

How to connect the camera to the raspberry pi:

Follow this link: <https://projects.raspberrypi.org/en/projects/getting-started-with-picamera>

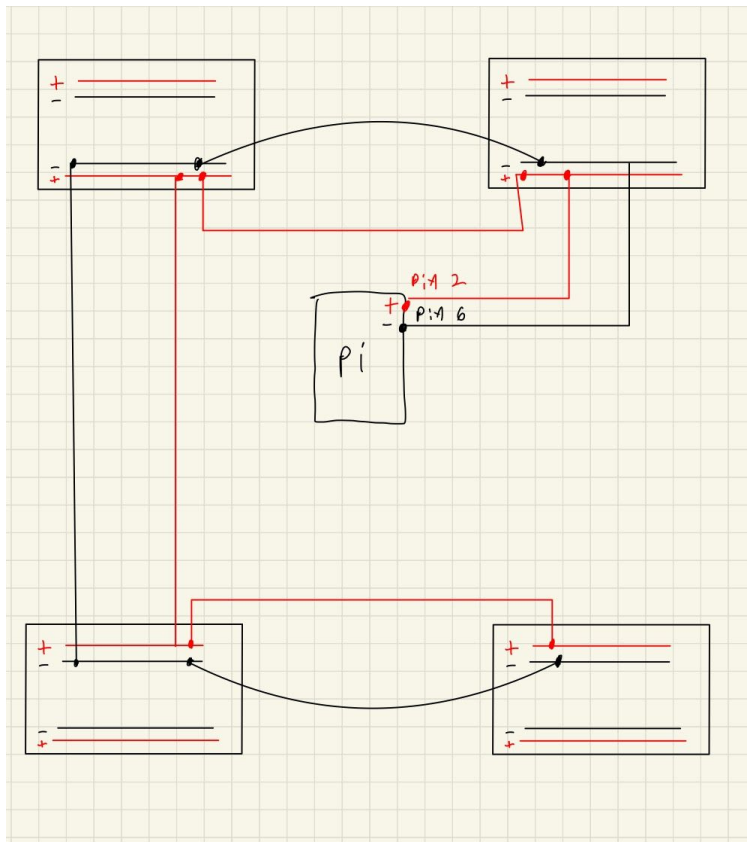
Mount the camera on the rover so it faces the user.

How to connect the ultrasonic sensors:

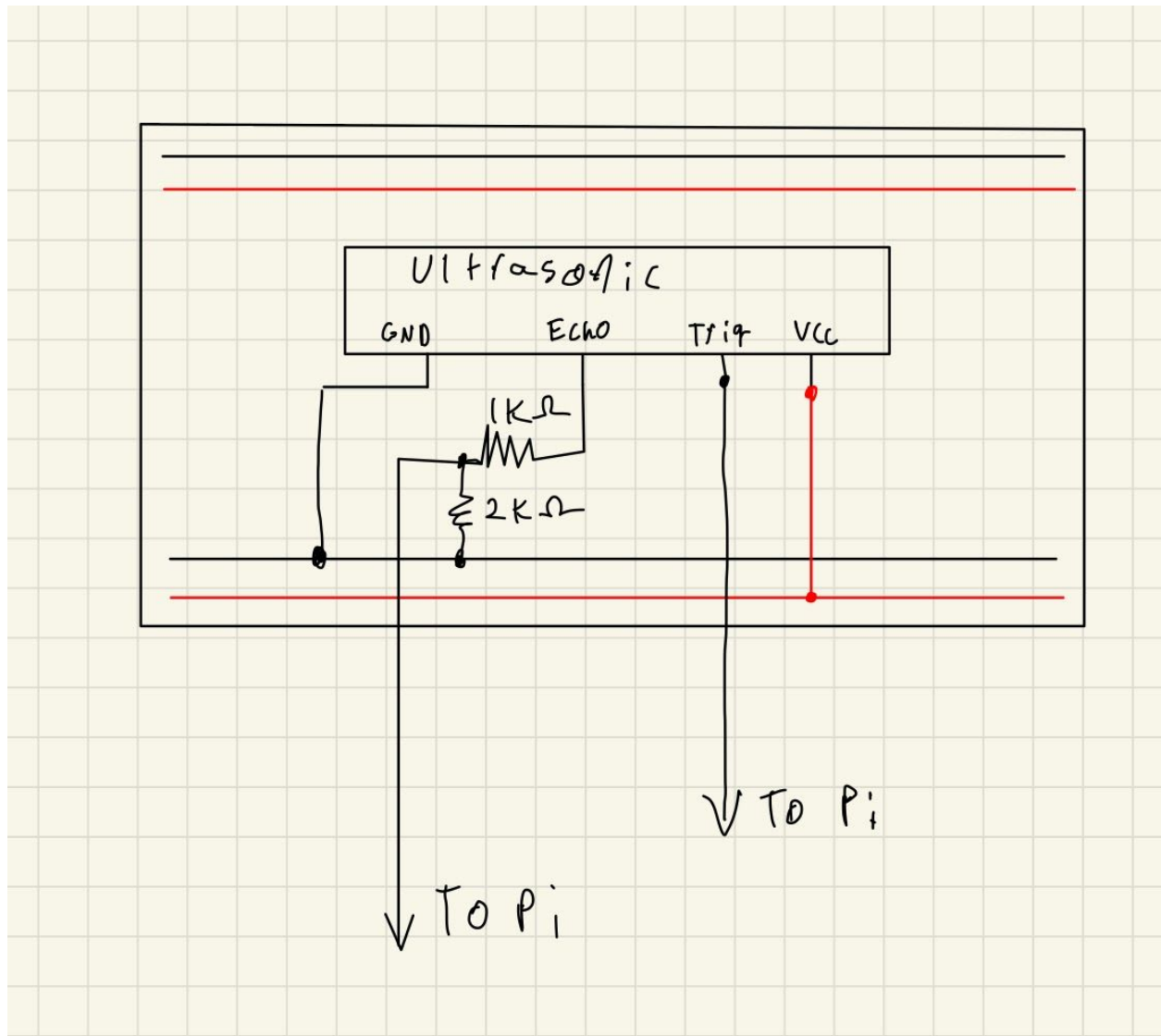
There are 4 ultrasonics we need, two on the front and two on the back. Insert each one on its own breadboard and mount the breadboards on the rover in the following configuration (you can use tape, or glue, or whatever, just make sure they're secure):

- The two on the front will face with the “eyes” towards the front of the rover (perpendicular to the wheels and facing the user)
- The two on the back will have the eyes facing outwards (towards the wheels). Note that you might have to mount them on top of something to raise their height so the wheels aren't blocking them.

Wire up the positive rails on all breadboards to 5V on the Pi (pin 2) and the negative rails to GND (pin 6). To supply power for all the breadboards, connect the positive rails of all breadboards together and the negative rails of all breadboards together. Then connect the 5V pin to one of the positive rails and the GND pin to one of the negative rails. Something like this picture:



Now, on the ultrasonics, you have 4 pins called Vcc, GND, ECHO and TRIG. Vcc and GND go to the positive and negative terminals of each board, respectively. The general form of the connections follow the fashion in the picture below (note the voltage divider present between the ECHO pin and GND, this is because the Pi's GPIO pins function on 3.3 V and the ECHO pin of the Pi outputs 5V. The voltage divider reduces the voltage sent to the Pi so the Pi doesn't get damaged.)



To clarify:

- Pin **GND** goes to the ground of the breadboard the sensor is connected to.
- Pin **Vcc** goes to the positive rail of the breadboard the sensor is connected to.
- Pin **Trig** is wired depending on the sensor:
 - **Upper right:** Pin 7 on the Pi
 - **Upper left:** Pin 31 on the Pi
 - **Lower left:** Pin 33 on the Pi

- **Lower right:** Pin 36 on the Pi
- **Junction between the 1K and 2K resistors** (voltage-reduced ECHO signal) is also wired depending on the sensor:
 - **Upper right:** Pin 11 on the Pi
 - **Upper left:** Pin 29 on the Pi
 - **Lower left:** Pin 35 on the Pi
 - **Lower right:** Pin 38 on the Pi

Wiring the Motors:

Wire the motors the same way you did last semester, except pin 12 controls the motion of the left motor and pin 13 controls the motion of the right motor.

Wiring the buzzer:

Connect the buzzer to one of the breadboards. Connect the negative terminal of the buzzer to ground and the positive terminal to pin 18 on the Pi.