ROBOTIC ARM
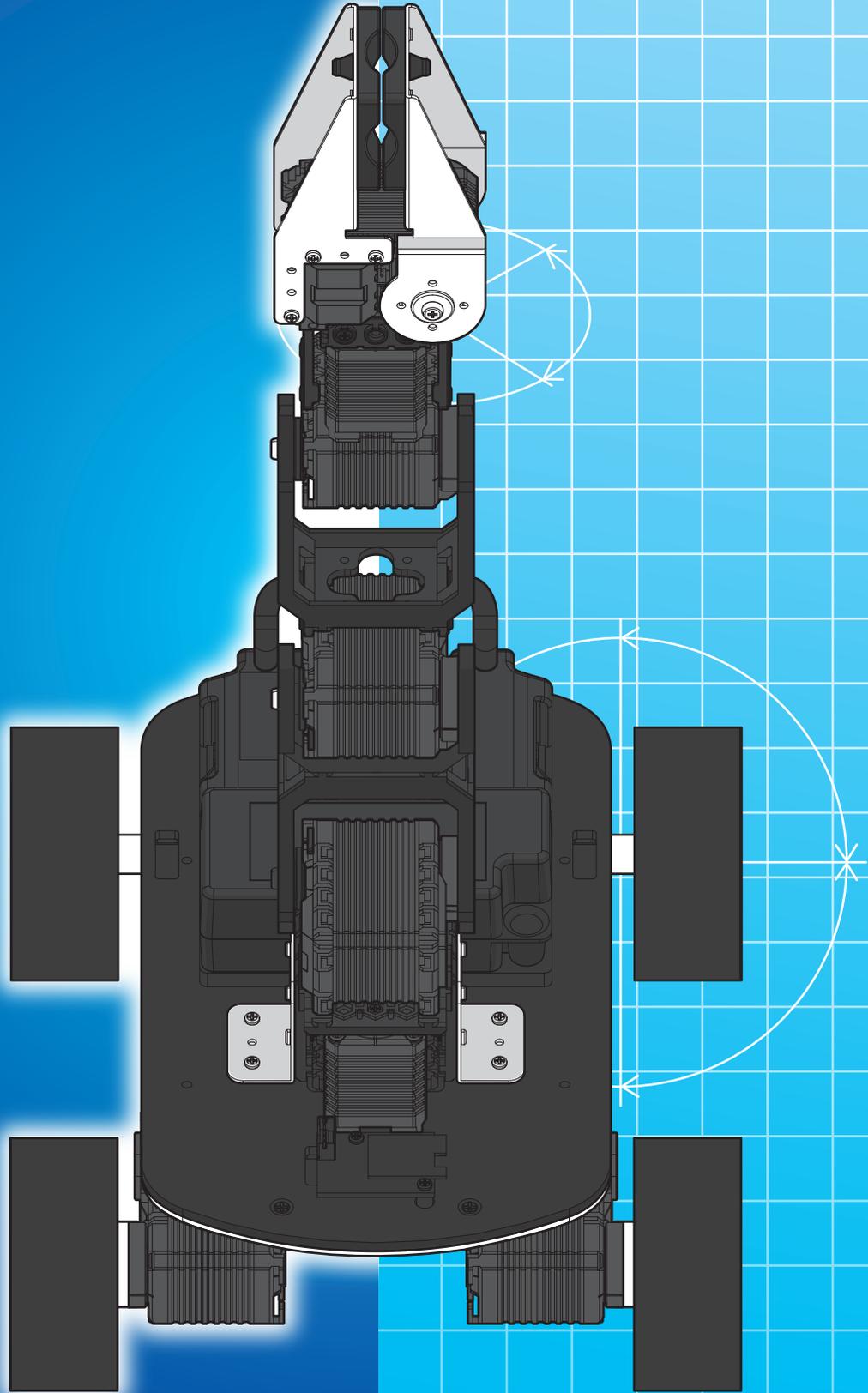
IMAGINE YOUR POSSIBILITIES

CONSTRUCT OF YOUR IMAGINATION

Safety Guideline

Please read the following information: failure to comply with provided information may lead to voiding the warranty.

This document covers safety, proper handling, and regulatory information for use of your Robotic Arm.

General Precautions

Caution: To avoid injury, damage to the robot or equipment, please follow the provided guidelines.

- Please read through the directions before starting.
- The robot is not intended for use by children under 15 years old, or any person with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless:
  - Supervised by a person responsible for the child's safety and who has read and understood these instructions.
- Keep the robot away from children under 3 years old at all times to prevent injury or damage.
- Keep components or small parts away from children.
- Keep away from pets and animals of any kind, animals may behave erratically in the presence of the robot.
- First time users should take extra care when handling the robot to minimize injury or damage.
- If the robot is operating abnormally, there is an unusual sound, smell or smoke is detected:
  - Turn the robot OFF immediately.
  - Unplug the robot.
  - Ensure the robot does not tip over or fall down.
  - Remove the battery (remove 1 screw on the back of the battery casing).
- To prevent the spread of fire, keep candles or other open flames away from the robot at all times.
- At all times, keep in mind safety first to prevent injury to individuals using or around the robot.
- Always follow installation and service instructions closely. Keep manuals for future reference.
- Review and follow all safety information provided throughout this manual.
- This guide does not cover all possible safety issues or conditions. Always use common sense and good judgment.
- Warning: Conversion or modifications to this product not expressly approved by the party responsible for compliance could void the user's authority to operate the product.
- The battery will become hot a little during charging, which is normal phenomenon.
- Please take care of this unit and its accessories, keep them clean. Please do not let this unit or accessories exposed to fire/burning cigarette, etc... Try to keep the robot and its accessories dry; please do not let this unit exposed to water or moisture.
- Please do not break, throw or trample the robot.
- Avoid installation in extremely hot, rainy or water splashing, or being placed in high temperature or moist environment.
- Please use the accessories we match for this robot.

Safety Guideline

- Never disassemble or modify the smart servo in any way, otherwise, warranty of the product will be lost. For non-human faults or breakdown, please contact authorized distributors.
- Please unplug the charging cord from the charger after charging completed to avoid over-charging.
- Keep robot away from face and body when moving.
- Do not use any tools other than those provided in the kit.

RF Exposure Warning (Bluetooth)

The equipment complies with FCC RF exposure limits set forth for an uncontrolled environment.

The equipment must not be co-located or operating in conjunction with any other antenna or transmitter.

Battery Safety Warning:

DO NOT throw the battery in fire.

DO NOT short circuit the contacts.

DO NOT disassemble the battery.

DO NOT throw the battery in municipal waste.

The symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

Important Notice for Use in Healthcare Environments:

XYZprinting Inc. products are not medical devices and are not listed under UL or IEC 60601 (or equivalent).

You can find th User Guide, the Technical Guide and these Safety Instructions ("Documentation"), visit the following:

http://www.xyzrobot.com

You can contact XYZprinting Inc. support at:

http://www.xyzrobot.com

Safety Guideline

Handling and Personal Safety

Buttons

- Before using, take a moment to locate the Power On/Off and directional buttons and familiarize yourself with the functions.

Handling

- Handle the robot with care at all times.
- Pick up the robot by the bar in the event of the following situations:
    - If the robot comes close to danger, exposure to water, or falling off a surface.
    - Before the robot knocks over objects.
    - If the robot's operation seems erratic.
- Procedure for handling in a potentially hazardous event:
    1. Pick up the robot by bar even if it is still moving.
    2. Press the Power On/Off button to turn off.
    3. Put the robot in the starting default posture.

Refer to the User Guide for powering on instructions.

- In case of a power emergency, do not touch the robot.

⚠ **CAUTION:**

Pinching Hazard

- Avoid carrying and touching the robot when it is moving, walking or getting up to avoid getting pinched.
- Keep hand and fingers out of the joint areas to avoid getting caught in between.
- To avoid injury, do not place your hands in any joint to prevent damage or personal injury.
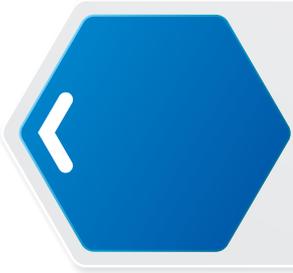
General

IMPORTANT:

- The robot requires a clean work space to move around and perform activities.
- Do not insert any foreign objects into any of the component or internal cavities.
- Generally, do not allow or cause the robot to fall down.
- Do not exert strong force against the joints or actuators (smart servos).
- Do not grab and pull by the head or arms/legs to prevent exerting force on the joints.

Powering

Please read the user manual that came with the Robotic Arm. It contains important installation and safety instructions.

⚠ **CAUTION:**

The AC adapter may become hot.

- Do not use the robot when the cables are plugged in to avoid damage.
- Do not use the AC adapter to charge the battery if room temperature is above 45°C (113°F).
- For the maximum battery lifespan, fully charge the battery at least once every 3 months.
- Protect the AC adapter terminals from dirt or other foreign objects.

⚠ **CAUTION:**

To avoid electric shock:

- Do not plug the power cables into an electrical outlet if the power cable is damaged.
- During a storm, unplug the AC adapter from the socket to protect it from damage.
- Never use an AC adapter that shows signs of damage or excessive wear.

⚠ **CAUTION:**

Risk of fire or electric shock:

- Use only the provided AC power cable with the AC adapter. Use of any other power cable may damage the robot or AC adapter or affect your safety.
- There is no switch on the AC adapter; to disconnect it, pull the plug. Keep the plug easily accessible at all times to allow easy disconnection.
- Unplug the power adapter if:
    - The adapter is exposed to rain, liquid, or excessive moisture.
    - The adapter case has become damaged.
    - You suspect the adapter needs service or repair.
    - You want to clean the adapter.

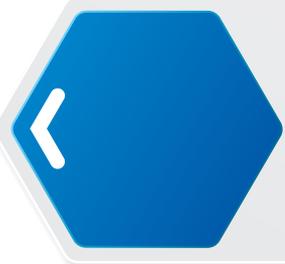# Safety Guideline

Extension Cables

⚠️ **CAUTION:**

To avoid electric shock:

- Do not use multiple socket adapters or power extension cables that bypass the ground wire or disable grounding.
- When using a power extension cable or a multiple socket adapter, make sure it is grounded and has sufficient current rating. No more than one extension device at a time is recommended for use.
- If using a multiple socket adapter, take care when plugging the power cable, as some types allow incorrect plugging which could result in permanent damage to the robot, as well as cause possible electric shock and/or fire damage.
- Do not plug the robot power cables into an electrical outlet if the power cable is damaged.
- Do not connect or disconnect the power adapter with wet hands.
- Plug the robot power cables only into properly grounded electrical outlets.
- Do not use adapter plugs that bypass the grounding feature, or remove the grounding feature from the plug or adapter.
- If using an extension cable, make sure that the total ampere rating of the products plugged in to the extension power cable does not exceed the ampere rating of the extension cable.
- Use an extension cable or power board designed for grounded plugs and plugged into a grounded wall outlet.

Working Area

- Start from the default posture before turning on the robot.
- When turned off, it is best to keep the robot in the default posture without the cable plugged unless charging.
- Before starting, make sure there is enough free space for operation. This requires a radius of at least 60 cm (24 inches) around the robot to avoid obstacles.
- Generally, leave at least 60 cm (24 inches) all around the robot to avoid damage. In particular, ensure that all cabling is removed from the usable area.
- The working surface must be dry and level; thick carpets or rugs are not recommended for operational stability.
- The robot is designed for indoor use only.
- Keep the robot away from radiators, heat sources and direct sunlight.
- Operating temperatures: between 0°C and 40°C (32°F to 104°F).
- Operating humidity range: between 20% and 80%.
- Do not leave the robot unattended on the floor.

Safety Guideline

Special Procedures

General

- Never oil the joints with any kind of lubricant.
- Do not modify or open any of the actuators.
- Do not drop, crush, bend, deform, puncture, shred, microwave, incinerate any of the components. Doing so can cause fire, electric shock, damage or personal injury.
- When handling sensitive components (e.g., printed circuit board), only hold the board by the edges to prevent damage due to electrostatic discharge (ESD).
- Do not forcibly twist the robot when the power is to prevent damaging the smart servos (acuators).
- Place the robot on a flat surface prior to the use of the remote control.

Liquid Spills

⚠️ **CAUTION:**

Use extreme caution when removing wet power cables from a power socket (or extension cable) and only attempt this if it is safe to do so:

- Liquids spilt onto the robot or AC adapter may cause a short-circuit and stop the robot from working. The warranty is automatically void if any liquid seeps inside the AC adapter, whether apparent from the outside or not.
- Do not use the robot in a wet environment.
- Do not connect or disconnect the battery or AC adapter when your hands are wet.
- Do not use the AC adapter if exposed to rain, liquid, or excessive moisture.
- Do not attempt to dry the components with an external heat source such as a hairdryer or an oven.

Procedures

- If liquid has not seeped inside the torso or battery casing:
  1. Turn off the robot.
  2. Disconnect all cables, including the AC adapter.
  3. Place the robot in the default posture.
  4. Wipe the robot completely dry.
  5. When thoroughly dry, turn on the robot to continue operation.

Safety Guideline

- If liquid has seeped inside the torso or battery casing:
    1. Disconnect all cabling from the power socket then disconnect the other cabling end from the robot.
    2. Turn off the robot.
    3. Place the robot in the default posture.
    4. Dry the robot as much as possible.
    5. Disconnect and remove the battery casing.
    6. Let the robot air dry completely before installing the battery casing.
    7. Once completely dry, install the battery casing.
    8. Turn on the robot.

NOTE: For information on your warranty coverage see the Warranty in this assembly manual.

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Prerequisites

Windows Operating System Requirements

- Windows 7 or later. Including both 32-bit and 64-bit versions
- Microsoft .Net Framework 4.5

Mac Operating System Requirements

- Mac OS X 10.8 or later

Arduino

- Arduino IDE 1.0.6

Getting Started

Introduction

The Firmware includes a XYZrobot Editor to help you define and edit action sequences. The XYZrobot Editor is easily installed on your computer, and designed to interface with current Bolide and future models.

XYZrobot Editor

The XYZrobot Editor is the software included with your Robotic Arm robot package. The software is compatible with both Windows and Mac OS operating systems. The XYZrobot Editor allows you to create a wide variety of standard and unique poses for your Robotic Arm, which are easily edited and stored. The software will also allow you to create action sequences, by combining the pose list in any number of combinations.

For more information about the XYZrobot Editor, visit XYZprinting Inc. at:

http://www.xyzrobot.com

Firmware

The software pack includes the following items:

- Arduino
- Arduino Library and Hardware for Bolide Y-01
- RCK100_6DOF_Wheel Firmware (download the firmware appropriate to your product.)

‹02 Setup Your Robotic Arm

Setup Your Robotic Arm

Requirements

The following list outlines prerequisites for the installation process.

1. Assembly the Robotic Arm; see the Robotic Arm Assembly Guide.
2. Download the **Firmware** from www.xyzrobot.com.

Overview of Installation Process

Review all instructions and information prior to starting the actual installation, to avoid hardware damage, difficulty during installation, or personal injury.

The document is organized to give the reader a straightforward account of the installation process. The sections are ordered sequentially as follows:

- Installing the XYZrobot Editor Software
- Installing Arduino Application
- Installing the Robotic Arm Firmware

Setup Your Robotic Arm

02›

Installing the XYZrobot Editor Software

Overview

The XYZrobot Editor is designed specifically to allow for easy creation of poses and action sequences for use with the Robotic Arm.

Prior to installation, you will need to have the Adruino software and the Bolide driver code installed on your computer system and MCU board, respectively.

See the following section for step-by-step instructions on installing the XYZrobot Editor software.
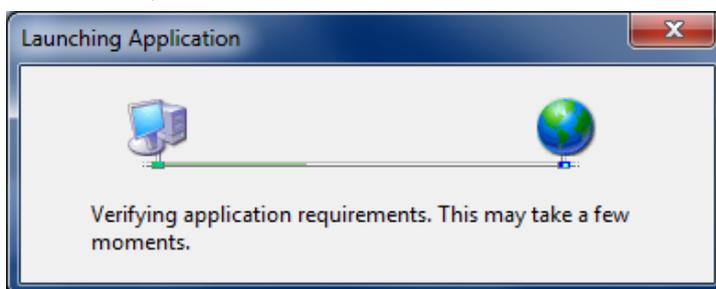
Installing the XYZrobot Editor

Before installing the Editor, download the driver from http:\\www.xyzrobot.com.

1. Locate the downloaded driver file.

2. Click **setup.exe** to run the application.

   The Launching Application window displays. Follow the on-screen prompts to continue.

   NOTE: At the time of writing, the file and folder names were under development. File and folder names may differ after production.

3. Click **Install** to install the XYZrobot Editor.
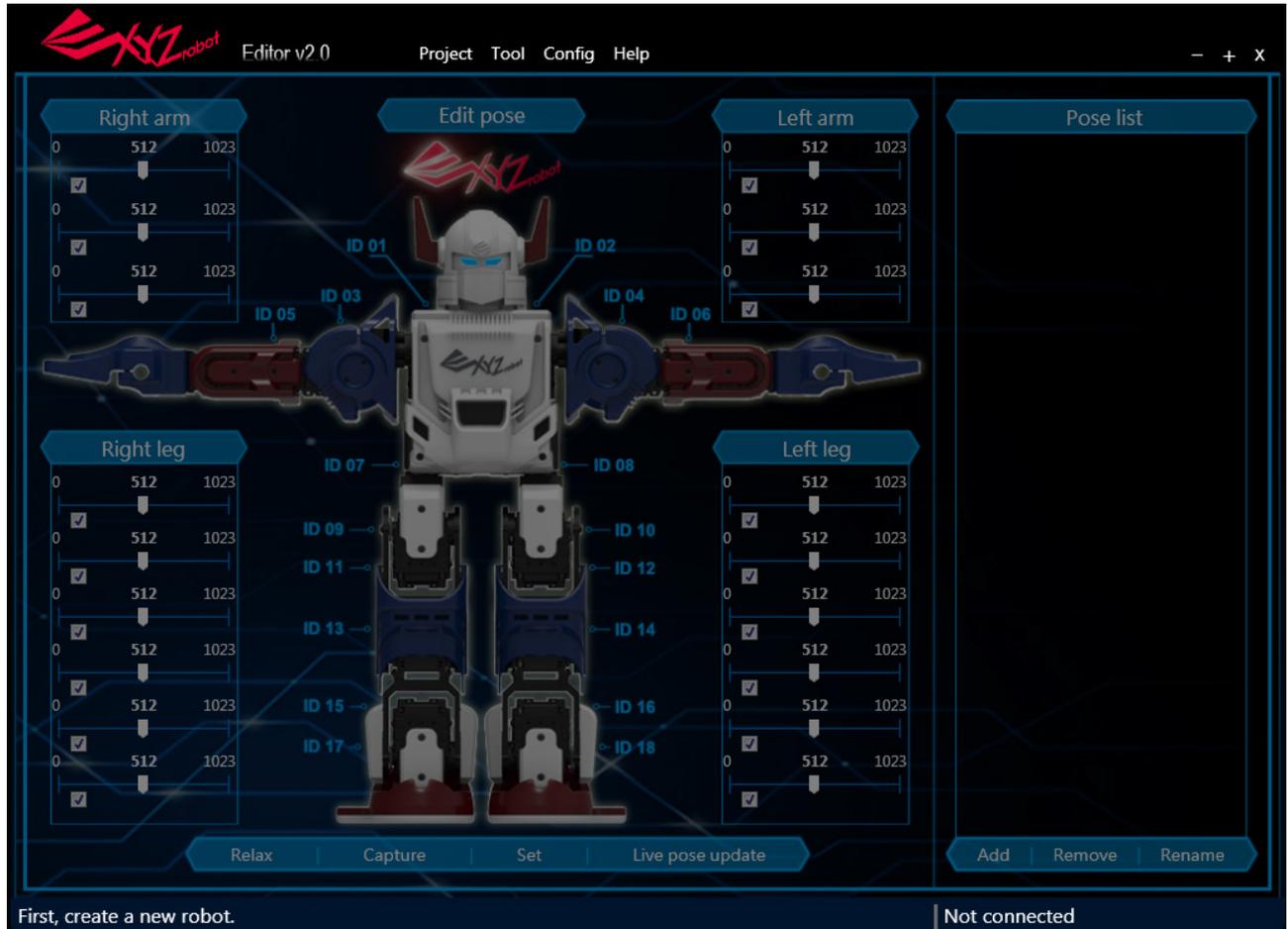
A status screen displays the installation status. Once the installation is complete, the XYZrobot Editor software opens.

NOTE: The default screen may not reflect your actual device.

NOTE: A security prompt may display requiring authorization to open the software. To continue with the procedure, click **OK** to continue or cancel to end the process.

Uninstalling the XYZrobot Editor

To uninstall the XYZrobot Editor software, follow these step-by-step instructions.

1. Close the XYZrobot Editor.
2. On Windows, click **Start > Control Panel** to open the computer's settings menu.
3. Click **Uninstall** a program to open the Uninstall or change a program menu.
4. Select XYZrobot Editor v1.0 from the list and click **Uninstall/Change**.

For Mac users:

1. Drag the app from the Applications folder to the Trash (located at the end of the Dock).
2. Choose **Finder > Empty Trash**.

The XYZrobot Editor application is removed from the program list.

WARNING: Emptying the Trash bin permanently removes the content, which is no longer available.

NOTE: The screens and procedure may vary slightly depending on the operating system in use.

Updating the Software

During the course of normal operations, the XYZrobot Editor automatically checks for updates and installs them. When new updates are available, you are notified before the process starts.

Arduino Application

Before you begin using the XYZrobot Editor, install and configure the Arduino application. The application is required to install the Robotic Arm drivers on your computer.

NOTE: Prior to connecting the Robotic Arm to your computer, it may be necessary to update the USB drivers on your system. See *"Installing a USB FTDI Driver"* *on page 44*.

Arduino 1.0.6 Version

The Firmware supports Arduinio 1.0.6.

The Firmware allows you to continue using the current 1.06 version without the need for reinstallation.

Installing an Arduino Package

The Installer Version allows you to fully install the Arduino application in your computer system. For this version, you will need admin priviledges to being the installation process. If you do not have admin privileges, see your network administrator or use the Non-+Admin Installation version.

1. Download the Arduino software; note only version 1.0.6 is supported.
    - Windows: http://arduino.cc/download.php?f=/arduino-1.0.6-windows.exe
    - Mac OS X: http://arduino.cc/download.php?f=/arduino-1.0.6-macosx.zip
2. Click the installer file to start the installation process.
3. The Installation Options prompt displays; click on the components to de-select from the installation process. By default all components are pre-selected.

Installing Arduino for Non-administrators

The Non-Admin version is a standalone package capable of running on your system without the need to initiate the installation process. This version is not installed onto the operating system and is not registered within the system registry. It can only be accessed by opening the executable file, provided in the software package.

1. Download the Arduino software (ZIP format), only version 1.0.6 is supported.
    - Windows: http://arduino.cc/download.php?f=/arduino-1.0.6-windows.zip
2. Once downloaded, extract the ZIP package to a desired folder on your system.

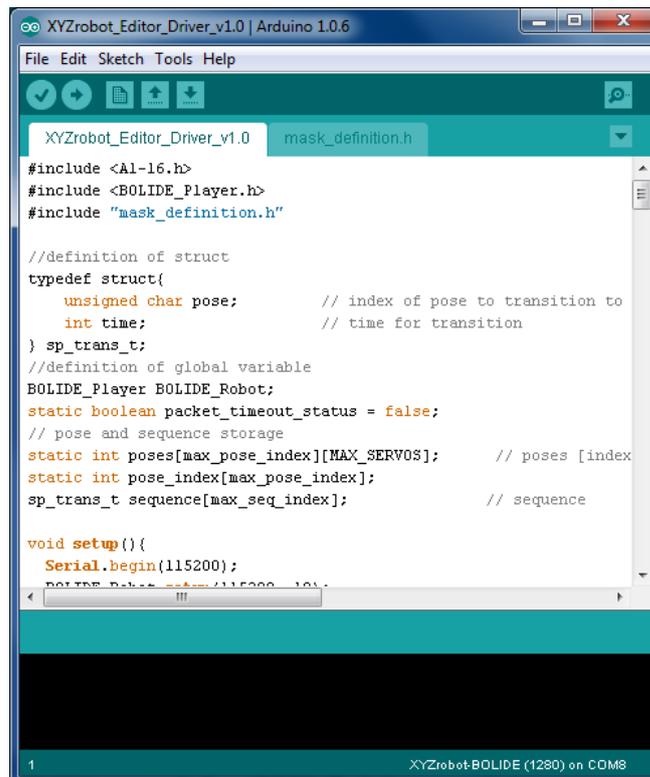The Arduino package (ver. 1.0.6) is now set up on your system.

Installing the Robotic Arm Firmware

The Robotic Arm comes with a pre-installed firmware driver. To allow you to make full use of all its features, the Robotic Arm comes with XYZrobot Editor, which allows you to create single and sequenced movement steps. The XYZrobot Editor makes use of the Arduino open-source platform, requiring the installation of Arduino on your system (if not done so at this point), and synchronizing it to your Robotic Arm.

The following instructions guide you through the complete installation of the driver required for the XYZrobot Editor.

1. Connect the Robotic Arm to your computer. Connect one end of a USB cable to the computer (USB Type A), and the other end to the Robotic Arm (USB Type Mini-B).

2. Power up the Robotic Arm; see "Testing the Robotic Arm" in the Assembly Manual.

3. Locate the Firmware and navigate to the following folder:

   Bolide_Y-01_Arduino_Support_File_20151201\XYZrobot_Editor_Driver (For the latest software visit http://www.xyzrobot.com).

4. Double click **XYZrobot_Editor_Driver.ino** to run the application.

5. From the menu toolbar, click **Tools > Board** and select the option **XYZrobot-BOLIDE**.

6. Next, select the COM port associated with the Robotic Arm. From the menu toolbar, click **Tools > Serial Port** and select the associated option.

   NOTE: If the device is not detected, the USB driver may not be recognized. The option to select the associated COM port will not be available. You will need to update or re-install the serial port drivers; see *"USB Drivers" on page 44*.
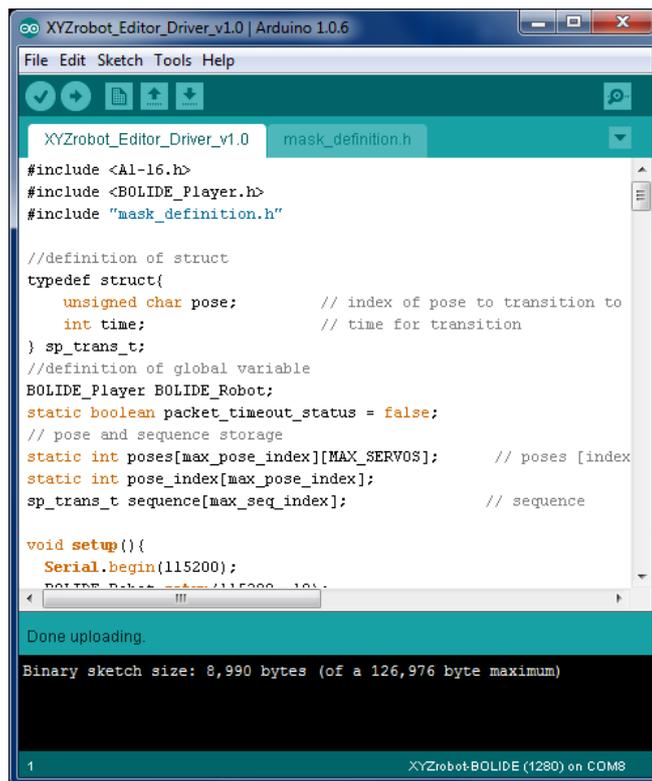
7. Click [✓] (Verify) to compile the codes.

   After compiling, the message **Done compiling** displays on the bottom of the frame.

   If there are no errors and the compiling is complete, upload the code to the MCU board.

8. Click [→] (Upload) to upload the codes.

   After uploading, the message **Done uploading** displays and no error is identified at the bottom of the frame.

Operations

Introduction

The following section provides a detailed description of the XYZrobot Editor's interface, including step-by-step instructions on the creation of poses and action sequences for use with the Robotic Arm robot.

Interface Menus

Main Menu

The main interface as described in the following figure is the initial display viewed when the XYZrobot Editor is opened. The following table provides a description of the menu names and a brief description of their function.

NOTE: The default screen may not reflect your actual device.
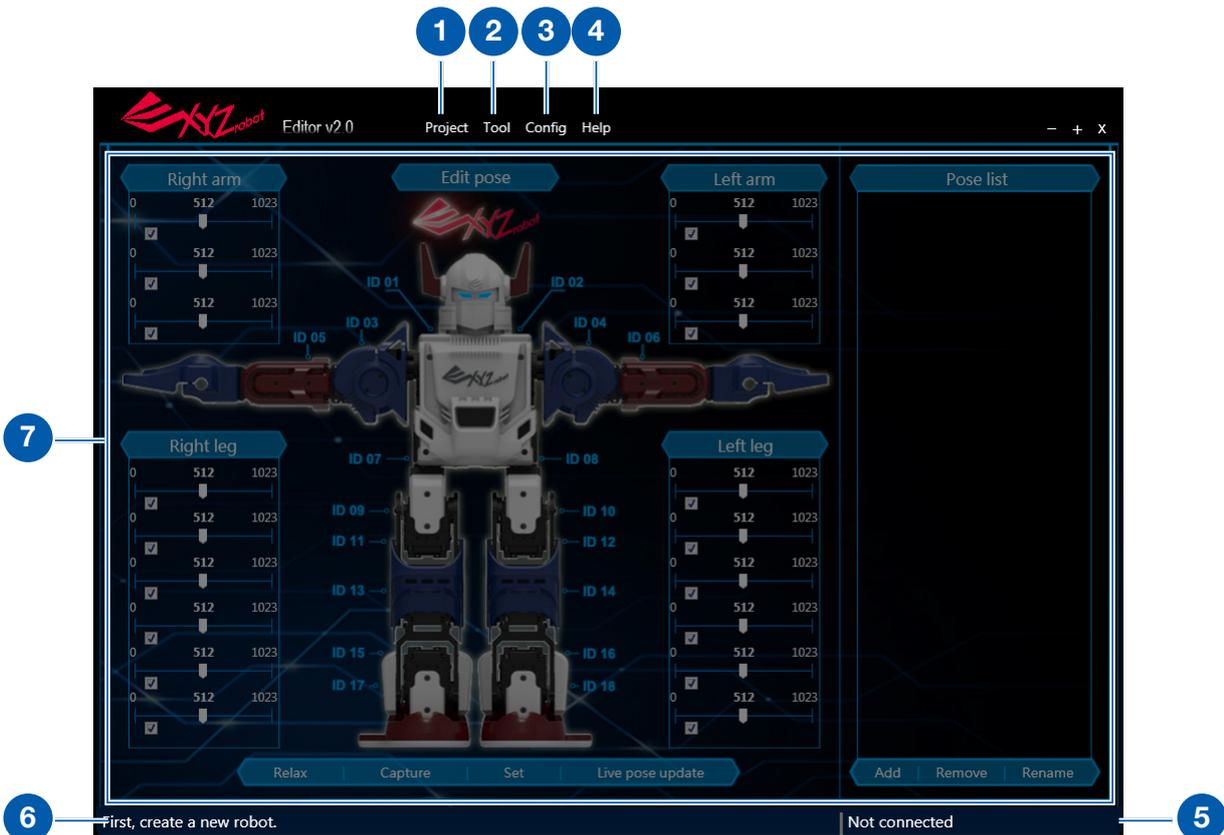
No	Item	Description
1	Project	Open to create new, open existing, save/save as projects. See *"Project"* on page 20.
2	Tool	Open to select the type of function screen to display: Pose editor, Sequence editor, Sample player, Control editor or Export to AVR. See *"Tool"* on page 20.
3	Config	Open to select the Port Settings option. See *"Config"* on page 20.
4	Help	Open to select the About, Serial number and Language settings options. See *"Help"* on page 20.

No	Item	Description
5	Connection Status	If a Robotic Arm device is detected, the dialogue displays a device connected status.
6	Description bar	The dialogue displays text description of the last initiated action.
7	Configuration Area	The configuration area displays the actual position of each smart servo, as well as editing functions to allow you to create unique movement and sequence definitions. See *"Main Menu" on page 19*.

Project

Item	Description
New	Create a new project.
Open	Open a saved project file. If a project is currently open, you will need to close it before opening the new project.
Save	Save the current project.
Save As	Save the current project under a different name.
Import	Import previously saved settings into the open project.

Tool

Item	Description
Pose editor	Switch main menu to pose editor.
Sequence editor	Switch main menu to sequence editor.
Sample player	Switch main menu to sample player.
Control editor	Switch main menu to control editor.
Export to AVR	Export the current settings to a .h file.

Config

Item	Description
Port setting	Select the current communication port.

Help

Item	Description
About	Show the information about the XYZrobot Editor.
Serial number	Show the serial number of the connected device.
Language	Select an interface language: English, Traditional Chinese, Simplified Chinese, Japaness, Deutsch, Español, Italiano, or Français.

Pose Editor

No	Item	Description
1	Pose list	Displays the list of all created pose descriptions.
2	Rename	Rename the selected pose.
3	Remove	Remove the selected pose.
4	Add	Create a new pose item.
5	Live Pose Update	Initiate to adjust the smart servo positions directly. Each setting adjustment directly moves the smart servo position. **WARNING:** The Live Pose Update allows you to directly adjust the smart servo position. Do not place your hands around the Robotic Arm. Ensure there is sufficient space around the Robotic Arm for unobstructed movement, to avoid personal injury or damage to the unit.
6	Set	Send the current desired position settings to the Robotic Arm board. The signal is then sent to each smart servo to match the desired position.
7	Capture	Capture the pose on the Robotic Arm to the corresponding smart servos, for the selected pose.
8	Relax	Stops the electric pulse signal to the smart servo, allows for manual rotation of the rotor.

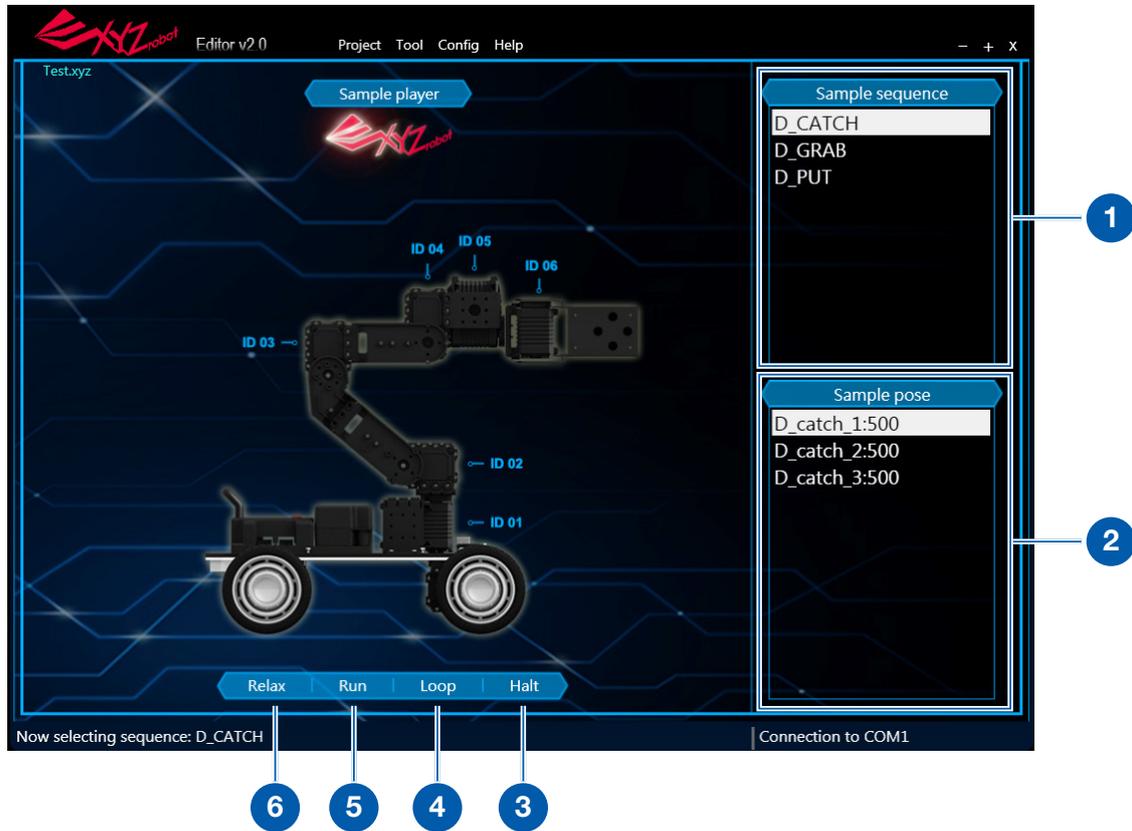| No	Item	Description
9	Smart servo ID	Click to move the slide bar and change the smart servo's actual position.
		By default, the neutral position is set at 512. A reading of 0 sets the desired position to 0° degrees, while a reading of 1023 defines a 330° turn.
		NOTE: The function is only accessible when a project is connected and a pose is selected.
10	Slide bar	Move the slide bar to manually adjust the actual position of the smart servo.
		NOTE: A reading of 0 sets the desired position to 0° degrees, while a reading of 1023 defines a 330° turn. The smart servo cannot rotate outside of these parameters.

Operations

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Sequence Editor

No	Item	Description
1	Sequence list	List the sequences.
2	Add	Create a new sequence list.
3	Remove	Remove the selected sequence.
4	Rename	Rename the selected sequence.
5	Pose list	List the pose entries for the selected sequence.
6	Delete	Delete the selected pose from the sequence.
7	Move down	Move the order of the selected pose down in the order.
8	Pose	Click the drop-down menu to select a pose.
9	Delay (ms)	Click the selector arrows to adjust the variable, or type a specific number and press **Enter** to manually set a delay variable.
10	Move up	Move the selected pose up in the order.
11	Add	Add a pose action to the sequence entry.
12	Halt	Initiate a stop command when a sequence is running.
13	Loop	Initiate a continuous run command for the selected sequence.
14	Run	Initiate a run command for the selected sequence.
15	Relax	Stops the electric pulse signal to the smart servo; allows for manual rotation of the rotor.

Sample Player

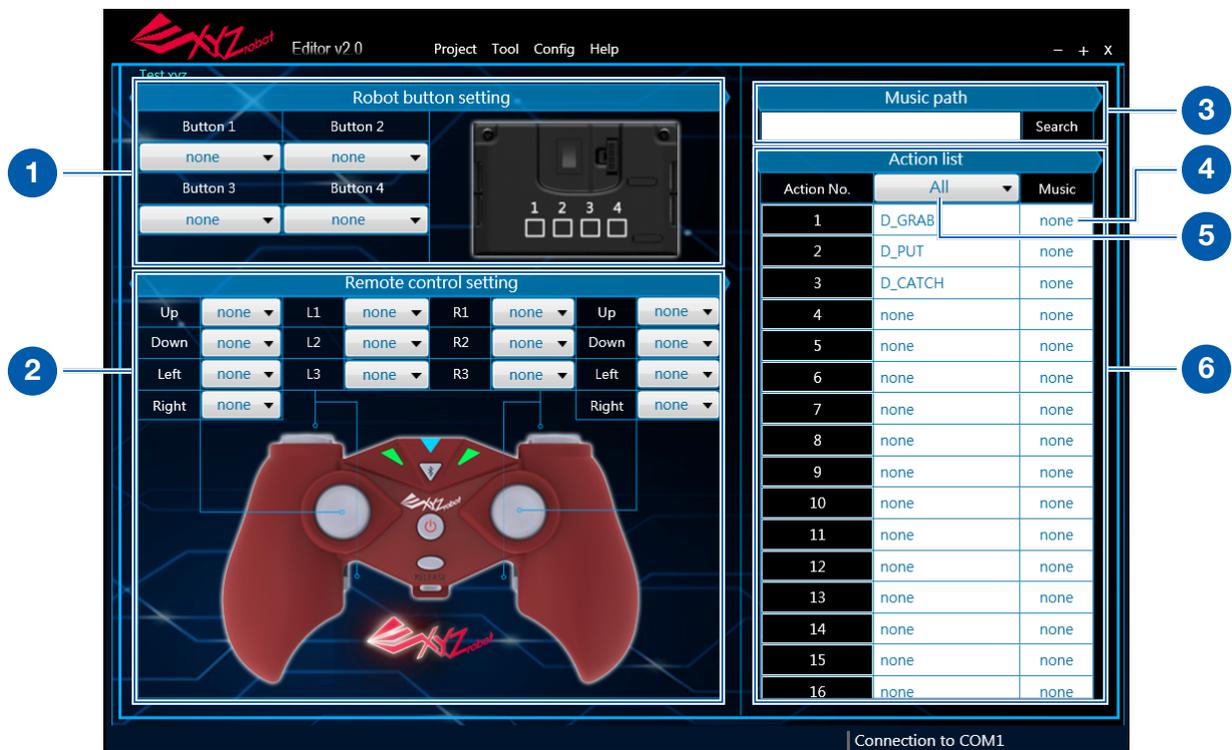| No	Item	Description
1	Sample sequence	Select a sequence entry to initiate the action sequences on the robot.
2	Sample pose	Select a pose entry to initiate the action on the robot.
3	Halt	Initiate a stop command when a sequence is running.
4	Loop	Initiate a continuous run command for the selected sequence.
5	Run	Initiate a run command for the selected sequence.
6	Relax	Stops the electric pulse signal to the smart servo, allows for manual rotation of the rotor.

Operations

Control Editor

No	Item	Description
1	Robot button setting	Click a drop-down menu to select the action entry to associate with the control panel button.
2	Remote control setting	Click a drop-down menu to select the action entry to associate with the remote control button.
3	Music path	Click **Search** to select the folder path for the audio source.
4	Music File	Click to select an audio file (WAV formats only) from the defined music path folder.
5	Action list type	Click the drop-down menu to select the type of entries to display: All, Default, Custom.
6	Action list	Click the adjacent field to select an action entry to associate with the selected action number.

Basic Editing

The XYZrobot Editor provides a simple and effective method to create, edit and remove pose and sequence entries.

The following section provides step-by-step instructions for creating complete pose and sequence entries.

Creating a Pose

Before you open the XYZrobot Editor, it is necessary to connect the Robotic Arm and computer through a USB cable.

The following procedure provides detailed instructions to allow you to create a pose:

1. Connect the Robotic Arm to your computer. Connect one end of a USB cable to the computer (USB Type A), and the other end to the Robotic Arm (USB Type Mini-B).

2. Once connected, power up the Robotic Arm, see "Testing the Robotic Arm" in the Assembly Manual.

3. Locate and open the XYZrobot Editor application.

4. From the toolbar, select **Project > New**.

5. Enter a new project name in the name field.

6. Click the **Model** drop-down field and select **Robotic Arm**.

7. Click **OK** to continue or **Cancel** to return to the previous menu.
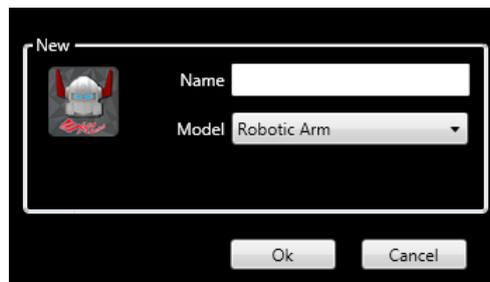
8. From the toolbar, select **Config > Port Setting** to open the option window.

9. A list of available ports displays in the window. Select the port that is assigned to the connected Robotic Arm.

10. Click **Ok** to continue.
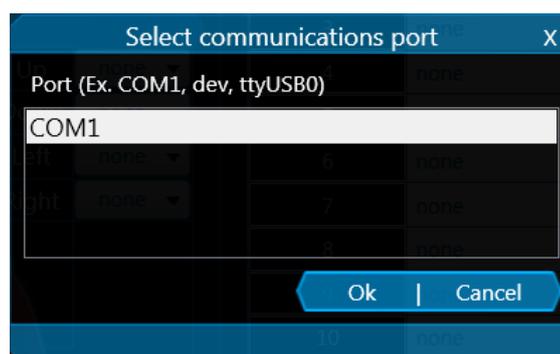
11. Select **Tool > Pose Editor**.

12. Under Pose List, click **Add** to create a new pose.

13. The New pose settings window displays. In the Pose name field, enter a name for the pose and click **Ok** to create the new entry.
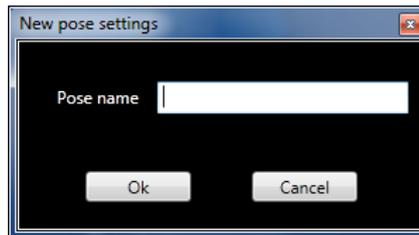
The New Pose is configured with the default settings. This function allows you to create pose entries which can be modified and saved, and used to create sequence entries.

14. Now that the pose is created, it appears in the Pose List column. Locate your desired pose entry and select it to edit the settings.

    You can edit a pose by one of two ways, physically move the smart servo position or through the use of the slide bar function in the Pose Editor. The following instructions provide a step-by-step instructions of both procedures.

    WARNING: Keep hand and fingers out of the joint areas to avoid getting caught. To avoid injury, do not place your hands in any joint.

    a. In the bottom toolbar, click **Relax** to release the smart servos and allow you to move them freely.

        NOTE: To avoid damage the Robotic Arm, please lay it down or grip it firmly by the bar on the back of the Robotic Arm (over the power switch), before clicking the **Relax**.

    b. Select a smart servo and adjust it to a desired position. This is the position that will be associated with the selected pose.

    c. Click **Capture** to save the settings to the selected Pose.

    d. Click **Set** after adjusting slide bars.

    OR

    a. Select a pose from the Pose List.

    b. Click **Live Pose Update** to adjust the actual position of a selected smart servo.

    c. Select a smart servo, and adjust the slide bar to a desired smart servo position.

    d. Click **Set** after adjusting slide bars.

    WARNING: Each servo has a limited control range:

        • ID1: 0 ~ 1023
        • ID2: 234 ~ 742
        • ID3: 252 ~ 790
        • ID4: 152 ~ 782
        • ID5: 128 ~ 896
        • ID6: 512 ~ 852

Creating a Sequence

Follow the procedure to create a sequence:

1. Connect the Robotic Arm to your computer. Connect one end of a USB cable to the computer (USB Type A), and the other end to the Robotic Arm (USB Type Mini-B).

2. Power up the Robotic Arm; see "Testing the Robotic Arm" in the Assembly Manual.

3. Locate and open the XYZrobot Editor application.

4. From the toolbar select **Tool > Sequence List**.

5. Click **Add** to create a new sequence entry. The **New sequence settings** window displays.

6. In the open field, enter the name of the sequence entry and click **Ok** to continue.
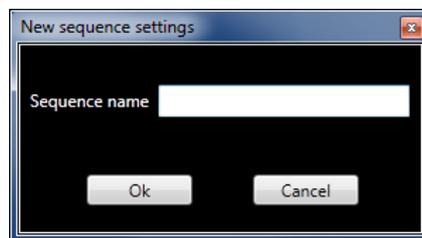
7. Under the Pose List column, click **Add** to add an available pose to the selected sequence list.

   The newly added pose entry is added to the bottom of the existing sequence list with the default Delay timer (500 milliseconds).

8. To modify the delay timer for a pose, click the **Pose** drop-down menu and click on the up and down arrows on the **Delay** frame to adjust the time (milliseconds). Alternatively, you can enter a variable by typing it in the Delay field.

9. Once you've edited the pose you will need to add it back in to the list. Click **Add** to add the pose into the selected sequence.

   You can also organize the pose order of appearance to customize the order in which the pose list is executed.

10. To re-order a pose, under Pose List, select a pose entry and click **Move Up** or **Move Down** to position the entry into your desired order.

11. Once the sequence is designed, you can initiate a test to view the pose selections performed by the Robotic Arm.

12. Select the a sequence from the Sequence List.

13. Click **Run** to run the selected sequence. Alternatively, you can click **Loop** to continuously run the selection. Click **Halt** to initiate a stop command.

Programming the Control Panel

You can customize the buttons on the control panel by designating default or custom action sequences. Before starting make sure you have already defined any custom sequences, see *"Sequence Editor"* on page 23.

1. Open XYZrobot Editor.

2. Select **Tool** > **Control editor**. The control editor screen displays.

3. In the **Music path** field, click **Search** to select the source directory for audio source. Only WAV formats are supported.

4. From the **Action list**, click the drop-down menu to select a library view type, options include: All/Default/Custom.

   - All: displays the full listing of default and custom entries.
   - Default: displays predefined sequences. Entries are defined with a D_ prefix and can not be customized.
   - Custom: display the user-creaed entries. These entries can be modified.

   NOTE: There is no default action for Robotic Arm.

5. Select an action number and click the drop-down menu to modify.

6. Scroll through the Action list library and select the list entry which will correspond to this action list entry.

7. Select an audio file to customize to this action item. Click the Music drop-down menu and select an available audio file.

Repeat this step for remaining action entries to define.

Once the action entries are defined, you can continue to the remote control settings.

8. Select a button from the Robot button setting and click on the drop-down menu.

9. From the drop-down menu, select an action number, which corresponds to the Action list, to customize the selected button.

Repeat for any remaining buttons.

In this way, the control panel buttons can be customized for defined action items.

Programming the Remote Control

You can customize the buttons on the remote control by designating default or custom action sequences. Before starting, make sure you have already defined any custom sequences; see *"Sequence Editor"* on page 23.

1. Open XYZrobot Editor.

2. Select **Tool** > **Control editor**. The control editor screen displays.

3. In the **Music path** field, click **Search** to select the source directory for audio source. Only WAV formats are supported.

4. From the **Action list**, click the drop-down menu to select a library view type, options include: All/Default/Custom.

   - All: displays the full listing of default and custom entries.
   - Default: displays predefined sequences. Entries are defined with a D_ prefix and can not be customized.
   - Custom: display the user-creaed entries. These entries can be modified.

   NOTE: There is no default action for Robotic Arm.

5. Select an action number and click the drop-down menu to modify.

6. Scroll through the Action list library and select the list entry which will correspond to this action list entry.

7. Select an audio file to customize to this action item. Click the Music drop-down menu and select an available audio file.

Repeat this step for remaining action entries to define.

Once the action entries are defined, you can continue to the remote control settings.

8. Select a button from the Remote control setting and click on the drop-down menu.

9. From the drop-down menu, select an action number, which corresponds to the Action list, to customized the selected button.

Repeat for any remaining buttons.

In this way, the remote control buttons can be customized for defined action items.

Creating an AVR Format

After customizing control panel buttons or remote control, select **Tool > Export to AVR** to save a .h file for Arduino.

The exporting function allows you to compile the sequenced information into a compiled AVR file, which turns the information into readable Arduino code.
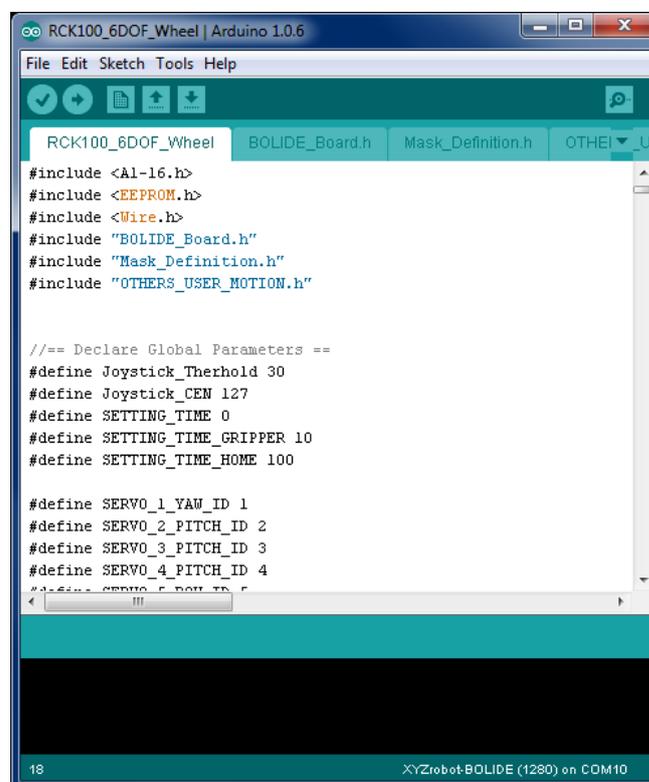
The file can be uploaded to the Arduino software library for editing, see *"Installing Robotic Arm Default Firmware"* on page 31.

NOTE: To avoid compiler errors, do not change the exported file name (OTHERS_USER_MOTION.h).

Installing Robotic Arm Default Firmware

Once the Robotic Arm firmware is uploaded to the Robotic Arm board, refer to the following section to continue configuring your device.

1. Connect the Robotic Arm and computer with a USB cable.

2. Power up the Robotic Arm; see "Testing the Robotic Arm" in the Assembly Manual.

3. Locate the Firmware and navigate to the following folder:

    Bolide_Y-01_Arduino_Support_File_20151201\Bolide_Y-01_Default (For the latest software visit http://www.xyzrobot.com)

4. Double click **RCK100_6DOF_Wheel.ino** to run the application.

5. From the menu toolbar, click **Tools > Board** and select the option **XYZrobot-BOLIDE**.

6. Next, select the COM port associated with the Robotic Arm. From the menu toolbar, click **Tools > Serial Port** and select the associated option.

   NOTE: If the device is not detected, the USB driver may not be recognized. The option to select the associated COM port will not be available. You will need to update or re-install the serial port drivers, see *"USB Drivers" on page 44.*
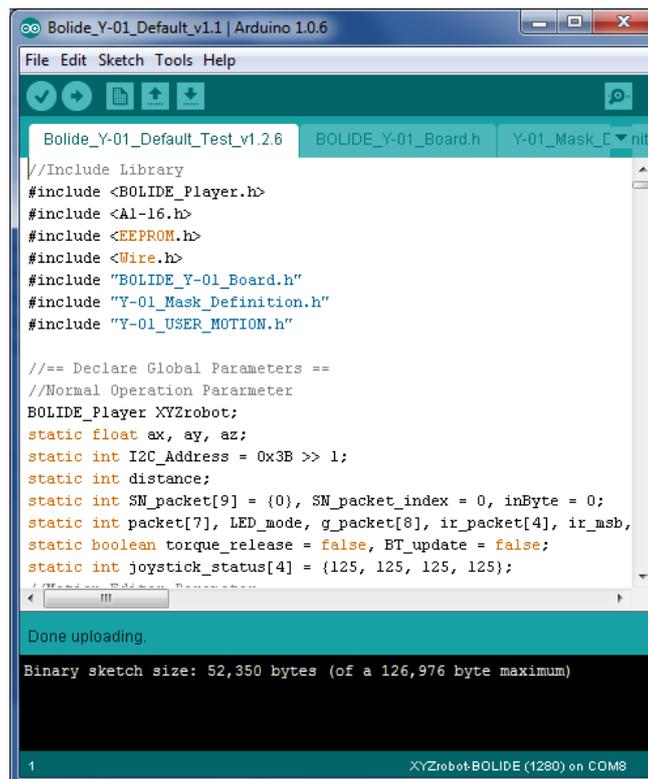
7. Click ✅ (Verify) to compile the codes.

   After compiling, the message **Done compiling** displays at the bottom of the frame.

   If there are no errors and the compiling is complete, upload the code to the MCU board.

8. Click ➡ (Upload) to upload the codes.

   After uploading, the message **Done uploading** displays at the bottom of the frame. The Robotic Arm returns to the default position and an audible alert sounds, indicating a successful upload.

Validating Environment Setup

Once the software is installed and the driver code is uploaded to the Robotic Arm, validating a successful upload is easy.

The resulting code upload will:

- Return the Robotic Arm to the default position
- An audible alert sounds indicating a successful completion of the update process.

Advanced Editing

The Advanced Editing feature provides a method for configuring the buttons on the control panel and remote control.

Once you've created a pose and sequence list using the XYZrobot Editor, you can save the list to an AVR format (see *"Basic Editing" on page 26*). The AVR file is necessary to cross reference and synchronize the pose definition library to the remote controller and buttons on the control panel.

Before You Start

The pose/sequence library can be extended through the use of the Arduino programming platform to provide a configuration function for your remote control and front control panel. This section describes the steps necessary to prepare an Adruino based pose/sequence list from an AVR file (XYZrobot Editor source file), in order to create a variable list to be used during configuration.

Creating an AVR Reference File

Before you can get started, you will need to create an AVR file which includes the list of pose and sequence entries, which will serve as the reference for the advanced configuration procedures. See *"Basic Editing" on page 26*.

To create an AVR file:

1. Select **Projector > Open** and select an .xyz file to open.

2. Select **Tool > Export to AVR** to save an .h file for use with the Arduino application.

3. Close the XYZrobot Editor.

4. Open the previously saved AVR file (*.h format).

NOTE: Open the AVR file using a general text editor (such as Notepad) as .h files cannot be opened in Arduino.

5. Once the file is open, the Pose and Sequence information is visible in the workspace in a compiled format. Copy the edited list, see the following example. The copied list will be later saved in a designated file (**OTHERS_USER_MOTION.h**), defining the pose list in the Arduino library.

```
const PROGMEM unit16_t U_p1[] = {6, 622, 251, 504, 602, 400, 625};
const PROGMEM unit16_t U_p2[] = {6, 400, 350, 400, 200, 850, 750};
const PROGMEM transition_t U_s1[] = {{0,2}, {p1,500}, {p2,1000}};
```

6. Locate the Bolide software pack and navigate to the following folder:

   Bolide_Y-01_Arduino_Support_File_20151201\Bolide_Y-01_UserMotion (For the latest software visit http://www.xyzrobot.com)

7. In the same folder, locate and open **RCK100_6DOF_Wheel.ino** file.

8. Three main tabs display. Click the **OTHERS_USER_MOTION.h** tab.

9. In the file body, locate the line section named `//===== User Define Pose ======` or `//===== User Define Sequence ======`.

10. Paste the previously copied Pose and Sequence information under the User Motion line. See the following example.

```
//===== User Define Pose ======
const PROGMEM unit16_t U_p1[] = {6, 622, 251, 504, 602, 400, 625};
const PROGMEM unit16_t U_p2[] = {6, 400, 350, 400, 200, 850, 750};
//===== User Define Sequence ======
const PROGMEM transition_t U_s1[] = {{0,2}, {p1,500}, {p2,1000}};
```

11. Click **File > Save** to save the file with the new section.

    The file is now ready for the configuration process, see ***"Programming the Control Panel"*** *on page 35* or ***"Programming the Remote Control"*** *on page 36.*

12. Under the section `=== User Sequence Setup ===`, select an entry. In the following example, the entry selection is `#define ActionNo_1 None`.

13. Under the column None, enter a name to personalize the entry. In the following example the selection is renamed U_s1; the name set here matches the name set defined in Step 12.

```
////==== User Sequence Setup ====////
#define ActionNo_1    U_s1
#define ActionNo_2    None
#define ActionNo_3    None
#define ActionNo_4    None
#define ActionNo_5    None
```

14. Save the file once you've completed the modifications. The **OTHERS_USER_MOTION.h** file is ready for use in further programming.

Programming the Control Panel

In the previous section you created an AVR file which contained the pose and sequence reference entries. The defined entries serve as the basis for the programming of the functions for each control panel button.

You can customize the buttons on the control panel with the use of the XYZrobot Editor or the Arduino application. Customizing the control panel is explained further in the following section.

Customizing Control Panel Buttons on Arduino

To program a control panel button:

1. Before starting this procedure, see *"Before You Start"* on page 33.
2. Connect the Robotic Arm to your computer. Connect one end of a USB cable to the computer (USB Type A) and the other end to the Robotic Arm (USB Type Mini-B).
3. Once connected, power up the Robotic Arm, see "Testing the Robotic Arm" in the assembly manual.
4. Open the Arduino software if it is not open already.
5. Click **File > Open** and select the source file to use in the programming. For instructional purposes, the file name **OTHERS_USER_MOTION.h** is used here.
6. To re-define the reference action of a button on the remote control, locate the section `////==== Robot Button Control & Remote Control ====////`.
7. In this step, you will modify the RB_1 definition, see the following image.
8. Sequence U_s1 was previously defined as ActionNo_1, see *"Before You Start"* on page 33. Change the RB_1 sequence to 1.

```
////==== User Motion Control ====////
//=== Robot Button ====
#define RB_1  1
#define RB_2  0
#define RB_3  0
#define RB_4  0
```

9. From the menu toolbar, click **Tools > Board** and select the option **XYZrobot-BOLIDE** option.
10. Next, select the COM port associated with the Robotic Arm. From the menu toolbar, click **Tools > Serial Port** and select the associated option.

    NOTE: If the device is not detected, the USB driver may not be recognized. The option to select the associated COM port will not be available. You will need to update or re-install the serial port drivers, see *"USB Drivers"* on page 44.

11. Click (Verify) to compile the entries.

After compiling, the message Done compiling displays on the bottom of the frame.

If there are no errors and the compiling is complete, upload the code to the Robotic Arm board.

12. Click (Upload) to upload the codes.

After uploading, the message Done uploading displays and no error on the bottom of the frame.

After uploading, use the button on the control panel to perform user action.

13. Click **File > Save** to save the file.

Control Panel Button Mapping
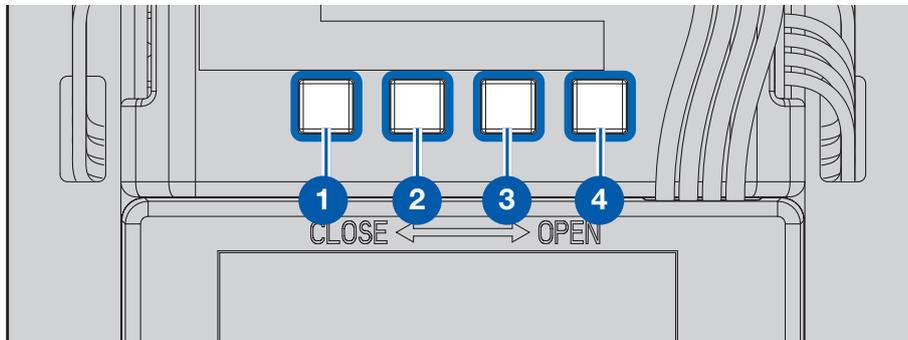
No.	Item	No.	Item
1	RB_1	2	RB_2
3	RB_3	4	RB_4

Programming the Remote Control

Now that you've defined and modified the variables referencing pose and sequence entries (see *"Before You Start"* on page 33), you can define the action to be associated with each button on the remote control.

You can customize the buttons on the remote control with the use of the XYZrobot Editor or the Arduino application. Customizing the remote control is explained further in the following section.

Customizing Remote Control Buttons on Arduino

To match the new sequence to the selected button on the remote control:

1. Before starting this procedure, see *"Before You Start"* on page 33.

2. Connect the Robotic Arm to your computer. Connect one end of a USB cable to the computer (USB Type A) and the other end to the Robotic Arm (USB Type Mini-B).

3. Once connected, power up the Robotic Arm, see "Testing the Robotic Arm" in the assembly manual.

4. Open the Arduino software if it is not open already.

5. Click **File > Open** and select the source file to use in the programming. For instructional purposes, the file name **OTHERS_USER_MOTION.h** is used here.

6. To re-define the reference action of a button on the remote control, locate the section `////==== Robot Button Control & Remote Control ====////`.

7. In this step, you will modify the RCU_LJU definition, see the following image.

8. Sequence U_s1 was previously defined as ActionNo_1, see *“Before You Start”* *on page 33*. Change the RCU_LJU sequence to 1.

```
//=== Remote Control ====
#define RCU_LJU    1
#define RCU_LJD    0
#define RCU_LJL    0
#define RCU_LJR    0
#define RCU_RJU    0
#define RCU_RJD    0
#define RCU_RJL    0
#define RCU_RJR    0
#define RCU_L1     0
#define RCU_L2     0
#define RCU_L3     0
#define RCU_R1     0
#define RCU_R2     0
#define RCU_R3     0
```

9. From the menu toolbar, click **Tools > Board** and select the option **XYZrobot-BOLIDE** option.

10. Next, select the COM port associated with the Robotic Arm. From the menu toolbar, click **Tools > Serial Port** and select the associated option.

    NOTE: If the device is not detected, the USB driver may not be recognized. The option to select the associated COM port will not be available. You will need to update or re-install the serial port drivers, see *“USB Drivers”* *on page 44*.

11. Click [✓] (Verify) to compile the codes.

    After compiling, the message Done compiling displays on the bottom of the frame.

    If there are no errors and the compiling is complete, upload the code to the Robotic Arm board.

12. Click [→] (Upload) to upload the codes.

    After uploading, the message Done uploading displays and no error on the bottom of the frame.

    After uploading, use the button on the remote control to perform user action.

13. Click **File > Save** to save the file.

Remote Control Button Mapping
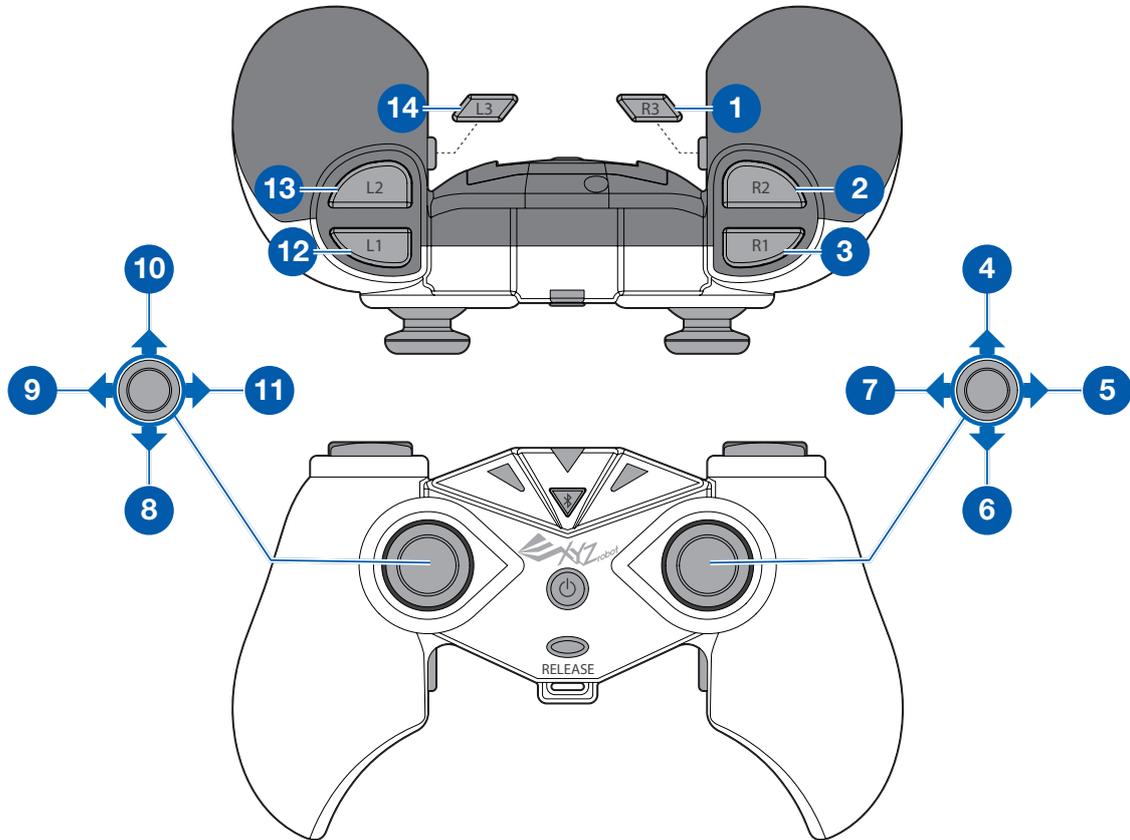
No.	Item	No.	Item	No.	Item
1	RCU_R3	2	RCU_R2	3	RCU_R1
4	RCU_RJU	5	RCU_RJR	6	RCU_RJD
7	RCU_RJL	8	RCU_LJD	9	RCU_LJL
10	RCU_LJU	11	RCU_LJR	12	RCU_L1
13	RCU_L2	14	RCU_L3		

Programming the Wheels

NOTE: The following procedure is only available for the Robotic Arm 6DW model.

You can customize the wheel control with the sequences you created in XYZrobot Editor with the use of the Arduino application.

Customizing Wheels on Arduino

To program a wheel control to a sequence:

1. Before starting this procedure, see *"Before You Start"* on page 33.

2. Connect the Robotic Arm to your computer. Connect one end of a USB cable to the computer (USB Type A) and the other end to the Robotic Arm (USB Type Mini-B).

3. Once connected, power up the Robotic Arm, see "Testing the Robotic Arm" in the assembly manual.

4. Open the Arduino software if it is not open already.

5. Click **File > Open** and select the source file to use when programming. For instructional purposes, the file name **RCK100_6DOF_Wheel.ino** is used here.

6. In the file body, locate the line section named `// Button function`.

7. In this step, you will modify the RB_1 definition; see the following image.

8. Add wheel control coding into `if(RB_1 != 0) { }` See the following example.

```
if(RB_1 != 0) {wheel_active(3,512); Action(RB_1); wheel_active(9,0);}
else {Action(52);}
```

The wheel control function is `wheel_active (int Z, int W)`

Z means direction (1 ~ 9) and W means speed (0 ~ 1023, 0 is stop).

	Definition		Definition
Z = 1	Turn right in place	Z = 2	Turn right
Z = 3	Forward	Z = 4	Turn left
Z = 5	Turn left in place	Z = 6	Backward and turn left
Z = 7	Backward	Z = 8	Backward and turn right
Z = 9	Stop		

NOTE:

- Add "; (semicolon)" after each command.
- Add `wheel_active(9,0);` to the end of the command. The wheels will not stop moving unless this command is added.
- If you need to extend the wheel moving time, add `delay(1000);`. 1000 could be any number, and the unit is a millisecond.
- Make sure the action definition in **OTHERS_USER_MOTION.h** is any number from 1~54. The default button control is 0.

External Applications

Introduction

Controlling your Robotic Arm is not limited to the remote control or the control panel. XYZprinting Inc. has designed and made available an APP for smart devices, making it possible for you to enjoy full control of your Robotic Arm. The APP is available on iOS and Android. To download your respective app, in Google Play or the APP Store use the keyword XYZrobot to locate and download the latest Robotic Arm application. To get further information on the user interface, control functions and programming, download the Robotic Arm APP user manual found on the XYZprinting Inc. website, available here: http://www.xyzrobot.com.

Mechanical Components

Additional Components

Adapters

Power cables may vary depending on regional requirements.

Control Panel

NOTE: The Robotic Arm 6DW model was used for the following procedure. Other models may be different.

The control panel consists of the power switch button along with four function buttons found just above the battery; see the following illustration.

The function buttons are pre-programmed for a specific action. They can also be manually programmed for personalized preferences.

1. Power switch
2. Function button 1
3. Function button 2
4. Function button 3
5. Function button 4
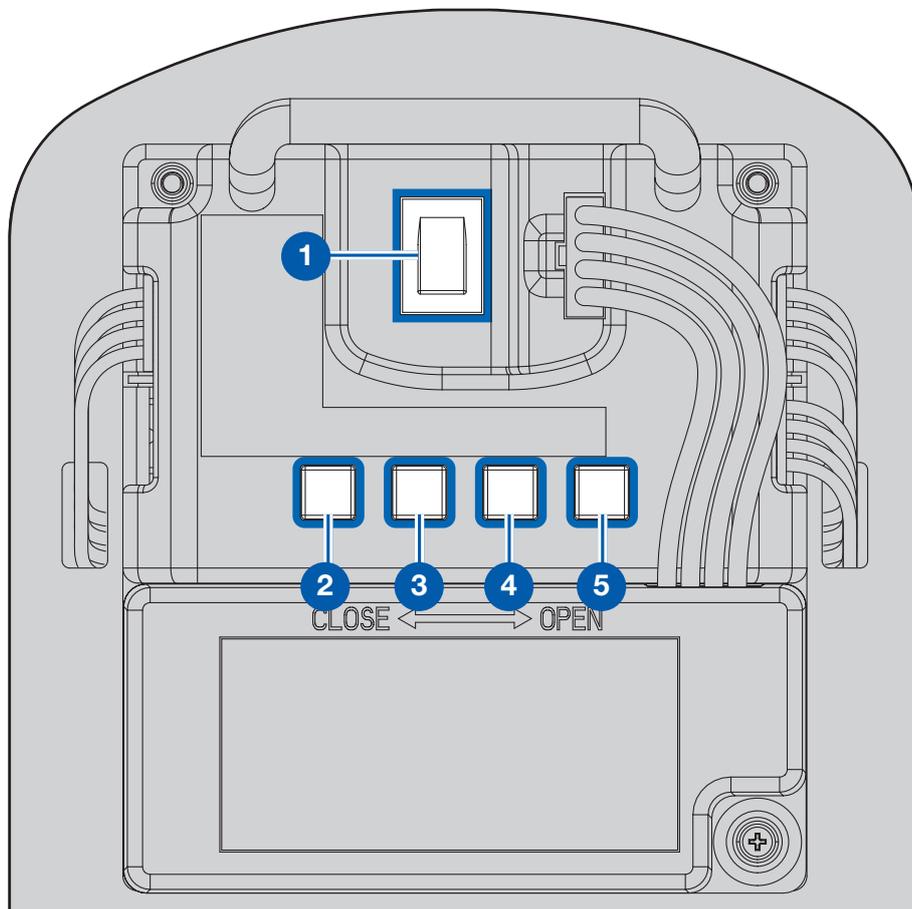
LED Codes

Definition List

For the LED position, please refer to the Robotic Arm Assembly Manual.

Eye LED

The LEDs located on the eye sockets indicate the following states:

- Power on: sequentially blinks red, green and blue.
- Connection to remote control: sequentially blinks red, green and blue.

Chest LED

Power on/control: LED blinks in sequence (Red, Green and Blue).

Remote Control LED

Transmit LED	Bluetooth LED	Receive LED	Description
LED on (Red)	LED on (Red)	LED on (Red)	Power on
LED on (Green)	LED off	LED on (Green)	Unconnected
LED on (Green)	LED on (Red)	LED on (Green)	Pairing
LED on (Red)	LED on (Blue)	LED on (Green)	Connected (Data transmitted)
LED on (Green)	LED on (Blue)	LED on (Red)	Connected (Data received)
LED on (Orange)	LED on (Blue)	LED on (Orange)	Press power button

Smart Servo LED

Status Error	Error LED on/off
Normal Operation	LED on (White)
Exceed Potentiometer Range Error	LED on (Blue)
Over Voltage/Temperature/Current Limits Error	LED on (Red)
	LED off (White)
Requested Packet Error	LED on (Green)

USB Drivers

Installing a USB FTDI Driver

The USB driver may require updating or re-installing when the Robotic Arm device is not recognized by your operating system. The following section provides step-by-step instructions of the installation procedure on a Windows operating system.

1. Download the driver file and extract it to your hard drive, somewhere you can find it.
2. You first need to uninstall the incorrect drivers on your computer. In Windows, go to **Control Panel** then to **Device Manager**.
3. Select **Ports (COM & LPT)** to expand the port list.
4. Select the USB Serial Port associated with the Robotic Arm device.
5. Right click on the selection and select **Uninstall** from the pop-up window.
6. A confirmation window appears, check the **Delete the driver software for this device** option and click **OK** to complete the uninstallation process.
7. From the Device Manager window, click **Universal Serial Bus Controllers** to expand the list.
8. You will need to uninstall the existing USB Serial Converter. To do this, scroll down the list and select USB Serial Converter and right click to open a pop-up menu.
9. From the menu selections, click **Uninstall**.
10. If the Robotic Arm device is connected to your computer through the USB cable at this time, disconnect the USB cable.
11. Turn on the Robotic Arm if it isn't powered on already. Then re-connect the USB cable from the Robotic Arm to a USB port on your system.

    The operating system detects the new USB connection. In the Device Manager, a new Flagged item appears under Other Devices.
12. Right click on the detected device and right-click on it to open up the Properties menu.
13. From the menu, select **Update Driver Software**.
14. An Update Driver Software window displays. Click **Browse** to navigate to the previously saved driver files on your computer.
15. Select the file and tick the **Include subfolders** option, then click **Next** to continue.
16. Click **Close** to finish this step.

    The USB Serial Converter drivers are now installed. Next you will need to install the Port driver.
17. In the Other Devices list item, the selection is now changed to USB Serial Port. Select this item and right-click to open up the Properties window.
18. Select **Update Driver Software**.
19. The Update Driver Software window displays. Click **Browse** to select the driver file, located in the same location as the previous file.
20. Select the file and tick the **Include subfolders** option, then click **Next** to continue.
21. Click **Close** to complete the Port driver installation.

Both drivers are now installed. The Robotic Arm is available for selection through the COM port by both the Adruino software and the XYZrobot Editor.

I can't connect my robot to the PC.

1. Open Device Manager on Windows.

    When the product is connected to the PC, please check whether the connected device's port is found.

2. If the port is not detected, you may need to install an FTDI serial driver.

    If you have problems with other products, or can't solve the problem with the instructions above, please contact your regional manager.

The Arduino displays "Done uploading" but still displays an error message the burn program process.


```
Done uploading.

Binary sketch size: 61,102 bytes (of a 126,976 byte maximum)
avrdude: stk500_getsync(): not in sync: resp=0x00
```

1. Possible cause: low power.

    Please charge the Li-ion battery fully or connect the adaptor and try again.

2. Possible cause: the selected COM port is wrong.

    Select **Config > Port Setting**. Select the currently connected COM port and click **OK**.