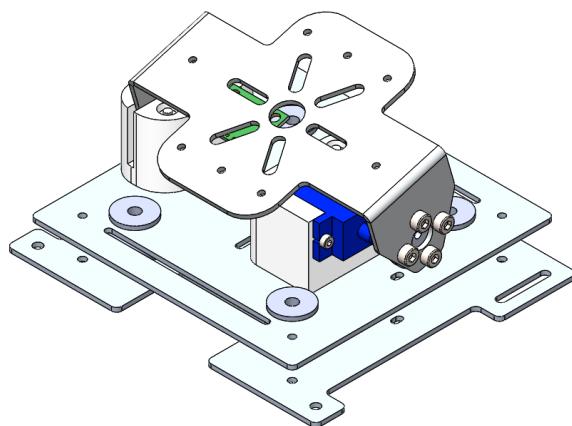


Auto-Leveling Gimbal Operation Manual

Davis Drone Club

October 7, 2018



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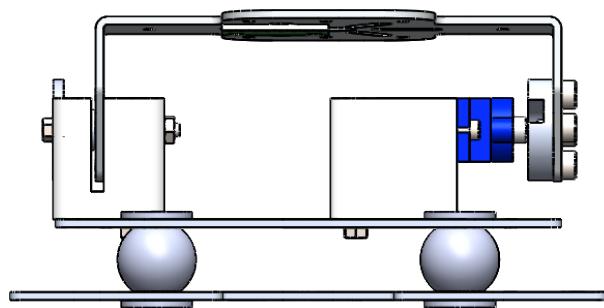
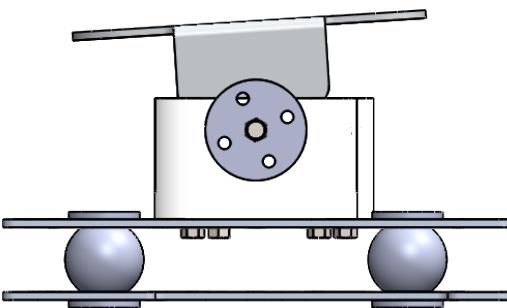
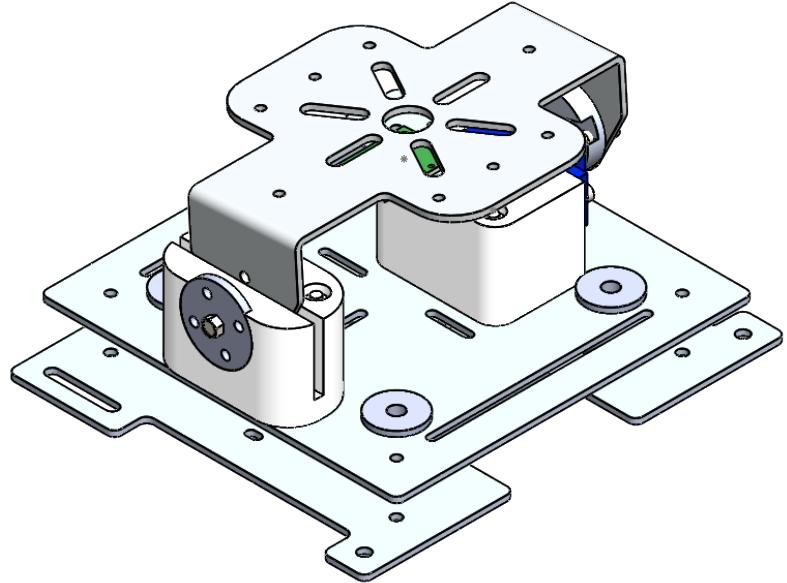
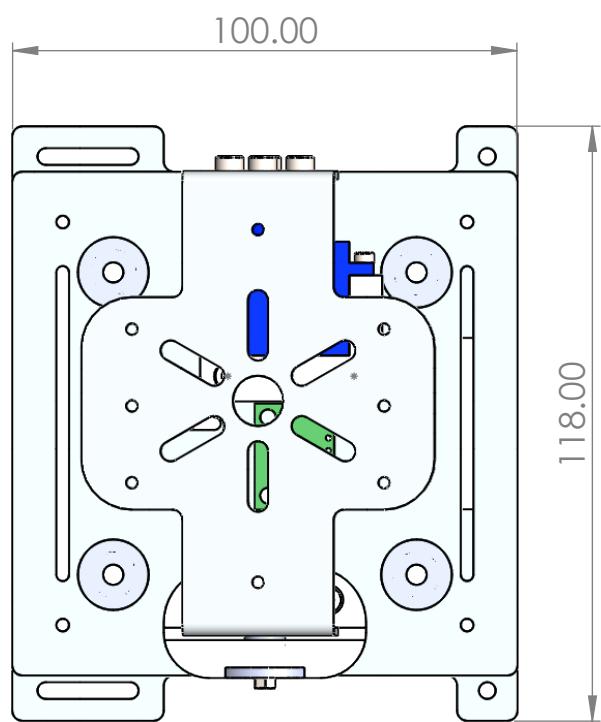
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All documents, software, and design files can be found at the
[Davis Drone Club Gimbal page](#).

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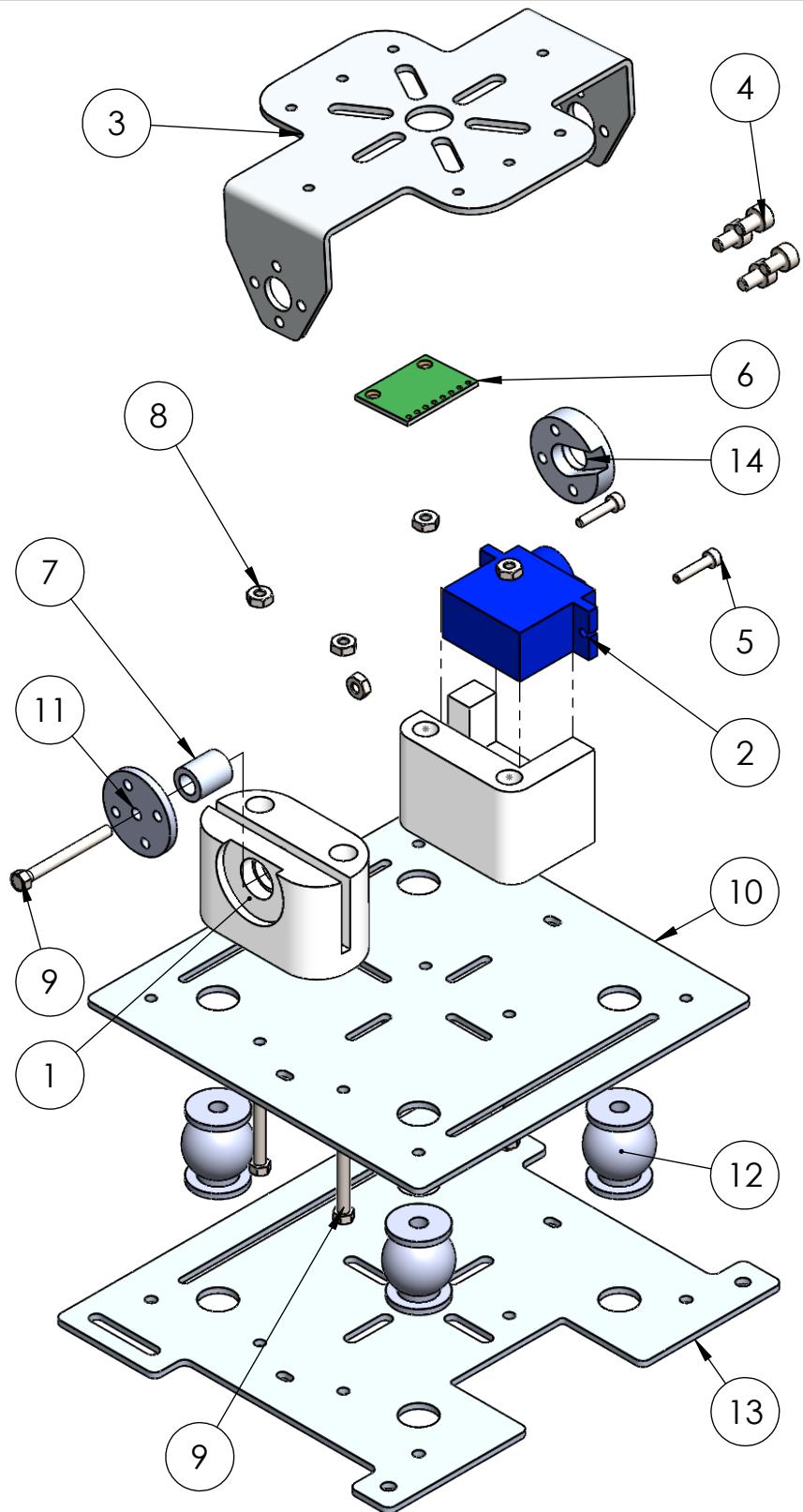


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		FRACTIONAL \pm		CHECKED		
		ANGULAR: MACH \pm BEND ± 1		ENG APPR.		
		TWO PLACE DECIMAL \pm		MFG APPR.		
		THREE PLACE DECIMAL \pm		Q.A.		
		MATERIAL		COMMENTS:		
NEXT ASSY	USED ON	FINISH				
APPLICATION	DO NOT SCALE DRAWING					
SIZE	DWG. NO.					REV.
A	GIMBAL ASSEMBLY					
SCALE: 1:1.5	WEIGHT:					
						SHEET 1 OF 2

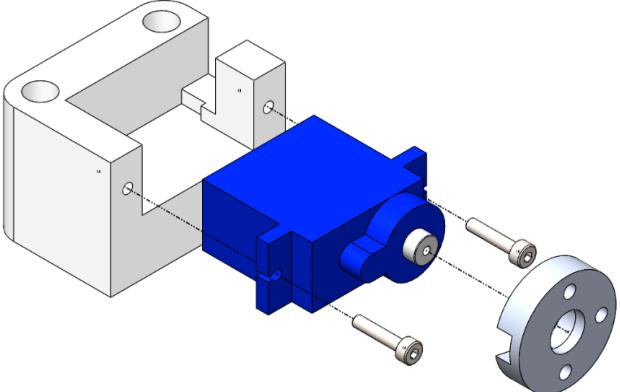
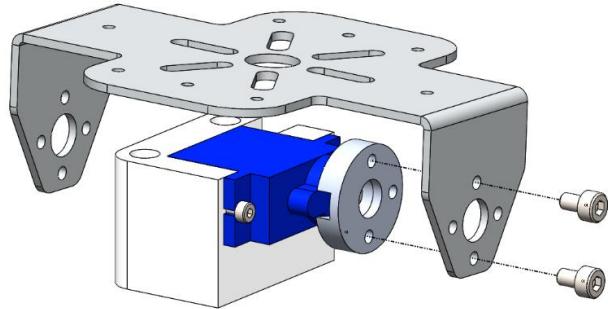
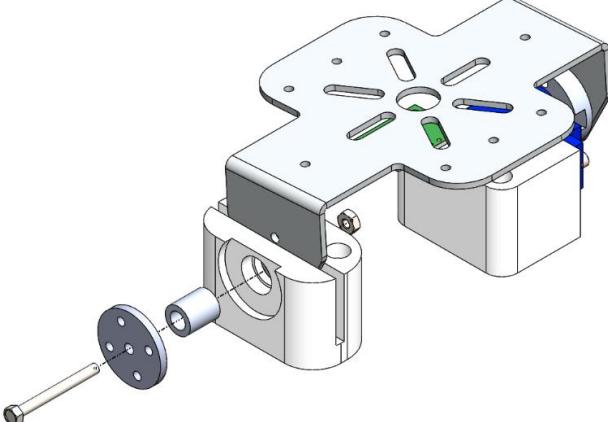
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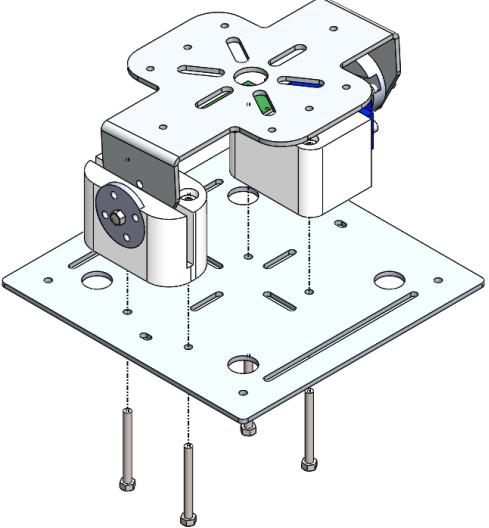
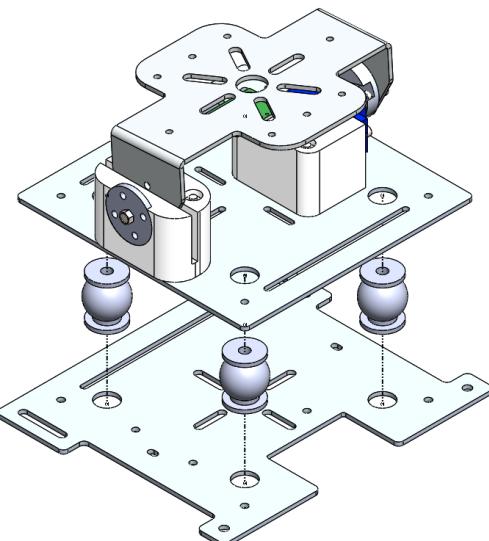
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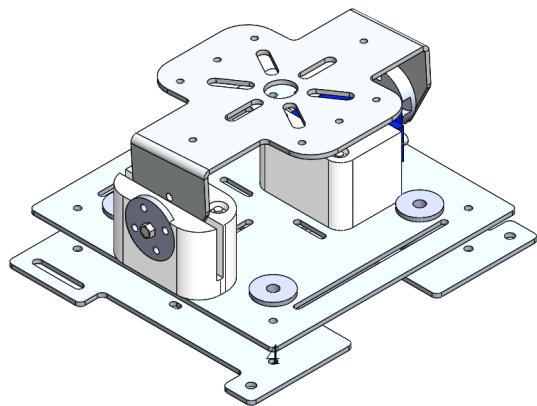
ITEM NO.	PART	QTY.
1	Axle Block	1
2	Servo Assembly	1
3	Camera Plate	1
4	Servo Horn Screw	4
5	Servo Screw	2
6	MPU6050	1
7	Aluminium Spacer	1
8	M2.5 Nut	5
9	M25 x 25 Screw	5
10	Gimbal Plate	1
11	Servo Wheel	1
12	Shock Ball	4
13	Matrice Plate	1
14	Servo Adapter	1



		DIMENSIONS ARE IN MILLIMETERS		NAME	DATE	
		TOLERANCES:	DRAWN	N.CHAN		
		FRACTIONAL \pm	CHECKED			
		ANGULAR: MACH \pm BEND \pm 2	ENG APPR.			
		TWO PLACE DECIMAL \pm	MFG APPR.			
		THREE PLACE DECIMAL \pm	Q.A.			
		MATERIAL	COMMENTS:			
NEXT ASSY	USED ON	FINISH				
APPLICATION	DO NOT SCALE DRAWING					
			SIZE	DWG. NO.		REV.
			A	GIMBAL ASSEMBLY		
			SCALE: 1:1.5	WEIGHT:	SHEET 2 OF 2	

Step #	Image	Description
1		<p>Attach the servo to the servo block using the screws included with the servo.</p> <p>Attach the servo adapter to the servo horn of the servo using epoxy glue.</p>
2		<p>Attach the camera plate to the servo adapter using the screws included with the metal servo wheel.</p>
3		<p>Assemble the axle block by aligning the camera plate within the slot of the block and pressing an aluminium spacer and servo wheel into the axle block.</p> <p>Use the M2.5 x 25mm screw to secure all the components.</p>

Step #	Image	Description
4		Attach the assembly to the base plate using four M2.5x25mm screws and nuts. Pass the screws from the bottom of the gimbal plate.
5		Attach the Matrice plate to the assembly using shock absorbers through the larger holes. Use the included retainer pins or zip ties to keep the plates from separating.



1 Mounting Instructions

1. Remove all battery compartments or expansion bays mounted to the bottom of the aircraft.
2. Align the gimbal such that the cutout on the metal plate is aligned with the bottom cooling fan. The gimbal can be mounted in the forward or rearward positions to adjust the center of gravity of the aircraft.
3. Use four M2.5x5 screws to attach the gimbal to the mounting rails.

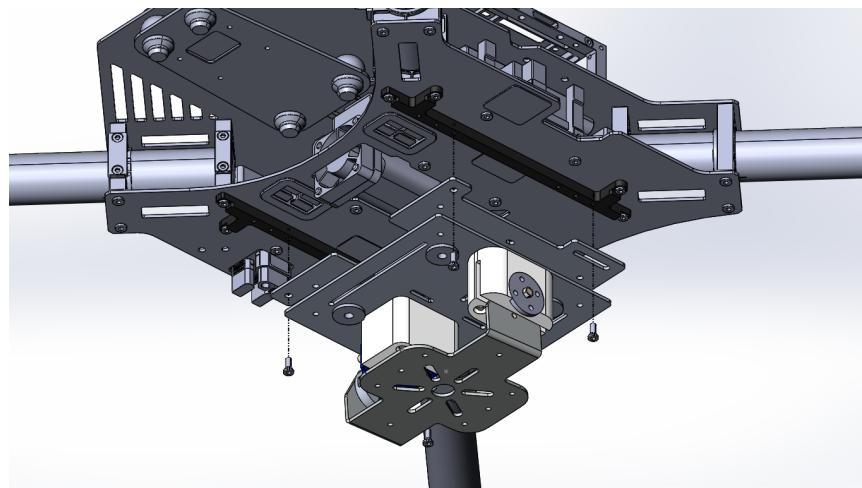


Figure 1: Gimbal mounted to the Matrice 100

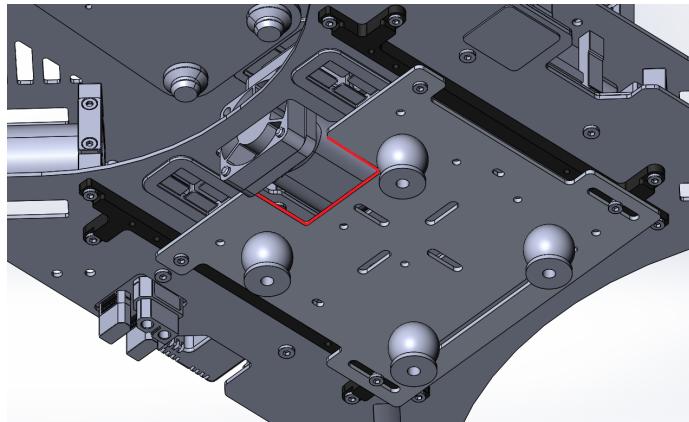


Figure 2: Fan cutout alignment

2 Wiring Guide

The gimbal can be operated from the Matrice power system through a BEC module. The gimbal board can take the power from a single BEC connector and distribute it to the servo motor, and attached camera.

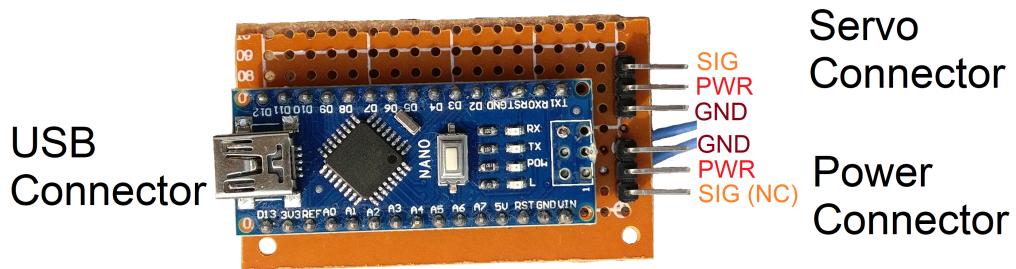


Figure 3: Power and servo connectors

When viewed in a orientation as shown in Figure 3, the top right connector is the connector for the servo motor. The wire must be attached with the brown wire facing the middle of the board. The next connector, on the bottom right of the board, is the power input to the board from the BEC. The wire must also be attached with the brown wire facing the middle of the board, reversed from the servo connector. Finally, the mini-USB connector on the left hand side of the blue board is used for uploading firmware, and can also be used to power the gimbal for testing purposes.

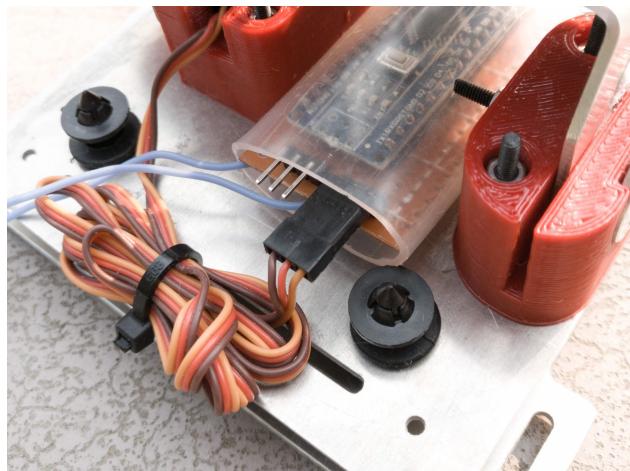


Figure 4: Servo connector

The IMU is connected to the electronics board using a removable, four wire cable. The pins for the IMU are located on the bottom of the electronics board, under the USB connector. The cable should be connected with the blue markings facing away from the gimbal plate, as shown in Figure 5

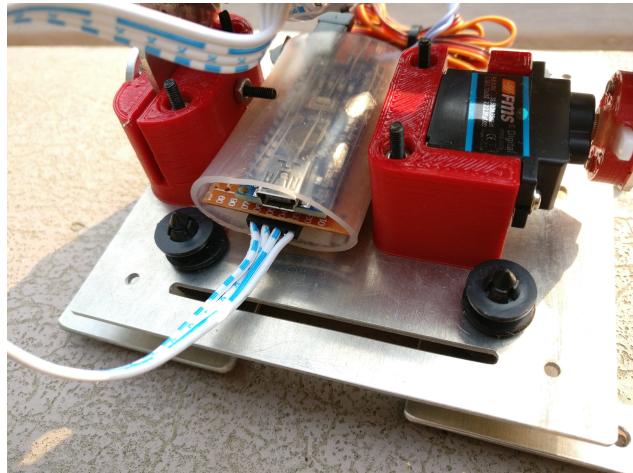


Figure 5: IMU connection

To power the RedEdge of Sequoia cameras, an appropriate camera power to JR connector cable can be used with the power bypass cable (blue) on the gimbal electronics board. While the USB port can power to the power bypass, a BEC should be used when drawing significant current.

3 Firmware Update Procedure

The Arduino IDE and drivers are used to upload code to the gimbal. Instructions for installing the IDE and drivers for Windows, Mac, and Linux can be found at the [Arduino website](#).

1. Download the gimbal code at [this](#) link.
2. Unzip the folder, and open the “code.ino” file with the Arduino IDE.
3. Connect the gimbal to the computer using a mini-USB cable.
4. Under “Tools”, change the board to “Arduino Nano” and select the port labeled with “Arduino”. (Port numbers may vary across different computers)

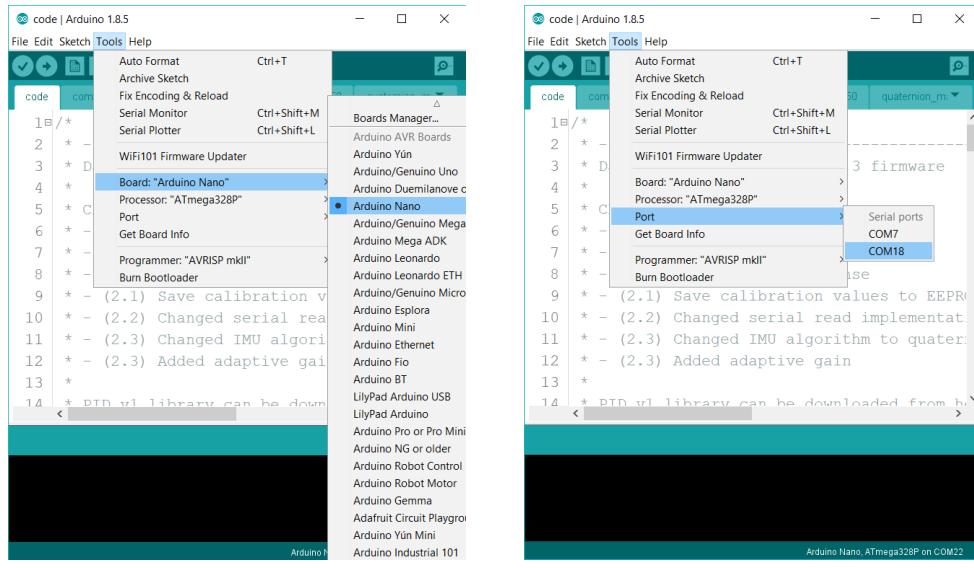


Figure 6: Configuring the Arduino IDE

5. With the gimbal connected, press the “Upload” button on the upper left hand corner of the IDE screen.

4 Troubleshooting

1. **Servo motor is making strange sounds when powered up:** Check to see if the servo connector is connected the right way.
2. **Camera plate is stuck in single position:** Press reset button on top of the blue board.
3. **Camera plate moves to extreme position at startup:** Gimbal mode may be set incorrectly.