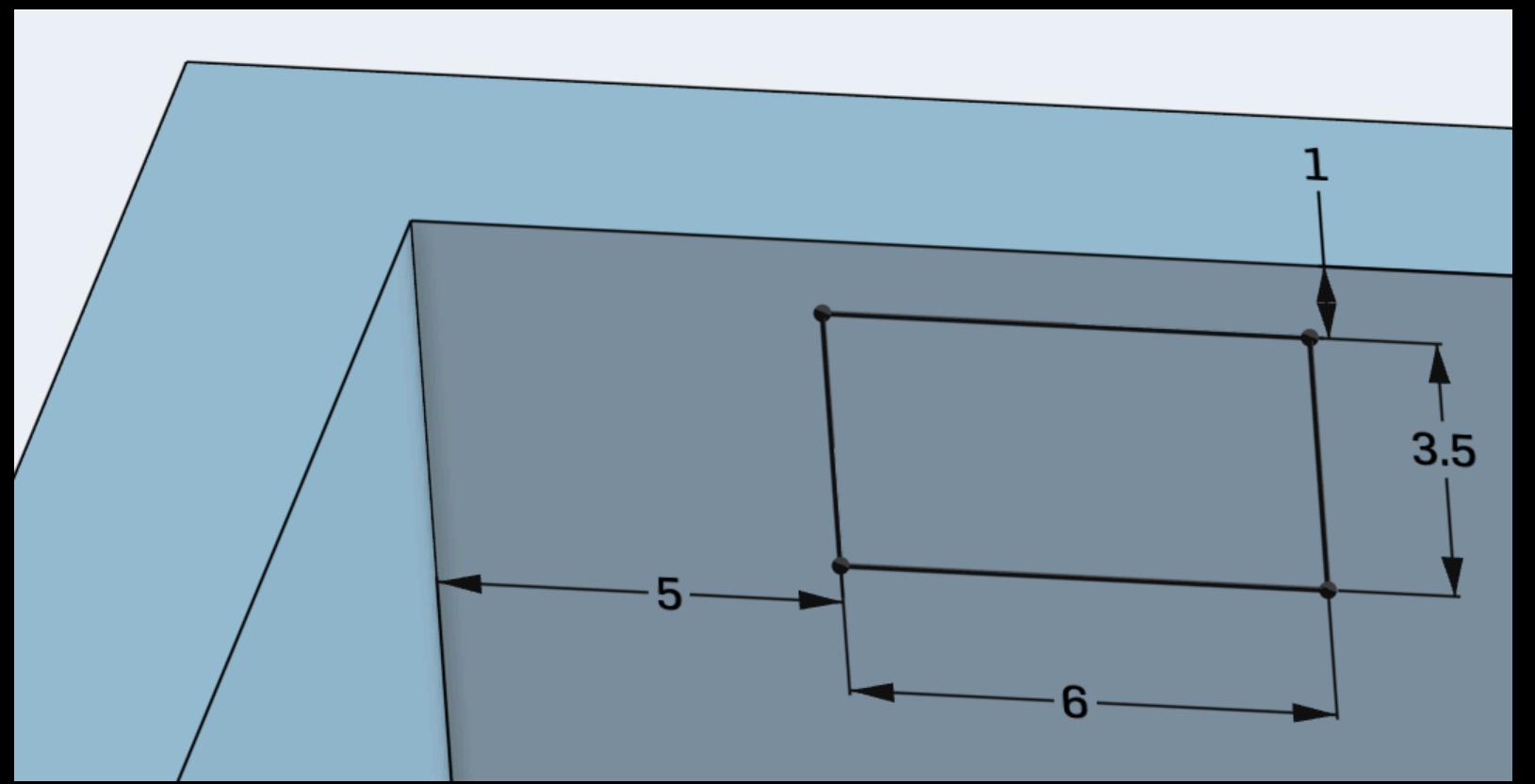
Esboço + Extrusão de uma Nova Parte



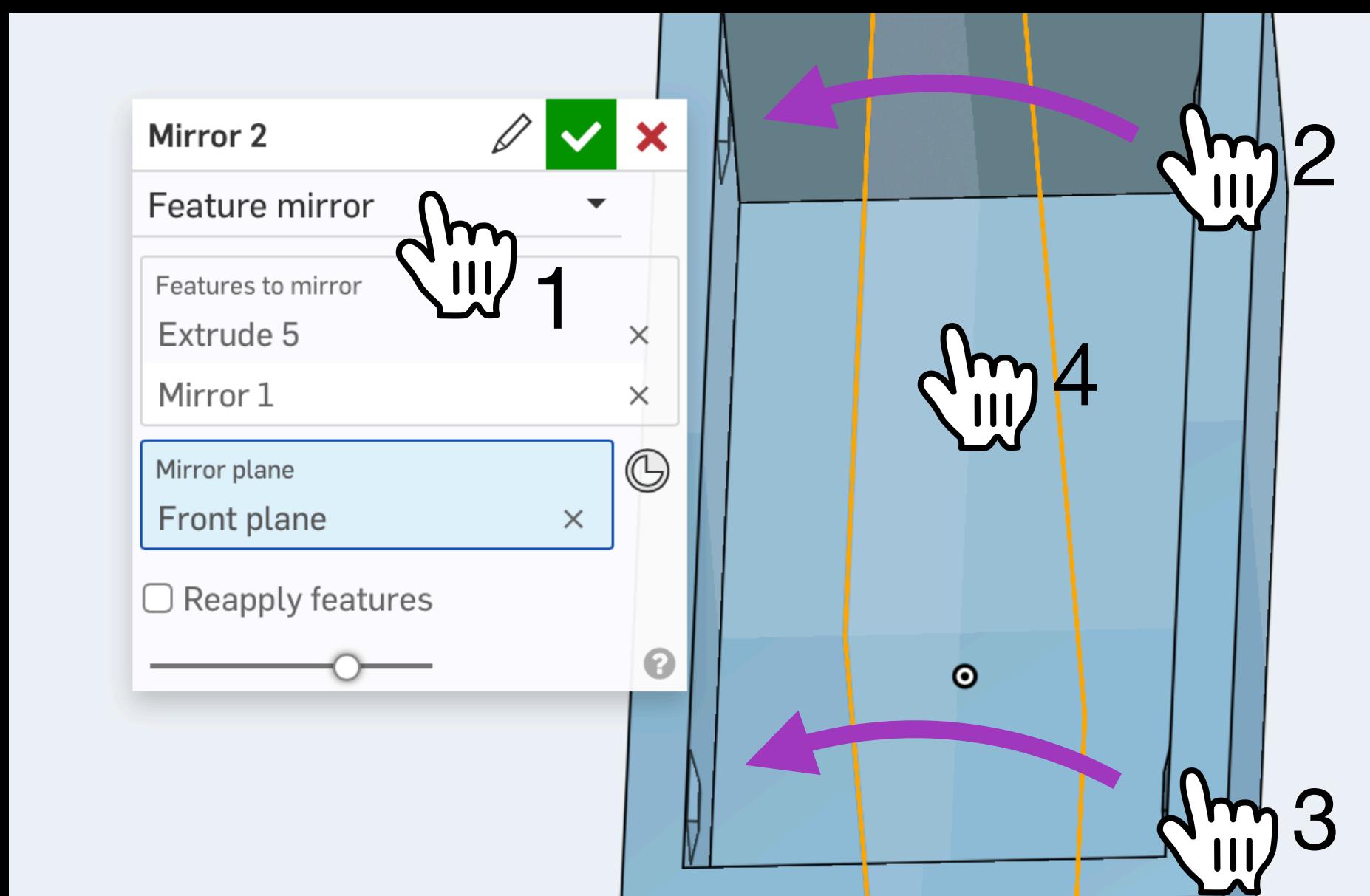
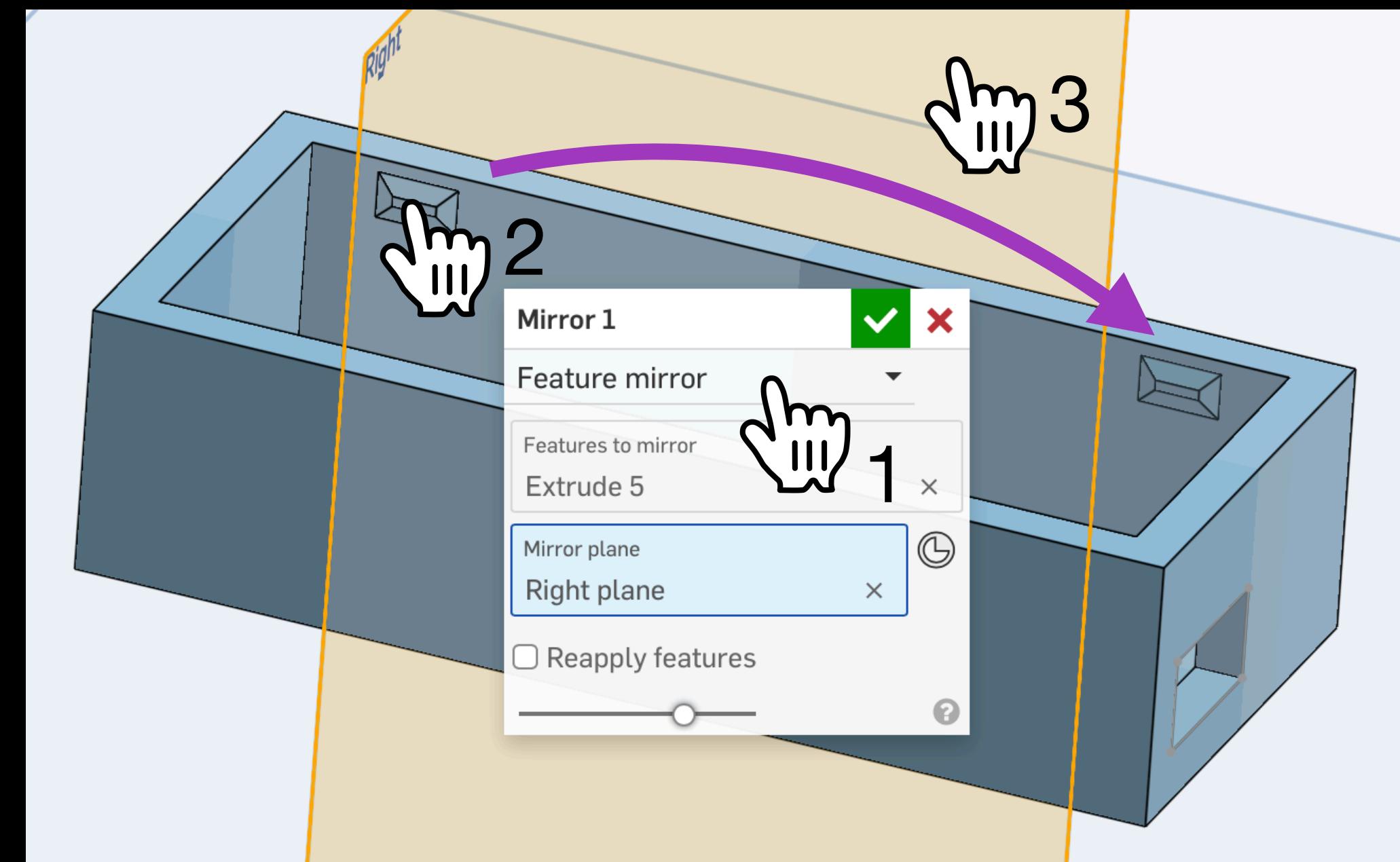
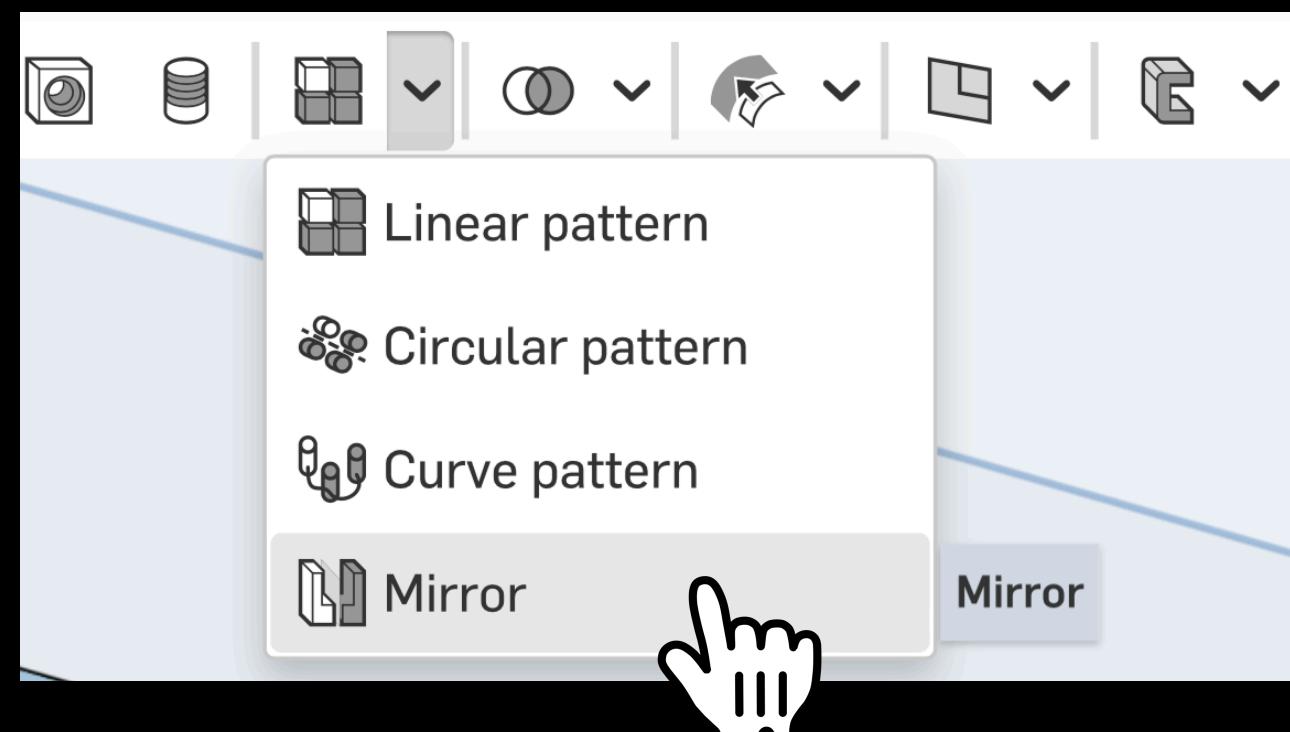
Esboço do Encaixe da Tampa Usando o Offset



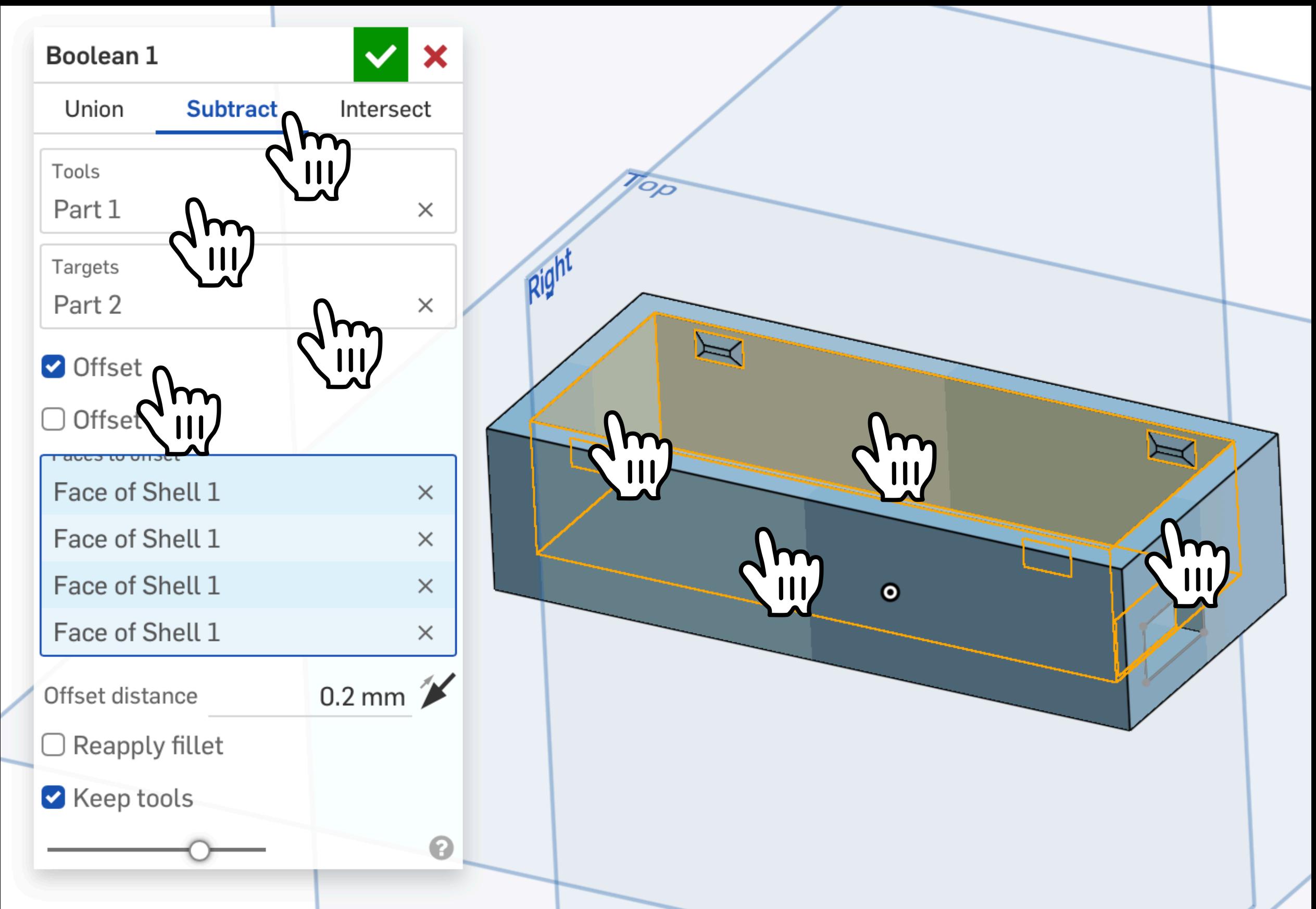
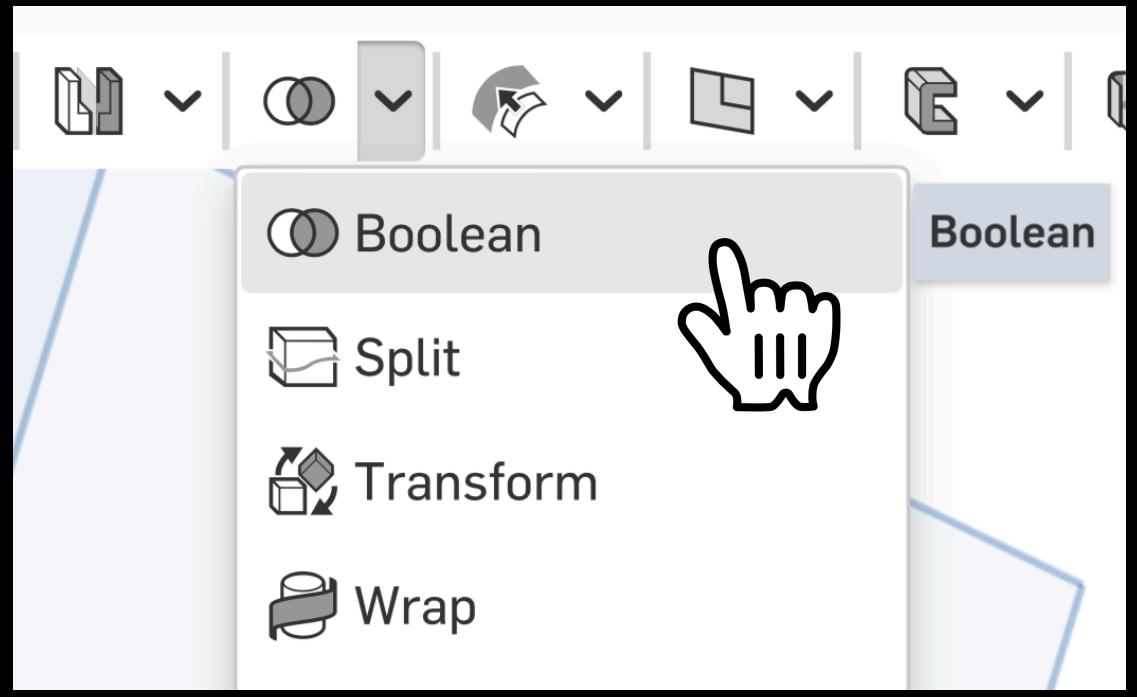
Extrusão do Encaixe da Tampa



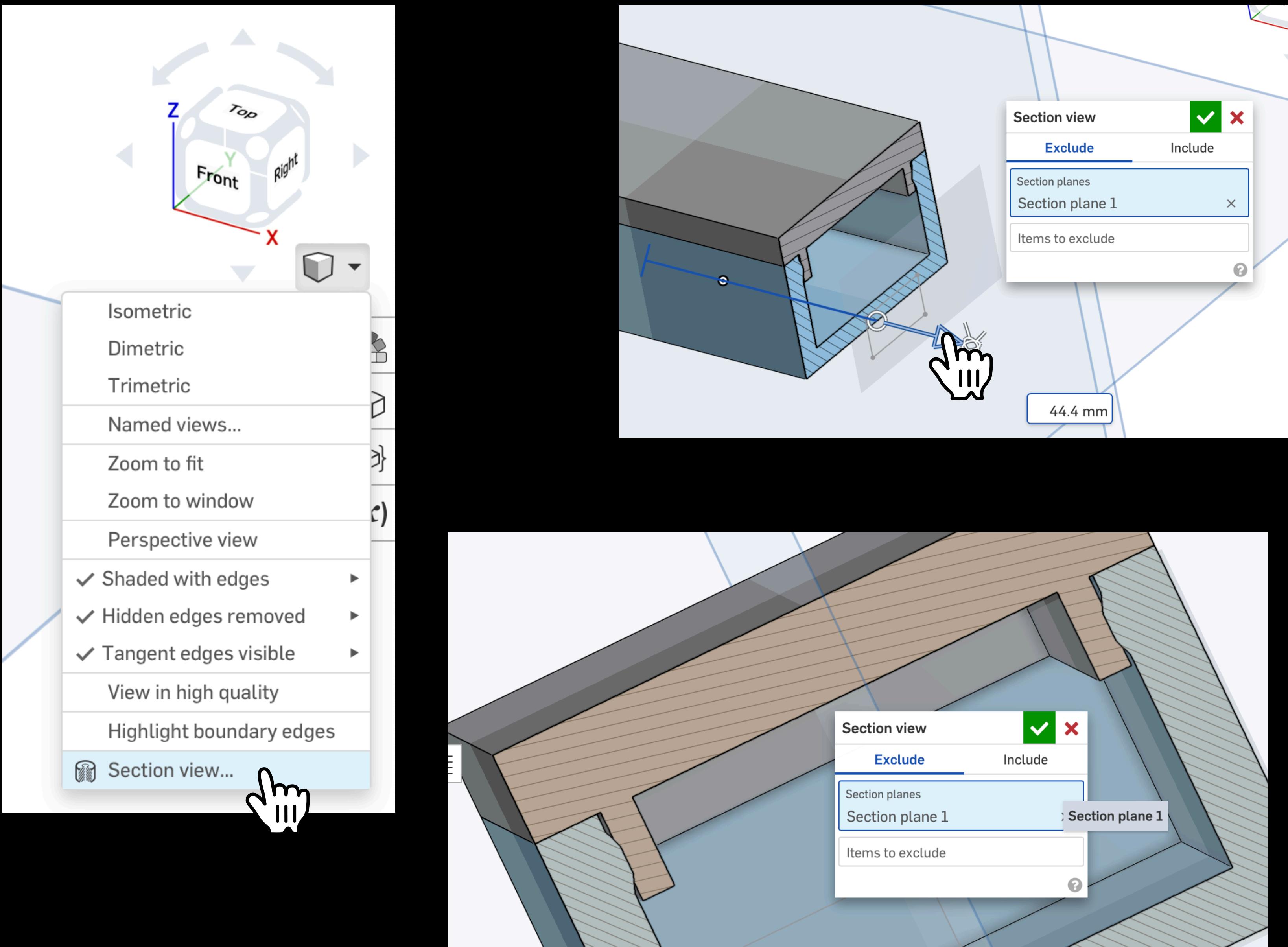
Esboço + Extrusão da Saliência de Encaixe



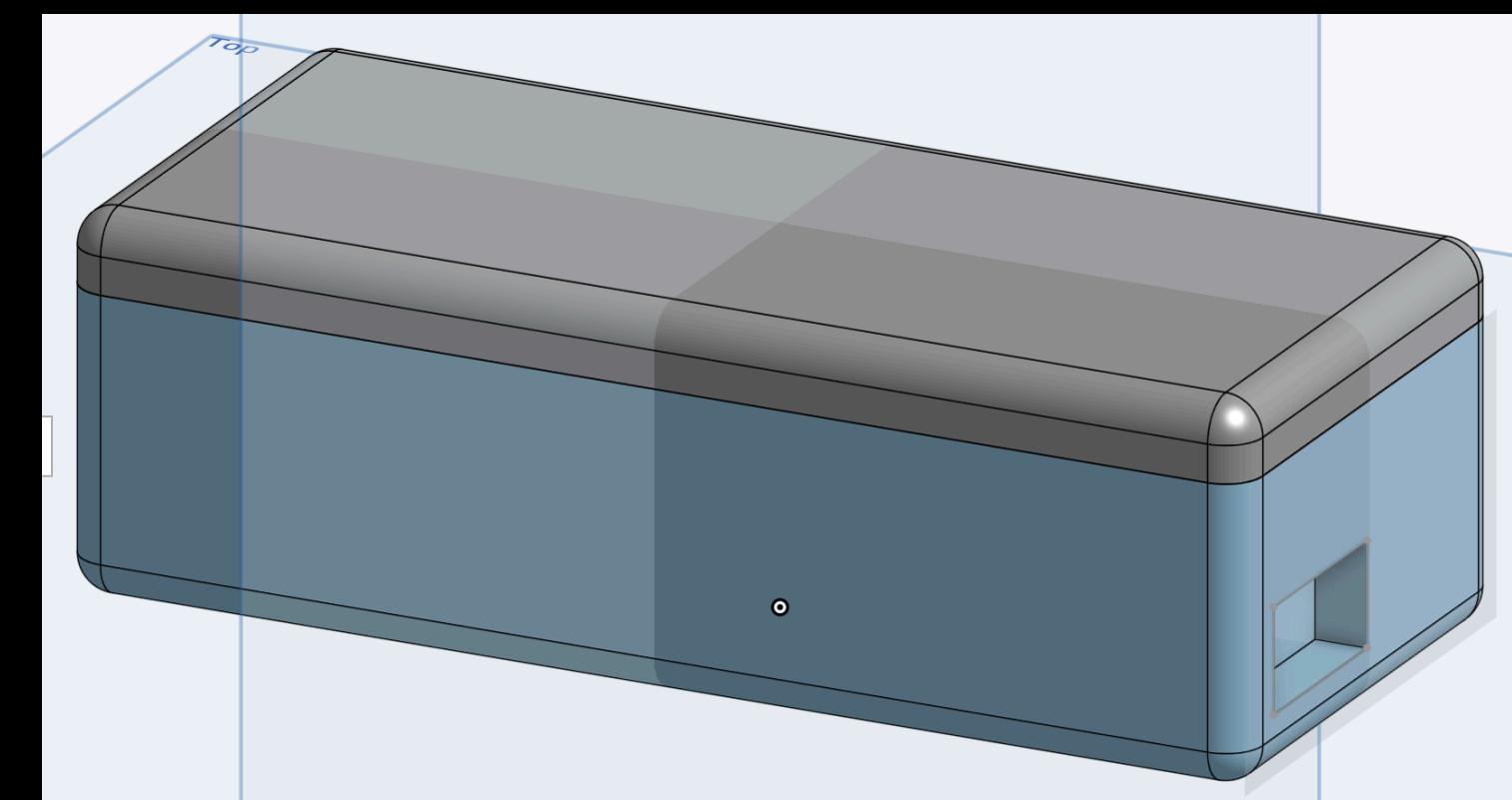
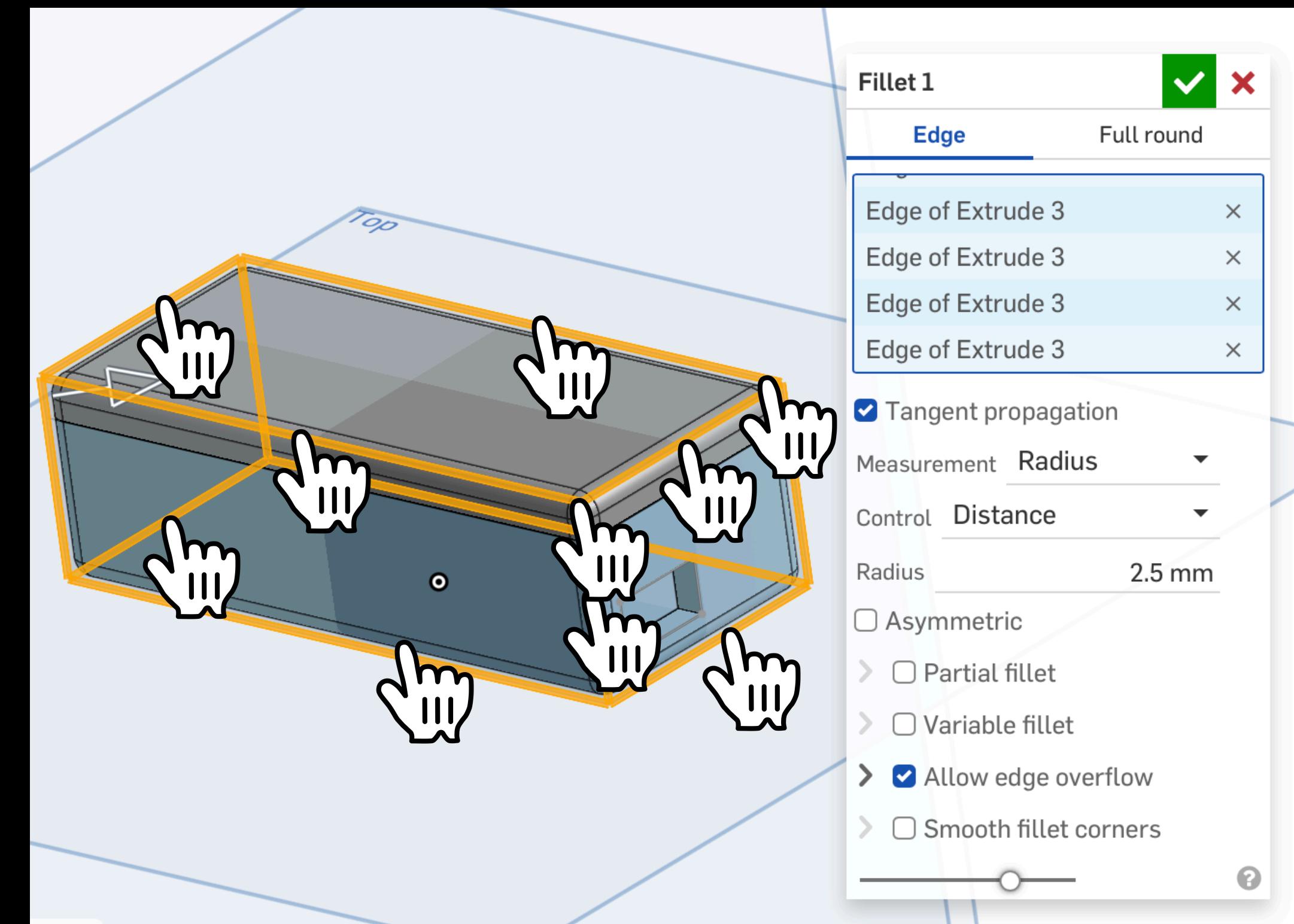
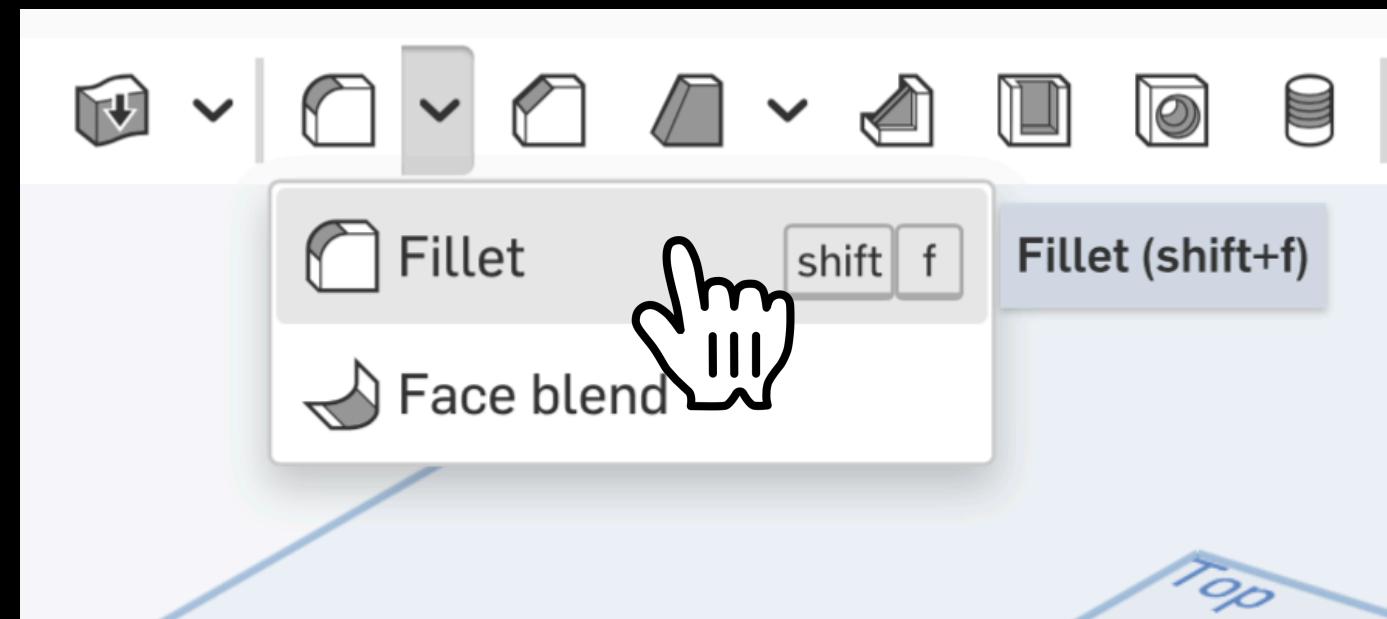
Espelhamento da Saliência de Encaixe



Subtração da Saliência na Tampa com Folga nas Faces Internas



Visão da Seção



Arredondamento das Quinas com Filetes