# jamboard 1 *

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Fig. 1 shows what the OSH Park (OSHP) board looks like. OSHP provides three boards. Expect some things to not work right. This is *version 1* of the board. Kluge it together as best as possible. Keep notes on what needs to be changed.

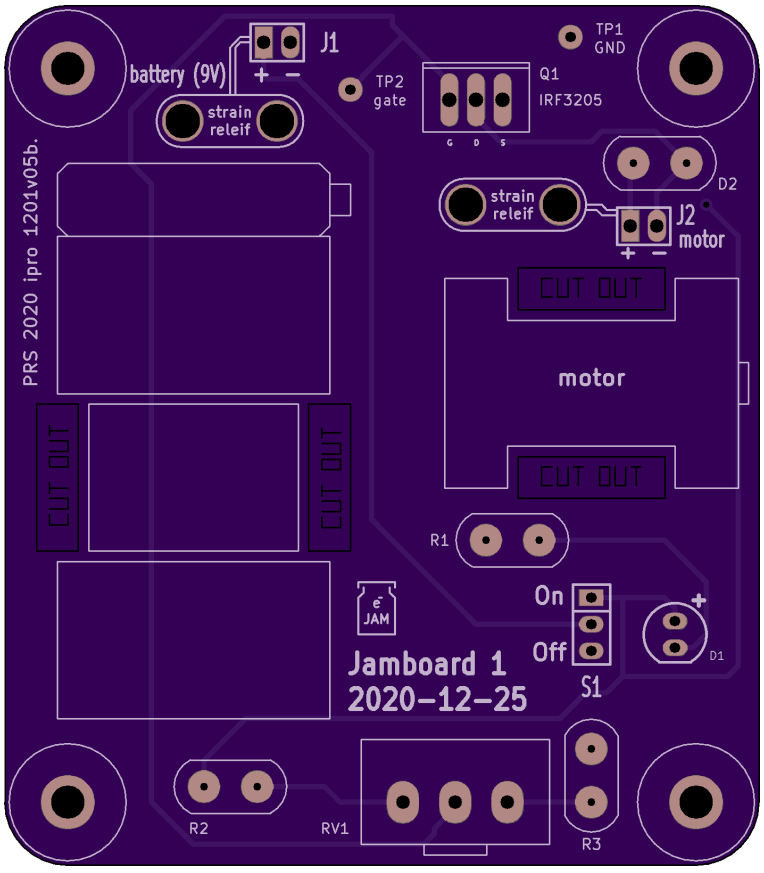


Figure 1: OSH Park - front.

*prs 2020 ipro 1201v05b. This reference code will allow me to find information for this project in the future.

# 1 Schematic.

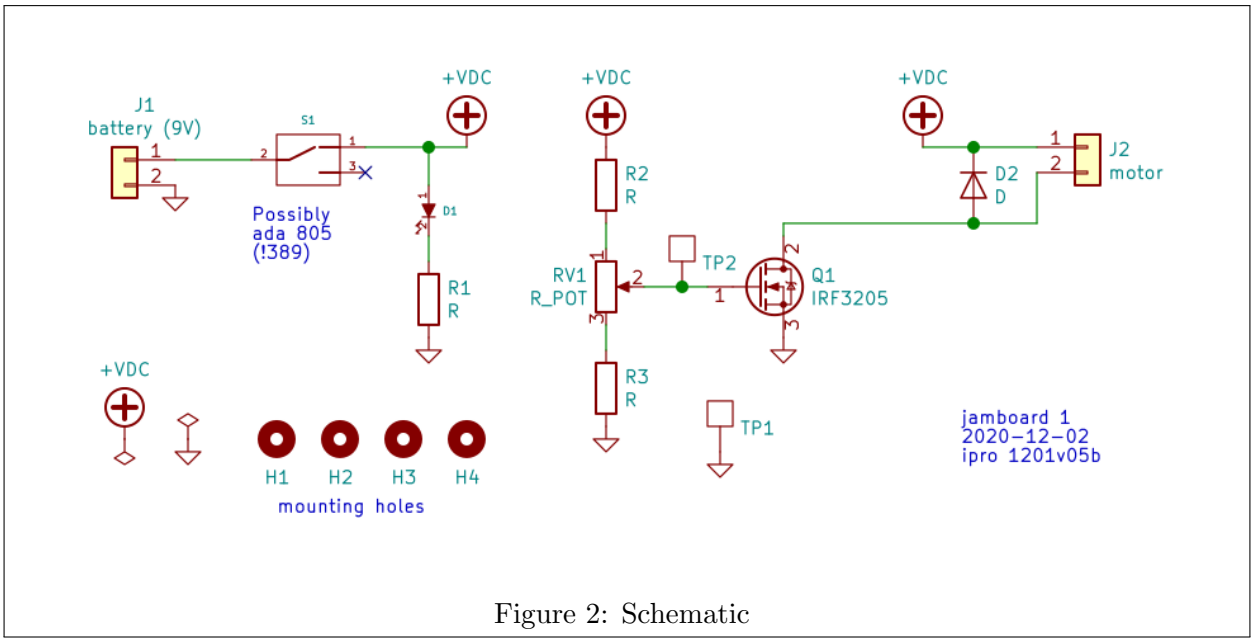


Figure 2: Schematic

## 2 Building the first board.

OSH Park (OSHP) provides three boards. For building the first board, keep it simple. In Fig. 3, ignore the grayed out areas and solder short wires ("jumpers") across the pads marked in red.

Then you will be left with these components to solder on:

- **J1.** The wires that go to the battery.
- **Q1.** The MOSFET.
- **D2.** A diode (more on that later).
- **J2.** The wires going to the motor.
- **RV1.** The potentiometer.

**Strain relief - wires to battery and motor.** Before soldering the wires onto the board pass them through the strain relief holes. This allows wires under motion to bend where they enter the strain relief holes rather than at the solder joint. [1]

**D2 diode.** [2] Solder a diode at **D2**. The two holes are close together, so solder it up-and-down. I forgot to put a mark on the PCB for the diode orientation. Diodes have a band at one end the marks the cathode. In our case, we want the cathode on the (+) side of circuit. So you want the banded side of the diode soldered into the **D2** pad closest to the **J2** (+) pad.

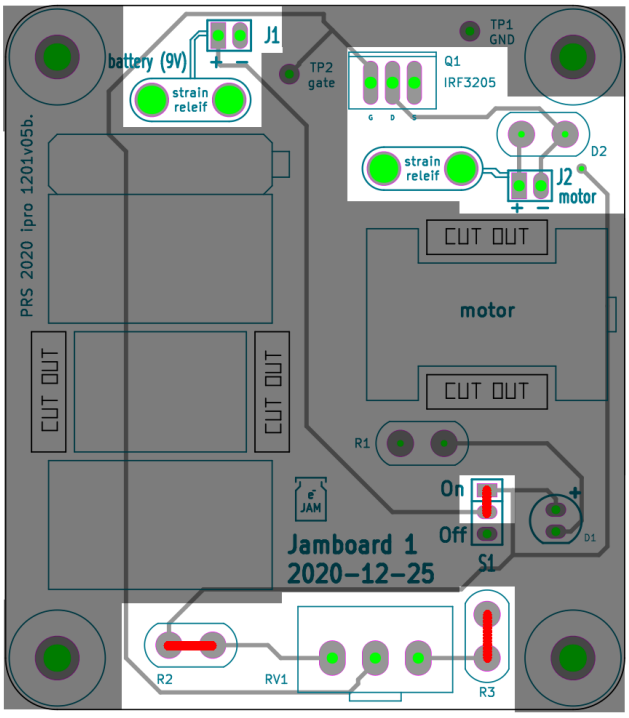


Figure 3: Gerbv layout, front, first build.

## 3 Subsequent builds.

The PCB was designed to provide options. Not everything on the PCB is meant to be used in every build.

**Mounting options.** The four mounting holes at the corners will fit #4 sized screws. Both the battery and the motor can be mounted directly to the PCB with some double sided foam tape and velcro straps. Permanent tape will work for the motor. Removable tape is best for the battery since it will need to be recharged.

**Electrical options.** **S1** provides a place for on-off switch. The pads have a 0.1 inch spacing (same as breadboards). Once the best range of potentiometer values have been determined, resistors can be placed at **R2** and **R3** so that a lower resistance potentiometer can be used. This will provide finer control. An LED can be placed at **D1** with its associated current limiting resistor at **R3**. This will give a power on-off indicator light. The pads are for a 3 mm LED. Finally, there are two testpoints provided, **TP1** and **TP2**. These allow monitoring the voltage on the gate using a multimeter or oscilloscope, which may be interesting. Soldering in the test point loops or simply short wires will provide a place for alligator clips to grab.

## 4 Sources for some of the parts provided.

| Ref. | type | manufacturer | manuf. No. | supplier | sup. No. |
|---|---|---|---|---|---|
| **D2** | diode | Comchip Technology | 1N4007-G | DigiKey | 641-1312-1-ND |
| **S1** | switch | ? | ? | Adafruit | 805 |
| **TP1**, **TP2** | test point | Keystone Electronics | 5001 | DigiKey | 36-5001-ND |

# Endnotes

[1] **Strain releif.** Solid wires are used to hook up different parts of a board. They are the best. Stranded wires are flexible and so are used to hook up the board to switches and dial on enclosure walls. They need to be flexible during building but after that they don't move. Sometimes it is necessary to hook up wires from a board and to a part that will move often. Where a stranded wire is soldered to anything, it will be stiff on the side with solder and flexible on the other side. Whenever the wire is moved, this place where the wire changes from soldered to un-soldered weakens greatly. It will break. Soon. The solution is to provide a for of *strain relief*.

[2] **Diode** I haven't done work with motors in super long. But one thing I came across while looking up stuff for this circuit was that a stopping motor creates a voltage surge which can damage circuits components. I'm not sure if this is the type of circuit that can be damaged but just in case... A diode can be used to prevent the voltage from getting to high. When used in this way, it's called a flyback diode. A stopping motor will create a high positive voltage on the motor's (-) terminal. A diode conducts when voltage is higher on the anode than on the cathode. To protect our components, we want the diode to conduct only when voltage increases on the (-) side. This will allow the current to flow through the diode instead of causing a voltage increase that will damage components. So we want the cathode connected to the (+) side in our circuit. The diode I sent has ratings of 1 kV and 1 A. That seems pretty large and should hold up to any surge the motor creates.