



VERSION 1.0

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# Power Distribution Board

BY: KAI DUCHANE

AVANTI R&D



## OVERVIEW

### 1.1-SYSTEM DESCRIPTION

This project implements a 1U dual 600W server power supply system, connected to 2 microcontrollers (Luck fox RV1106 Pico Pro/Max and Arduino Nano) to power 12 Nvidia Jetson Orin Nanos and 3 Nvidia Orin AGX computers. The system runs a python flask for remote control. The power is supplied through 16 DC jacks; each connected to an individually controlled relay channel which is also connected to a ws2812b LED for status indication.

### 1.2-PROJECT RESOURCES

GitHub Repository: <https://github.com/kai-duchane/Power-Distribution-Board>

Contains: Source code, 3D models, KiCAD Schematics

### 1.3-POWER SPECIFICATIONS

Total Power Capacity: 600W

Input Voltage: 100-240VAC

Output Voltage: 12V, 50A (max) on each channel

### 1.4-PHYSICAL SPECIFICATIONS

#### DIMENSIONS

Height: 1.7" (43mm) - Standard 1U form factor,

Width: 17.2" (437mm) - Standard 19" rack width

Depth: 19.98" (507mm)

### 1.5-CONTROL SPECIFICATIONS

Primary Controller: Luck fox RV1106 (relay control, web server)

Secondary Controller: Arduino Nano (LED control)

Communication: Serial UART between controllers through TXS0108e level shifter

Network Interface: Ethernet via RV1106

Status Indicators: 16x WS2812B addressable RGB LEDs

## OPERATING INSTRUCTIONS

### 2.1-INITIAL SETUP

#### 1. Network Configuration

- Connect RV1106 to network via Ethernet cable
- SSH into RV1106 using root@[IP Address], password: luckfox
- Start flask code using: python3 psu.py
- Access web interface: [http://\[IP\]](http://[IP])

### 2.2-LED STATUS INDICATORS

LED Color	Status
Green	Channel ON - Normal
Red	Channel OFF
Blinking White	Startup/Transition

### 2.3-SAFETY PROCEDURES

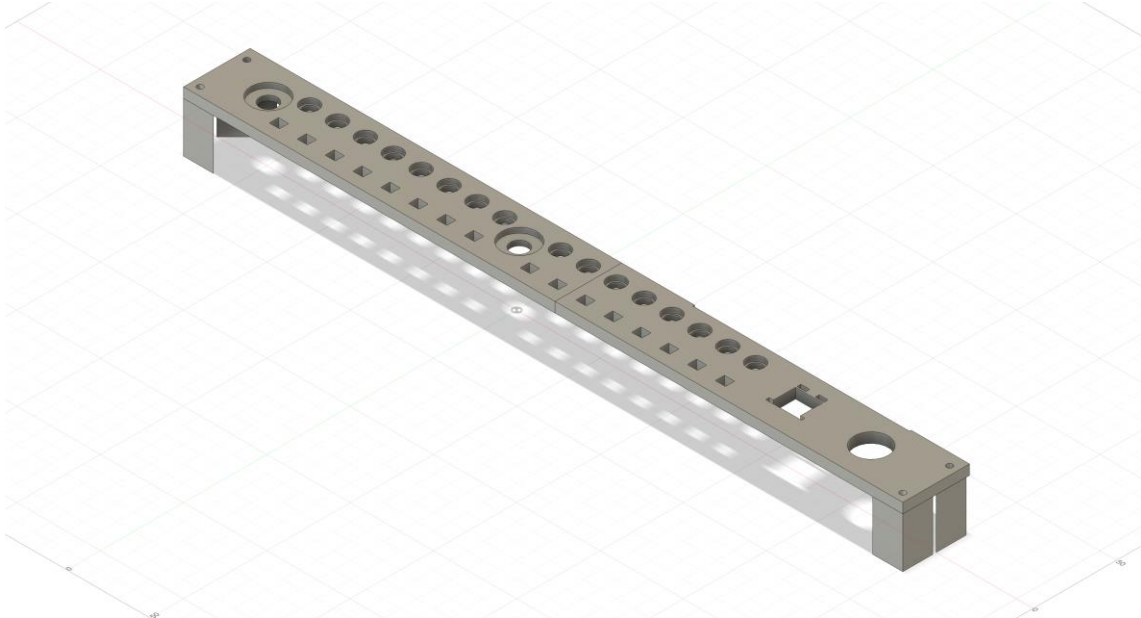
1. Always disconnect power before servicing
2. Ensure proper grounding
3. Do not exceed rated loads



### 3.2-FUSION 360 MODELS

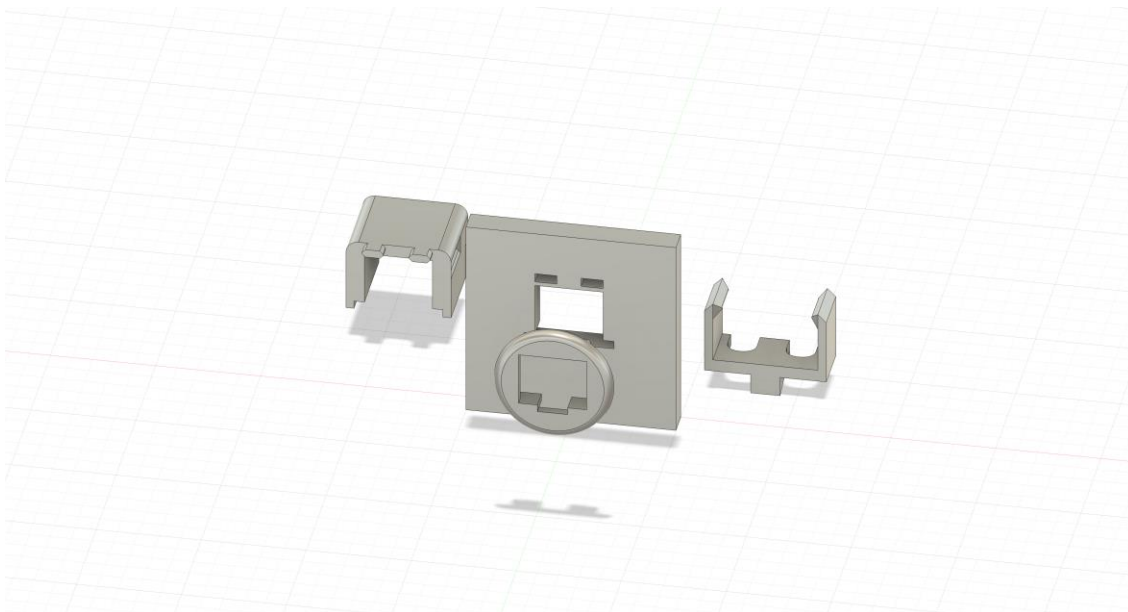
#### CUSTOM FRONT PLATE:

##### NOTES:



- Material: Hard Acrylic Plastic
- Insets for the circuit breakers and DC ported
- The corner pieces are connected using 3mm heat inserts
- LED's and DC Jacks have 16.731mm spacing

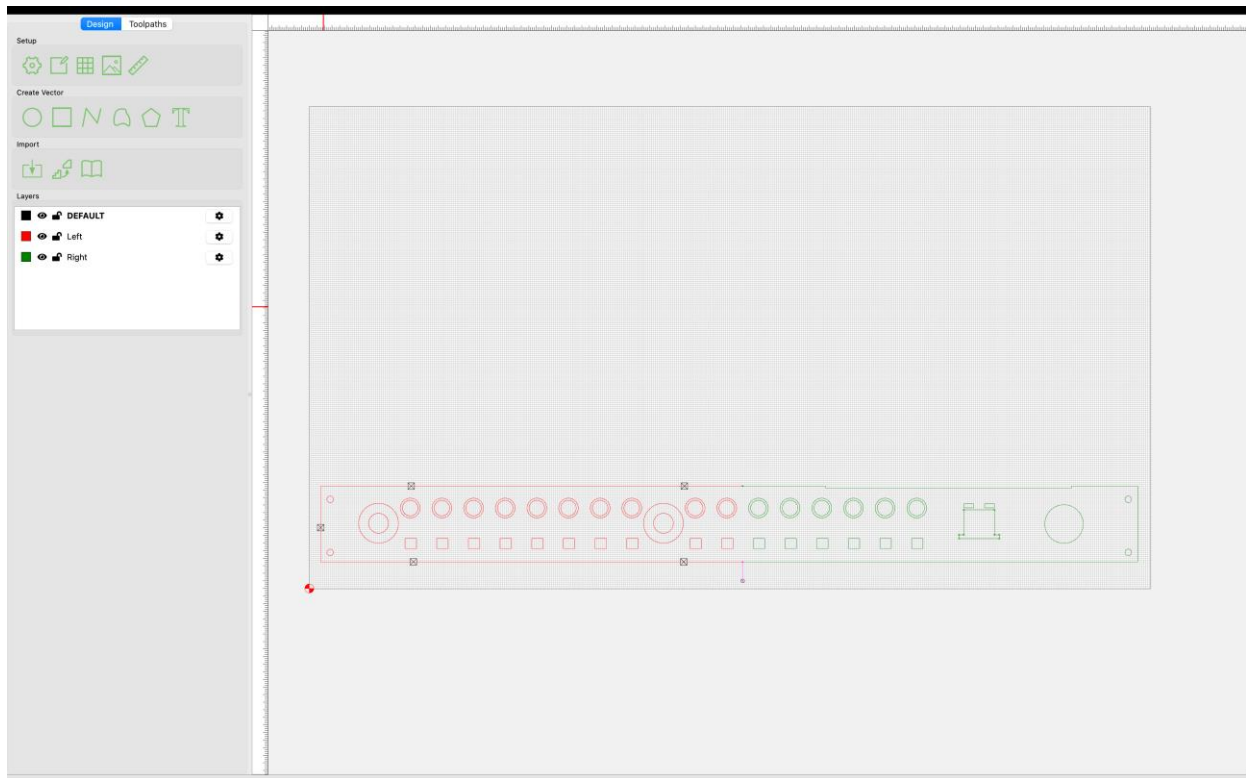
#### CUSTOM SNAP-FIT ETHERNET HOLDER:



## NOTES:

- 3 components: Top Holder, Bottom Holder, and Cover Plate
- Top and bottom holders are snap-fit

## 3.3-CNC TOOLPATH



## NOTES:

- Two toolpaths to slide board over and print
- Dimensions:
  - o Width: 444.500 mm
  - o Height: 254.000 mm
  - o Thickness: 6.100 mm

## SOFTWARE ARCHITECTURE

### 4.1-SYSTEM LOGIC FLOW

[Web UI Remote Control]



[Flask Web Server on RV1106]



[Relay Control Logic]



[Serial Command to Arduino]



[LED Status Update]

### 4.2-WEB INTERFACE FEATURES

Individual channel ON/OFF control

Status monitoring dashboard

Bulk Controls:

- ALL ON/OFF: Turns on/off all 16 outputs simultaneously
- Emergency Stop: Immediately cuts power to all outputs
- Test Sequence: Cycles through all outputs for testing

### 4.3-COMMUNICATION PROTOCOL

1. Web Browser ↔ Flask Server (HTTP/REST API)

Protocol: HTTP REST API over port 80

2. Flask Server ↔ Arduino (Serial UART)

Interface: UART1 (/dev/ttyS1)

Baud Rate: 9600 bps

Protocol: Simple character-based commands