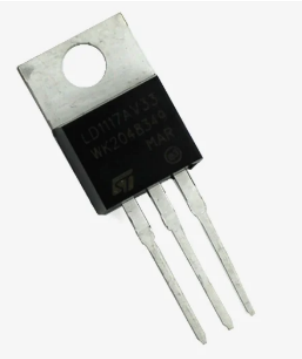
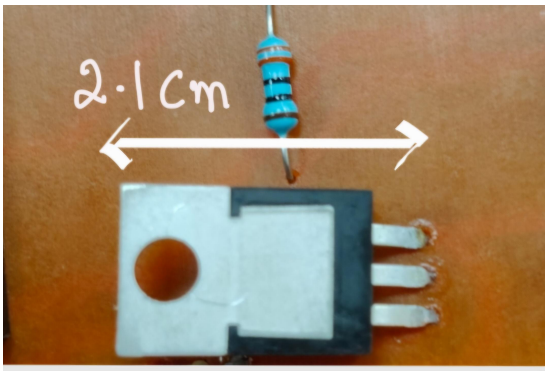
MS101 MakerSpace
2024-25/II Spring
PCB Design Guidelines

March 5, 2025

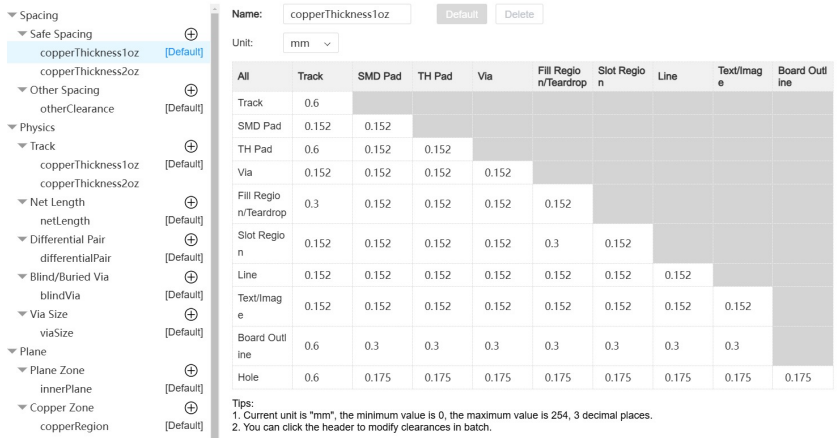
1 Instructions

- Follow the circuit diagram provided in **'4_joystick_schematic.pdf'** to create the PCB design.
- Use obtuse angles when changing the direction in routing to improve signal flow.
- Keep the joystick controllers as symmetrical as possible on both sides for better usability.
- Avoid making the PCB too small by overcrowding the components. Ensure there is adequate spacing between components while adhering to the area constraint of 130mm x 60mm.
- Use the bottom layer exclusively for routing between the components.
- Ensure that the top layer is not used for routing.
- Only through-hole (TH) components should be used. surface-mount device (SMD) components must not be used.
- After receiving the physical PCB board and completing the soldering, you will need to bend both voltage regulators, LD1117AV33 and LM7805, by 90 degrees. Ensure there is enough space around the components, and After bending, the space required for each voltage regulator is 2.1 cm.

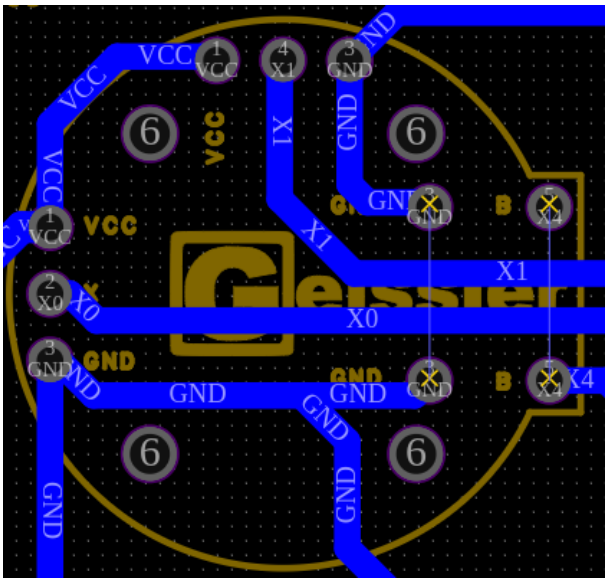




- Perform a DRC (Design Rule Check) after completing the routing and ensure the design matches the constraints specified in the figure provided. Check both **copperThickness1oz** and **copperThickness2oz**(see the figure below for reference), ensuring that the values for each remainsthe same.



- You can ignore the connection errors related to the joystick as shown in figure, but only for the pins that are not physically connected. These pins have the same name and are internally connected within the joystick. The missing connections are highlighted with a cross.(✗)

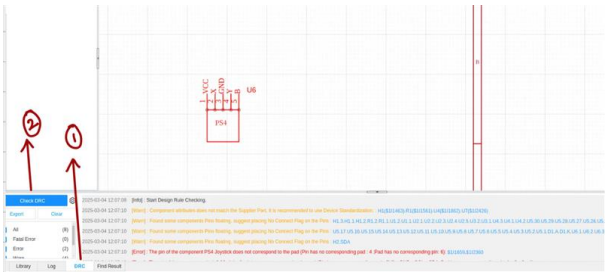


	Connection Error	TH Pad	Common	TH Pad (X5): U2_5		Object 1 is disconnected from other objects of the same ne
	Connection Error	TH Pad	Common	TH Pad (X4): U3_5		Object 1 is disconnected from other objects of the same ne
	Connection Error	TH Pad	Common	TH Pad (X4): U3_5		Object 1 is disconnected from other objects of the same ne
	Connection Error	TH Pad	Common	TH Pad (GND): U3_3		Object 1 is disconnected from other objects of the same ne

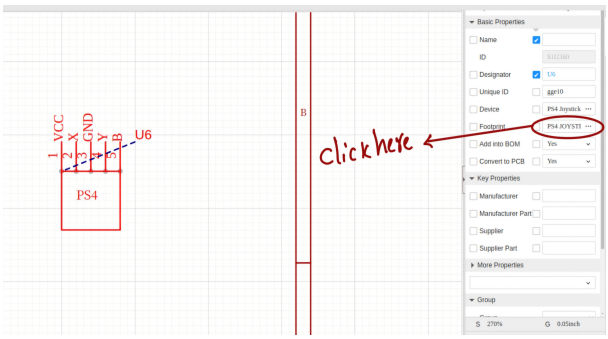
2 **Errors and Their Corresponding Solutions

- After placing the components in the schematic, perform a DRC check(DRC → Check DRC). If the error displayed in the figure below occurs, follow the steps outlined.

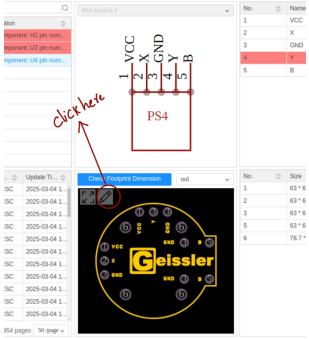
PS4 Joystick



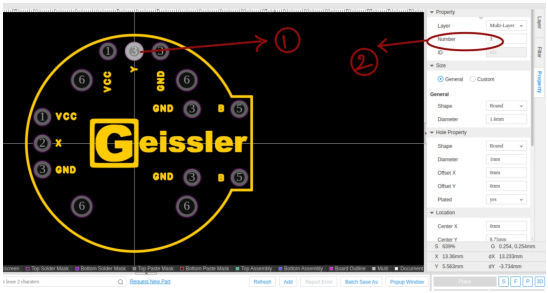
- Select the component and then click on the corresponding footprint.



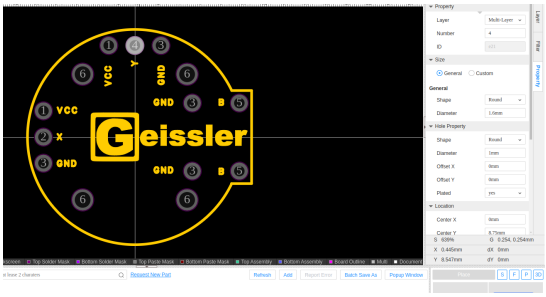
step-1



step-2



step-3

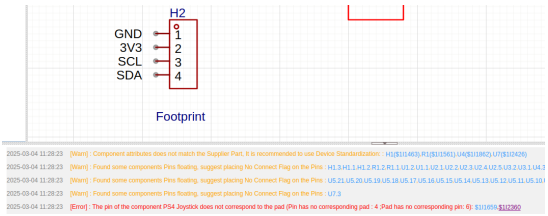


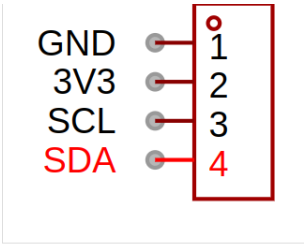
step-4

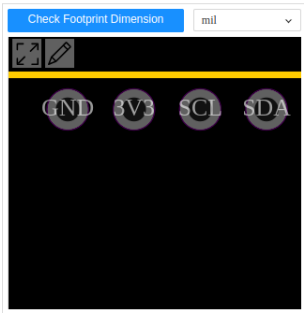
- After editing,save the changes by **CTRL + S**. Perform a DRC check again in the schematic again to verify whether the error has been resolved.

OLED Error:

If you encounter a similar error for the OLED component, you may change the footprint in the same manner as described above.







3 Common Questions and Clarifications:

- The same capacitor footprint may be used for all capacitors, provided they are through-hole (TH) components and comply with the specified technical requirements outlined in the documentation(**1_Joystick_PCB_design_document.pdf**).
- The physical dimensions of the components to be used for soldering will align with the footprint dimensions specified in the documentation.