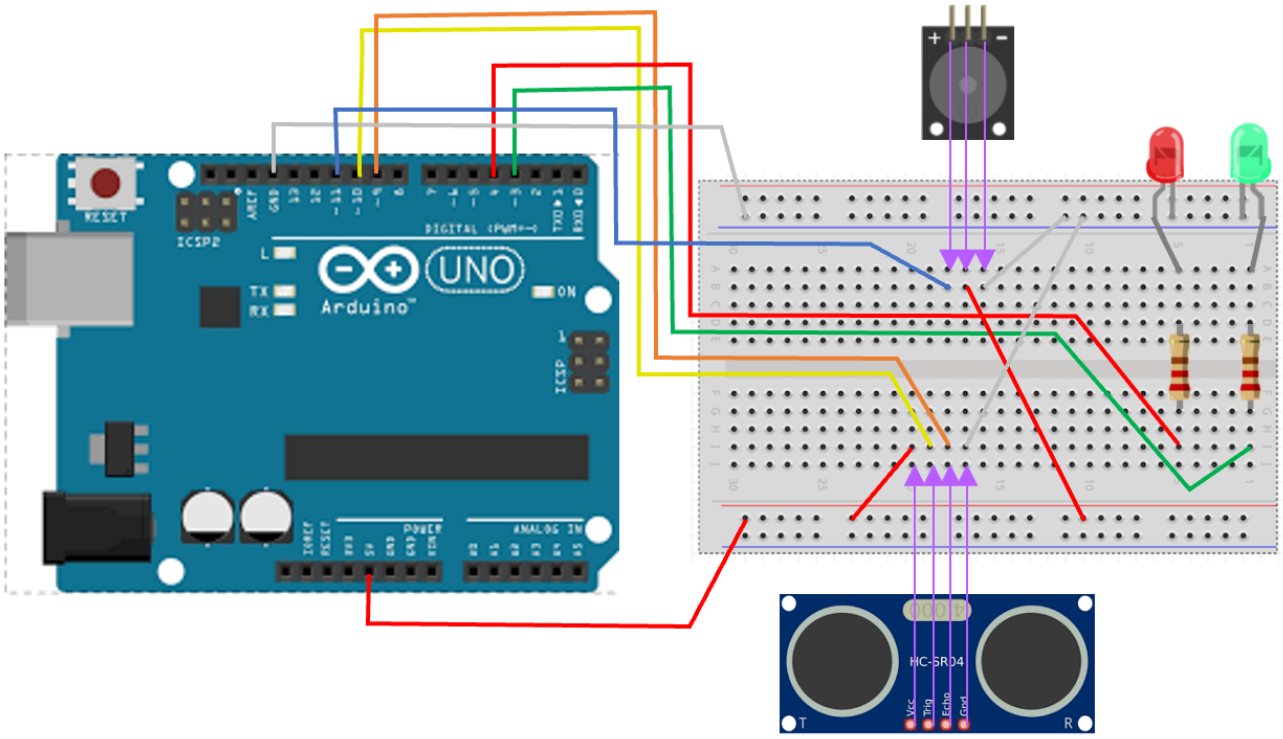
Discover Engineering!
Workshop on rapid prototyping of a "High-tech" Security System

THE UNIVERSITY OF SYDNEY | ACFR AUSTRALIAN CENTRE FOR FIELD ROBOTICS | ARIAM

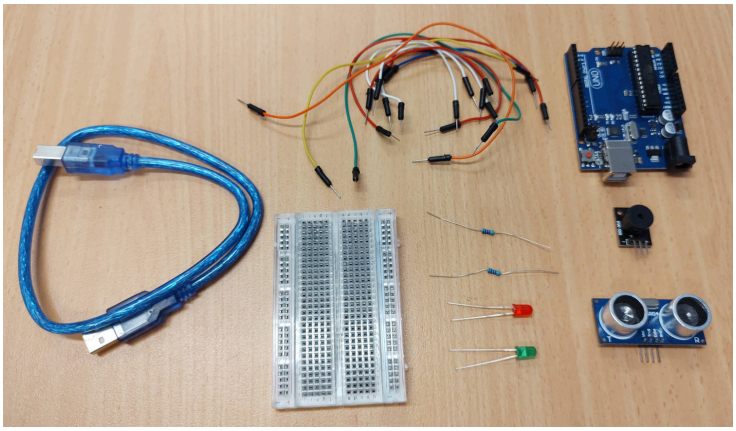
Circuit for the Security System:



Circuit Building Instructions:

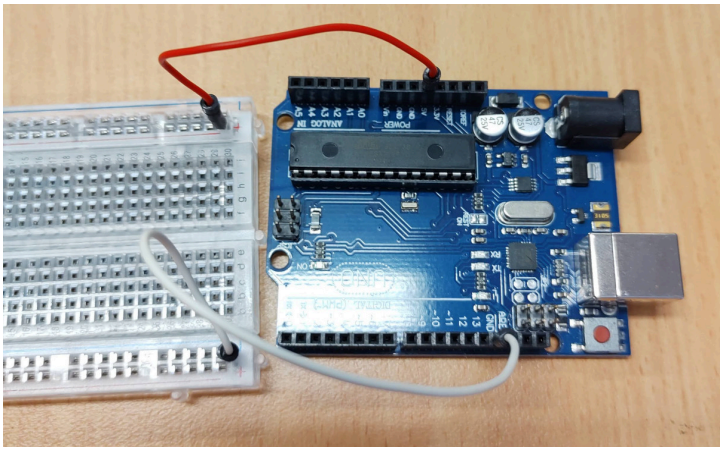
Step 1: Start by un-packing the parts needed:

- Arduino Uno
- Breadboard
- Dual Ultrasonic Sensor Module
- One red and one green LED
- Two resistors
- Buzzer
- Collection of jumper wires (snip the cable-tie off with scissors)



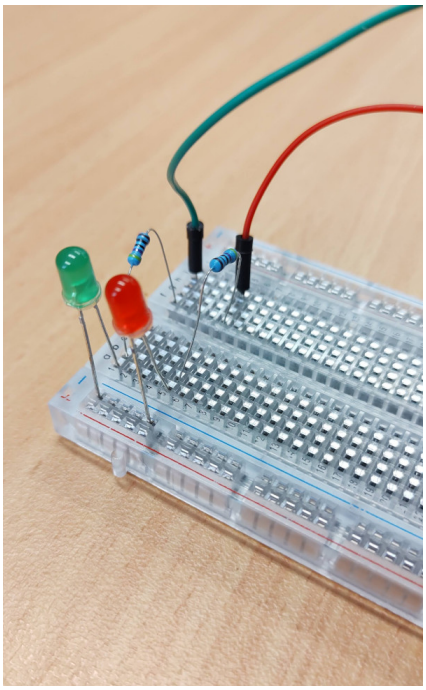
Step 2: Connect power to the breadboard rails:

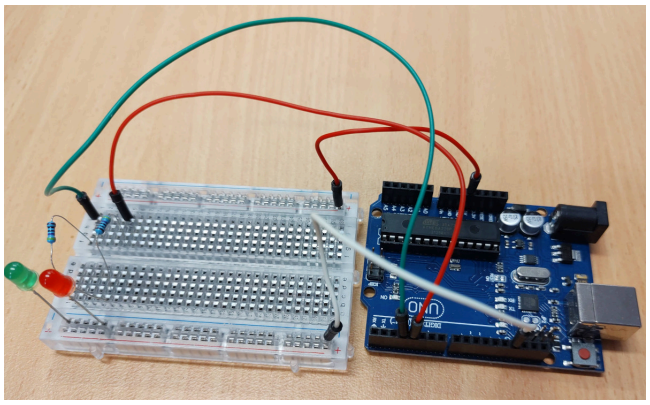
- Connect one wire between the "+" power rail on the breadboard and the "5V" pin on the Arduino (use a red wire).
- Connect a second wire (use white) between the "-" power rail on the breadboard and any one of the "GND" pins on the Arduino
- The colour doesn't really matter but we will try to follow a convention:
    - Red: connected to 5V
    - White: connected to "Ground"



Step 3: Connect the LEDs:

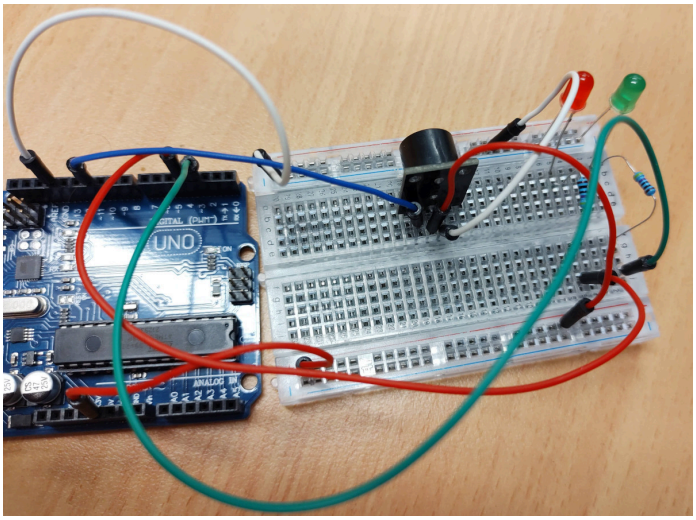
- Take one red and one green LED. Connect the shorter leg of each LED into the "-" power rail on the breadboard, and the longer legs into two different rows of the breadboard (shown here the green LED long leg is in in row 1 and red LED long leg in row 5.
- Take two resistors: connect one resistor between row 1 adjacent to the green LED, and the other end to row 1 on the other half of the breadboard. Connect the second resistor between row 5 adjacent to the green LED, and the other end to row 5 on the other half of the breadboard.
- Connect a wire (shown here as green) between pin 3 on the Arduino to row 1 on the breadboard (opposite half to where the LED is plugged in)
- Connect a wire (shown here as red) between pin 4 on the Arduino to row 5 on the breadboard (opposite half to where the LED is plugged in)
- See the images to the right and circuit diagram above for reference





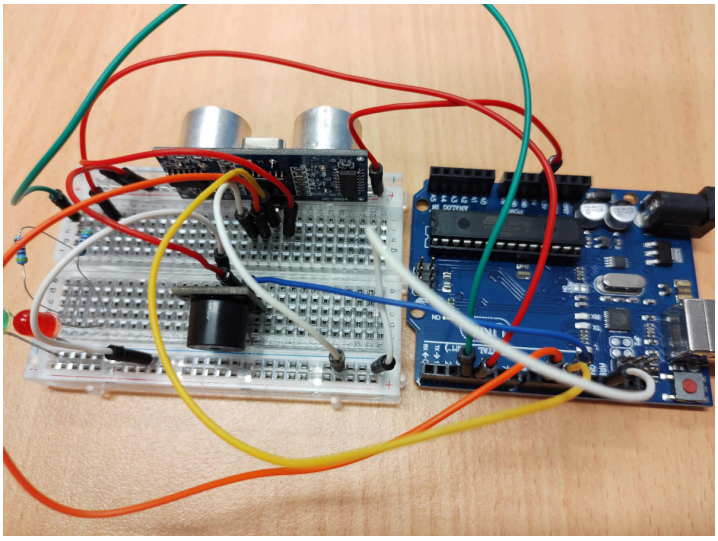
Step 4: Connect the Buzzer:

- Plug-in the three pins on the buzzer into a position on the breadboard as shown (same side as the LEDs, facing outwards): each pin must be on a different numbered row on the breadboard (try using rows 16, 17 and 18 for the pins)
- Connect (using a white wire) the "-" breadboard power rail to a connection on the same row as the right-most pin of the buzzer (row 16 shown here).
- Connect (using a red wire) the "+" breadboard power rail to a connection on the same row as the middle pin (row 17 as shown here) of the buzzer.
- Finally, connect (using a blue wire) the left-most pin of the buzzer (row 18 as shown here) to pin 11 on the Arduino.



Step 5: Connect the Ultrasonic Sensor:

- Plug in the Ultrasonic sensor's four pins into the breadboard as shown (facing outwards: opposite side to LEDs and buzzer). We are using rows 18, 19, 20 and 21 on the breadboard
- Use a red wire to connect the "+" breadboard power rail to the sensor's right-most pin ("Vcc" row 21)
- Use a white wire to connect the "-" breadboard power rail to the sensor's left-most pin ("Gnd" row 18)
- Connect an orange wire from the row on the breadboard connected to the "Echo" pin of the sensor (row 19) to Pin 9 on the Arduino.
- Connect a yellow wire from the breadboard row connected to the "Trigger" pin of the sensor (row 20) to Pin 10 on the Arduino.



Your circuit is now complete: move on to the Coding Worksheet to program the Arduino.