

# AX-12 Motor Test Setup

*Survivor Buddy Group @ Texas A&M University • January 2013*

## Overview

This guide explains how to create a test system for working with Dynamixel motors. It covers the basic hardware assembly and software installation required for creating a basic setup which can control a Dynamixel motor.

## System Requirements

- Windows 7 or Windows 8
- Virtual Machine w/USB support is acceptable

## Hardware Requirements

- AX-12 Motor
- Power Supply
- USB2Dynamixel Dongle
- AX-12 Wire
- Extra Wire, Electrical Tape
- Tools: Screwdriver, Multimeter, Wire Strippers

## Background & Motivation

In order to safely develop motor control software for the Survivor Buddy Platform, it is often beneficial to have independent test motors which are not part of the actual robot. This guide explains how to build a simple test setup with a single AX-12 motor which can then be controlled with a variety of software packages.

## Disclaimer

This document comes with no guarantees. All information should be used at your own risk. You may share this document with anyone by any means. Questions or concerns can be directed to zmhenkel [at] tamu [dot] edu.

## I. Gather Components

First, you'll need a clean workspace with all of your components nearby:



**Pictured here:** USB2Dynamixel Dongle, Black 22 AWG Wire, Green 22 AWG Wire, White Electrical Tape, Power Supply, AC Power Cable, 3-Pin Dynamixel Cable, AX-12 Motor, Wire Strippers, Multimeter

## II. Assemble System

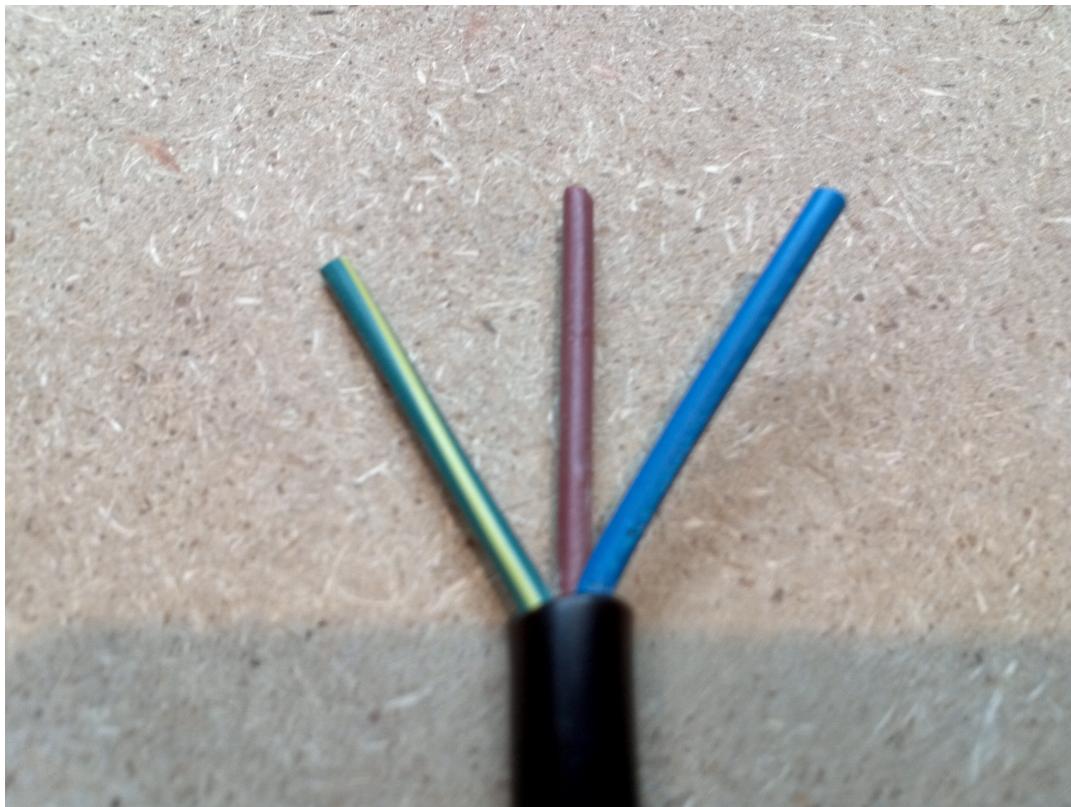
Once you've gathered all of your components, you'll need to modify a few items, and connect everything together properly. This section details the assembly of a working hardware system. Steps may vary depending on the hardware you have available.

**WARNING:** Electricity is dangerous and can cause injury or death if mishandled. Always follow the safety warnings of each product and seek advice from a qualified individual when working with electrical systems. This guide should NOT be considered professional advice.

1. If you are using a power cord which has connectors on both ends, like the one pictured below, you'll need to first remove the end which doesn't connect to the AC power source.

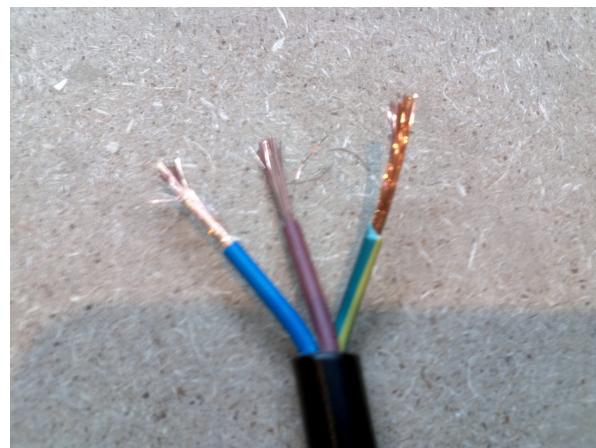


Once the connector is removed, you should be left with three wires:



**NOTE:** The color of your wires may vary. Common combinations include:  
Brown, Blue, Green and Black, White, Green

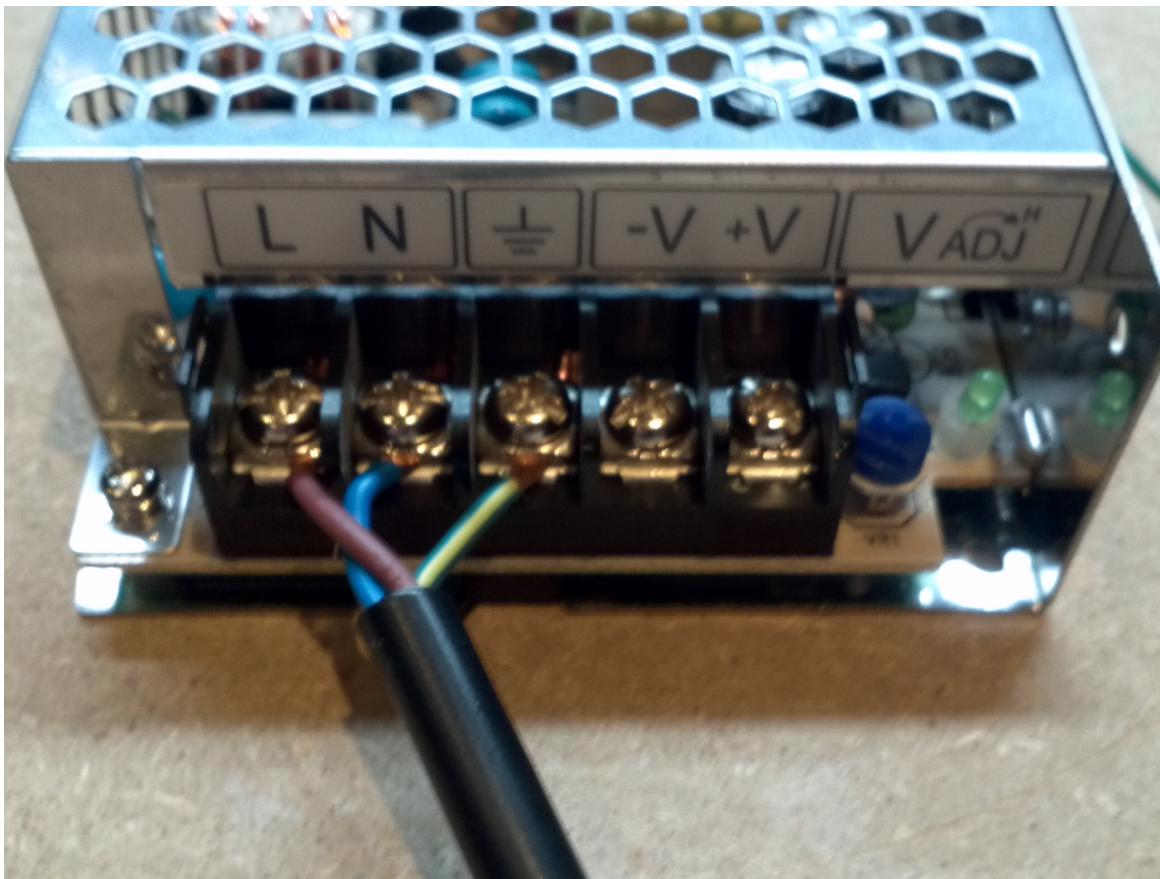
Once the three wires are exposed, strip about 1/2 inch of each wire.



2. Next, connect the appropriate lines of the AC power cord to the appropriate terminals on the power supply. Here we start by unscrewing the terminal for "L", the live wire from AC. Our power supply has terminals: "L" for live or hot AC wire, "N" for neutral AC wire, and the ground symbol for the ground AC wire.



We now connect the live, neutral, and ground wires.



**NOTE:** Our live wire is brown in color. Yours may be black or another color.

**WARNING:** If you are uncertain about the function of a wire do NOT continue assembly until you have verified its functionality with someone qualified to do so.

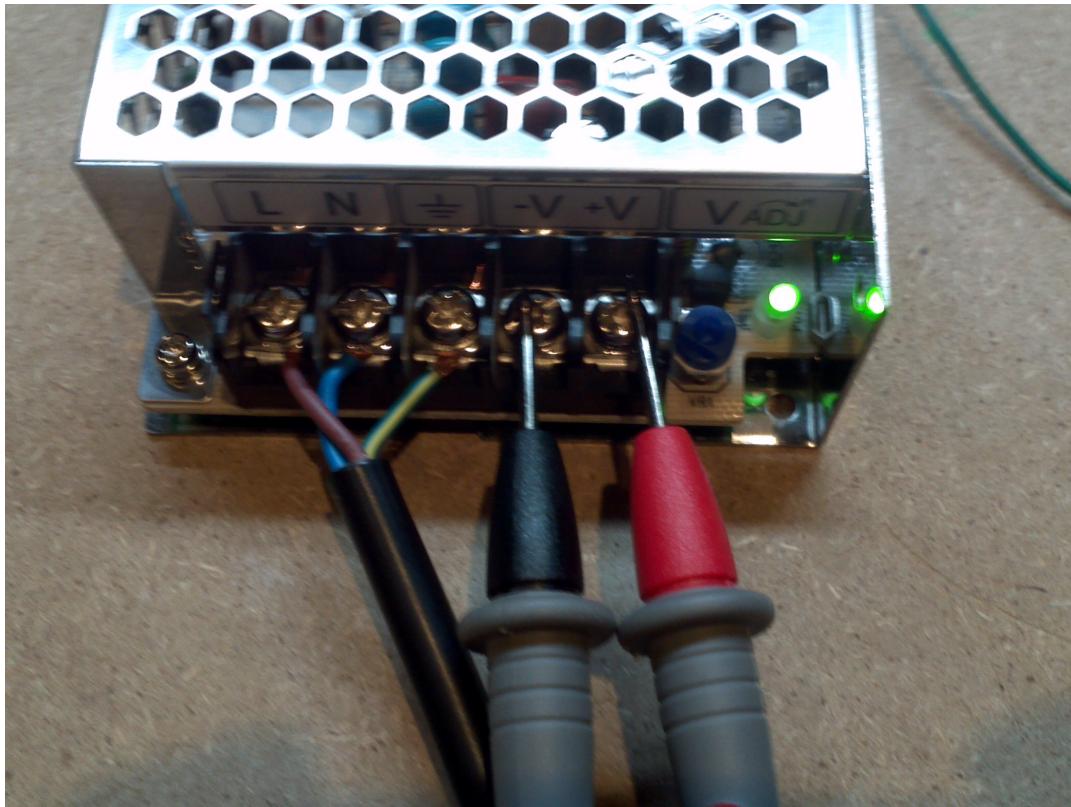
3. Now, test the power supply. Begin by setting your multimeter to measure volts.

**WARNING:** Be sure that your multimeter is configured correctly to measure the potential voltage and current of the power supply.

**WARNING:** If sparks, smoke, or overheating occur when applying AC power: immediately disconnect the system from AC power.

Plug in the power supply to AC power.

Next, touch the reference lead (black) to the V- or DC Ground Reference. Touch the measuring lead (red) to the V+ terminal.



The multimeter should read ~12V DC.



Use a screwdriver to turn the adjustment knob until you reach ~11.1 V DC



Unplug the power supply from AC power, put away the multimeter.

4. Now that we have verified that the power supply is functioning properly, we will make the appropriate connections from the power supply to the motor and from the power supply to the USB2Dynamixel dongle.

First, plug one end of the Dynamixel 3-pin cable to the AX-12 motor



The middle wire supplies power to the motor.

Cut the middle wire at the end of the 3-pin cable that connects to the dongle.



Strip the end of the wire, and lengthen it by connecting to another wire.

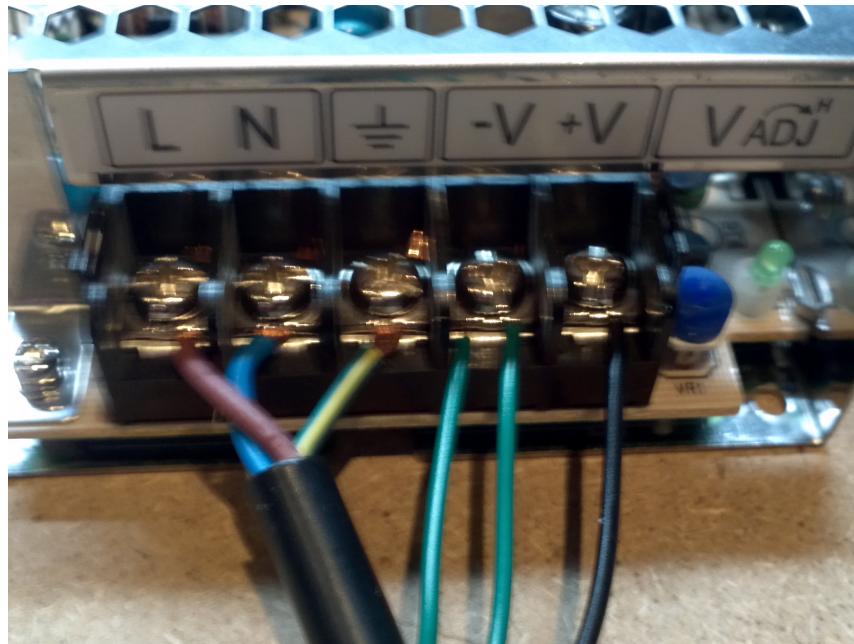


Connect the lengthened wire to the V+ terminal of the power supply.

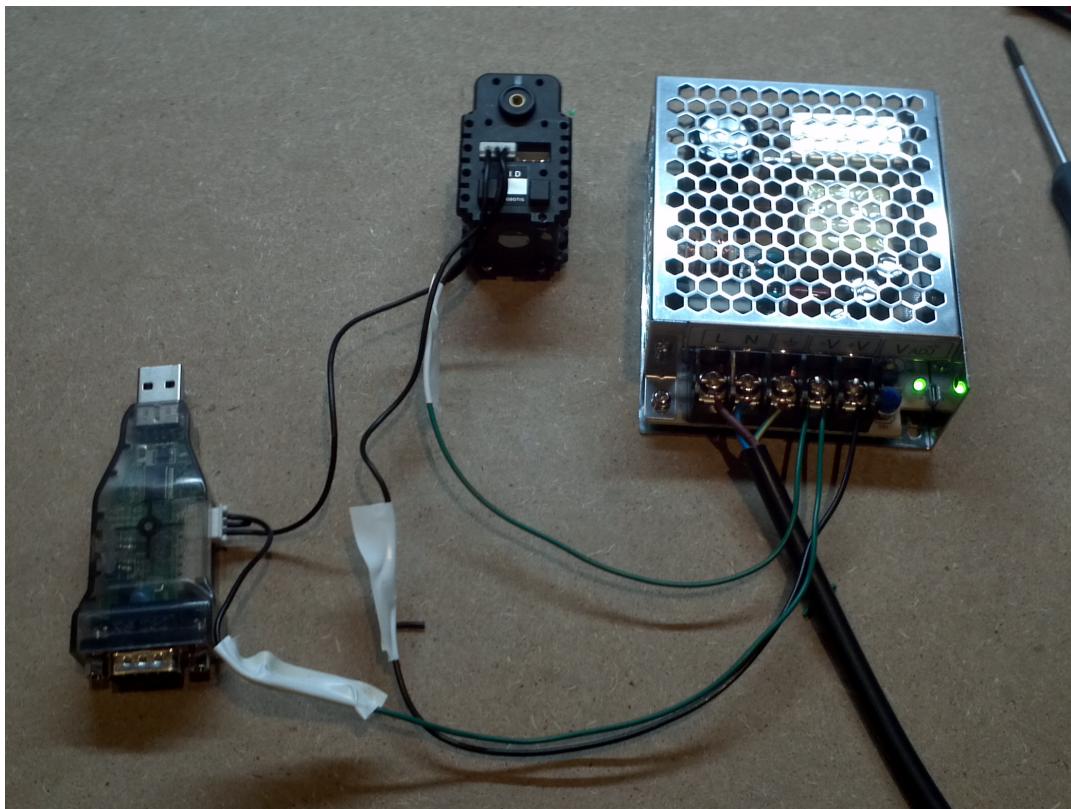


Next, the wire to the right of the middle wire on the motor must be connected to the V- or DC reference terminal of the power supply. Both the dongle and the motor need to be connected to this terminal.

Achieve this by cutting the wire mid-way and extending each wire to the V- terminal of the power supply.



5. Finally, connect the other end of the 3-pin cable to the USB2Dynamixel dongle. You should verify that the labeled pins match with the connections you have made. Also verify that the switch on the opposite side of the dongle is set to TTL mode.



6. Before moving connecting to the computer, test your assembly by powering the power supply. You should briefly see the motor's red LED flash once power is connected.

### III. Install Software

In order to test the hardware system, you can use the software suite provided by Robotis, the maker of the AX-12. You will need a computer running a modern version of Microsoft Windows. A virtual machine can be used if it supports USB hardware connections.

1. Navigate to the Robotis site (<http://www.robotis.com/xe/>) and click on download RoboPlus.



Choose the most recent English version of the software

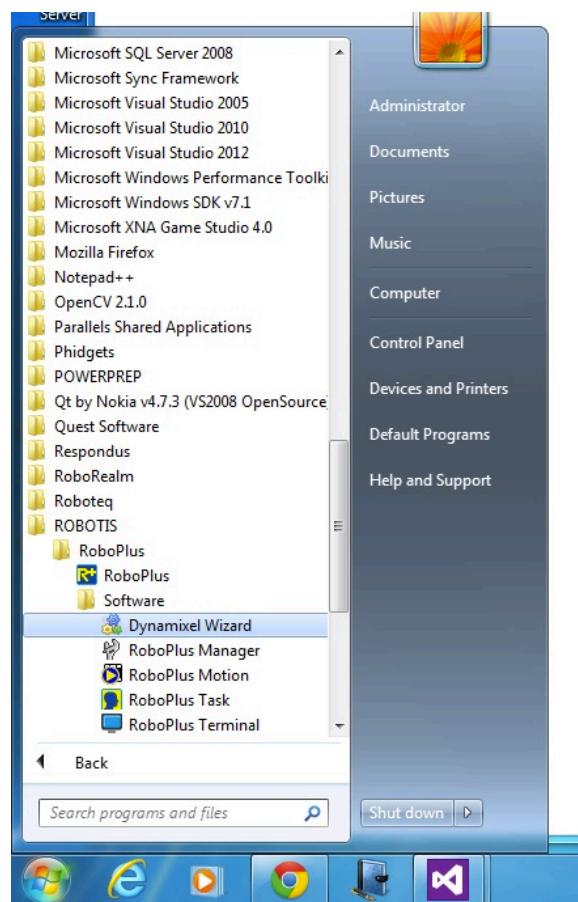
If you don't have .NET installed, choose the version that includes it.

2. Follow the instructions for installing the RoboPlus Software.

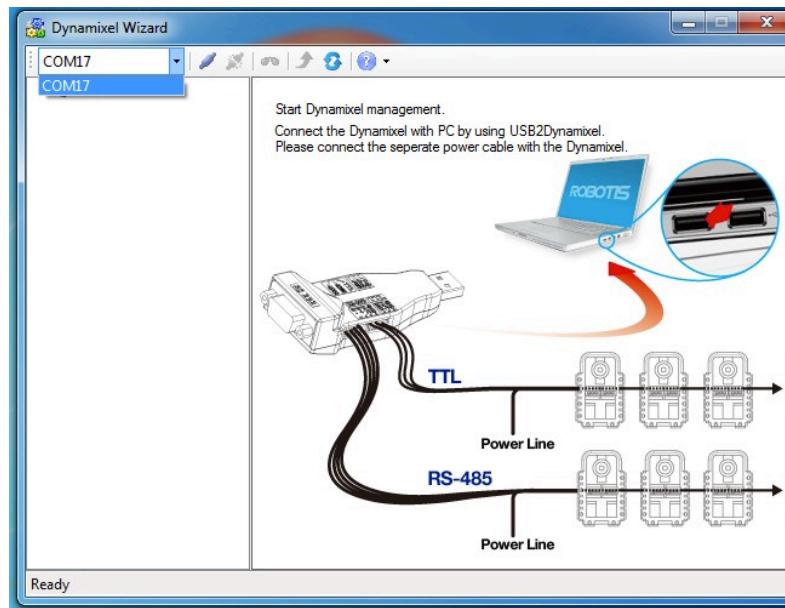
## IV. System Test

Finally, you can test the entire system by hooking the motor to power and attaching the USB2Dynamixel dongle to the computer. The system may take a moment to install the FTDI drivers for the dongle. Wait for this to complete before moving forward.

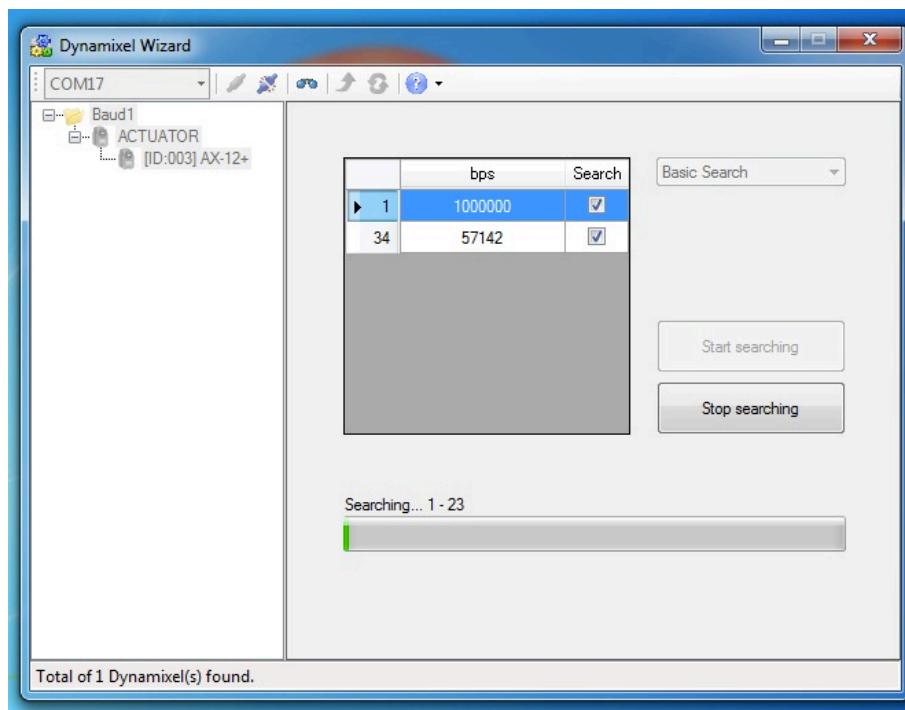
1. In the start menu, navigate to the Robotis folder and then to the Software sub-folder and launch the Dynamixel Wizard Software.



2. Select the COM port that is the USB2Dynamixel dongle (note you may have to do some trial and error if you have multiple choices). Click the connect button.



3. Now click start scan to scan for motors attached to the dongle. Once the motor appears in the left panel, you can click stop scan.



4. Click on the motor in the left panel to read and modify its attributes.

