







Electronics Assembly and User Guide

1. Parts List

Each team will be given the following electronics kit:

Part	Image	Quantity	Description
Power Board		1	Regulates power to electronics, motors and servos. Home to radio module, power connectors and data cables.
Slug		1	Houses the main processor. USB ports for Memory and Webcam. Connects to power board using ribbon cable
PWM Board		1	This board controls the main drive motors
Joint IO Board		1	Digital/analogue inputs (bump/position sensors) connect to this board.
Servo Controller		1	Servos connect to this board
Data Cables		6	These are used to connect PWM, Joint IO and Servo Controller boards to the Power Board.
USB Memory Stick	-	1	Stores Program code and operating system

Web Camera	-	1	Provides input to vision system
PCB Standoffs	-	~	Bag of metal standoffs with screws to securely mount boards to robot
Power Connectors	-	~	Insulated connectors for making connections to the terminals on the Power Board
Batter Charger	-	1	Mains powered battery charger.
Electrical Wire	-	~	Many coloured lengths of insulated electrical wire

Table 1.1 – List of electronic modules and kit supplied

2. Basic Configuration

2.1 Connections to Power Board.

The (black) data cables are used to connect the Power Board to the Servo Controller, PWM Board and the Joint IO Board. Connect each board in turn to one of the four available sockets on the Power Board. The order does not matter.

Next, connect the Slug to the Power Board using the coloured ribbon cable. The socket is located at the centre of the Power Board. Be sure to line up the connector carefully, since it can only fit in one orientation.

Now insert the (orange) USB Memory Stick into one of the spare sockets on the Slug, followed by the Webcam in the remaining socket.

2.2 Power Connections

Using the Power Connectors and Electrical Wire supplied, make the following connections (see Figure 2.11):

Connect LGP1 to LGP2. You may wish to use one of the switches provided so that power to the electronics can easily be turned on and off.

Connect the positive terminal of the battery to BAT+. Connect the negative terminal of the battery to one of the GND terminals on the Power Board.

To allow power to reach the motors, and to charge up the battery, connect CGCOM to CHRG. To stop powering the motors and charging the battery connect CGCOM to CG-RN, (this may be useful when you want to quickly disable the motors). You may want to use one of the switches provided to quickly turn the motors on/off.

Connect SERV+ on the Power Board to the ***** on the Servo Controller Board. Connect GND on the Power Board to ***** on the Servo Controller Board. This provides power to the servos.

Connect MOT+ on the Power Board to the ***** on the PWM Board. Connect GND on the Power Board to ***** on the PWM Board. This provides power to the motors.

Finally, having made the above connections, insert the lead from the battery charger into the socket on the Power Board.

2.3 Safety

Always remove the power supply before adjusting ANY wiring.

Stick to a colour convention for wiring. For example use Red for all positive connections and Black for connections to ground. This should help prevent accidentally shorting the battery and potentially damaging the electronics

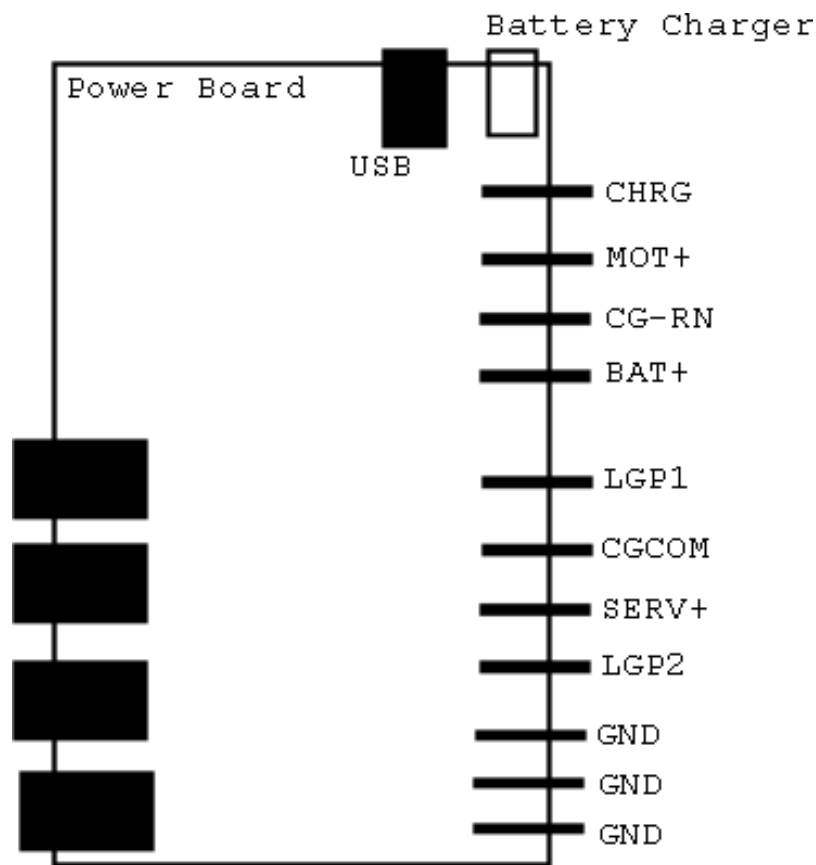


Figure 2.11 – Power Board Connections

3. Joint IO Board – Analogue/Digital Inputs and outputs

The Joint IO Board provides 8 Analogue or Digital inputs and 4 digital outputs. The Inputs are numbered in ascending order from left to right in the diagram. To connect digital devices such as bump sensors (push switches), use the wire supplied to connect the terminals of the switch as show in Figure 3.1, with one to positive supply, and the other to one of the inputs.

Analogue inputs are connected in a similar way, illustrated in Figure 3.1 by the variable resistor which could be used to measure the position of an arm.

Finally, digital outputs such as LEDs can be connected to the Joint IO as illustrated in Figure 3.1. Note that it is necessary to place a resistor in series with the LED to reduce the current.

3.1 Safety

Do not connect servos or motors directly to the Joint IO board because the large currents will damage the board. Instead, speak to your mentors/teachers about using a relay to switch the motor on and off.

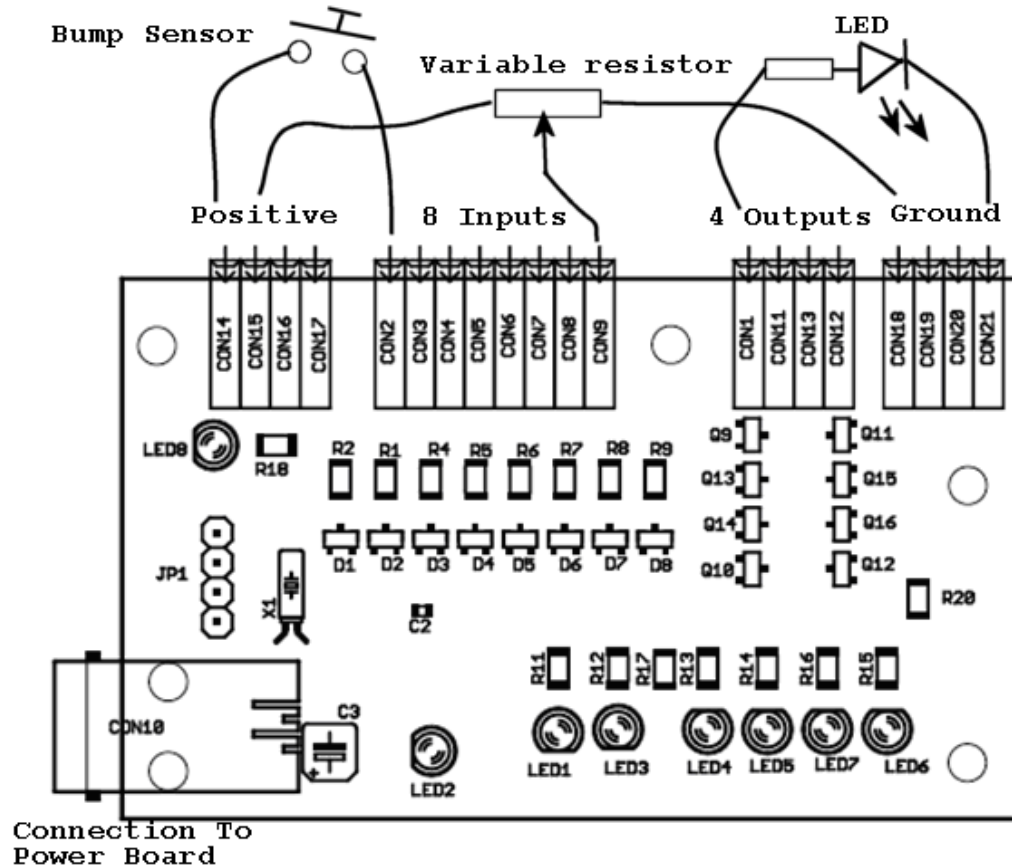


Figure 3.1 – Overview of Joint IO Board with bump sensor, variable resistor and LED connected

4. Connecting Motors

The PWM board can control (with variable speed) two DC motors. The positive and negative leads from the motor should be screwed into the green terminal blocks on the PWM board. It is recommended that you connect the two drive motors to the Motor Controller Board. Any additional motors used for purposes other than propulsion should be connected directly to the battery, perhaps using a relay controlled by an output on the Joint IO Board.

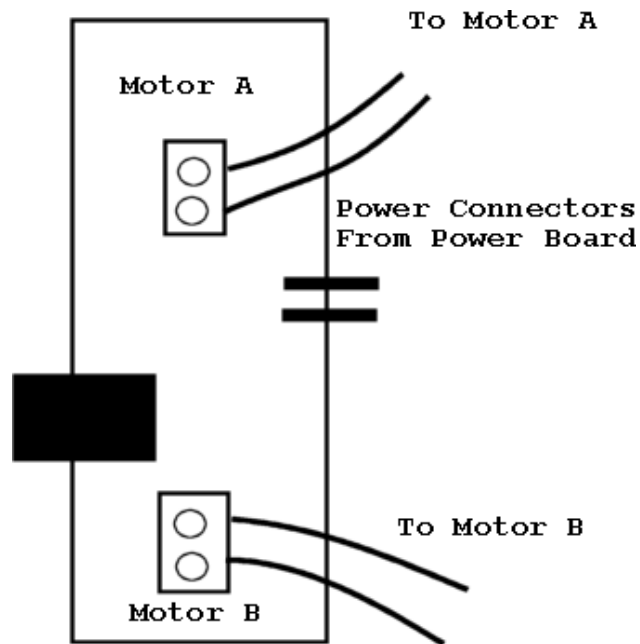


Figure 4.1 – Overview of Motor Controller Board

5. Connecting Servos

There is provision for up to eight servos to be added to the Servo Controller board. You should connect the servo to the board using the standard connector which comes with most servos.
 *****polarity?! +diagram