RGB Matrix Screen

Project Overview

Safety warning

Some procedures require the use of power tools, such as a high-speed circular cutting device and power drill. Use of these tools can present a safety hazard to eyes, ears and hands! Cutting and drilling with metal can and will produce sparks and smoke.

The following safety rules are non-negotiable and must be followed!

- Use of all power tools must be performed outdoors on cement
- Use of power tools must only be performed by qualified personnel
- Required safety gear:
  - Impact resistant safety glasses
  - Hearing protection
  - Cut-resistant leather gloves
  - Closed toe footwear
  - Long-sleeve shirt
  - Pants

Safety iconography

Adhere to all safety procedures

Impact resistant eye protection required

Cut-resistant leather gloves required

Hearing protection required

High-level goals

- Invest in culture by building something cool and complex
- Create learning opportunities for IoT, low-level electronics and C++
- In each major office, construct a screen comprised of RGB Matrices driven by our software
- Share our project & learnings w/ the world via social media platforms, blog posts & youtube videos
- Demonstrate IoT & electronic building capabilities to the market
- Create an opportunity to integrate cloud-based slack bot with our RGB Screen (stretch goal)

High level operation

The screen operates by receiving information from a “controller” device.

Communication is facilitated via TCP/IP on a physical LAN.

The controller generates and sends display information in “frames”.

Multiple frames comprise of an animated picture.

A controller can be any Linux or mac running our software.

How the screen works

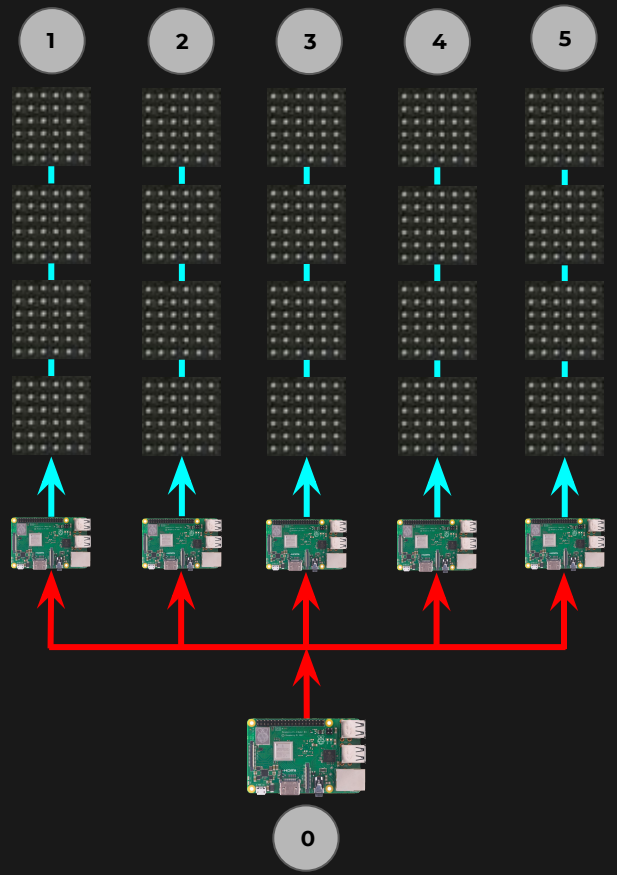
Screen divided by 5 vertical segments with no synchronization.

Each segment is comprised of four RGB Matrices and is driven by a Raspberry pi.

Controller feeds each Pi segment its video data.

If no data is present within ~50 ms, each segment will go black.

Segment controllers are “dumb”. E.g. If multiple controllers feed segment information, they’ll flip/flop display what they received, alternating between “frames” of data.



Raspberry Pi Power Solution

Each Raspberry Pi requires a steady 5V 2.4A power supply. For this, we use an Anker power port device.

Only cables (USB-A to Micro USB) that are properly rated for 2.4A can be used.

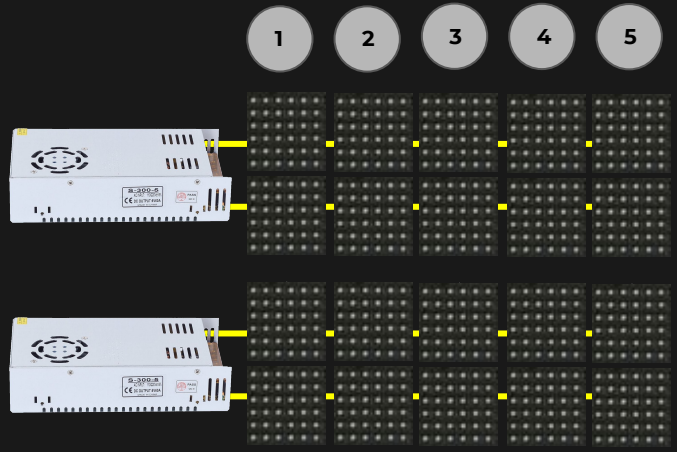
2.4 Amps is enough to power the Pi, it's daughter board and the dual fan cooling solution.

Powering RGB Matrices

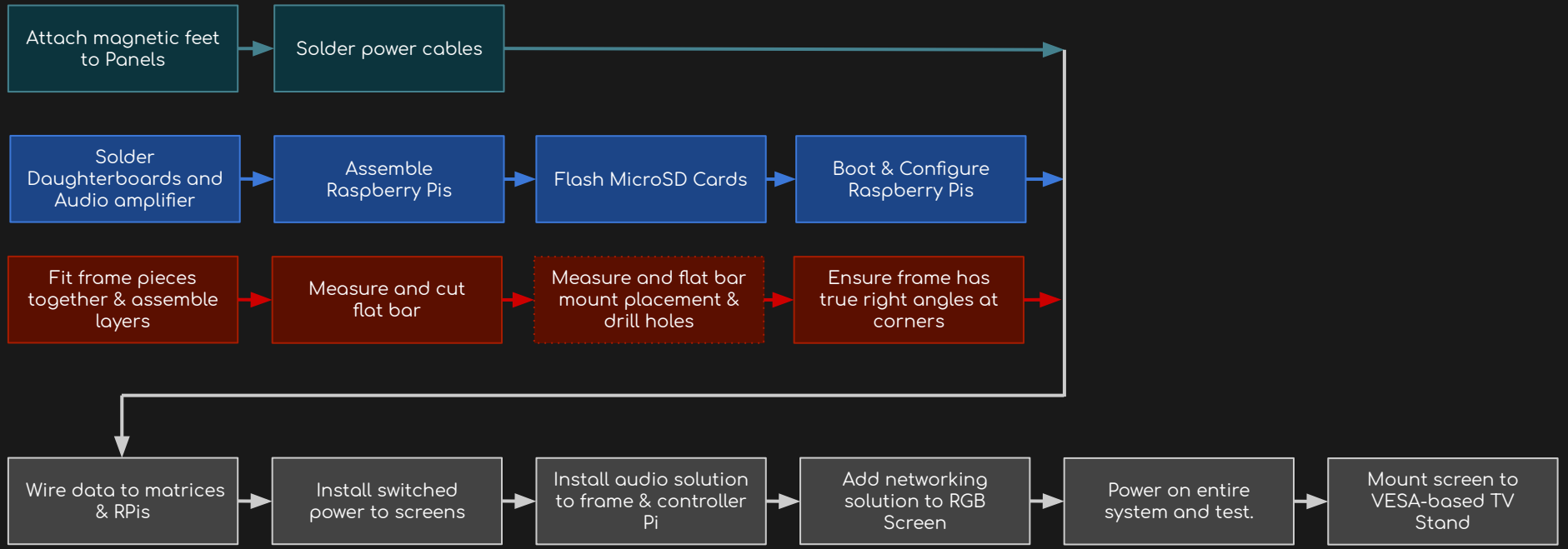
Each Matrix requires a steady 5V to run properly.

2 x 60A 110V - 220V AC power supplies will be used to ensure clean power is provided.

Each power supply is connected to two rows of 5 RGB Matrices.



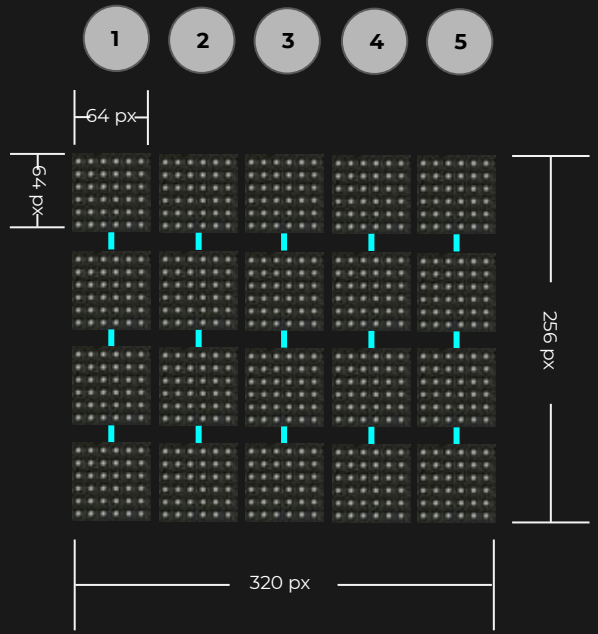
Overall assembly process



Screen specs (logical)

Logical dimensions:

- RGB Matrix panel :
  - 64w x 64h
  - 4,096 pixels
- Segment :
  - 64w x 256h
  - 16,384 pixels
- Screen :
  - 320w x 256h
  - 81,920 pixels



Screen specs (physical)

Physical dimensions:

- RGB Matrix panel :
  - 192mm x 192mm
- RGB Matrices (assembled) :
  - 960mm x 768mm
- Frame (front) :
  - 1000mm x 808mm
- Frame (side) :
  - 80mm x 808mm