Instituto Federal da Paraíba - Campina Grande

Áquila Samuel Azevedo Dias
Lucas Dantas de Araújo
Luiz Henrique da Silva Oliveira

Projeto de um MiniLab com Franzininho

Campina Grande
Dezembro/2022

Sumário:

Objetivo:

O objetivo deste trabalho é realizar o projeto de um Minilab, um dispositivo que poderá ser utilizado, por exemplo, para testes e aprendizagem de circuitos e portas lógicas. Esse projeto abrangeu desde a criação do diagrama de blocos até a geração dos arquivos de impressão dos componentes, assim, aqui estão apresentados o diagrama de blocos, o esquema do circuito elétrico, o projeto da placa PCB e também um modelo 3D dos componentes com uma case na qual será alocado a placa PCB e componentes do nosso projeto para ser utilizado.

Especificação do projeto:

O projeto tem o propósito de facilitar a implementação de circuitos para teste e aprendizagem, desta forma ela conterá uma protoboard que ajudará na ligação e conexão de componentes, botões que serão utilizados como chaves para configurarmos as entradas dos nosso minilab, fonte de energia para energização dos componentes será via usb, display de 7 segmentos e led para ajudar na sinalização e visualização das saídas.

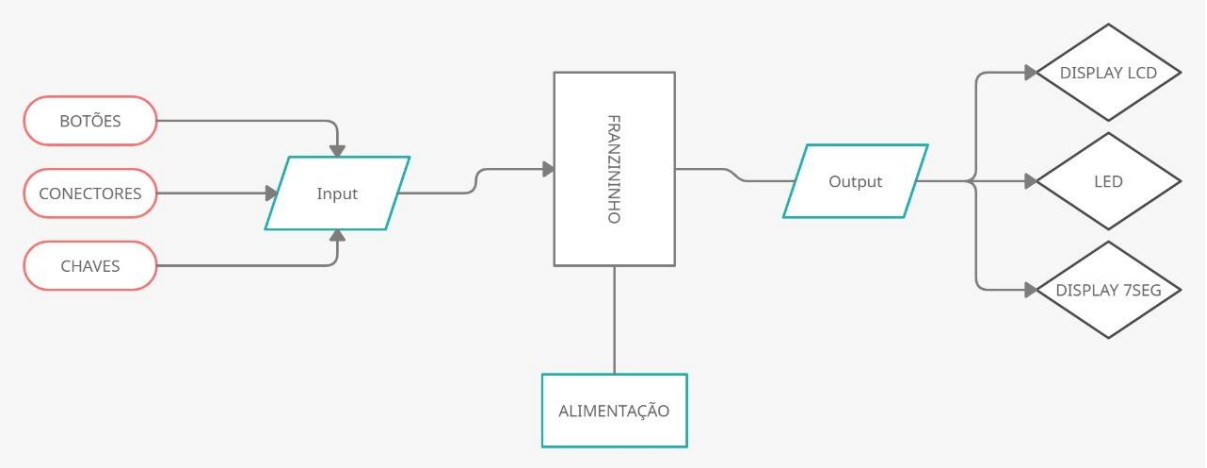
Além disso, nesse projeto está sendo utilizada uma placa franzininho que contém um módulo ESP32-S2-WROOM e será responsável pelo auxílio na configuração e lógica interna do projeto, uma de suas vantagens é que ele é programável, desta forma, é possível ajustar o seu funcionamento para se adequar ao projeto sempre que necessário.

Softwares utilizados:

Para esse Projeto foram utilizados os seguintes softwares para cada etapa:

1. Diagram.io - Diagrama de blocos do sistema
2. Fusion 360 - Esquema do circuito elétrico
3. Fusion 360 - Projeto da PCB(Layout + Modelo 3D)
4. Fusion 360 - Design do modelo 3D da case
5. Prusa Slicer - Geração dos arquivos para impressão do projeto.

Diagrama de blocos:



Lista de componentes (BOM):

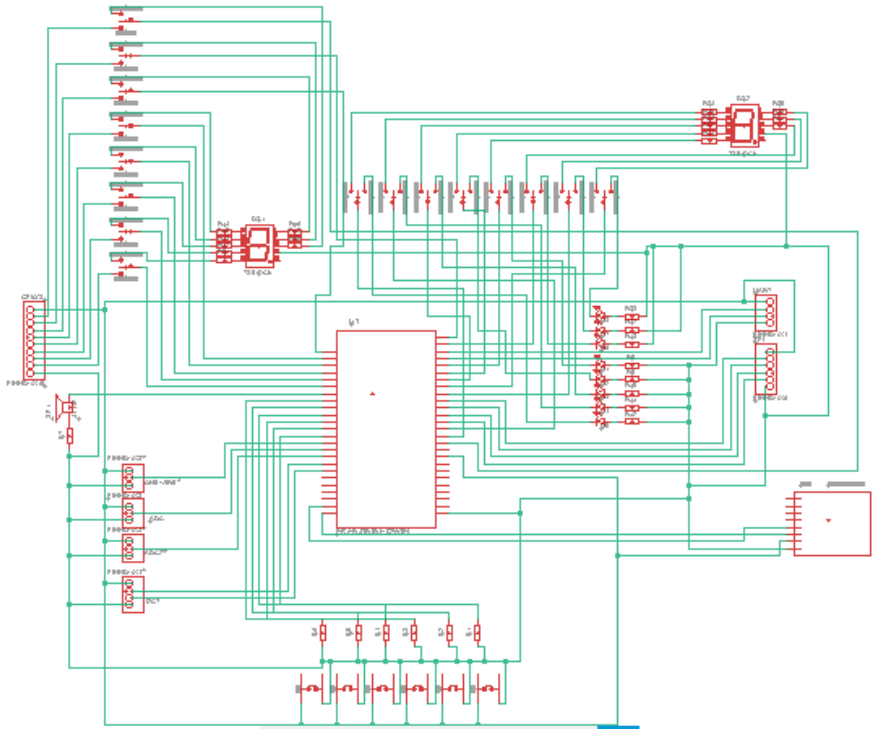
Part	Value	Device	Package	Description
7SEG/LEDS	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS2	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS3	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS4	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS5	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS6	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS7	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
7SEG/LEDS8	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
ADC	PINHD-1X3	PINHD-1X3	1X03	PIN HEADER
ADC2	PINHD-1X3	PINHD-1X3	1X03	PIN HEADER
D1	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
D2	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
D3	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
D4	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
D5	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
D6	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
D7	LED_RED	LED_RADIAL_RED	LEDRD254W60D5	LED - Generic

			65H860B	
D8	LED_RED	LED_RADIAL_RED	LEDRD254W60D565H860B	LED - Generic
DS1	7SEG-CK	7SEG-CK	7SEG-13	7-segment DISPLAY
DS2	7SEG-CK	7SEG-CK	7SEG-13	7-segment DISPLAY
GPIO'S	PINHD-1X10	PINHD-1X10	1X10	PIN HEADER
I2C	PINHD-1X4	PINHD-1X4	1X04	PIN HEADER
IO/7SEG	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG2	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG3	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG4	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG5	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG6	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG7	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
IO/7SEG8	472123010111	472123010111	472123010111	WS-TOTV Ø 6.35mm Panel Cut-Out Vertical Operation Toggle Switch
ONEWIRE	PINHD-1X3	PINHD-1X3	1X03	PIN HEADER
R1		R_AXIAL-11.7MM-PITCH	RESAD1176W63L850D250B	Resistor Fixed - Generic
R2		R_AXIAL-11.7MM-PITCH	RESAD1176W63L850D250B	Resistor Fixed - Generic
R3		R_AXIAL-11.7MM-PITCH	RESAD1176W63L850D250B	Resistor Fixed - Generic
R4		R_AXIAL-11.7MM-PITCH	RESAD1176W63L850D250B	Resistor Fixed - Generic
R5		R_AXIAL-11.7MM-PITCH	RESAD1176W63L850D250B	Resistor Fixed - Generic
R6		R_AXIAL-11.7MM-PITCH	RESAD1176W63L850D250B	Resistor Fixed - Generic

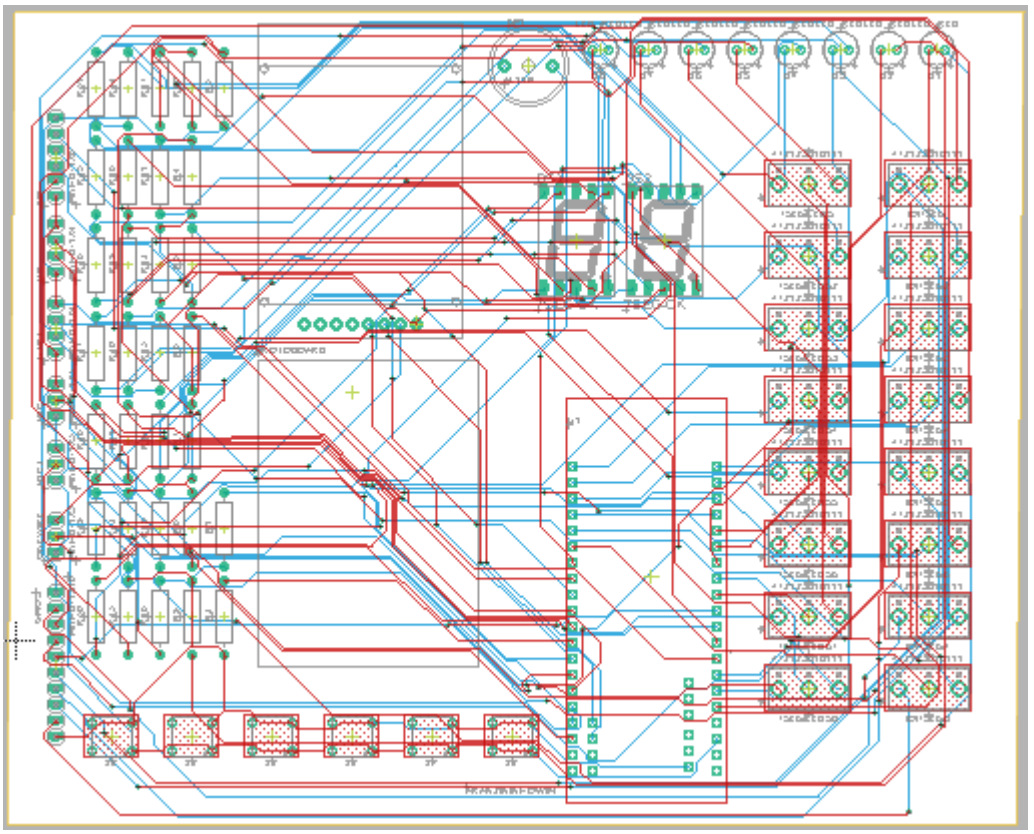
R7		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R8		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R9		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R10		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R11		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R12		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R13		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R14		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R15		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R16		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R17		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R18		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R19		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R20		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R21		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R22		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R23		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R24		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R25		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R26		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R27		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R28		R_AXIAL-11.7MM-PITCH	RESAD1176W63L	Resistor Fixed - Generic

			850D250B	
R29		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R30		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
R31		R_AXIAL-11.7MM-PITCH	RESAD1176W63L 850D250B	Resistor Fixed - Generic
S1		430156050726	4301X60507X6	WS-TATV THT Tact Switch 6x6 mm
S2		430156050726	4301X60507X6	WS-TATV THT Tact Switch 6x6 mm
S3		430156050726	4301X60507X6	WS-TATV THT Tact Switch 6x6 mm
S4		430156050726	4301X60507X6	WS-TATV THT Tact Switch 6x6 mm
S5		430156050726	4301X60507X6	WS-TATV THT Tact Switch 6x6 mm
S6		430156050726	4301X60507X6	WS-TATV THT Tact Switch 6x6 mm
SP1	AL11P	AL11P	AL11P	SPEAKER Source: Buerklin
SPI	PINHD-1X6	PINHD-1X6	1X06	PIN HEADER
U$1	1.44-TFT-V1.1"	1.44-TFT-V1.1"	1.44-TFT-V1.1	
U1	FRANZININHOWIFI	FRANZININHOWIFI	FOOTPRINT-FRANZININHO	Check availability Check availability Check availability
UART	PINHD-1X4	PINHD-1X4	1X04	PIN HEADER

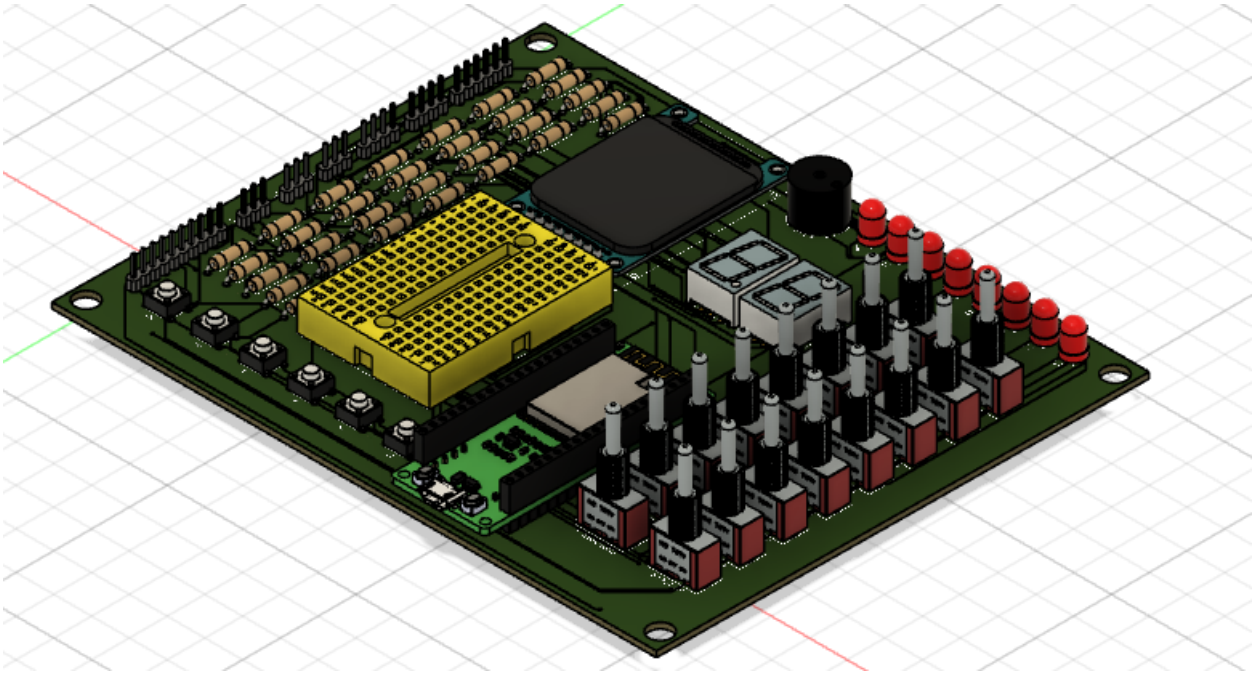
Circuito elétrico do projeto:

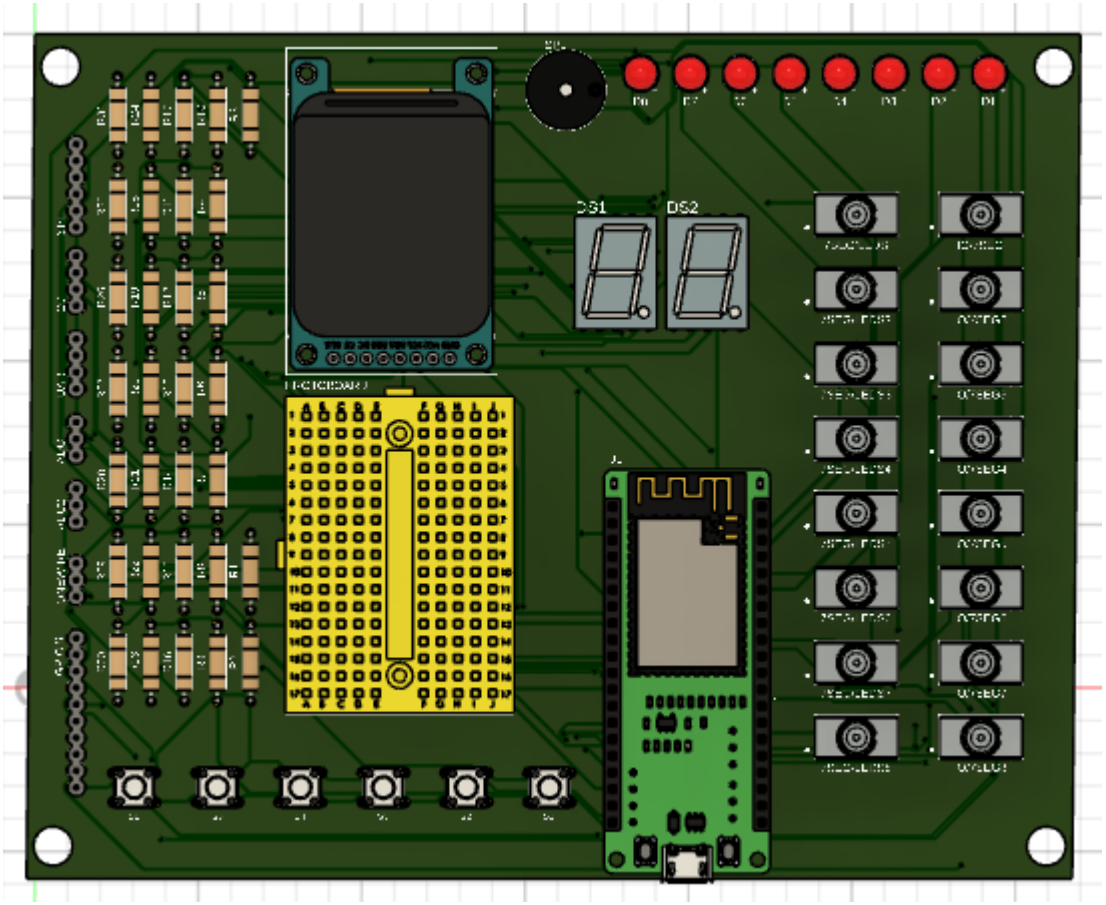


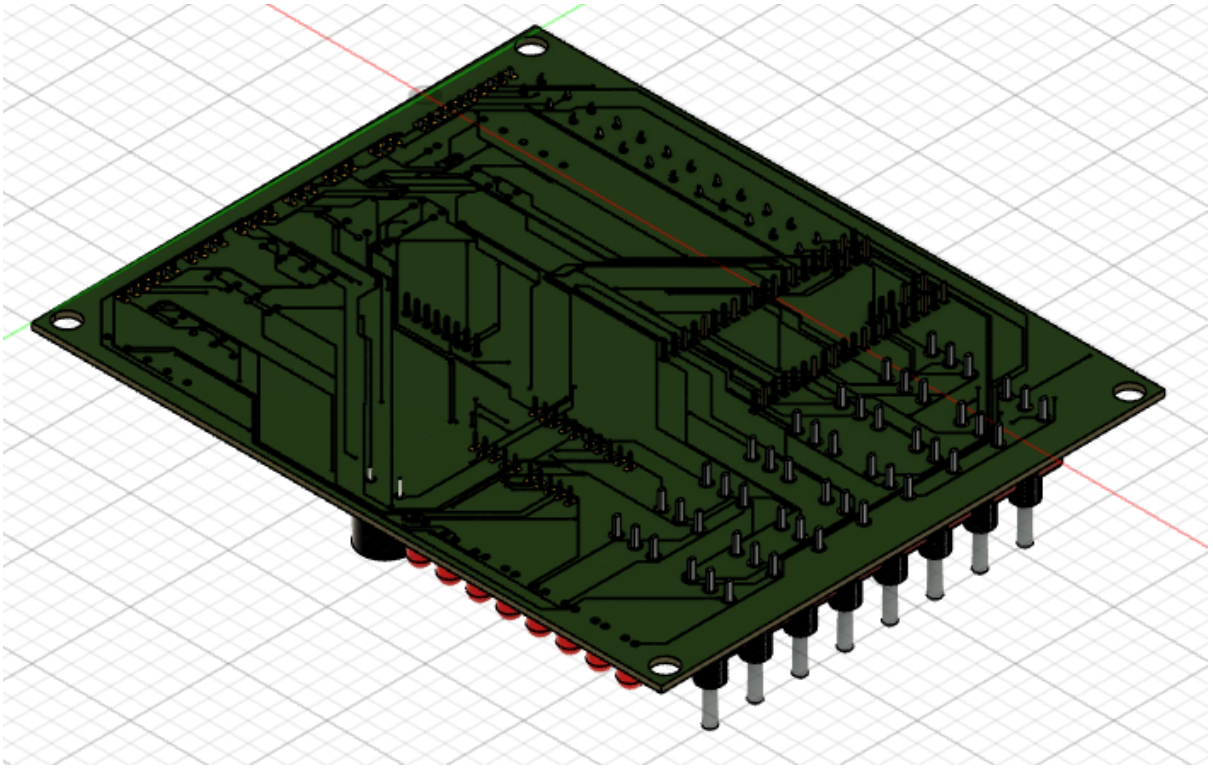
Layout da pcb:

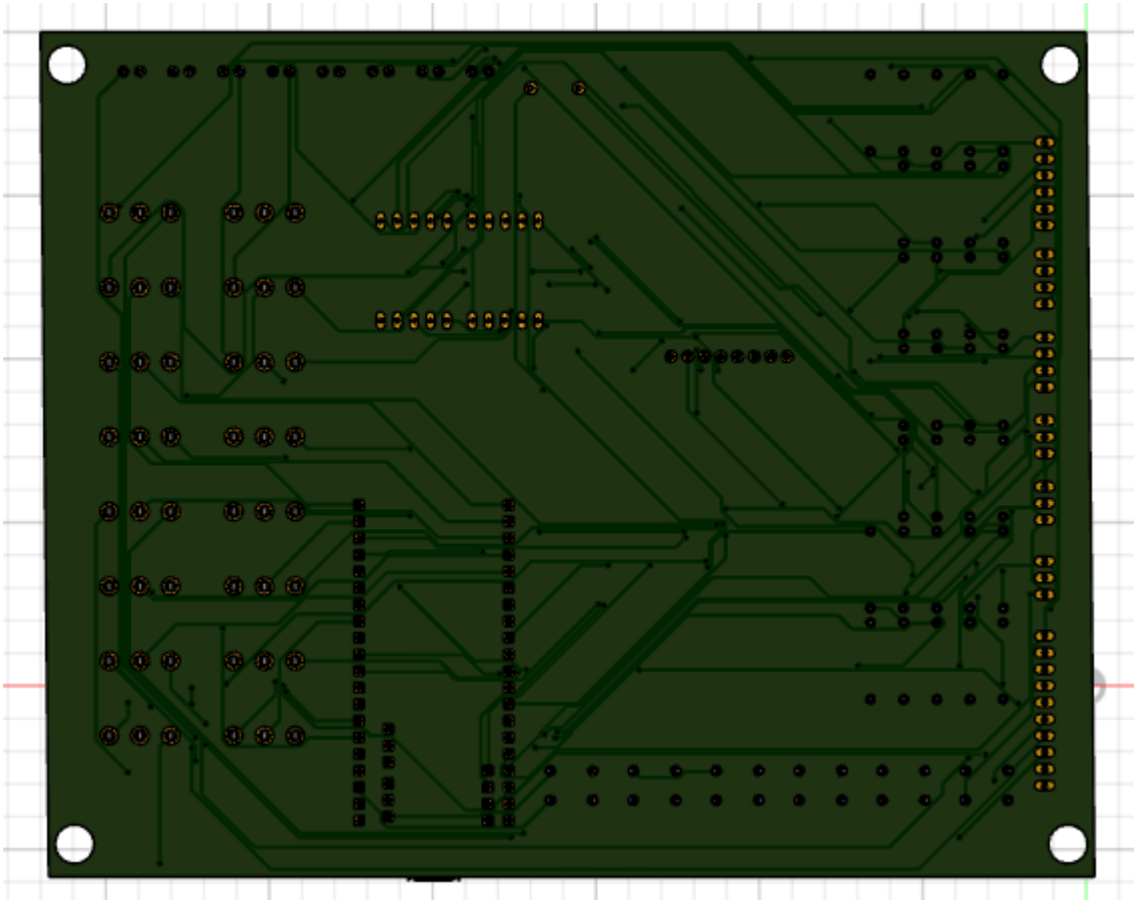


Imagens do placa 3D:

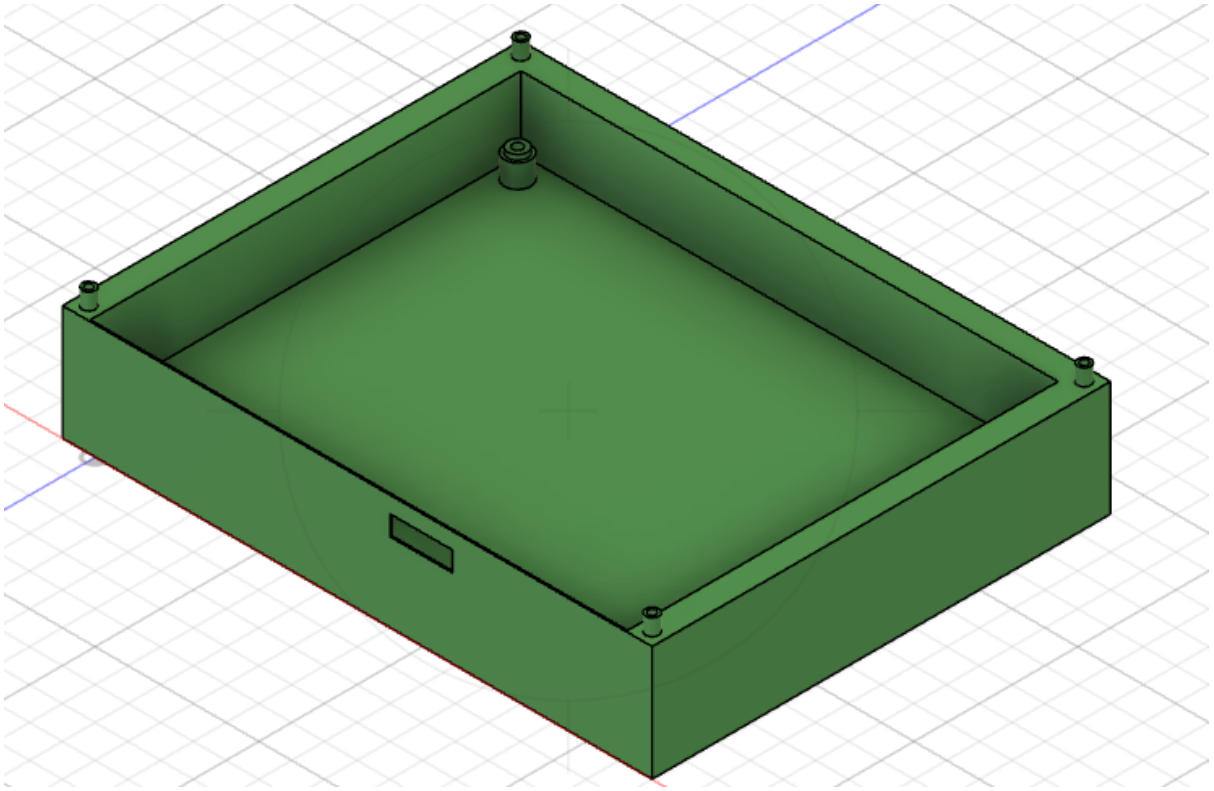


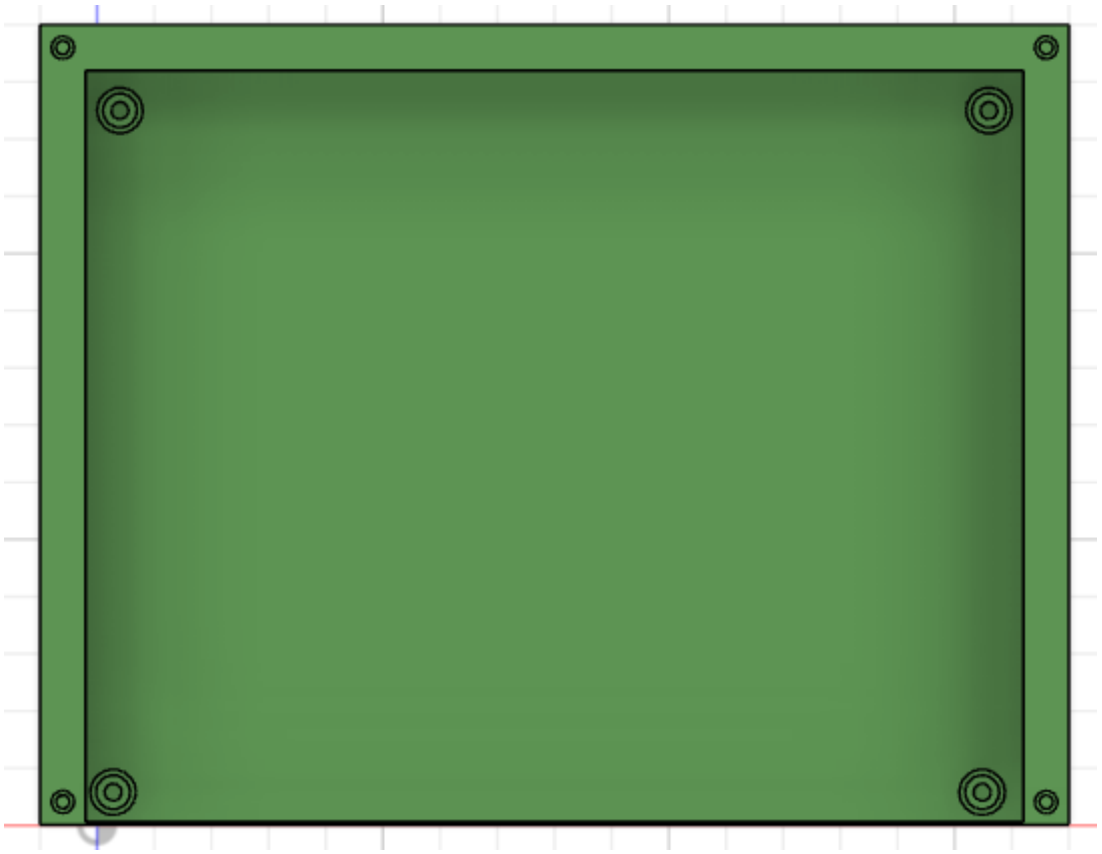

DS1
DS2



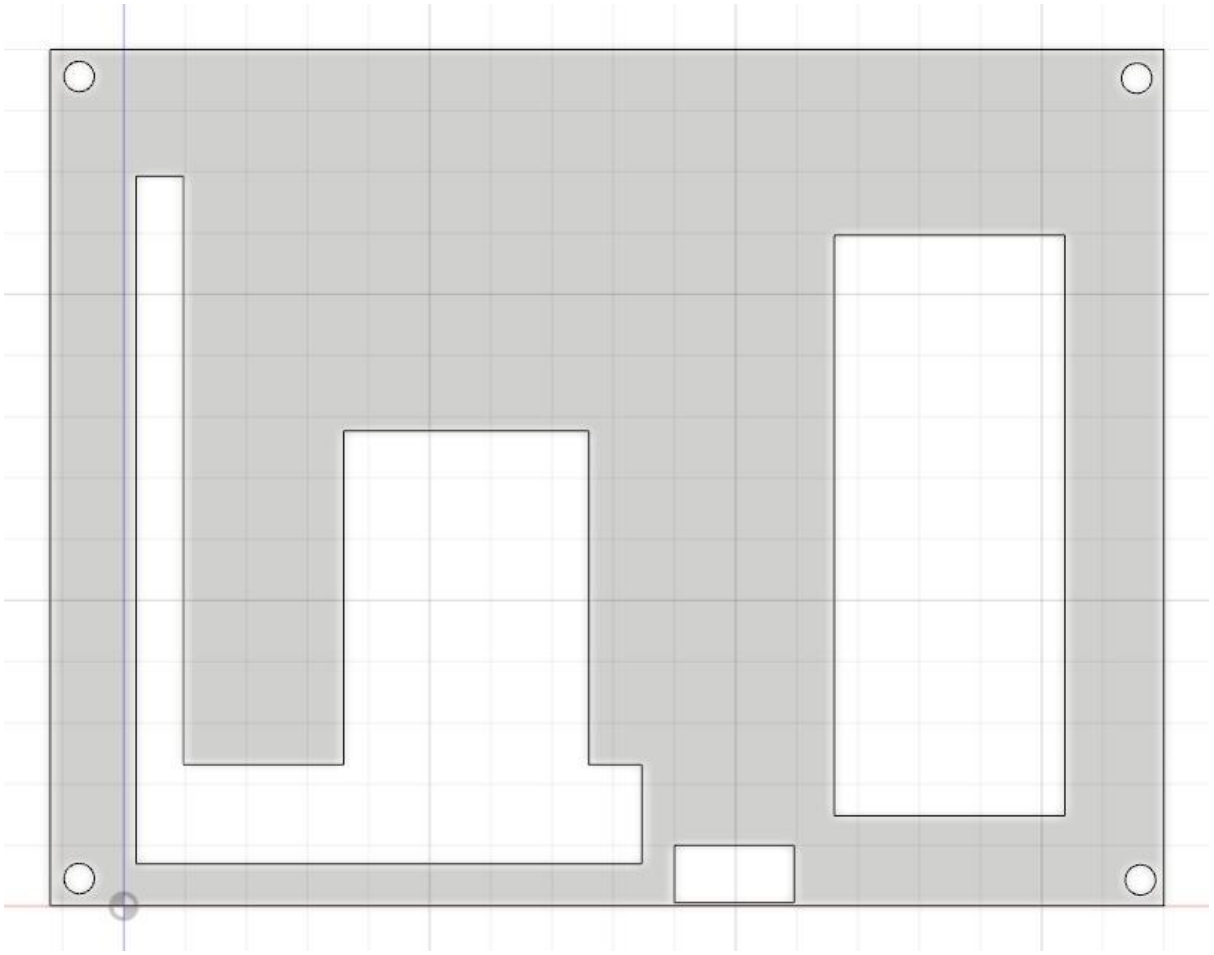


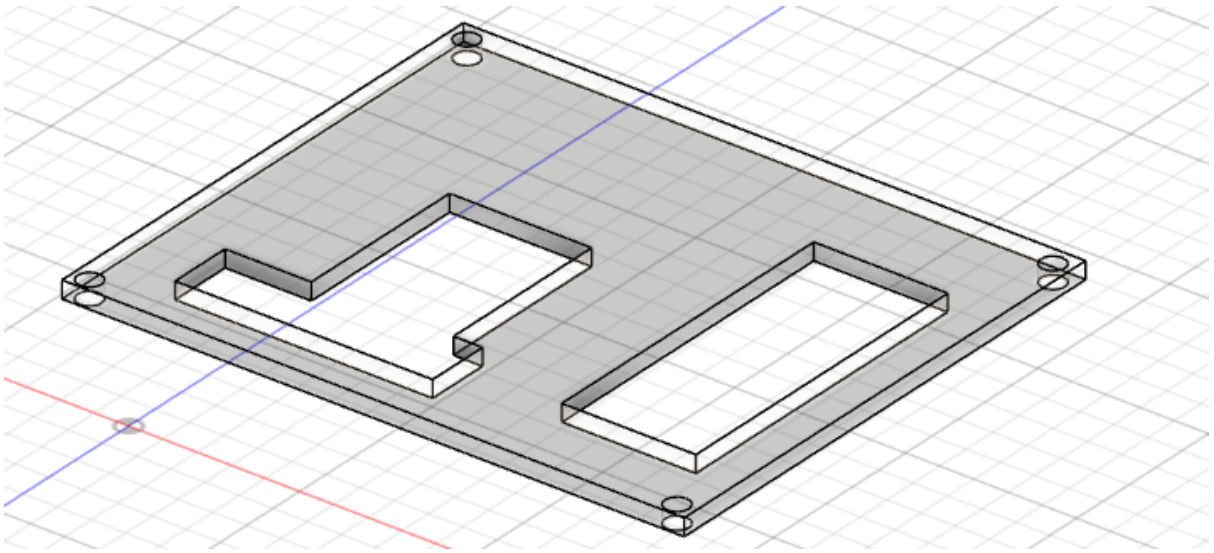
Modelo 3d case (caixa):



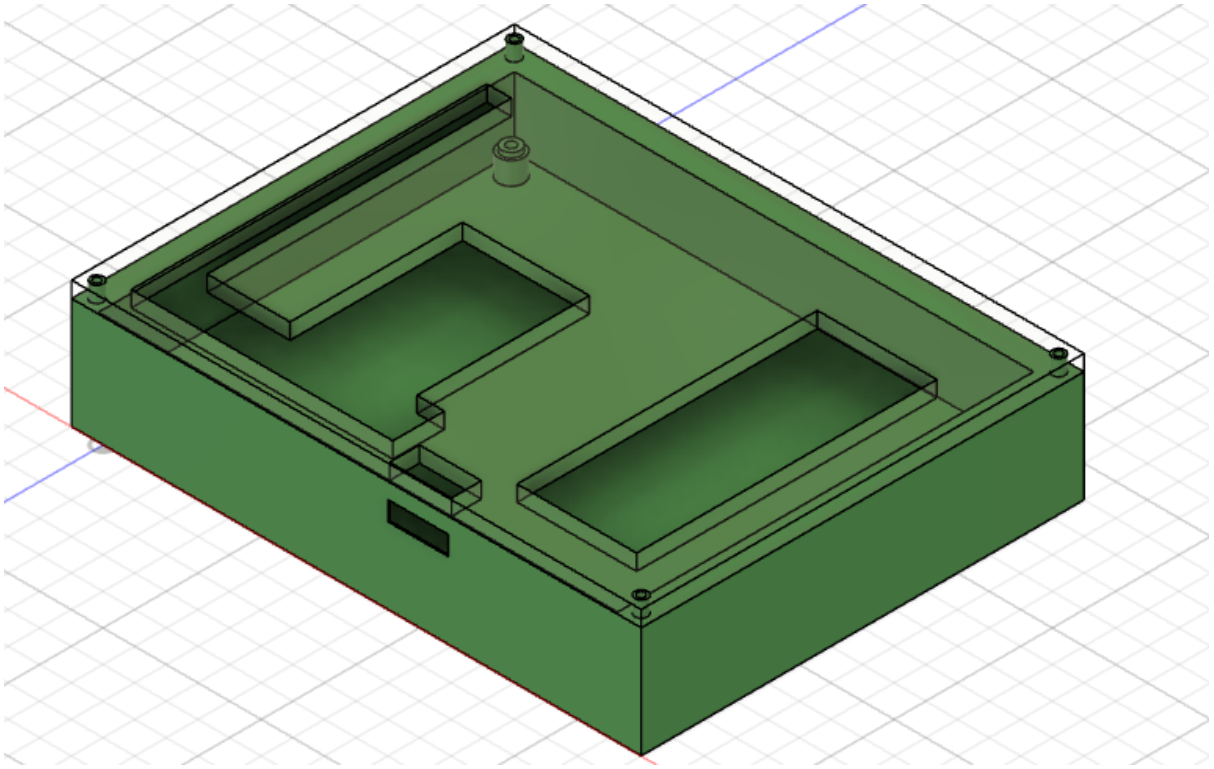


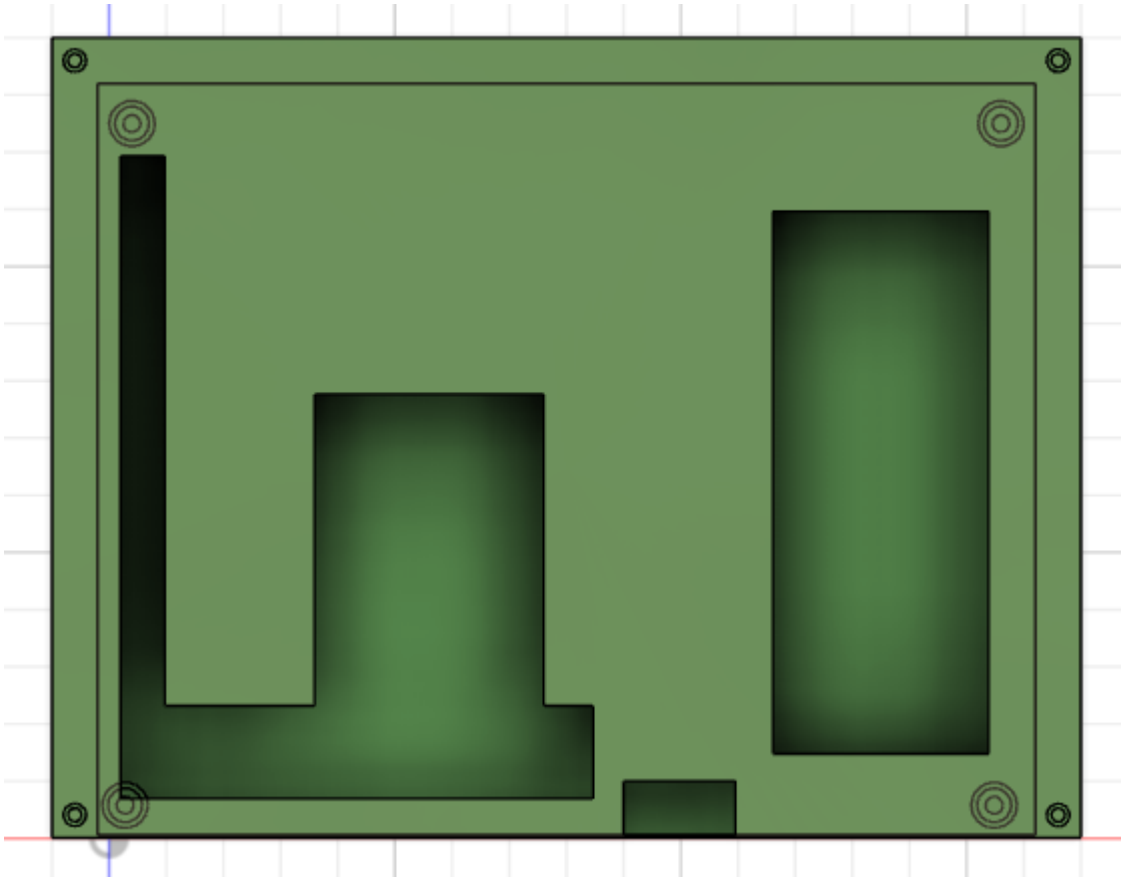
Modelo 3d case (tampa):





Modelo 3d case completo:





Modelo 3d protótipo completo: