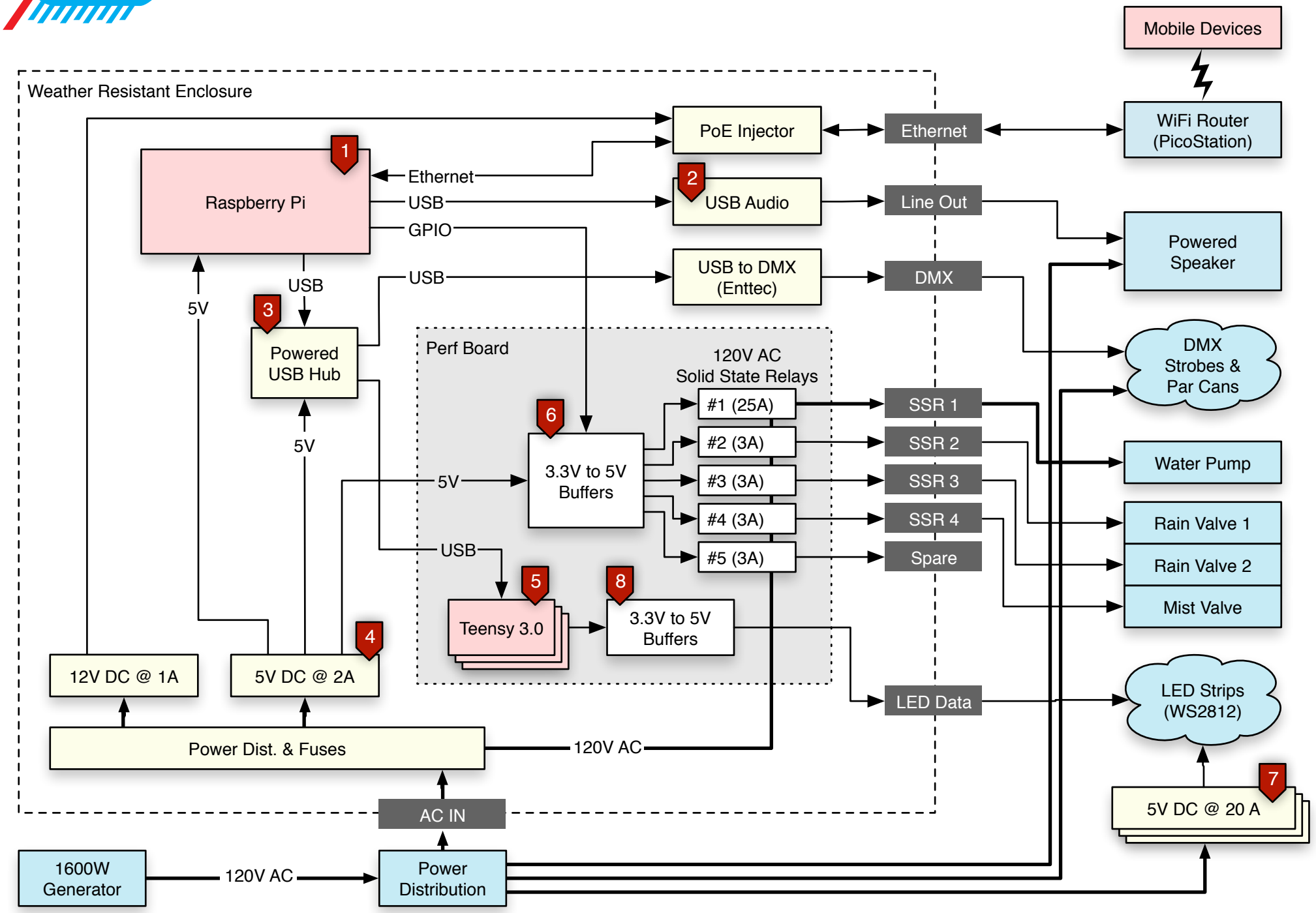
Cloud Electrical System Overview



Cloud Electrical System Notes

1. The Raspberry Pi single-board computer runs our custom control software, orchestrating light and sound performances.

2. An external USB sound adapter provides higher quality audio than the Raspberry Pi's built-in D/A converter.

3. The Pi only has two built-in USB ports. One of these is connected directly to the USB audio interface, to avoid bottlenecks due to Isochronous USB streaming via hubs. The other two peripherals are less demanding of the USB protocol, so they connect via a hub.

   The hub is externally powered, so that we can route less power through the Raspberry Pi's 750mA main fuse.

4. The low-current 5V power supply only runs the Raspberry Pi, USB devices, Teensy micro-controllers, and the low-voltage side of the Solid State Relay circuit.

5. The Teensy 3.0 is a tiny ARM board which can interface with the LED strips, and handle repetitive real-time tasks. Multiple Teensy boards are used, depending on the number of LEDs we have.

6. Level-shifting buffers convert the low-current 3.3V signals from the Raspberry Pi's GPIO port into slightly higher current 5V signals suitable for driving the solid state relays. They also provide a layer of protection for the Pi's GPIO port.

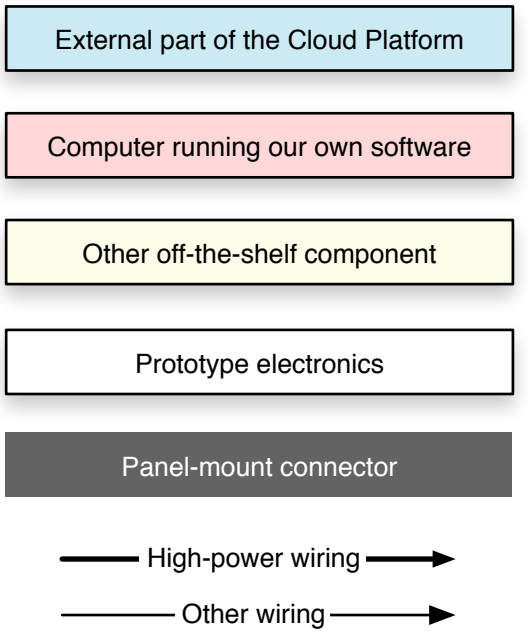
7. The LED strips are powered by multiple waterproof 100W 5V supplies, according to the number of LEDs we plan to support.

8. Level-shifting buffers are used to level-shift the WS2811 serial signals from 3.3V to 5V and to protect Teensy pins. Outputs should have ~100 ohms impedance for driving transmission lines.

Goals

- Keep it simple
- Use parts we already have on hand
- High quality audio
- High quality and nuanced LED animation
- Fault isolation and safety precautions

Legend



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