# Progwhiz

# **Robotics Commander Pro Software**

# **User Guide**

Version 2.3

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# Introduction

The following document will guide the user to get started very quickly. The Software Tools covered in this illustration manual are:

- Pololu Module
- Pololu Advanced Module
- Pololu Switching Module
- Pololu Maestro Modules (New)
- CMUCam2/CMUCam3 Modules
- RoboBuilder Module
- Robotis Module
- Wireless Support

# **Modules User Guide**

# Pololu 8 Port Module

# Hardware Setup

Accessories







Switch

Battery Pack Servo



Fig 1

Above there are four (4) simple steps to be ready to use the controller:

- 1) Remove Protocol Jumper
- 2) Connect DC Battery power to VIN & GND pins + & (Red/Black) respectively
- 3) Connect DC Battery power to Servo Power pins + & (Red/Black) respectively



- 4) Connect Servo 3 wire to Servo Outputs (Black, Red & Wite) Black at end of board
- 5) Connect Serial Cable to PC and RS232 connector on Pololu unit

### **Pololu Software Startup**

Double Click Desktop Robotic Icon



Step 1

Step 2



#### Step 3

Step 4



#### Step 5

Step 6



### **Software User Setup**



The above image represents the Pololu Module. To quickly configure and start using the Robotic Module you need to configure the following settings:

- 1) Set the Servos X and Y Axis connected by clicking the listbox (0 to 7) which maps back to Fig 1
- 2) Set the Switches connected clicking the listbox (Select 0 to 7) which correlates back to Fig 1
- 3) Set the activator Type (Unchecked RCatsystems, Checked Dimension Engineering)

### **Options**

- I. Reset Servos Only required if the board is not responding. After clicking the button you must reset the board (Power Off/On)
- II. Set Limits Servos are allowed to navigate. Simply move the circled object to the lower or upper limit and click on the corresponding Axis checkbox
- III. Click **Any-Quad** to enable both X & Y Axis to move at the same time when you click anywhere on the screen

# **Pololu Advanced Module**

### Software User Setup



The above image represents the Pololu Advanced Module. To quickly configure and start using the Robotic Module you need to configure the following settings:

- 1) Set the Servos X and Y Axis connected by clicking the listbox (0 to 7) which maps back to Fig 1
- 2) Set the Servos X and Y Trims connected by clicking the listbox (0 to 7) which maps back to Fig 1
- 3) Set the Switches connected clicking the listbox (Select 0 to 7) which correlates back to Fig 1
- 4) Set the activator Type (Unchecked RCatsystems, Checked Dimension Engineering)

### **Options**

- I. Reset Servos Only required if the board is not responding. After clicking the button you must reset the board (Power Off/On)
- II. Set Limits Servos are allowed to navigate. Simply move the circled object to the lower or upper limit and click on the corresponding Axis checkbox
- III. Click **Any-Quad** to enable both X & Y Axis to move at the same time when you click anywhere on the screen
- IV. You can record the motions you make for playback by clicking Log Moves(Beta) and when complete click again and then you can replay using the Play(Beta) button

# **Pololu Switch Activation Module**

### Software User Setup

🗿 Pololu External Dev	vice Activator	-			X
#1 🗖 Switch Type Ac	tivator None	<ul> <li>Start Inactiv</li> </ul>	e 💌 Duration Inactive	🔽 🗖 Activate 🛛 🔘	Flepeat every duration
#2 Switch Type Ac	tivator None	- Start Inactiv	e 🔽 Duration Inactive	💽 🗖 Activate 🛛 🧶	Flepeat every duration
#3 🗐 Switch Type 🗛	tivator None	Start Inactiv	e 🔽 Duration Inactive	💽 🗖 Activate 🛛 🥥	Flepeat every duration
#4 🔲 Switch Type 🗛	tivator None	Start Inactiv	e 🔽 Duration Inactive	💌 🗖 Activate 🛛 🔵	Flepeat every duration
#5 🗐 Switch Type 🗛	tivator None	- Start Inactiv	e 🔽 Duration Inactive	💽 🗖 Activate 🛛 🔵	Flepeat every duration
#6 🗐 Switch Type 🗛	tivator None	- Start Inactiv	e 🚽 Duration Inactive	💌 🗖 Activate 🛛 🖉	E Repeat every duration
#7 🗐 Switch Type 🗛	tivator None	- Start Inactiv	e 🔽 Duration Inactive	💽 🗖 Activate 🛛 🔵	Flepeat every duration
#8 🗐 Switch Type 🗛	tivator None	- Start Inactiv	e 🔄 Duration Inactive	💽 🗖 Activate 🛛 🔘	E Repeat every duration
		Engage	Disengage	Switch Si	gnalling <b>63</b>

The above image represents the Pololu Switch Activation Module. To quickly configure and start using the Robotic Module you need to configure the following settings:

- 1) Set the activator Type (Unchecked RCatsystems, Checked Dimension Engineering)
- 2) Set the Switches connected clicking the listbox (Select 0 to 7) which correlates back to Fig 1
- 3) Set the start time to toggle the switch On/Off
- 4) Set the time the switch is to stay on till it is turned off
- 5) Click the checkbox to enable the switch settings as Active
- 6) Click the repeat checkbox only if you what the switch to turn On/Off every N-seconds (Value of Duration) and the Start Time is immediate
- 7) Press the engage button for processing of all Active switches set in #5

### **Options**

I. Tweak switch signal value (useful for new switches not yet released or tested post software release)

# **Pololu-Maestro Interfaces**

### **Maestro Micro 6 Port**

The new interface for the Maestro Micro 6 Port embodies the following functionality

- ✓ Servos x 2
- ✓ Switch Relays x 2
- ✓ Sensors x 2
- ✓ Sensor Thresholds
- ✓ Sensor Triggers



### Sensor Threshold management

To manage the sensor threshold settings please click on the 'Set Sensor Thresholds' button and the following dialogue will launch as shown below:

Theshold	Settings	-	-	×
	All Clear	Safe	Caution	Altert
Sensor 1	50 👻	100 👻	160 🖵	160+
Sensor 2	<b>50</b> -	100 👻	150 👻	150+
Sensor 3	<b>50</b> -	100 👻	150 👻	150+
Sensor 4	-	100 👻	150 👻	150+
Sensor 5	<b>50</b> -	100 👻	150 👻	150+
Sensor 6	150 -	234 🖵	251 👻	251+

### Sensor Trigger Management

To manage the Trigger Rules bases on Sensor readings, please 'Double Click' on the sensor indicators as shown via the green arrows below:



The Sensor Trigger Rules dialogue will launch as shown below:

🛣 A	ction Rules				10.00	5000	-	×
=	0 🗸	Port 0	•	Value	0 🔹	Run Script #	Inactive 💌	C Active
>	0 💌	Port 0	•	Value	0 💌	Run Script #	Inactive 💌	C Active
<	0 💌	Port 0	•	Value	0 💌	Run Script #	Inactive 💌	C Active
					Finished			

**Features** 

- Sensor Trigger Actions
  - o Run Script
  - o Move Servo
  - o Turn On/Off Switch

Maestro Micro 6 Topology



### Maestro Mini's 12 Port

### Maestro 12 Port - Power Connection Guidelines

The following illustrates the possible ways to connect power to your Maestro 12 Port:

1<sup>st</sup> Option: Requires One (1) Power connector. Jumper is closed as shown in Fig I. Power is connected as highlighted in Fig II



Fig I

Fig II

2<sup>nd</sup> Option: Requires two (2) power connections. Jumper is open and paired Power 1 connector as shown in Fig III & IV. Power 2 is connected as highlighted in Fig V



Fig III

Fig IV

Fig V

The new interface for the Maestro Mini 12 Port embodies the following functionality

- ✓ Servos x 6
- ✓ Switch Relays x 2
- ✓ Sensors x 3
- ✓ PWM x 1
- ✓ Sensor Thresholds
- ✓ Sensor Triggers

Pololu-M	aestro M	onit	oring Advanced Station	-	
Servo X-Axis Servo Y-Axis Y-Trim1 Y-Trim2 X-Trim1 X-Trim2 Switch 1 Switch 2 Sensor 1 Sensor 2	0         ~           None         ~           3         ~           None         ~           None         ~           None         ~           None         ~           10         ~           None         ~	•		Set Axis Limits           X - Min           X - Max           Y - Min           Y - Max           Any-Quad           Delay           10           Act           900           X-Trim1:           X-Trim2:           Speed           0	USB mini-B connector grean USB LED GND VIN (5-16V board power) RX (TL serial injud) TX (TL se
Sensor 3 PLIM	None 🔻			Acc 0 🗸	🚆 🗔 Main Power 🚆 🗔 Servo Power 🚆 🗔 TTL Power
Device ID	12 -	?	Buggy Disabled  Stop Point 1500  Sensor Readings	- PWM Values	Sensor Thresholds
W/less Attempts	1 💌			0 🗸	Set Sensor Thresholds
Start Script	0 🔻				Record Sequence and Replay
Check Script	0 💌		Check Sensors Beadings		
Stop So Reset E	ripts rrors		Auto Get Sensors		Track 1 V Play 1 V

### Sensor Threshold management

To manage the sensor threshold settings please click on the 'Set Sensor Thresholds' button and the following dialogue will launch as shown below:

Theshold	Settings		×
	All Clear Safe	Caution	Altert
Sensor 1	50 👻 100 👻	160 🖵	160+
Sensor 2	► 100 ▼	150 🖵	150+
Sensor 3	<mark>► 100 -</mark>	150 🖵	150+
Sensor 4	<b>100</b> -	150 🖵	150+
Sensor 5	<b>100</b> -	150 🖵	150+
Sensor 6	1140 👻 234 👻	251 -	251+

### Sensor Trigger Management

To manage the Trigger Rules bases on Sensor readings, please 'Double Click' on the sensor indicators as shown via the green arrows below:



The Sensor Trigger Rules dialogue will launch as shown below:

靈 4	Action Rules		1.1		10.00	500	-	×
=	0 -	Port 0	•	Value	0 •	Run Script #	Inactive 💌	C Active
>	0 💌	Port 0	•	Value	0 •	Run Script #	Inactive 💌	C Active
<	0 💌	Port 0	•	Value	0 •	Run Script #	Inactive 💌	C Active
					Finished			

### **Features**

- Sensor Trigger Actions
  - o Run Script
  - o Move Servo
  - o Turn On/Off Switch

Maestro Mini's 12 Topology



## Maestro Mini's 12 Port (2<sup>nd</sup> Version)

The new interface for the Maestro Mini 12 Port embodies the following functionality

- ✓ Servos x 6
- ✓ Sensors x 6
- ✓ Sensor Thresholds
- ✓ Sensor Triggers

A Maestro	Monitoring A	Advanced Station 6 Sensors No PWM	Yes	×
Servo X-Axis Servo Y-Axis Y-Trim1 Y-Trim2 X-Trim1 X-Trim2 Sensor 1 Sensor 2 Sensor 3 Sensor 3 Sensor 4 Sensor 5	None   None  Non		Set Axis Limits           X - Min           X - Max           Y - Min           Y - Min           Y - Max           Any-Quad           Delay           Delay           Act           900           X-Trim1:           Y-Trim2:           Speed         0	USB mini-B connector grean USB LED GND VIN (5-16V board power) RX (TTL serial input) TX (TTL serial input) RST (board reset) ERR (error output) TXIN (deisy-chain input) red status LED yellow status LED VISRV=VIN jumper + - (VSRV)
Sensor 6 Device ID Wiless Attempts Start Script Check Script Stop Sc Reset E	None	Buggy Disabled Stop Point 1500 Sensor Readings	Acc 0 🗸	Main Power Concerning Servo Power Concerning TTL Power

### Sensor Threshold management

To manage the sensor threshold settings please click on the 'Set Sensor Thresholds' button and the following dialogue will launch as shown below:

Theshold	Settings	-	-	×
	All Clear	Safe	Caution	Altert
Sensor 1	50 -	100 👻	160 🖵	160+
Sensor 2	-	100 👻	150 🖵	150+
Sensor 3	•	100 👻	150 👻	150+
Sensor 4	-	100 👻	150 👻	150+
Sensor 5	•	100 👻	150 👻	150+
Sensor 6	150 👻	234 👻	251 👻	251+

### Sensor Trigger Management

To manage the Trigger Rules bases on Sensor readings, please 'Double Click' on the sensor indicators as shown via the green arrows below:



0

0 🔻

Detect Presense 👻

Camera Settings

No Camera

•

•

Ŧ

Sensor Thresholds

Track 1

Record Sequence and Replay

 $\mathbf{T}$ 

Set Sensor Thresholds

Play 1

•

Speed

Acc

25

•

Ŧ

▼ ?

•

12

1 🔻

0 🔻 🃒

10

Stop Scripts

Reset Errors

Device ID

Start Script

Check Script

W/less Attempts

**Buggy Disabled** 

Sensor Readings

R

Tracking Disabled

В

Check Sensors Readings

. . . . . . . . . . . . . . .

F

. .

Stop Point 1500

The Sensor Trigger Rules dialogue will launch as shown below:

🗿 Ac	tion Rules		-			(C.) 1.04	55	-	×
=	0	•	Port 0	•	Value	0 💌	Run Script #	Inactive 💌	C Active
>	0	•	Port 0	•	Value	0 💌	Run Script #	Inactive 💌	C Active
<	0	•	Port 0	•	Value	0 💌	Run Script #	Inactive 💌	C Active
						Finished			

**Features** 

- Sensor Trigger Actions
  - o Run Script
  - o Move Servo
  - o Turn On/Off Switch

Maestro Mini's 12 (2<sup>nd</sup> Version) Topology



### **Networkable Software Monitoring Solution**

The IP Networkable solution is engineered with business solutions in mind. The Network Module is a Peer to Peer network schema and there are two distinct applications:

- Server Application
- Client Application

The topology of solution is illustrated diagrammatically below:

### <u>Topology</u>



### Server Application

The Server Application provides Network visibility to manage and the Controller and the devices connected to the ports on the controller (Wired/Wireless). Please see below the interface and the functions therein.

### **Features**

- Declare the Port type
  - o Servo
  - o Switch
  - o Sensor
- Assign Device # to a particular Port
- Protect the connection with encrypted Password
- Support All Maestro Controllers
  - o 6 Port
  - o 12 Port
  - o 18 Port
  - o 24 Port

🛣 Listener (Meastro - 6 Port)						
Port #	Port Type	Switch Type				
0 💌	Servo 👻					
0 👻	Sensor 💌					
0 💌	Servo 👻					
0 💌	Servo 👻					
0 👻	Sensor 👻					
0 💌	Switch 👻					
0 🗸	Servo 👻					
0 🗸	Servo 👻					
0 🔻	Servo 👻					
0 🗸	Servo 👻					
0 🗸	Servo 👻					
0 🗸	Servo 👻 👻					
Page # 1st	Page	•				
# of Ports Ma	estro 6 Port	-				
Device # 12		-				
Listen Port# 盾	0391 Connect	Port# 50389				
Connect IP 0.	.0.0.0					
Password #	#######					
Initialise Listener Connected 🔽 Active						
Disconnect						
	Start Uver					
JITT-2400-551						

### **Client Application**

The Client Application provides Connectivity to the Server Application to indirectly manage the Controller and the devices connected to the ports on the controller (Wired/Wireless). Please see below the interface and the functions therein.

### Features

- Auto/Manual Sync Server Application Settings
  - o Port Type
    - Servo
    - Switch
    - Sensor
- Manage
  - o Servo Movement
  - o Toggle Switch On/Off
  - o Sensor Feedback
- AutoFetch Sensor Readings
- Sensor Trigger Actions (Launched by Double Clicking Sensor Text Box)
  - o Run Script
  - o Move Servo
  - o Turn On/Off Switch

🛣 Client (Maestro Micro - 6 Port)	
Options	
Port Type Action	
? Servo V	
Sensor 💌 🛛 🔤	
? Servo 👻	
? Servo 👻	
Sensor 👻 🛛 🛛 Get	
Switch	
? Servo -	
? Servo 🔽	
? Servo -	
? Servo V	
? Servo -	
? Servo 🔽	
Pagett 1st Page	
Sensor Fetch Inactive	Action Rules
Listen Port# E0399 Connect Port# E0391	- Dup Soriet # Justice - Dup Soriet # Justice - Dup Soriet
Connect IP 192.168.1.3	> 0 v Port 0 v Value 0 v Run Script # Inactive v Active
Password ########	
Initialise Client Connected	I value 0 value 0 value 1 v
Be-Sunc Settings Start Over	
cr1-00020000000200100-ss1	Finished

## **CMUCam2 Module**

### **Hardware Setup**







Fig 2 represents the CMUCam2Module. To quickly configure and start using the Robotic Module you need to configure the following settings:

- 1) Remove the jumper if present from the Servo Power Jumper
- 2) Connect the serial ribbon to the Serial Port pins
- 3) Connect DC (Battery or Adapter provided) to **Power** (next to the power switch as seen in Fig 2) pins
- 4) Connect DC (Battery or Adapter) to Servo Power pins
- 5) Connect Serial Cable to PC and RS232 connector on CMUCam2 unit
- 6) Switch on Power using the **Power Switch**

### CMUCam2/CMUCam3 Software Startup

Double Click Desktop Robotic Icon



Step 1

Step 2



#### Step 3

Step 4



### Step 5

Step 6



### **Software User Setup**



The above image represents the CMUCam2 Module. To quickly configure and start using the Robotic Module you need to configure the following settings:

Set the Servos X and Y – Axis connected by clicking the listbox (0 to 4) which maps back to Fig 2 Set the Switches connected clicking the listbox (Select 0 to 4) which correlates back to Fig 2 Set the activator Type (Unchecked – RCatsystems, Checked – Dimension Engineering) Set Image Delay (only potentially applicable in wireless configuration) Set Cam On (Only Registered version)

### **Options**

- I. Set Limits Servos are allowed to navigate. Simply move the circled object to the lower or upper limit and click on the corresponding Axis checkbox
- II. Click **Any-Quad** to enable both X & Y Axis to move at the same time when you click anywhere on the screen
- III. Click Power Save to conserve power when CMUCam2 is not required
- IV. Click **Track Object (Beta)**. Requires Pan on Servo Port 0 and Tilt Servo on Servo Port 1 (*Ensure Object to be tracked is near centre of cameras view*)

# **RoboBuilder Module**

## Hardware Setup

The controller unit is a closed unit so this will be more straight forward and is covered in the user manual for the RoboBuilder controller.

These simple steps must be followed:

- 1) Connect the servos to the 4 pin ports(one at a time if configuring the Servo ID is recommended)
- 2) Connect the Distance sensor which is a 5 pin port at the top surface
- 3) Verify the controller has the Tri-Axis unit installed (if not will have to be soldered and is covered in the Robobuilders literature)
- 4) Recharge the battery by plugging in the AC/DC Adapter and holding down the selector button as you turn on the unit until they blink Red and Green. It is wise to double check the manual in case the Firmware has changed after writing of this user guide and the selection and visual has changed

### **RoboBuilder Software Startup**

Double Click Desktop Robotic Icon

Set Delay Robobuilder Module -Ok

### Step 1

Step 2



### Step 3

Step 4



#### Step 5

Step 6



### **Software User Setup**



The above Form is used to configure the key attributes of the 1 to 6 servos

- Servo ID
- > Speed
- > Torque
- Position
- Direction
- Continuous motion

It is best practice to configure the ID for each servo with only that servo connected to ensure you do not accidentally set all servos with the same ID.

The following are the steps to get started:

- 1) Select if on a Robobuilder Controller or a Roboard G
- 2) Set Servo ID via Servo Configure button
- 3) Set Torque, Speed & Position see **D**, **E & F** in above Form. Default settings are adequate
- 4) Set Direction (Clockwise/Anticlockwise) B
- 5) Set Continuous(Behaves as a wheel) A
- 6) Allow free movement by removing holding force on Servo C



After the configuration is set you can then explore the other buttons:

- Read Position & Velocity
- Show Sensor Panel
- ≻ HuD

The **Read Position & Velocity** button returns the values of the all the connected and configured servos with respect to current Position, Speed and Torque,

The Show Sensor Panel shows the Analog sensors available

- ✓ Distance
- ✓ Tri-Axis readings (X, Y & Z)
- ✓ Sound
- ✓ Battery level
- ✓ Button Pressed indicator

(Note the checkbox next to each sensor must be checked for the system to return a reading when the **Check Sensor** button is pressed)

A Heads Up Display(He	uD RoboBuilder - Car Wheels	
Going Forward Servo 1	Auto Sensor 🔽 Get Sensors 🔵 🔵 🔵	
Servo 2	Speed L:0/R:0	
Servo 3		
Servo 5		
Servo 6		)
Servos Off 🔲 ShutDo <del>w</del> n 🗖	START	
Havimo 1.x 🔽	Img Fast Sensor Settings	
Engine 🔴 🔵	Delay Ser Sensor Thresholds	
- Play Stored Sequences-	Enabled 0	

The HuD is the Vehicle cockpit (available only in Registered version). As shown below in the HuD Display.

Each of the Six (6) distinct servo groups defined in the previous panel can be selected for unique tasks, by select 1 of the 6 listboxes:

- Wheel1 (Applies only to continuous motion set servos)
- Wheel2(Applies only to continuous motion set servos and a Tank track type vehicle build)
- Turret (To move a mounted device)
- Steering (To guide the vehicle Not a Track type vehicle)

### Sensor Options

- Capture Image Click on Img Slow
- Read Sensors(6 Max) Click button Get Sensor or click Auto Sensor to check every 30 secs. The sensors reported will be based on the sensors you ticked in the previous panel
  - o Sensor Threshold Management (Details on next page)
  - Trigger Rules for Sensor Readings (Details on next page)

#### Sensor Threshold management

To manage the sensor threshold settings please click on the 'Set Sensor Thresholds' button and the following dialogue will launch as shown below:

2 Theshold	Settings	-	-	×
	All Clear	Safe	Caution	Altert
Sensor 1	50 -	100 👻	<mark>160 🖵</mark>	160+
Sensor 2	-	100 👻	150 👻	150+
Sensor 3	-	100 👻	150 👻	150+
Sensor 4	-	100 👻	150 👻	150+
Sensor 5	-	100 👻	150 👻	150+
Sensor 6	150 -	234 👻	251 👻	251+

#### Trigger Rules

To launch the Trigger Rules dialogue simply '*Double Click*' on the Sensor colour indicator and the following dialogue will launch:

🚳 Hu	D Actio	n Rules	-		-		~		_	- 1	×
=	0	•	ID	0	•	Value	0	•	Play Sequence #	Inactive 💌	C Active
>	0	•	ID	0	•	Value	0	•	Play Sequence #	Inactive 💌	C Active
<	0	•	ID	0	•	Value	0	•	Play Sequence #	Inactive 💌	C Active
							Fin	ished			

#### **Features**

- Sensor Trigger Actions
  - o Run Sequence
  - o Move Servo
  - Continuous Motion (Forward/Reverse/Stop)

To get started follow these three(3) easy steps:

- 1. Select the Servos to be used and what task they must perform
- 2. Click on Servos Off
- 3. Click on Start Image

That's it! The servos will respond to every move you make by dragging the objects on the Cockpit view

# **Robotis Module**

### Hardware Setup



The controller unit is a closed unit so this will be more straight forward and is covered in the user manual for the RoboBuilder controller.

These simple steps must be followed:

- 1) Connect the servos to the controller (CM510, CM7, CM5, CM2+ or Roboard)3 pin (AX Servo) or 4 pin (DX, RX or EX Servo) ports(one at a time if configuring the Servo ID is recommended)
- 2) Connect the sensors
  - a. Using the Aux ports on the controller
  - b. Using 3<sup>rd</sup> party capture devices on the 3pin port (Half Duplex)
  - c. Using 3<sup>rd</sup> party Sensor interface on the 3 pin ports (Half Duplex)
- 3) Recharge the battery by plugging in the AC/DC Adapter

### **Robotis Software Startup**

Double Click Desktop Robotic Icon



Step 1

Step 2



#### Step 3

Step 4



#### Step 5

### Step 6



### Software User Setup



The above Form is used to configure the key attributes of the 1 to 6 servos

- Servo ID
- > Speed
- > Torque
- Position
- > Direction
- Continuous motion

It is best practice to configure the ID for each servo with only that servo connected to ensure you do not accidentally set all servos with the same ID.

The following are the steps to get started:

- 1) Select if on a Robotis Controller, USB2Dynamixel or a Roboard G
- 2) Set Servo ID via Servo Set button
- 3) Set Torque, Speed see **D**, **E** in above Form. Default settings are adequate
- 4) Set Direction (Clockwise/Anticlockwise) C
- 5) Set Continuous(Behaves as a wheel) A
- 6) Set real time interaction as you change Servo attributes F
- 7) Free roaming on Servo by removing holding force on Servo B

Vehicle Control AX/RX/EX Servos - Direct BUS								
			Sensor Readings L C B					
1 = Left Front 2 = 7	1stTurret 3 🚔 🕋	Right Front						
		<b>P</b> Far						
		Sound						
		Light						
			Get AXS1					
Left Back	2nd Turret	Right Back Ports (0-5)						
		<b>P</b>	Get IOBoard ID 122 💌					
		Ports						
		(0 - 5)						
Auto 🔲 Dynamixel Direct 💽 Init Controller	Process Read All Servo Set HuD	lide Sensor Panel	Get CM(510/7)-Aux					

After the configuration is set you can then explore the other buttons:

- ➢ Read All
- Process
- Show Sensor Panel
- ≻ HuD

The **Read All** button returns the values of the all the connected and configured servos with respect to current Position, Speed and Torque,

The Show Sensor Panel shows the Analog sensors available

- ✓ Get AXS1 Distance , Light and Sound
- ✓ Get IOBoard 3<sup>rd</sup> Party Sensor interface supports 6 Analog Sensors
- ✓ Get CM Aux Read 6 Analog sensors via the CM Controller Aux

(Note the checkbox next to each sensor must be checked for the system to return a reading when the **Check Sensor** button is pressed)

A Heads Up Display(Hu	uD RoboBuilder - Car Wheels	
Going Forward Servo 1	Auto Sensor 🔽 Get Sensors 🔵 🔵 🔵	
Servo 2	Speed L:0/R:0	
Servo 3		
Servo 4		
Servo 5		
Servo 6		
- Settings-		
Servos Off	STARLY	
ShutDown	Img Slow	
Havimo 1.x 🔽	Img Fast Sensor Settings	
Engine 🔵 🔵	Delay J Set Sensor Thresholds	
Play Stored Sequences	Enabled 0  Play Sequence	

The HuD is the Vehicle cockpit (available only in Registered version). As shown below in the HuD Display.

Each of the Six (6) distinct servo groups defined in the previous panel can be selected for unique tasks, by select 1 of the 6 listboxes:

- Wheel1 (Applies only to continuous motion set servos)
- Wheel2(Applies only to continuous motion set servos and a Tank track type vehicle build)
- Turret (To move a mounted device)
- Steering (To guide the vehicle Not a Track type vehicle)

# Sensor Options

- Capture Image Click on Img Slow
- Capture Image Click on Img Fast (Only USB2Dynamixel or Roboard ver 2)
- Read Sensors(6 max) Click button Get Sensor or click Auto Sensor to check every 30 secs. The sensors reported will be based on the sensors you ticked in the previous panel
  - o Sensor Threshold Management (Details on next page)
  - Trigger Rules for Sensor Readings (Details on next page)

### Sensor Threshold management

To manage the sensor threshold settings please click on the 'Set Sensor Thresholds' button and the following dialogue will launch as shown below:

Theshold	Settings	-	-	×
	All Clear	Safe	Caution	Altert
Sensor 1	50 -	100 👻	<mark>160 🖵</mark>	160+
Sensor 2	-	100 👻	150 🖵	150+
Sensor 3	-	100 👻	150 👻	150+
Sensor 4	-	100 👻	150 👻	150+
Sensor 5	-	100 👻	150 👻	150+
Sensor 6	150 -	234 👻	251 👻	251+

### Trigger Rules

To launch the Trigger Rules dialogue simply '*Double Click*' on the Sensor colour indicator and the following dialogue will launch:

🌆 H	luD Actio	n Rules	-		-	and the second s	x
=	0	•	ID	0 -	Value 0	Play Sequence # Inactive	Active
>	0	•	ID	0 💌	Value 0	Play Sequence # Inactive	Active
<	0	•	ID	0 🗸	Value 0	Play Sequence # Inactive	Active
					Finished		

### **Features**

- Sensor Trigger Actions
  - o Run Sequence
  - o Move Servo
  - Continuous Motion (Forward/Reverse/Stop)

To get started follow these three(3) easy steps:

- 4. Select the Servos to be used and what task they must perform
- 5. Click on Servos Off
- 6. Click on Start Image

That's it! The servos will respond to every move you make by dragging the objects on the Cockpit view

# C328/C329/4D uCam 232/TTL Modules

### Hardware Setup



The setting up of the hardware is carried out in three(3) easy steps

- 1) Connect the C328 camera to the above interface board via the coloured wires provided (Red +V, Green-Tx, Yellow- Rx, Black-Gnd).
- 2) Connect power using the adapter plug or the battery socket connector
- 3) Connect the serial cable DB9 tot eh PC and the interface board

#### **C328 Software Startup**

Double Click Desktop Robotic Icon



Step 1

Step 2



#### Step 3

Step 4



#### Step 5

### Step 6



## C328/C329/0V528 Software Setup

🐼 Remote Camera Monitoring - InActive		×
	0, 0	
NO PHOTO		
AVAILABLE		7, 7
Image Grab Settings	Image Detection	
Camera C328 Colour 💌 Size Small 80x60 💌 Archive 🗖	Sensitivity 25	X-Coord
Detection     Detect Presense     Initialise       Progress     Get Picture     Auto Fetch Image	Re-Init at 64   Image Selection	Y-Coord

Remote Camera Monitoring - InActive	
NO PHOTO AVAILABLE	0, 0
	7,7
Image Grab Settings	Image Detection
Camera C329 Colour Size Medium 160x120  Archive	Sensitivity 25 🚽 X-Coord
Detection Detect Presense	Re-Init at 64 Y-Coord
Progress Get Picture Auto Fetch Image	Image Selection

The C328 Module is one module that is fully functional in the UnRegistered version of the Robotic software. To get started is quite easy:

- 1) Click Initialise Button
- 2) Click Get Picture for manual capture
- 3) Check Auto Fetch to automatically capture images every 1 to 20 seconds

# **Wireless Support**

### **Wireless Software Options**

Below illustrates the various settings available to support wireless communication using the XBee technologies and devices:



**Transmission Options:** 

- Wireless Parser Delay Compensate (0-Pololu, 1-All other controllers)
- Wired no Msg parsing Standard for wired connection
- > Wireless w/Delay & Msg parsing Wireless connection with poor transmission throughput
- Wireless w/No Delay & Msg parsing Standard for Wireless connection

### **Wireless Hardware**



Wireless Drivers

Driver Support Downloads

# **Joystick Configuration**

The following configuration permits the user to interact with the robotic components (Servo/Switches). The user dialogue is extremely user friendly and highly fault tolerant.

👼 Jostick Con	figuration - No Jo	ystick at Game Port 0			×
Joy X-Axis Port - 0 Joy Y-Axis Port - 2			1st Trigger Port is Not Ac Joy Game Port 0	tive 2nd Trigger tof Axes	Port is Not Active
Joy Z-Axis F	Port - 1 Minimun	Maximum	Buttons		
X-Axis	-1 Se	t J Set	#1 .1	#2 .1	#3 .1
Y-Axis	-1 Se	t .1 Set			
Z-Axis	-1 Se	t -1 Set	Set MotionButton 1	Set Button 2	Set Button 3
			Reset		

# Acknowledgments

We would like to acknowledge the credits to the manufacturers of the hardware for which the Robotic Software is compatible. All images of the hardware are the sole property of the respective manufacturer. Below are the links of the hardware manufacturers for your easy reference to technical documents.

Pololu – <u>http://www.pololu.com</u> CUMCam2 – <u>http://www.cs.cmu.edu/~cmucam2/</u> RoboBuilder – <u>http://www.robobuilder.net/eng/</u> Robotis - <u>http://www.robotis.com/xe/bioloid\_en</u> Hitec – <u>http://www.hitecrcd.com</u> RCatSystems - <u>http://www.rcatsystems.com</u> Dimension Engineering - <u>http://www.dimensionengineering.com/PicoSwitch.htm</u> Roboard – <u>http://www.roboard.com</u> Xbee – http:// <u>www.digi.com/getXBee</u> SparkFun – <u>http://www.sparkfun.com</u>

# **Warranty & Disclaimers**

### <u>Warranty</u>

No warranty is implied or stated for the devices managed by the Robotics Software other than the individual warranties of the hardware provided by the manufacturer or resellers of those devices. Any damage to devices, property or person(s) using any or all of the Robotics Modules is the sole responsibility and liability of the person(s) using the Robotics Software Solution with the equipment.

### **Disclaimer**

The Robotics software is intended for recreational and Hobby use only. No applications managing or monitoring critical systems is guaranteed and to implement for this purpose is at the users own risk.