Brushless Gimbal

Worldwide first Open Source Brushlessgimbal Controller

Brushlessgimbal.de

when you receive any Brushless Gimbal Controller that is running the Open source project, you might run into some of the following problems when connecting to the computer. when connecting windows will install all the drivers for you but if it set's the com port above 9 when you go to connect to the GUI configuration software it will not connect.

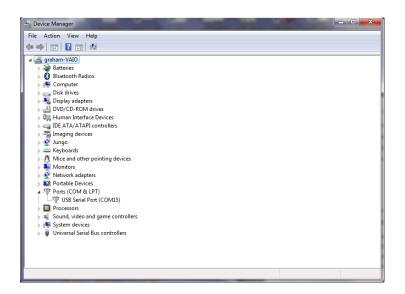


if you right click and go to properties you will see this next image

FT232R USB UART Properties	×
General Hardware	
TZ32R USB UART	
Device Functions:	
Name Typ	e
	versal Se
USB Serial Port (COM15) Por	ts (COM
Device Function Summary Manufacturer: FTDI	
Location: Port_#0002.Hub_#0004	
Device status: This device is working properly.	
	Properties
OK Cancel	Apply

as you can see in this image windows has assigned COM 15, so this will not allow you to connect to the GUI So you need to change this to between COM 1 to 9 then you will be able to connect.

To change the COM port go to your computer icon on your desktop and right click and go to properties then click on device manager this will open

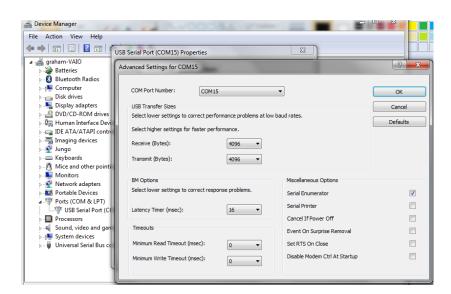


click on the USB Serial Port (COM15) and this will open

click on the Port Settings and you will see this image

ί	JSB Serial Port (COM15) Properties
	General Port Settings Driver Details
	Bits per second: 9600 💌
ł	Data bits: 8
	Parity: None
l	Stop bits: 1
	Flow control: None
	Advanced Restore Defaults
l	
l	
l	
	OK Cancel

this will open this image next



click on the com port settings tab and this will open

anced Settings for COM15	Also I			2
COM Port Number:	COM15	-		ОК
	COM1			
USB Transfer Sizes	COM2 (in use)			Cancel
	COM4 (in use)	=	d rates.	Defaults
Select higher settings for fas	COM5 (in use) COM6 (in use)			berdaria
Receive (Bytes):	COM7 (in use) COM8 (in use)			
Transmit (Bytes):	COM9 (in use) COM10 (in use) COM11 (in use)			
	COM12 (in use)			
	COM13 (in use) COM14 (in use)		Miscellaneous Options	
· · · · · · · · · · · · · · · · · · ·		- 11		
Select lower settings to corre	COM16		Serial Enumerator	V
	COM17			
Latency Timer (msec):	COM18		Serial Printer	
	COM19			
	COM20		Cancel If Power Off	
	COM21		Surah On Suraha Barrad	
	COM22		Event On Surprise Removal	
Minimum Read Timeout (mse	COM23		Set RTS On Close	
			Sec KTS OF Close	
	COM25		Disable Modem Ctrl At Startup	
Minimum Write Timeout (mse	COM26 COM27		bisable hidden ear Ac startap	
	COM27 COM28			
	COM29			

change this to a com port that is not in use (if you find that they are all in use) then select one that is between (1 to 9) and click OK.

Arduino

Now that you have got connected we need to load the code that can be found here <u>https://code.google.com/p/brushless-gimbal/downloads/list</u>

when you have down loaded the software and unzipped it you will also need Arduino this can be found here <u>http://arduino.cc/en/Main/Software</u>

Ok now that you have the software that is needed we will load the code, to do this you need to start up Arduino. Go to the folder that you have unzipped Arduino and look for the Ardunio.exe file as in the picture

Organize 🔻 🛛 Inclu	ıde in	library ▼ Share with ▼ Bur	n New folder	: :::: •	
🔆 Favorites	-	Name	Date modified	Туре	Size
📃 Desktop		퉬 drivers	29/01/2013 00:00	File folder	
鷆 Downloads		🎉 examples	29/01/2013 00:00	File folder	
📃 Recent Places		퉬 hardware	29/01/2013 00:00	File folder	
	Ξ	鷆 java	29/01/2013 00:01	File folder	
📜 Libraries		鷆 lib	29/01/2013 00:01	File folder	
Documents		퉬 libraries	29/01/2013 00:01	File folder	
J Music		鷆 reference	29/01/2013 00:02	File folder	
Pictures		鷆 tools	29/01/2013 00:02	File folder	
🗐 Subversion		💿 arduino	10/12/2012 12:50	Application	84
🛃 Videos		cygiconv-2.dll	10/12/2012 12:50	Application extens	94
		🚳 cygwin1.dll	10/12/2012 12:50	Application extens	1,82
🜉 Computer		🚳 libusb0.dll	10/12/2012 12:50	Application extens	4
🚢 Local Disk (C:)	-				Ū Ū

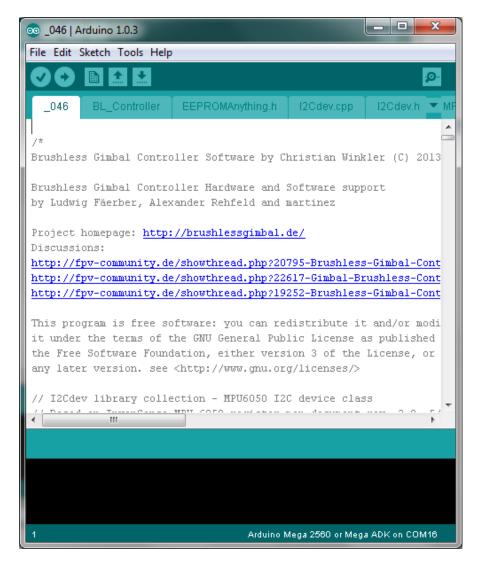
click the icon to start the programme

💿 sketch_mar24a Arduino 1.0.3	
File Edit Sketch Tools Help	
	<u>Q</u>
sketch_mar24a	
	^
4	
1	Arduino Mega 2560 or Mega ADK on COM16

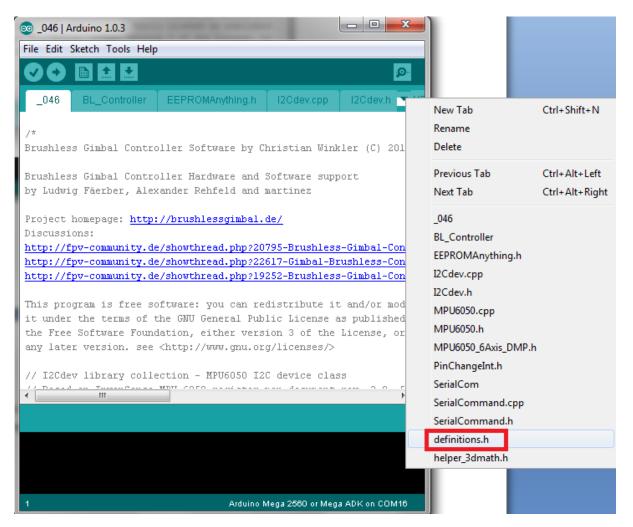
now we need to load the code for the brushless gimbal, click on file then open and then navigate to the folder were you have your gimbal software saved as seen here

Look in:	J046	•	G 🤌 📂 🖽 🗸			
(Pa)	Name		Date modified	Туре	Size	
	🌗 GUI		03/03/2013 18:08	File folder		
Recent Places			03/03/2013 17:59	INO File	18 KB	
	BL_Controller.ino		09/02/2013 13:28	INO File	5 KB	
·	definitions		03/03/2013 17:54	H File	3 KB	
Desktop	EEPROMAnything		31/01/2013 21:00	H File	1 KB	
—	helper_3dmath		10/01/2013 13:33	H File	7 KB	E
6 6 77	🕶 I2Cdev		10/01/2013 13:33	C++ Source File	53 KB	
Libraries	12Cdev		10/01/2013 13:33	H File	12 KB	
	4 MPU6050		27/01/2013 18:21	C++ Source File	125 KB	
	MPU6050		02/02/2013 16:55	H File	42 KB	
Computer	MPU6050_6Axis_DMP		17/02/2013 14:10	H File	38 KB	
	PinChangeInt	Type: H Fi	le	H File	20 KB	
	ReleaseHistory	Size: 37.9		Text Document	5 KB	
Network	SerialCom ino	Date mod	ified: 17/02/2013 14:10	INO File	6 KB	
	File name:					Open

click on the 046.ino (just for this example) to open the code



now that you have the code open there is at the time of writhing this manual only 1 thing that you might have to change and this is under the Definitions.h tab



when loaded you will see at the top there is the following code

// MPU Address Settings

#define MPU6050_ADDRESS_AD0_LOW 0x68 // default for InvenSense evaluation board

#define MPU6050_ADDRESS_AD0_HIGH 0x69 // Drotek MPU breakout board

#define MPU6050_DEFAULT_ADDRESS MPU6050_ADDRESS_AD0_HIGH

if you find that when you have loaded th code that your sensor is not working and you are NOT getting any readings from this then you must reload this code and change the

#define MPU6050_DEFAULT_ADDRESS MPU6050_ADDRESS_AD0_HIGH

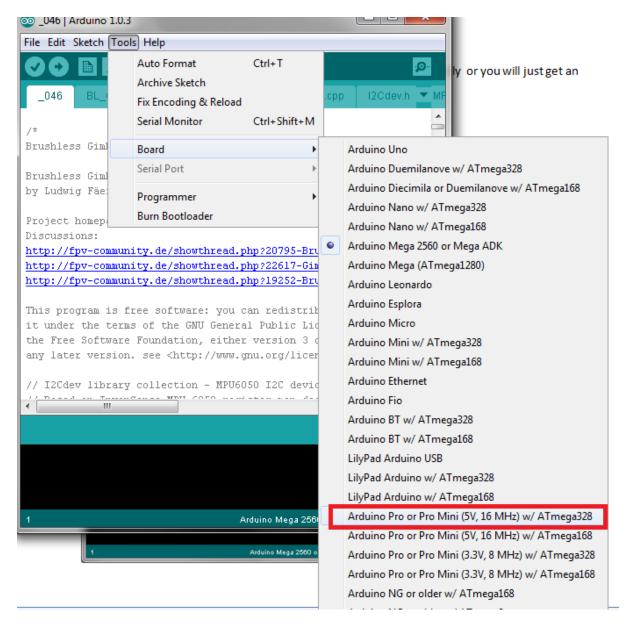
to

#define MPU6050_DEFAULT_ADDRESS MPU6050_ADDRESS_AD0_LOW

re upload the code and you should find that this will fix the sensor error.

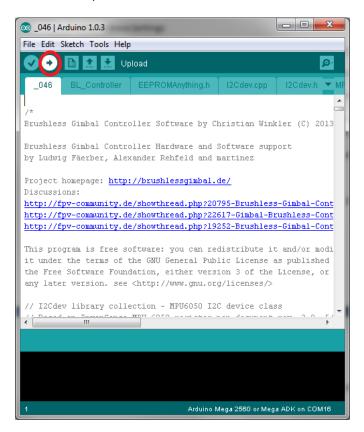
To load the code to your board you need to select the following correctly or you will just get an error

click on the Tools tab in the top menu and select the correct board that you have (this is just an example)

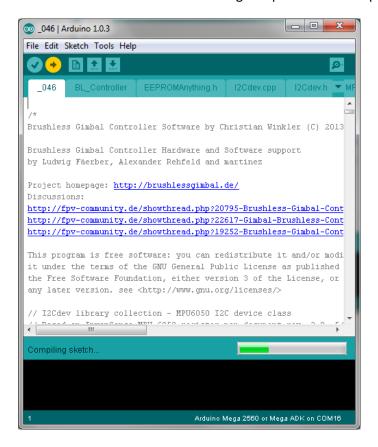


next you must select the correct com port this have normally only one listed, click on this to select the com port, Now we can upload the code

click on the upload button



The next screen shows the code being compiled and then uploaded to your controller board



Now its time to connect to your Brushless Gimbal and start tuning your settings

The GUI

Brushless-Gimbal-Tool	(for v46)					• ×			
	Version: Windows NT/6.1								
Pitch			Roll						
P	0.00	* *	P	0.00		*			
I	0.00	* *	I	0.00		*			
D	0.00	4 F 4 F 4 F 4 F 4 F	D	0.00		4 P 4 P			
Number	0		Number	1		*			
Dir		reverse	Dir		□ reve	rse			
Poles	3	*	Poles	3		* *			
max PWM	0	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	max PWN	1 0		4			
RC-Min	-90		RC-Min	-90		* *			
RC-Max	-90		RC-Max	-90		*			
General	Chart								
-	4 *								
ACC/DMP 🔲 use ACC						Start			
RC Abs/Prop 🔲 Absolute	e					Start			
rcGain 0	*								
Connection									
Port COM15:				- Con	nect	Close			
Defaults	Load	Save	Gyro-Cal	Load from Flash	Save	to Flash			
		Not cor	nnected	a.					

This is the software that you will use to adjust the setting on your Brushless Gimbal Controller

NOW if you have not changed the COM port as above then you will get this error

Brushless-Gimbal-Too	ol (for v46)				
		Serial-Error: CC	M15: @ 115200		
Pitch			Roll		
Р	0.00	<u>*</u>	Р	0.00	<u>*</u>
I	0.00	4 4 4 7 7 7 7 7 7 7 7 7 7 7 7 7	I	0.00	<u> </u>
D	0.00	* *	D	0.00	*
Number	0	* *	Number	1	* *
Dir		reverse	Dir		reverse
Poles	3	A 7	Poles	3	*
max PWM	0	4 4 4 4 4 4 4 4 4 4 4 4 4 4	max PWN	1 0	() () () () () () () () () () () () () (
RC-Min	-90	<u>*</u>	RC-Min	-90	A
RC-Max	-90	4	RC-Max	-90	
General	Chart				
Accel-Weight 0.0000 ACC/DMP T use AC RC Abs/Prop Absolu	ute				Start
rcGain 0	×				
Connection					
Port COM15:				▼ Con	nect Close
Defaults	Load	Save	Gyro-Cal	Load from Flash	Save to Flash
		not cor	nnected		

When you have made the changes to the Com Port then you should see the following images when you click Connect

Brushless-Gimba	Il-Tool (for v46)	A 64	-0038	4.10		• X
		Serial-Ok: CO	M1: @ 115200			
Pitch			Roll			
P	0.00	* *	Р	0.0	0	*
I	0.00	* *	Ι	0.0	0	
D	0.00	4) 4) 4) 4) 4)	D	0.0	0	A
Number	0	A V	Number	1		* *
Dir		☐ reverse	Dir		∏ re	verse
Poles	3	* *	Poles	3		4 V
max PWM	0	*	max PWIV	1 0		
RC-Min	-90	4	RC-Min	-90)	
RC-Max	-90		RC-Max	-90)	4 V
General	Chart					
Accel-Weight 0.000 ACC/DMP u RC Abs/Prop A rcGain 0	se ACC					Start
Connection	<u> </u>					
Port COM	1.			-	Reconnect	Close
		1			1	
Defaults	Load	Save	Gyro-Cal	Load from I	Flash Sa	ave to Flash
		Serial-Ok: CO	M1: @ 115200			

Brushless-Gi	mbal-Tool (fe	or v46)	_	-		X
			Serial-Ok: CO	M1: @ 115200		
Pitch				Roll		
P		0.00	* *	Р	0.00	4
I		0.00		Ι	0.00	
D		0.00	4	D	0.00	4
Num	ber	0		Number	1	4
Di	ir		🗖 reverse	Dir		☐ reverse
Pole	es	3	* *	Poles	3	-
max P	WM	0	4 V 4 V 4 V	max PWN	1 0	
RC-N	/lin	-90	* *	RC-Min	-90	-
RC-N	/lax	-90	* *	RC-Max	-90	-
General		Chart				
Accel-Weight 0.	.0000 单 use ACC					Start
RC Abs/Prop F rcGain 0	Absolute					Start
Connection						
Port C	:OM1:				▼ Reco	nnect Close
Defaults	L	oad	Save	Gyro-Cal	Load from Flash	Save to Flash
			TC: readin	ig values		

Brushless-Gimbal-Tool	l (for v46)					×
		Firmware-V	ersion: 46			
Pitch			Roll			
Р	20.0	4	Р	25.0		*
Ι	0.005		Ι	0.005		
D	0.15	4 4	D	0.15		-
Number	0	*	Number	1		-
Dir	🔲 re	everse	Dir		reverse	
Poles	14		Poles	14		
max PWM	150	4 4	max PWM	150		4 F 4 F 4 F
RC-Min	-45	4	RC-Min	-45		
RC-Max	45	4	RC-Max	45		
General	Chart					
Accel-Weight 0.007	<u>A</u> <u>W</u>					
ACC/DMP 🔽 use AC	с					
RC Abs/Prop 🔲 Absolut						Start
rcGain 10	* _					
Connection					,	
Port COM1:				▼ Record	nnect Clo	se
Defaults	Load	Save	Gyro-Cal	Load from Flash	Save to FI	ash
		TAC: reading	valuesdone			

Brushless-Gimba	al-Tool (for v46)					• ×
		Firmware-	Version: 46			
Pitch			Roll			
Р	20.0	÷	Р	25.0		4
I	0.005	4 4 4 4 4 4 4 4 4 4 4 4 4 4	I	0.005		
D	0.15	÷	D	0.15		2
Number	0	÷	Number	1		2
Dir		reverse	Dir		🗌 rev	erse
Poles	14	+	Poles	14		ŝ
max PWIV	150	4 F 4 F 4 F 4 F 4 F 4 F	max PWM	1 150		
RC-Min	-45	*	RC-Min	-45		2
RC-Max	45	*	RC-Max	45		2
General	Chart					
Accel-Weight 0.007 ACC/DMP マロ	se ACC					Start
RC Abs/Prop C A	ibsolute					
Connection	10					
Port COM	11:			▼ Re	connect	Close
Defaults	Load	Save	Gyro-Cal	Load from Flas	h Sav	e to Flash
		readin	g done			

YES your connected to your Brushless Gimbal Controller. Now to check your Sensor reading please click on the Start button and you will see the following screens

Pitch Roll P 20.0 P I 0.005 I D 0.15 D Number 0 P Dir reverse Dir Poles 14 Poles RC-Min -45 Poles RC-Max 45 RC-Max Accel-Weight 0.007 Poles Number Poles Poles RC-Max				Firmware-Ve	rsion: 46		
Dir reverse Dir reverse Poles 14 - Poles 14 max PWM 150 - max PWM 150 RC-Min -45 - RC-Min -45 RC-Max 45 - RC-Max 45 General Chart - - - Accel-Weight [0.007 - Rolis 11.23 - - AccC/DMP Mose Accc - - - - - Connection -	Pitch			F	loll		
Dir reverse Dir reverse Poles 14 - Poles 14 max PWM 150 - max PWM 150 RC-Min -45 - RC-Min -45 RC-Max 45 - RC-Max 45 General Chart - - - Accel-Weight [0.007 - Rolis 11.23 - - AccC/DMP Mose Accc - - - - - Connection -		P	20.0	*	Р	25.0	
Dir reverse Dir reverse Poles 14 - Poles 14 max PWM 150 - max PWM 150 RC-Min -45 - RC-Min -45 RC-Max 45 - RC-Max 45 General Chart - - - ACC/DMP We accc Rclis 11.23 - - Connection - - - - -		Ι	0.005	*	I	0.005	
Dir reverse Dir reverse Poles 14 - Poles 14 max PWM 150 - max PWM 150 RC-Min -45 - RC-Min -45 RC-Max 45 - RC-Max 45 General Chart - - - ACC/DMP We accc Rolis 11.23 - - Connection - - - - -		D	0.15	*	D	0.15	
Poles 14 -1 Poles 14 max PWM 150 -1 max PWM 150 RC-Min -45 -1 RC-Min -45 RC-Max 45 -1 RC-Max 45 Seneral Chart	Nu	umber	0	*	Number	1	
Seneral Chat Acccl-Weight [0.007 ⇒ ACC/DMP Image: Seneral sen		Dir	☐ reve	rse	Dir		☐ reverse
General Chat Lccel-Weight 0.007 ⇒ ACC/DMP Image: Second s	P	oles	14	*	Poles	14	
General Chart Accel-Weight[0.007 ⇒ ACC/DMP Image: Second	ma	x PWM	150	*	max PWM	150	
General Chart Accel-Weight[0.007 ⇒ ACC/DMP Image: Second	RC	C-Min	-45	*	RC-Min	-45	
Accel-Weight 0.007 ACC/DMP IV use ACC RC Abs/Prop Absolute rcGain 10 Connection	RC	C-Max	45	*	RC-Max	45	
ACC/DMP v use ACC RC Abs/Prop Absolute rcGain 10	General		Chart				
	ACC/DMP RC Abs/Prop	₩ use ACC	Roll: 11.23				Ste
	Connection-						,
Port COM1: Reconnect Clo	Port	COM1:				✓ Record	nnect Close
Defaults Load Save Gyro-Cal Load from Flash Save to Fl	Defaults	;	Load	Save	Gyro-Cal	Load from Flash	Save to Flash
OAC: -12.72 ACC 11.23			i.	OAC: -12.72 A	CC 11.23		

Diusiliess-Ol		v40)							
			Firmware-	Version: 46					
Pitch				Roll					
Р		20.0	<u>*</u>	Р	25	.0			
Ι		0.005	4 4 4 4 7 4 7 4 7	I	0.0	05			4 5 4 5
D		0.15	<u>*</u>	D	0.1	5			*
Num	ber	0	<u>*</u>	Number	1				*
Di	ir		reverse	Dir			rever	se	
Pol	es	14	*	Poles	14				*
max P	WM	150	4 4 4 4 7 4 7 4 7	max PWM	1 15)			4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
RC-N	/lin	-45	<u>*</u>	RC-Min	-4	5			*
RC-N	Лах	45		RC-Max	45				*
General		Chart							
Accel-Weight ACC/DMP	use ACC	Pitch: 0./6 Roll: -48.8		AAAN		4			Stop
rcGain 1			- / ⁻ V		\lor				
Connection	- <u>-</u>	· ·	/ V						
	COM1:				•	Recon	nect	Clo	se
	1		_		1				
Defaults	L	bad	Save	Gyro-Cal	Load from	Flash	Save	to Fla	ash
			OAC: 0.76	ACC -43.89					

Tuning your Gimbal

when you have uploaded the software and connect to your board, the software will load the default settings. You will need to change these to suit your gimbal and motors

Brushless-Gimbal-	Tool (for v46)		1000								
Version: Windows NT/6.1											
Pitch			Roll								
1 P	0.00	* *	Р	0.00		÷					
2 I	0.00	* *	I	0.00		\$					
3 D	0.00	4	D	0.00							
4 Number	0	* *	Number	1		*					
5 Dir		reverse	Dir		∏ rev	/erse					
6 Poles	3	 ▼	Poles	3		*					
7 max PWM	0	4 V 4 V 4 V 4 V 4 V	max PWN	1 0		4 F 4 F 4 F					
8 RC-Min	-90	* *	RC-Min	-90		*					
9 RC-Max	-90	* *	RC-Max	-90		*					
General	Chart										
Accel-Weight 0.0000	*										
ACC/DMP 11 use	ACC										
RC Abs/Prop12 Abs	solute					Start					
13rcGain 0	<u>A</u>										
	<u> </u>										
Connection											
Port				- Co	onnect	Close					
Defaults	Load	Save	Gyro-Cal	Load from Flash	sa Sa	ve to Flash					
		Not cor	nnected		Not connected						

- 1. First thing to do is to set the ACC-Weight to Zero (Number 10)
- Next start to make it in 0,0005 steps high until the Gimbal does no more drift (what is drift) when you set the ACC-Weight to Zero , the gimbal begin to move slowly to one side that is drift it will not sit level.
- 3. Next , adjust (increase) the P Term in 1.0 Steps (Number 1) stop when the movement is perfect if you go too far the motor will start to vibrate
- 4. minimize the MAX PWM Steps (Number 7) as much as possible this will also help to stop the vibration in the motor, when you have got NO vibration you are ready
- 5. If you still have some problems start to adjust the D Term in 0,005 steps higher until the motor stops vibrating.
- 6. (Number 10) is the ACC weight this is to eliminate the Drift from the Gyro.

- 7. (Number 11) is to switch between ACC and DMP Mode ACC Mode is the better one , DMP is only to test it.
- (Number 12) Absolute or Proportional mode is for RC Channel, Proportional is when you are using a second RC Transmitter to control your Gimbal Absolute for normal Pot control on your RC Transmitter.
- 9. (Number 13) Is the RC Gain , how fast it react when you are change you RC channel you have it connected to.

Please note: (Number 4) is the motor, if you find that the wrong motor is connected you can just change the 0 to the 1 and this will save unplugging your motors.

(Number 5) is for reversing your motor if it is rotating in the wrong direction.

(Number 6) is the amount of poles your motor has.

(Number 8 & 9) is the amount or rotation your motor will make on that axis.

Software License :

http://www.gnu.org/licenses/

Arduino software:

http://arduino.cc/en/Main/Software

Latest Software:

http://code.google.com/p/brushless-gimbal/downloads/list

Credits

Manual: By Graham Miller

Brushless Gimbal: By Ludwig Faerber

GUI: By Meister

Software: By

Christian Winkler, Ludwig Faerber and Alexander Rehfeld

All rights reserved