

## Solar Coronagraph Documentation

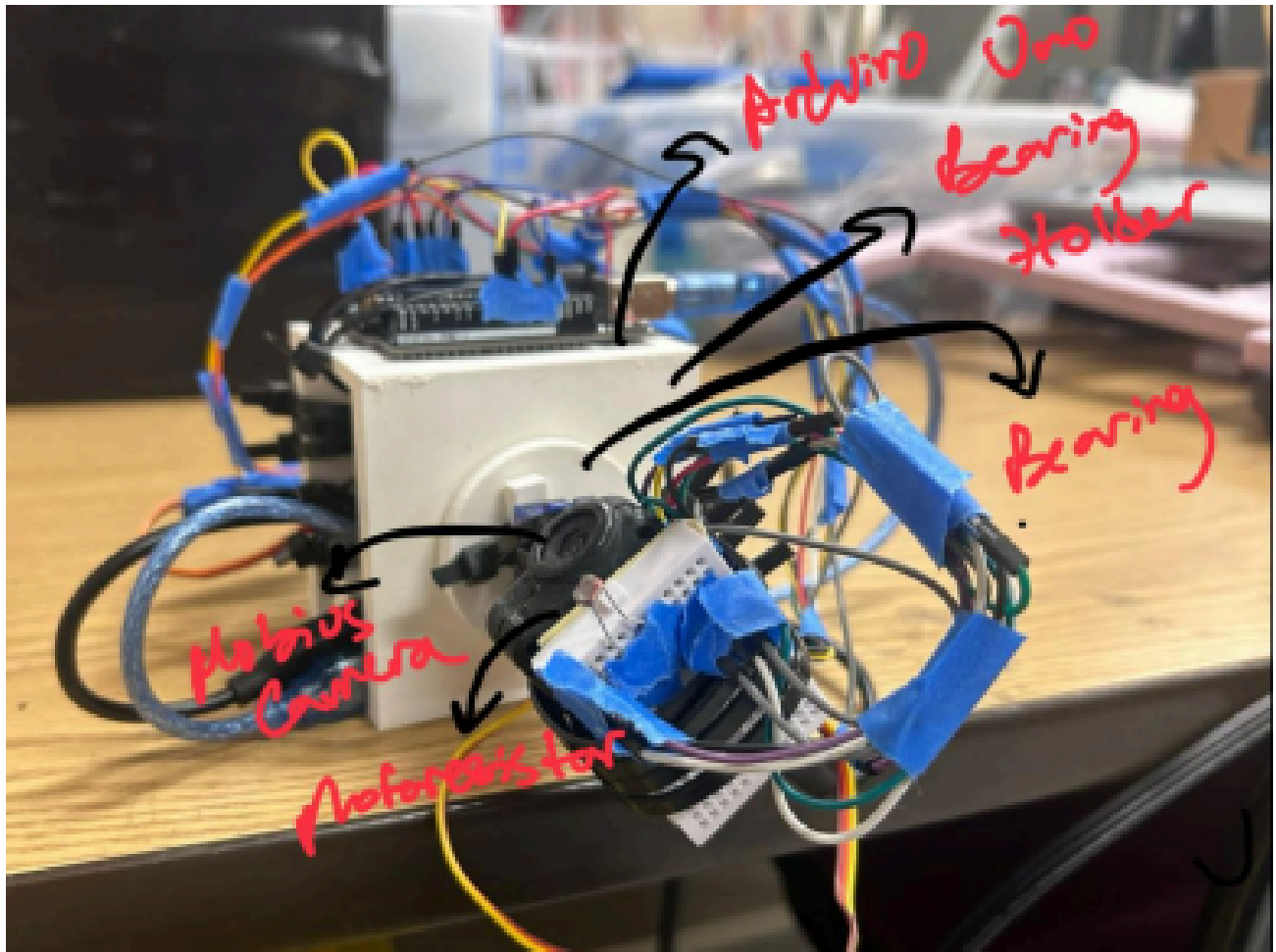
### Summary

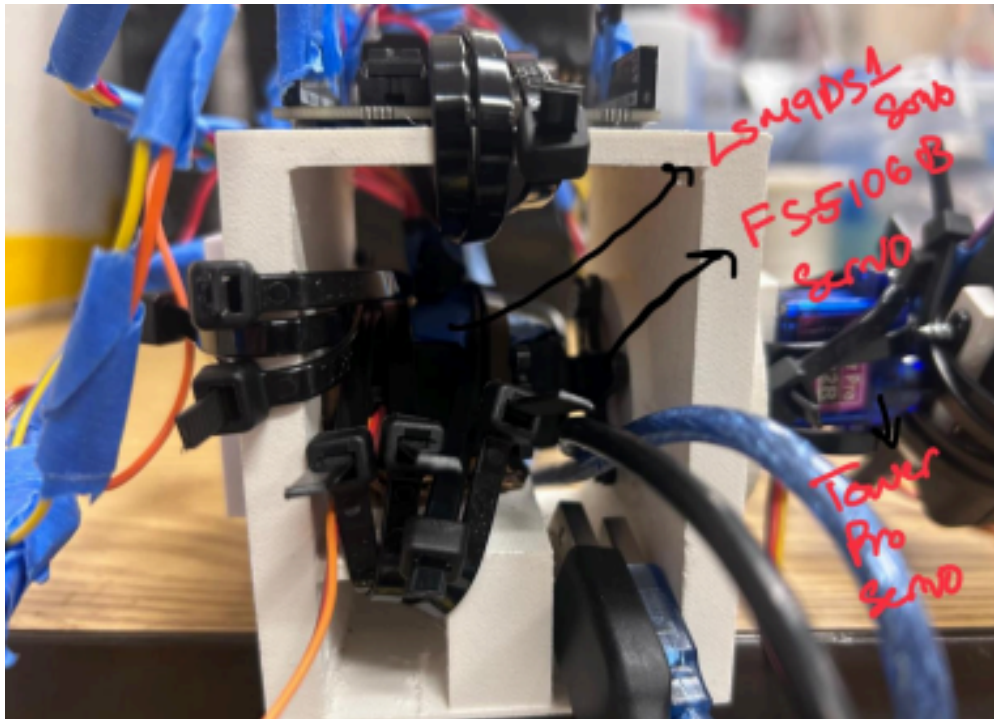
In astronomy, a solar coronagraph is a device that blocks out the larger middle of the sun in order for observations directly on the corona, or the outer ring of the sun, to be made. This motion is also synonymous to generating a pseudo-eclipse. The University of Minnesota's solar coronagraph is the first attempt of such a device being used in the collegiate stratospheric ballooning community. Using Arduino data generated from an IMU and Photoresistor, the device compensates for changes in tilt up to  $180^\circ$  using a system of 2 servo motors.

### Reference Links

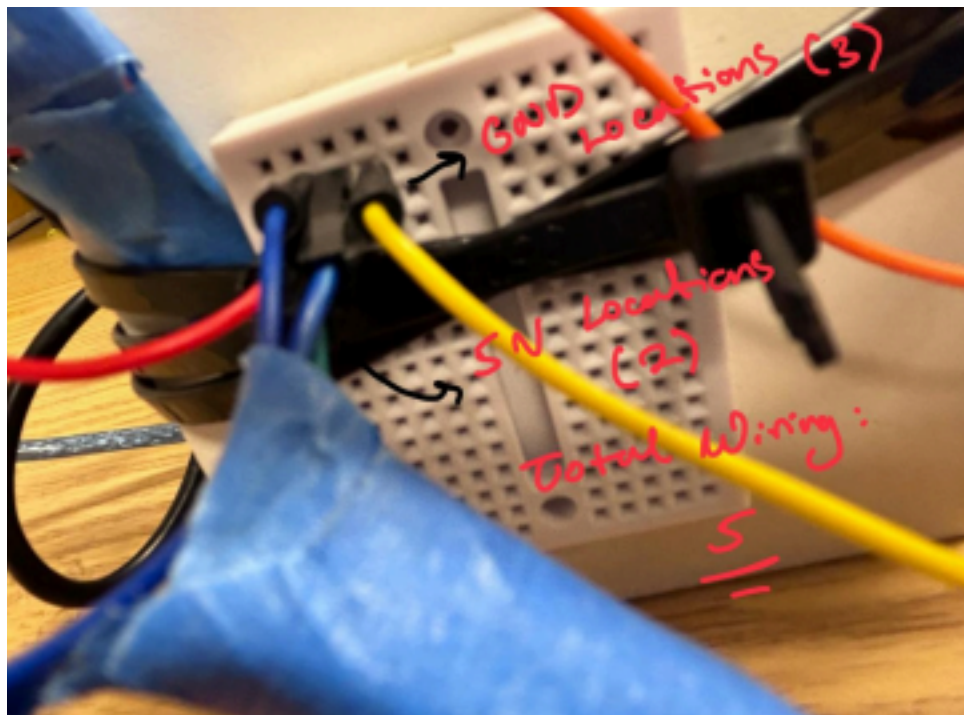
MiniCor: <https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3246&context=smallsat>

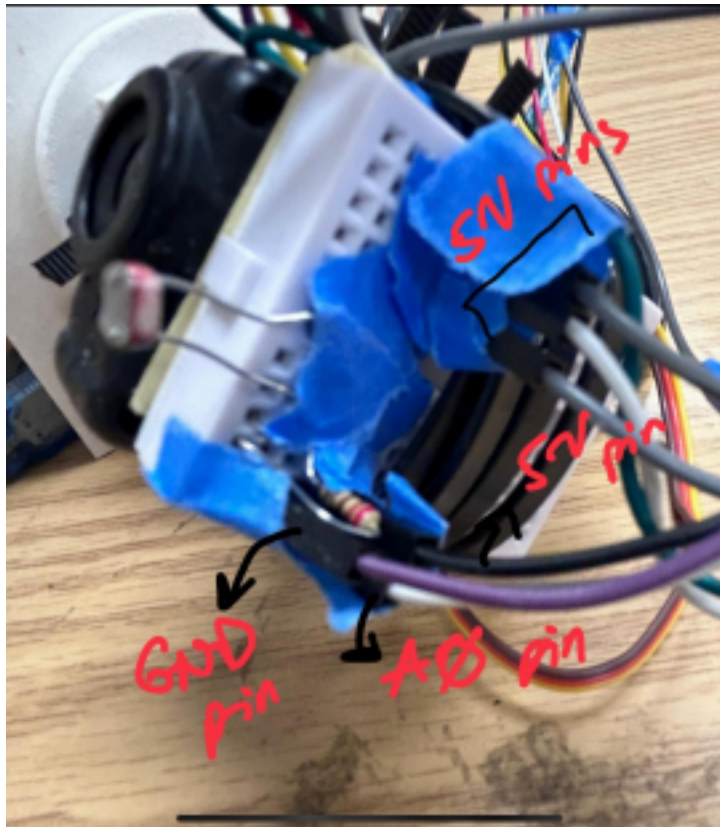
### Parts



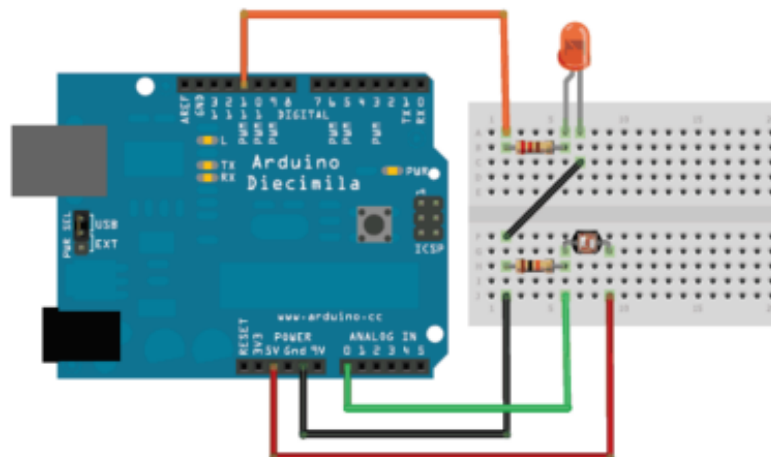


## Wiring





- **Servos:** The servos' brown pin goes to GND, the orange pin to 5V, and the yellow pin to D9
- **IMU:** The IMU's GND goes to GND, the VDD goes to 3.3V, the SDA to A4, and the SCL to A5
- **Photoresistor:** The right end of the photoresistor goes to 5V, the left end goes to A0, the left end of the resistor (please check the type by removing the tape) goes to GND.
  - Wiring Model:



### Steps to operate the Solar Coronagraph:

- Download source code straight from UMN Ballooning Drive OR the Github
- Ensure that the Arduino UNO is updated with the most recent code modifications
- Turn on the Mobius Camera:
  - Hold the power button until a yellow light appears, then press the record button
- For ground use/testing:
  - Use a fairly dark room with exception for your chosen light source
  - Connect the Arduino UNO to your chosen power source to start the device
  - Give the device a few minutes to orient itself and focus in on the light source
  - Tilt the device back and forth within a 180° range of motion to test its tilt compensation
- For flight use:
  - All of the above, + connect the UNO to a large power source
  - No need to keep the device in a dark room, of course
- Problems ***TO BE INVESTIGATED***: The device randomly shut off during its test flight, making it so that no data was retrieved; Adding in a solar filter so that the device actually records only the corona of the sun