

### Interface Definitions

| Interface Name          | Interface Type             | Specifics                                                                                                                                                                                                                                                                       |
|-------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| envin_sensors           | Environment Input          | Color sensor-> black vs white @ <4cm and varying light levels<br>Distance Sensor-> presence of 10cm sq block reliably at .5m 30 deg forward cone                                                                                                                                |
| envin_enclosure         | Environment Input          | Length <= 10cm<br>Width <= 10 cm                                                                                                                                                                                                                                                |
| controller_bt_usrin_rf  | User Input, Wireless Comm. | Bluetooth Ver2.1+EDR<br>Baud rate = 9600 bps                                                                                                                                                                                                                                    |
| bt_processing_dsig      | Digital Signal             | Button codes: 300-320<br>Button values: 0 or 1<br>Analog codes: 0-4<br>Analog values: 0-255                                                                                                                                                                                     |
| sensors_processing_asig | Analog Signal              | Color Sensor Output:<br>1 PWM freq pin (sq wave)(0 or 1)<br>Color Sensor Input<br>2 freq scaling pins (0 or 1)<br>2 RGB color select pins (0 or 1)<br><br>Distance sensor Output:<br>TTL Pulse (high pulse)(0 or 1)<br>Distance Sensor Input:<br>1 high pulse trig pin (0 or 1) |
| pwr_sensors_dcpwr       | DC Power                   | Color Sensor: 5v DC<br>Distance Sensor: 5v DC                                                                                                                                                                                                                                   |
| pwr_processing_dcpwr    | DC Power                   | Pi Zero Input $V_{nominal} = 5V$<br>Pi Zero Input $I_{nominal} = 1A$                                                                                                                                                                                                            |
| pwr_led_usrout          | User Output                | Input Voltage = 12v; 10LED's<br>Input Voltage = 10v; 5LED's<br>Input Voltage = 8v; 1LED                                                                                                                                                                                         |
| pwr_out_dcpwr           | DC Power                   | Output = 12v<br>PowerTime = >15min                                                                                                                                                                                                                                              |
| code_processing_code    | Data                       | Python Language<br>Stored locally                                                                                                                                                                                                                                               |

|                        |                    |                                                                                                                                                                                                              |
|------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                    | Size = less than 16kB                                                                                                                                                                                        |
| processing_driver_asig | Analog Signal      | Driver Input Voltage Low = $0 \leq V_{in} \leq 1.5V$<br>Driver Input Voltage High = $2.3V \leq V_{in} \leq V_{ss}$<br>$V_{ss}$ = Logic Supply Voltage = 7V (max)<br>Driver Output Voltage to Processing = 5V |
| pwr_driver_dcpwr       | DC Power           | InputV Range = 3.2V - 12V<br>Operating Current = 0 - 36mA                                                                                                                                                    |
| driver_motors_asig     | Analog Signal      | Driver Output $V_{max} = 12V$<br>Motor Input $V_{min} = 3V$<br>Motor Input $V_{nominal} = 6V$<br>Motor Input $V_{max} = 9V$                                                                                  |
| motors_envout          | Environment Output | RPM @ 7V = 62.5<br>Time to travel 100 cm @ 7V = 4.36 seconds                                                                                                                                                 |
| battery_pwr_dcpwr      | DC Power           | 8 AA batteries<br>Voltage = 12V (1.5V per battery)                                                                                                                                                           |
| sensor_data_out        | Analog Signal      | 0/1 equivalent data for whether a sensor value is being acted upon                                                                                                                                           |