Robotathon Workshop #1

Kit of Parts and Basic Electronics Assembly

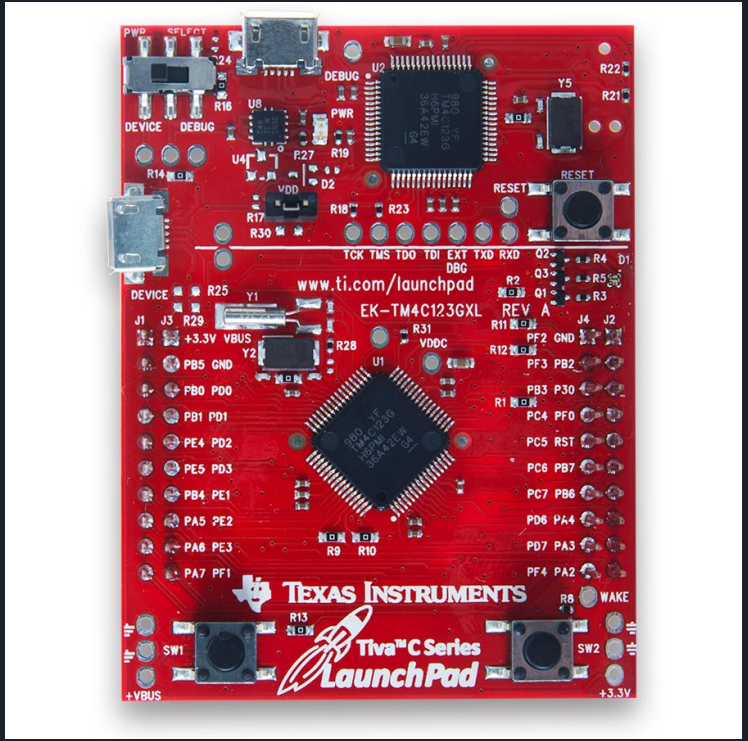
Dues and kit distribution

- You can pay **dues**:
  - At the end of each workshop
  - After a RAS general meeting
- When you can use kits:
  - Office hours (makerspace robotics room, 4-8ish weekdays)
  - Workshops
  - Other times only if everyone has
    - Paid dues
    - Unanimously consents to kit check-out
- **Checkpoints:**
  - Due by 11:59 PM the day of the following workshop

The brains

TM4C123G/LM4F110 LaunchPad

- Microcontroller
- Controls the bot!
- Needs to be programmed



The braun

Continuous rotation servos (3)

- Not like typical servos: run at the speed you tell them to
- One servo will be a less powerful model
- Can be connected directly to wheels (2)

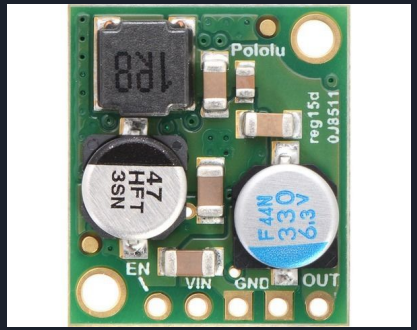
Power

Battery pack

Power Switch

5V Regulator

- Makes sure you are getting a constant 5V

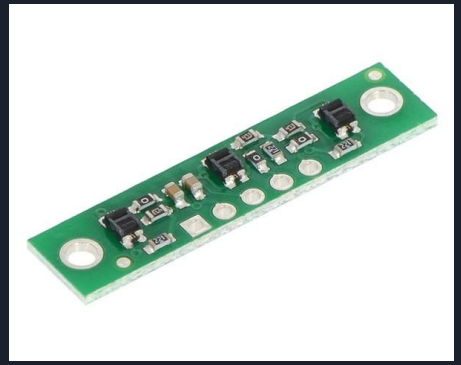


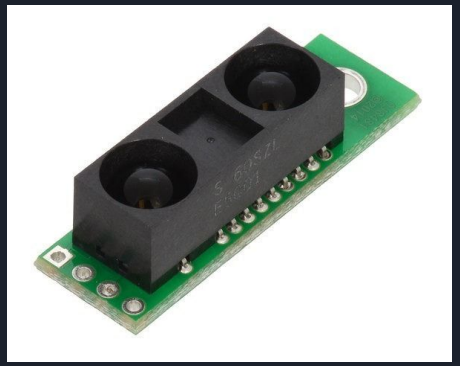
Senors

Line sensor
- IR Reflectance
- Great for sensing lines on contrasting background

IR Distance sensor
- Gives distance to object ahead

Microswitches (2)
- Can detect when you touch something





Misc. Electrical

Breadboard

Headers

- For making things breadboard friendly :)

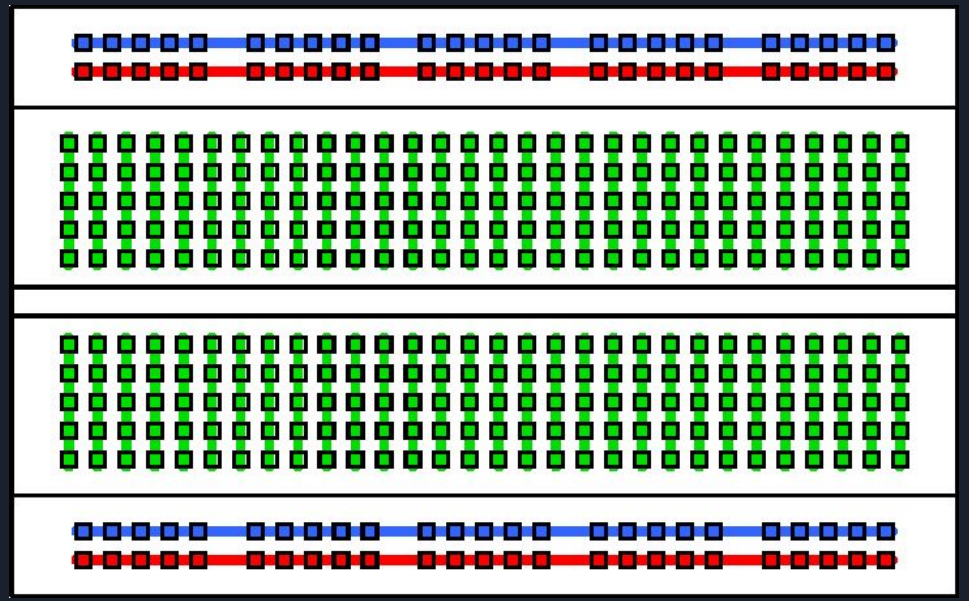
Jumper wires

- For connecting on/to your breadboard

How do I connect all this?

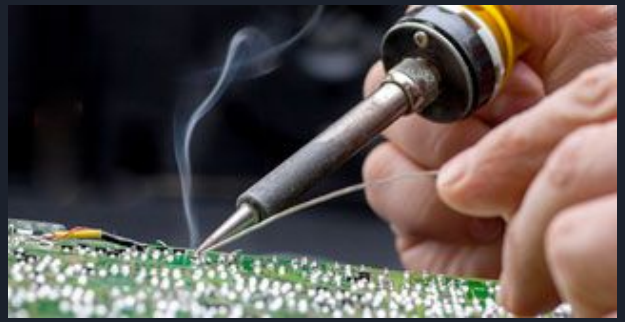
First, the breadboard basics:

The lines show how the tie points on the breadboard are connected underneath

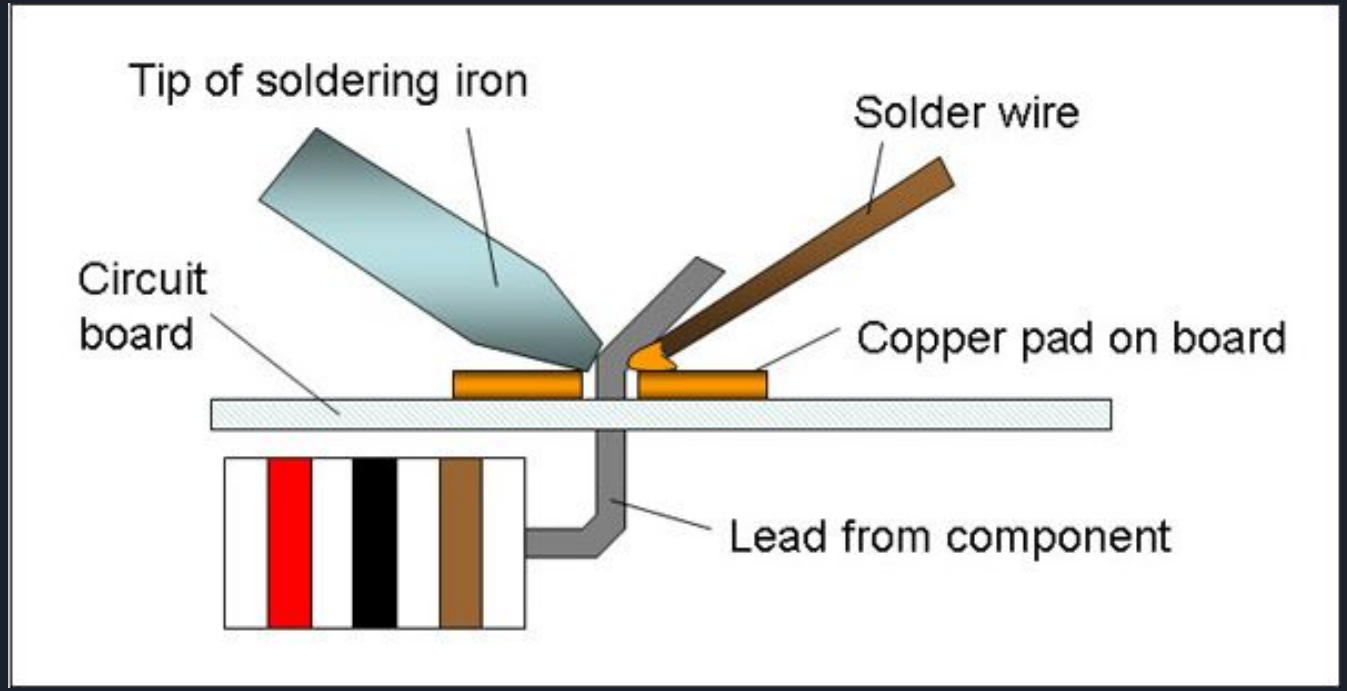


Soldering!

- Making electronic connections with molten metal
- Important things to know:
  - Soldering irons are very hot, over 600°F
    - Tie up hair
    - Secure loose clothing
  - Don't try to catch a hot soldering iron if it slips, let it fall!
  - Wash your hands after soldering
    - Most solder is lead-free
- Each team will need to solder at the very least their 5V regulator's header.
  - You NEED to have a working regulator on your power line or PARTS WILL BLOW UP!
- Need soldering training to solder in the Makerspace

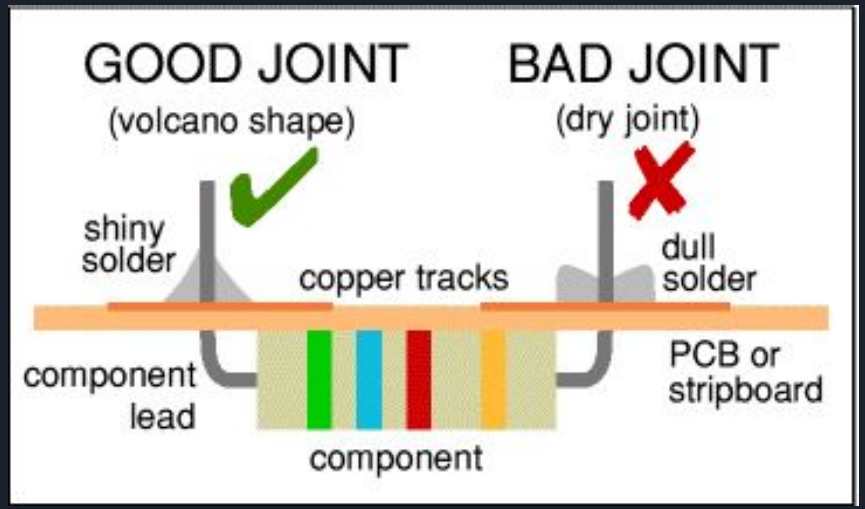


Soldering theory



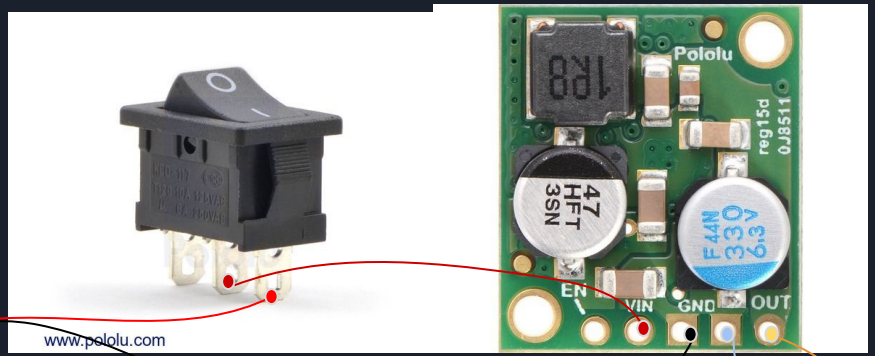
- Tinning the tip, and cleaning

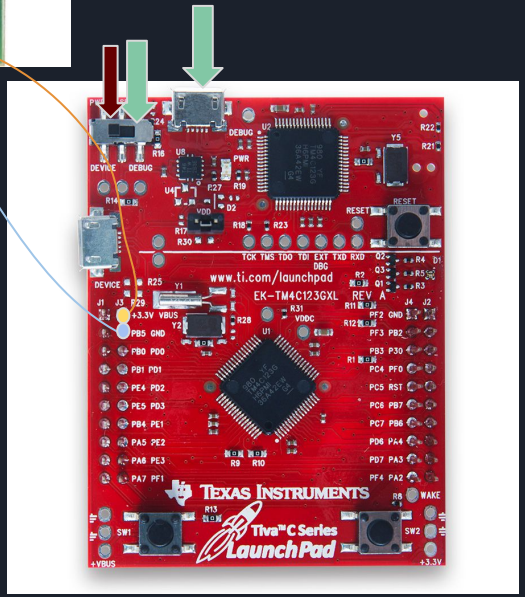
How'd you do?



- Make sure you didn't short anything!
- If you need to unsolder something, ask about how to use wick or a solder sucker
- RAS has a soldering iron in the RAS Office
- Please come to office hours if you need help or access to the soldering iron

What to connect?



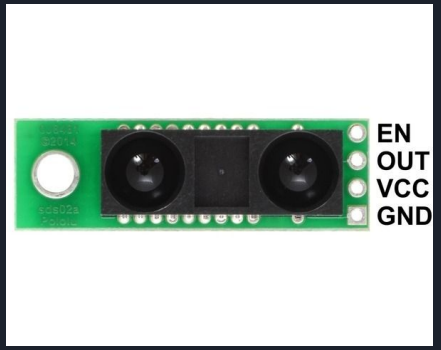


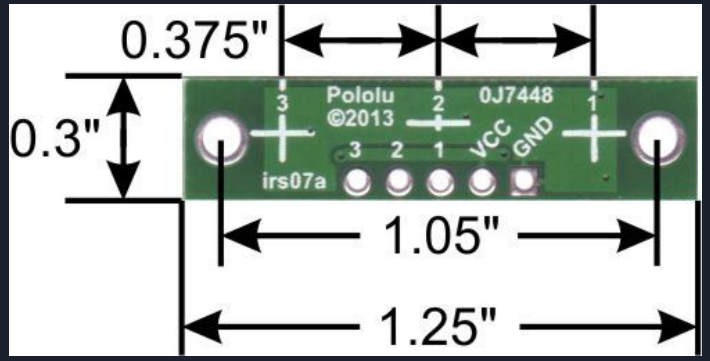
For programming

For running, switches to battery

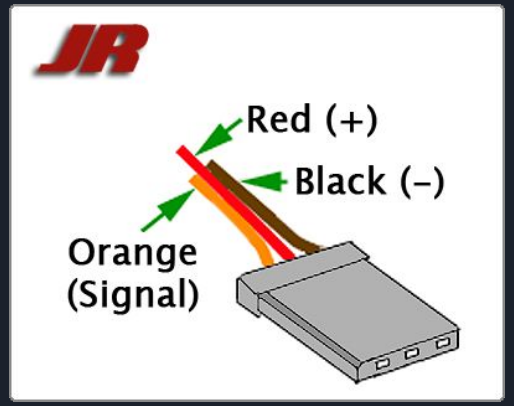
- Enable pin does not need to be connected, it has an internal pull-up resistor
- Use the switch to break V_in to the regulator
- Connect V_out to VBUS on the Launchpad

Sensors, microswitches, and servos



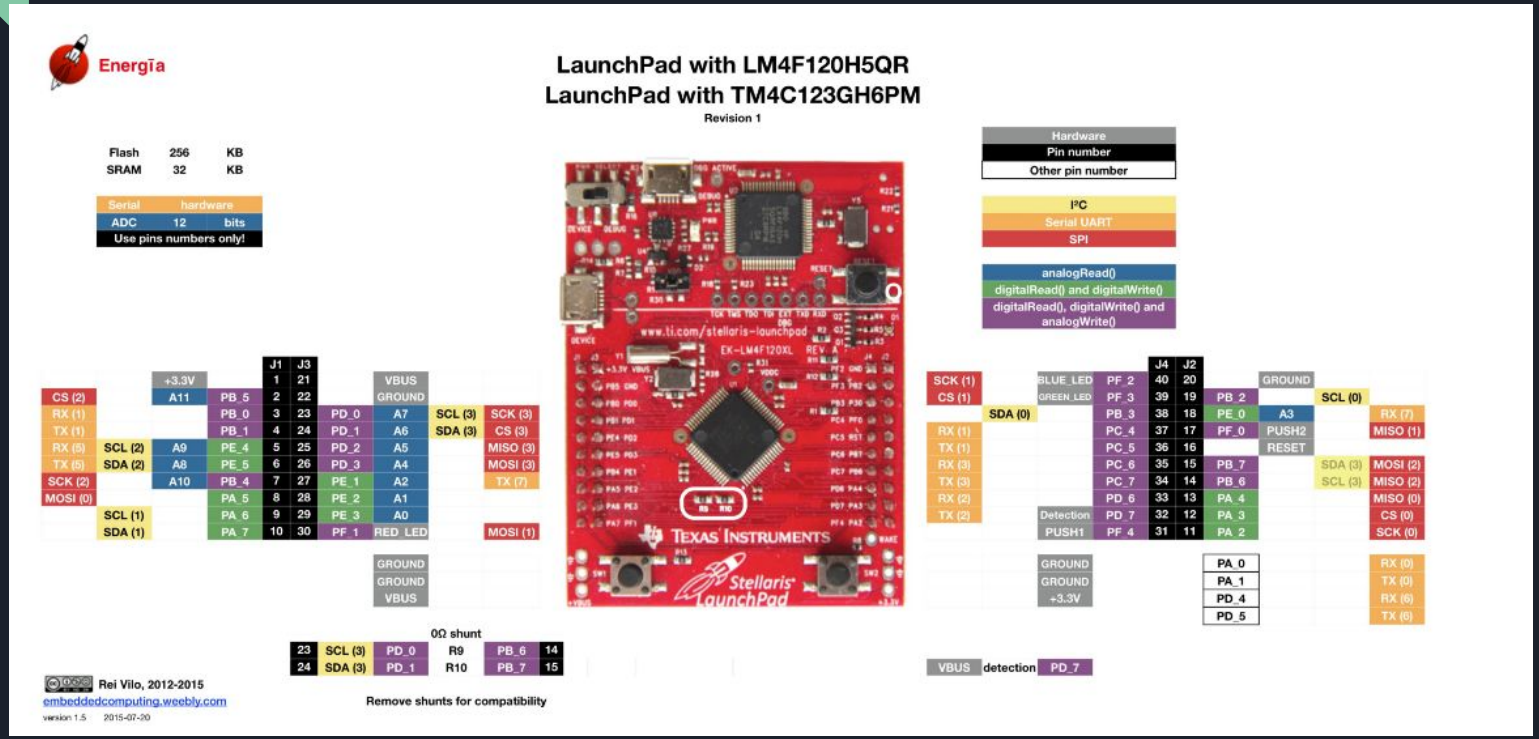


VCC = power (+)
GND = ground (-)
NC = normally connected
NO = normally open
C = connected



servo connections

Launchpad Pinout



Programming and flashing

- Demo!

https://github.com/ut-ras/Rasware - detailed instructions on setting up the programming environment

Your turn!

- Flash your board with some code
  - Blink or a test file
- Get your circuit layed out and soldered
- Battery charging:
  - There are 2 chargers in the makerspace robotics room where office hours are held.
  - Charge batteries during office hours and overnight.