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Control More Than One Robot

How to control more than one robot in a single EZ-Builder project. This tutorial uses Revolution robots that depend on the Auto Position control, but the similar approach can be used for any robot styles.

Last Updated: 9/4/2018

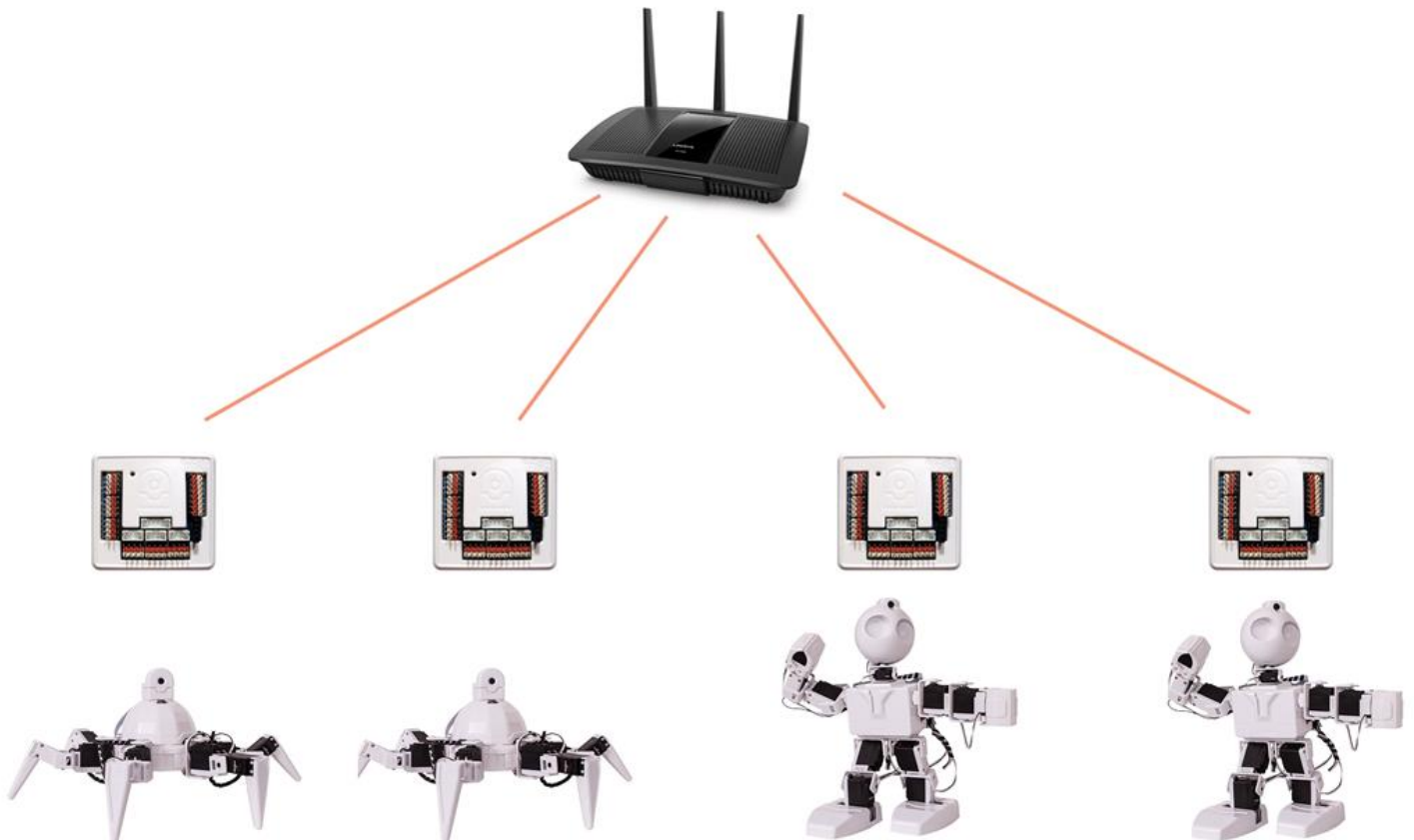
Ⓢ Configure EZ-B's

This tutorial will help you achieve something similar to how ez-robot created this video...

*Note: This tutorial uses the EZ-B v4.x/2 (Comm 2). Although the process can be achieved with the earlier Comm 1, there will be differences. It is recommended to upgrade to the [EZ-B v4/2 Comm Upgrade](#) or replace entirely with a [EZ-B v4/2 Wi-Fi Robot Controller](#) to utilize these advanced features.

WiFi Mode The EZ-B of each robot is most likely in default AP mode. That means "Access Point", which you already have learned in the [EZ-B Tutorials](#) of the learn section. The AP mode limits the connection between PC and single EZ-B, only. In this step, each EZ-B will need to be configured to connect to a WiFi router in Client Mode.

In this example, we will use 2 Six's and 2 JD's...



Web Config What you will need is a configured WiFi router. Keep note of the WiFi SSID Network name and the password. These two pieces of information will be entered into each EZ-B's web configuration tool.

Step 1 Connect to the first robot's EZ-B WiFi network. Visit the default configuration in your web browser: <http://192.168.1.1>

The EZ-B Wi-Fi Robot Controller

Introduction
Welcome to the EZ-B v4 Embedded Web Server. This web interface allows you to configure the EZ-B v4's network settings. For more information about the EZ-B v4 Robot Controller, connect to the internet and visit www.ez-robot.com.

Current Configuration

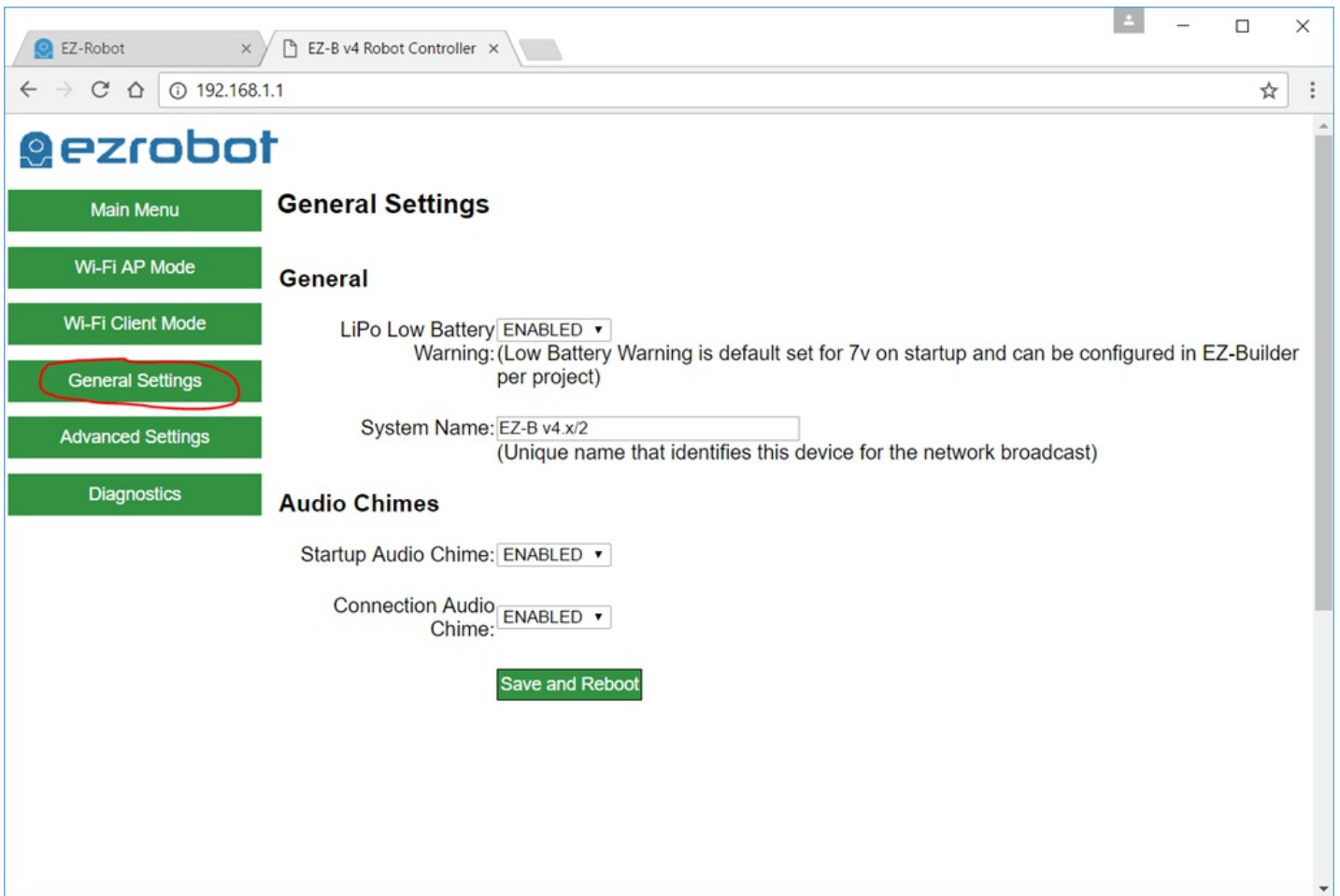
System Name:	EZ-B v4.x/2
SSID:	EZ-B v4 JD1
WiFi Mode:	Custom AP Mode (Ad-Hoc)
System Uptime:	28 seconds and 723 milliseconds
Model:	EZ-B v4.x/2
Version:	WiFi 3165 v2016.09.27.00

WiFi Modes

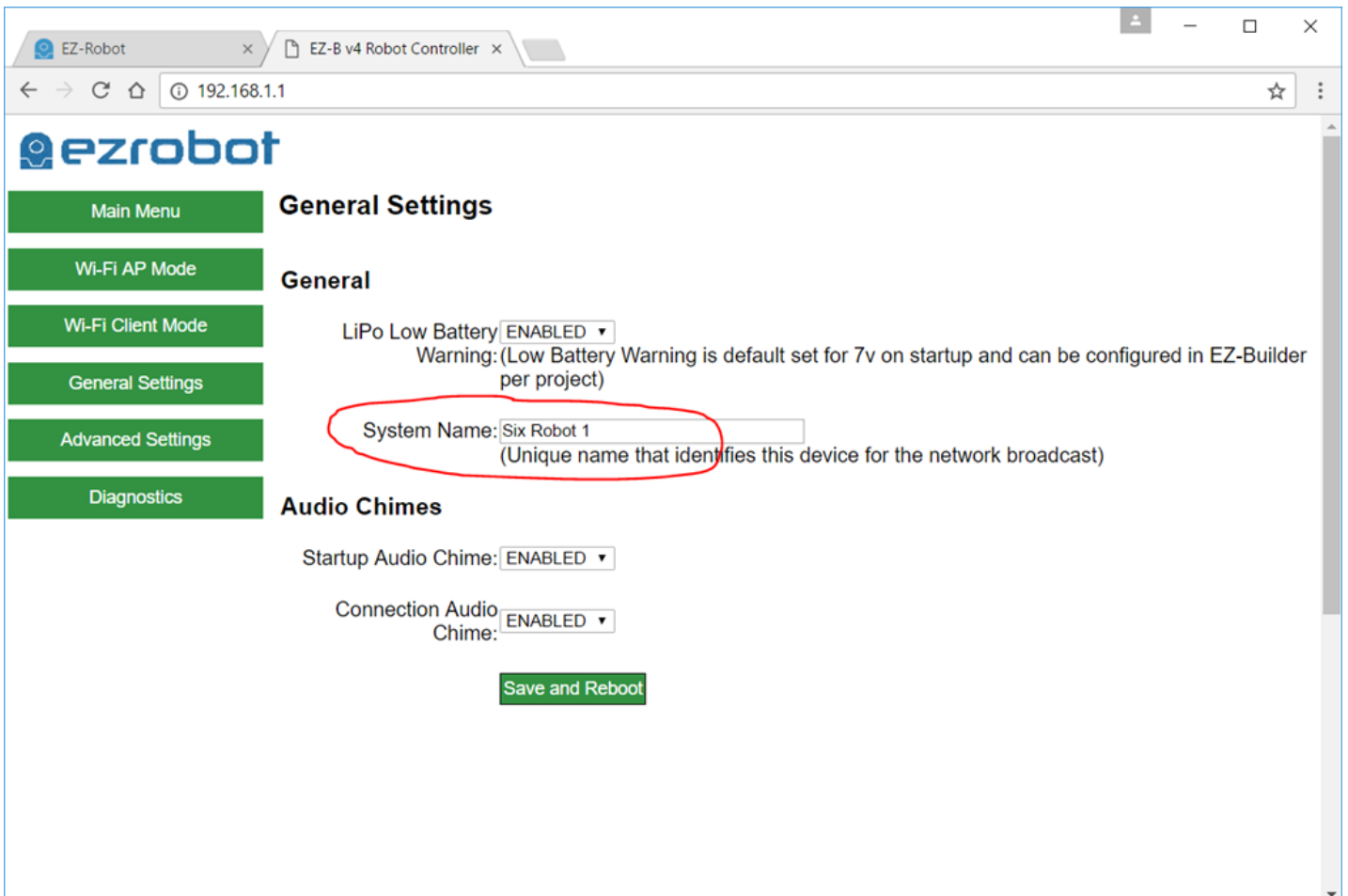
Access Point (AP) Mode
The EZ-B v4 becomes a Wi-Fi Server which allows your device to connect to it. This is the default setting for the EZ-B v4. In this mode, your device (i.e. Computer, iPad, iPhone, etc.) will connect directly to the EZ-B v4 over its Wi-Fi network. You will lose access to the internet if connected this way, unless your device has two network adapters.

Wi-Fi Client Mode
The EZ-B v4 will connect to an existing Wi-Fi network as a client, much like how your iPhone, iPad and Computer connects to your home network. When the EZ-B v4 is connected to your Wi-Fi network, you may not know the IP Address that it is assigned. The EZ Builder software includes a network scan tool which will find all EZ-B v4's on your

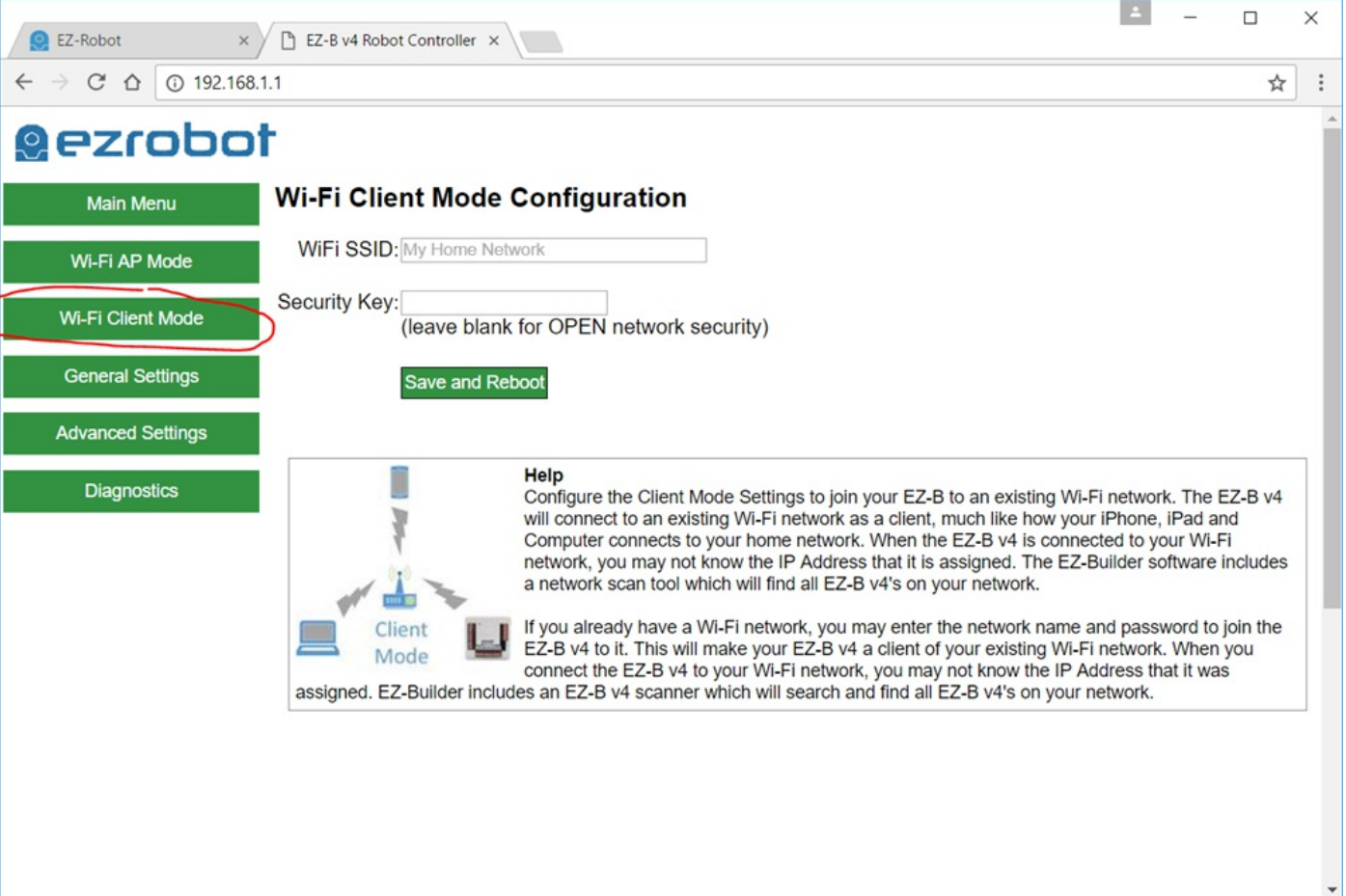
Step 2 We are going to give this EZ-B a specific System Name, which will be helpful to identify what robot it is during the Client Scan Mode later on in this tutorial. Press the General Settings menu option



Step 3 Give this robot a specific System Name that defines what robot it is. In this case, I'm assigning this robot the System Name of Six Robot 1. This name will be broadcasted and used during the Client Scan Mode within EZ-Builder later in this tutorial. Press SAVE AND REBOOT



Step 4 The EZ-B will have rebooted. You may need to reconnect to the WiFi, although in most cases it happens so quickly that your PC will still maintain a connection. Either way, we wish to now visit the Wi-Fi Client Mode menu item.




The screenshot shows a web browser window with the URL 192.168.1.1. The page title is "EZ-Robot" and the main heading is "Wi-Fi Client Mode Configuration". On the left side, there is a vertical menu with several green buttons: "Main Menu", "Wi-Fi AP Mode", "Wi-Fi Client Mode" (circled in red), "General Settings", "Advanced Settings", and "Diagnostics". The main content area contains two input fields: "WiFi SSID: My Home Network" and "Security Key:" with a note "(leave blank for OPEN network security)". Below these fields is a green "Save and Reboot" button. A "Help" section is located at the bottom, featuring a diagram of a robot connected to a Wi-Fi router and a laptop. The text in the help section reads: "Configure the Client Mode Settings to join your EZ-B to an existing Wi-Fi network. The EZ-B v4 will connect to an existing Wi-Fi network as a client, much like how your iPhone, iPad and Computer connects to your home network. When the EZ-B v4 is connected to your Wi-Fi network, you may not know the IP Address that it is assigned. The EZ-Builder software includes a network scan tool which will find all EZ-B v4's on your network. If you already have a Wi-Fi network, you may enter the network name and password to join the EZ-B v4 to it. This will make your EZ-B v4 a client of your existing Wi-Fi network. When you connect the EZ-B v4 to your Wi-Fi network, you may not know the IP Address that it was assigned. EZ-Builder includes an EZ-B v4 scanner which will search and find all EZ-B v4's on your network."

Step 5 Enter the name of your router's WiFi network SSID and its password. Save the settings. The EZ-B will reboot and connect to the WiFi router SSID with the credentials entered. The EZ-B will speak and verbally let you know if it was able to connect. If the EZ-B gives a verbal error message, then manually pressing the RESET button on the EZ-B will be necessary and repeating these steps, but entering the correct SSID and Password of your router next time.

EZ-Robot x EZ-B v4 Robot Controller x

192.168.1.1




Wi-Fi Client Mode Configuration

- Main Menu
- Wi-Fi AP Mode
- Wi-Fi Client Mode
- General Settings
- Advanced Settings
- Diagnostics

WiFi SSID:

Security Key:
(leave blank for OPEN network security)



Help
Configure the Client Mode Settings to join your EZ-B to an existing Wi-Fi network. The EZ-B v4 will connect to an existing Wi-Fi network as a client, much like how your iPhone, iPad and Computer connects to your home network. When the EZ-B v4 is connected to your Wi-Fi network, you may not know the IP Address that it is assigned. The EZ-Builder software includes a network scan tool which will find all EZ-B v4's on your network.

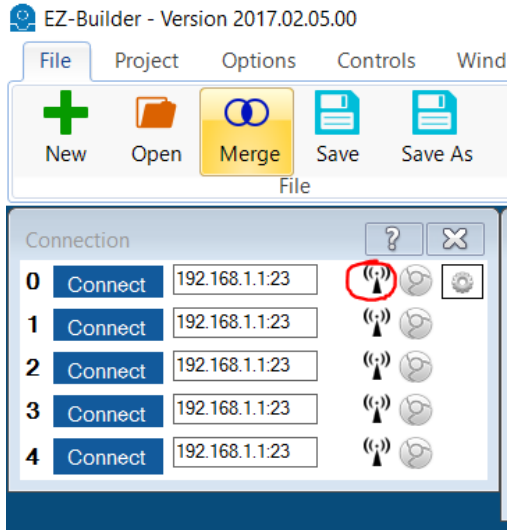
If you already have a Wi-Fi network, you may enter the network name and password to join the EZ-B v4 to it. This will make your EZ-B v4 a client of your existing Wi-Fi network. When you connect the EZ-B v4 to your Wi-Fi network, you may not know the IP Address that it was assigned. EZ-Builder includes an EZ-B v4 scanner which will search and find all EZ-B v4's on your network.

Almost There! Now that you have each robot connected to the WiFi network, you can move to the next step of this tutorial.

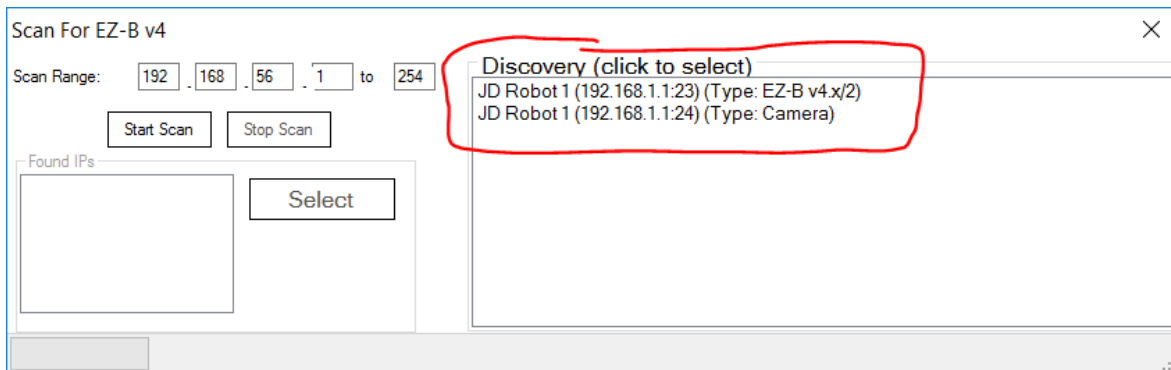
Connecting EZ-Builder

EZ-Builder will now need to know the IP Address of each EZ-B of the robots connected to the WiFi network. Ensure your laptop is connected to the WiFi network as well.

Step 1 Load EZ-Builder. Locate the Client Scan Tool icon in the Connection Control. Press the icon for the first EZ-B index.



Step 2 Each EZ-B will be displayed as the broadcasts are received. The EZ-B's will broadcast their system name, which was entered for each robot in the previous step of this tutorial. This helps you identify all of the robots.



Repeat For Each Robot Repeat this process for each robot. We will add the SIX robots to index 0 and 1, and JD robots to index 2 and 3. When complete, each index of your connection control for 0, 1, 2 & 3 will have unique IP addresses.

File Project Options Controls Wind

New Open Merge Save Save As

File

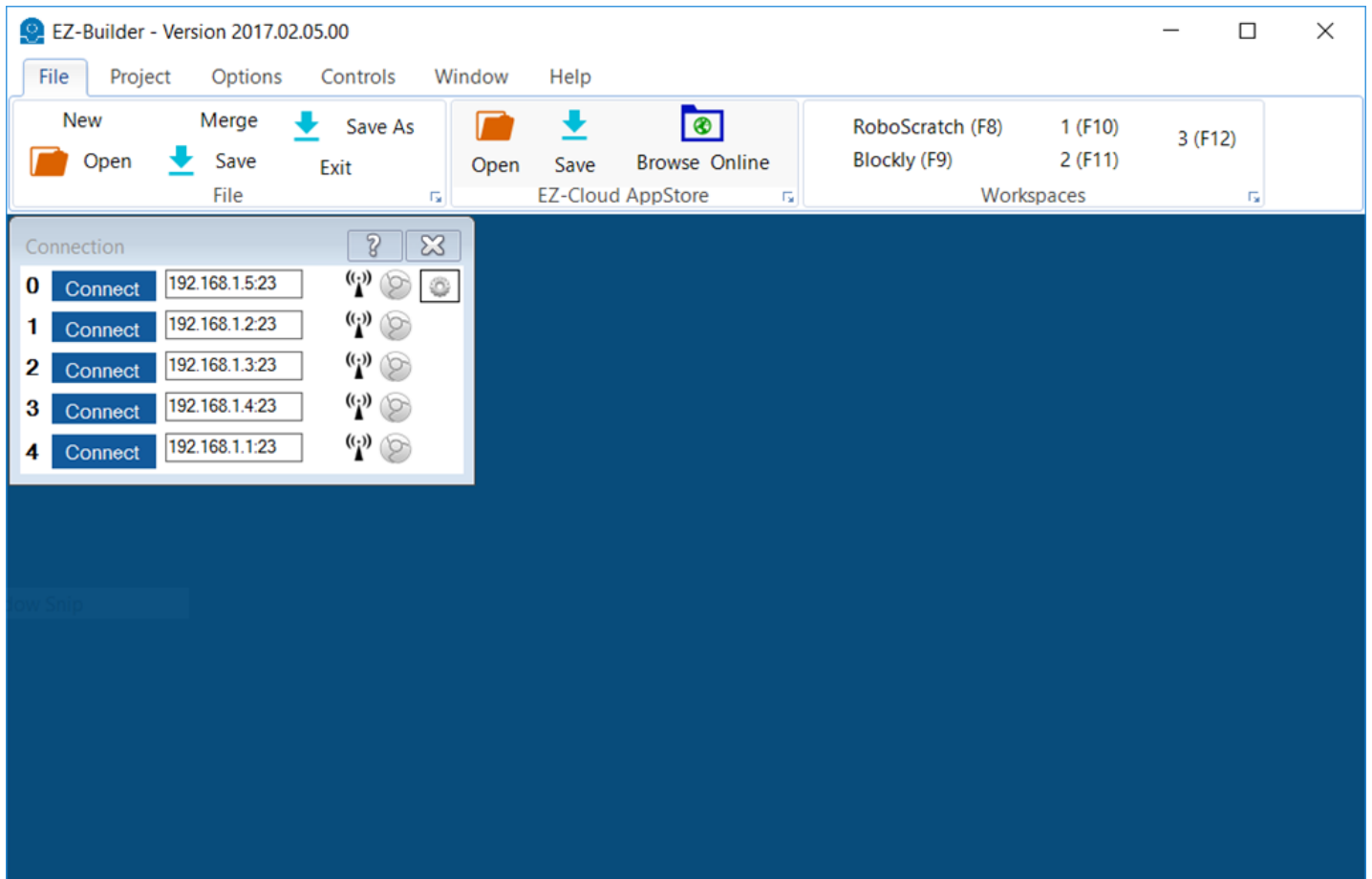
Connection

0	Connect	192.168.1.5:23	(:)	⊗	⊗
1	Connect	192.168.1.2:23	(:)	⊗	⊗
2	Connect	192.168.1.3:23	(:)	⊗	⊗
3	Connect	192.168.1.4:23	(:)	⊗	⊗
4	Connect	192.168.1.1:23	(:)	⊗	⊗

The image shows the EZ-Builder software interface. At the top, there is a menu bar with 'File', 'Project', 'Options', 'Controls', and 'Wind'. Below the menu bar is a toolbar with icons for 'New' (green plus), 'Open' (orange folder), 'Merge' (blue circles), 'Save' (blue floppy), and 'Save As' (blue floppy). Below the toolbar is a 'Connection' panel. This panel has a title bar with a question mark and a close button. It contains a list of five connections, each with an index (0-4), a 'Connect' button, an IP address and port, and three status icons. The IP address '192.168.1.5:23' for connection 0 is highlighted with a red rectangular box.

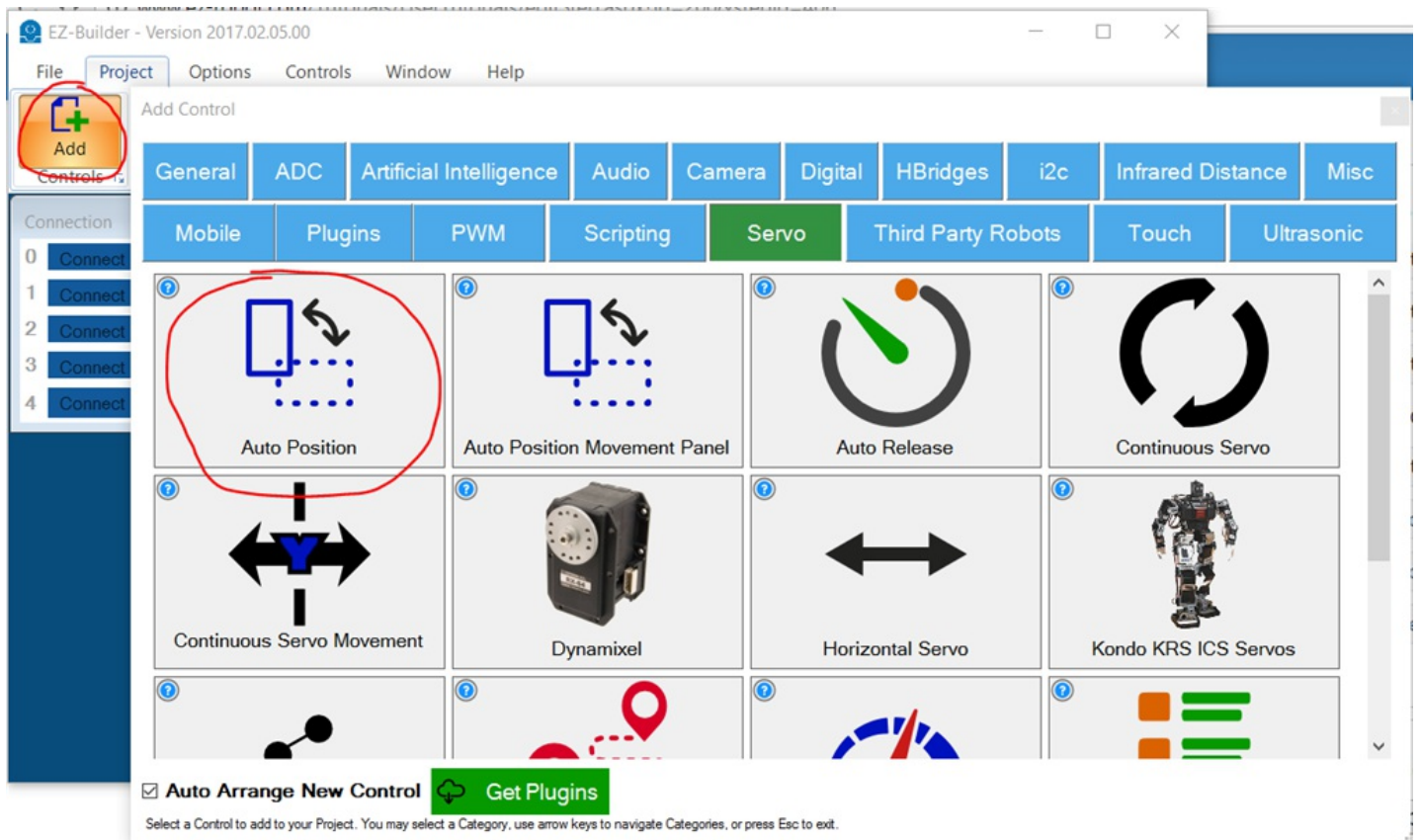
Auto Positions

The E-Builder project should be empty, except for the connection control, which has IP addresses entered for each robot.

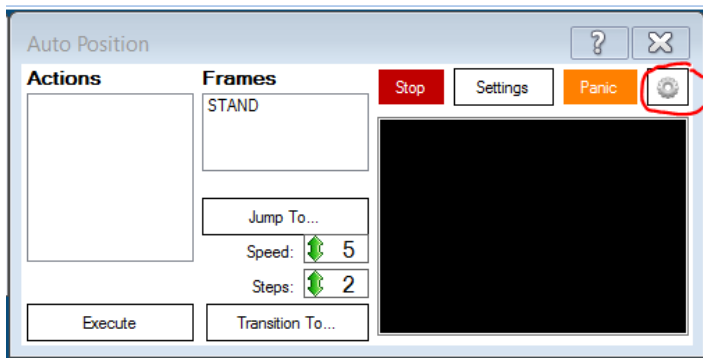


We will now add an auto position for each robot. Remember, we connected... EZ-B Index 0 -> Six
EZ-B Index 1 -> Six EZ-B Index 2 -> JD EZ-B Index 3 -> JD

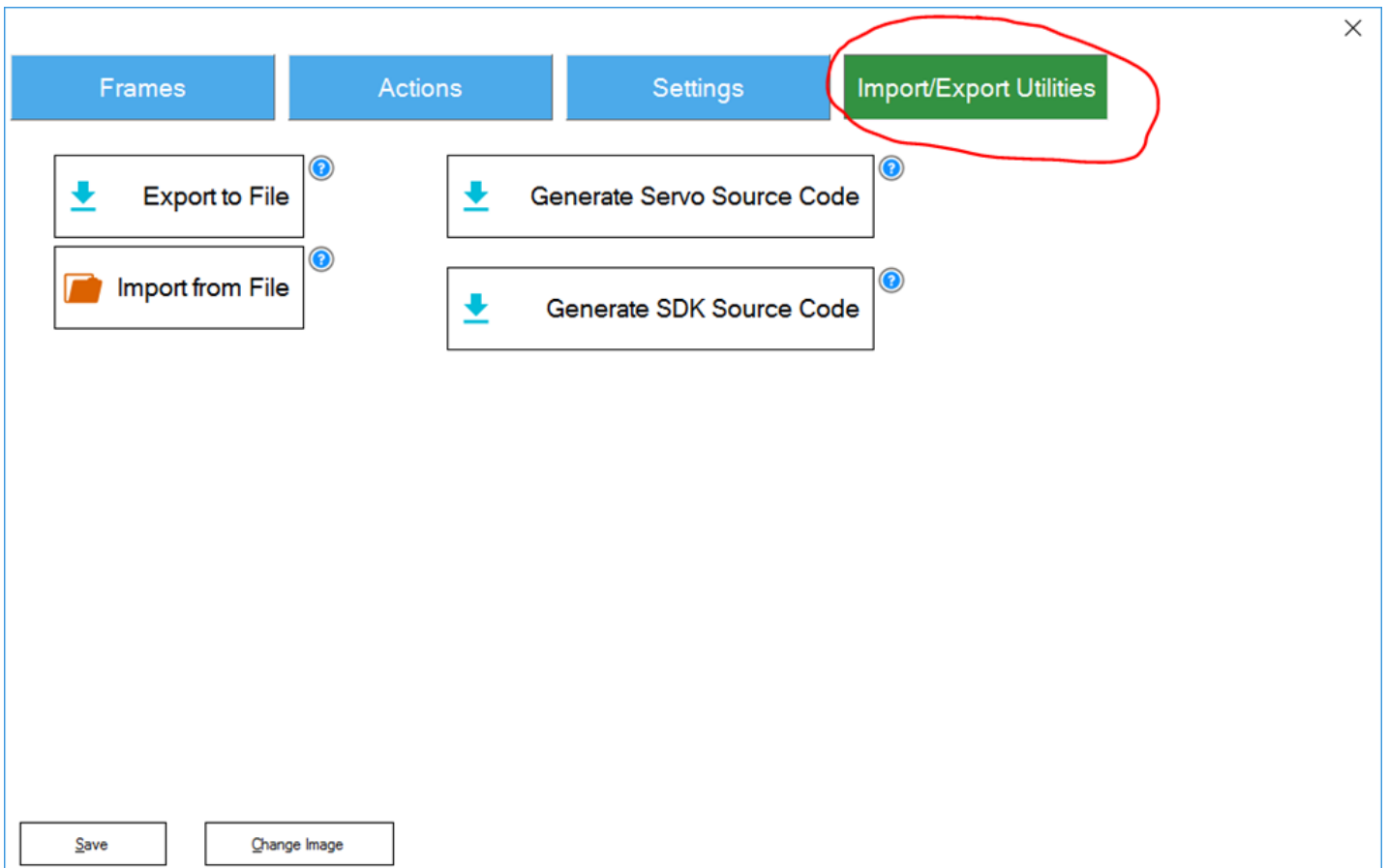
Step 1 Add an Auto Position for the first SIX robot. Press Add Control->Servos->Auto Position



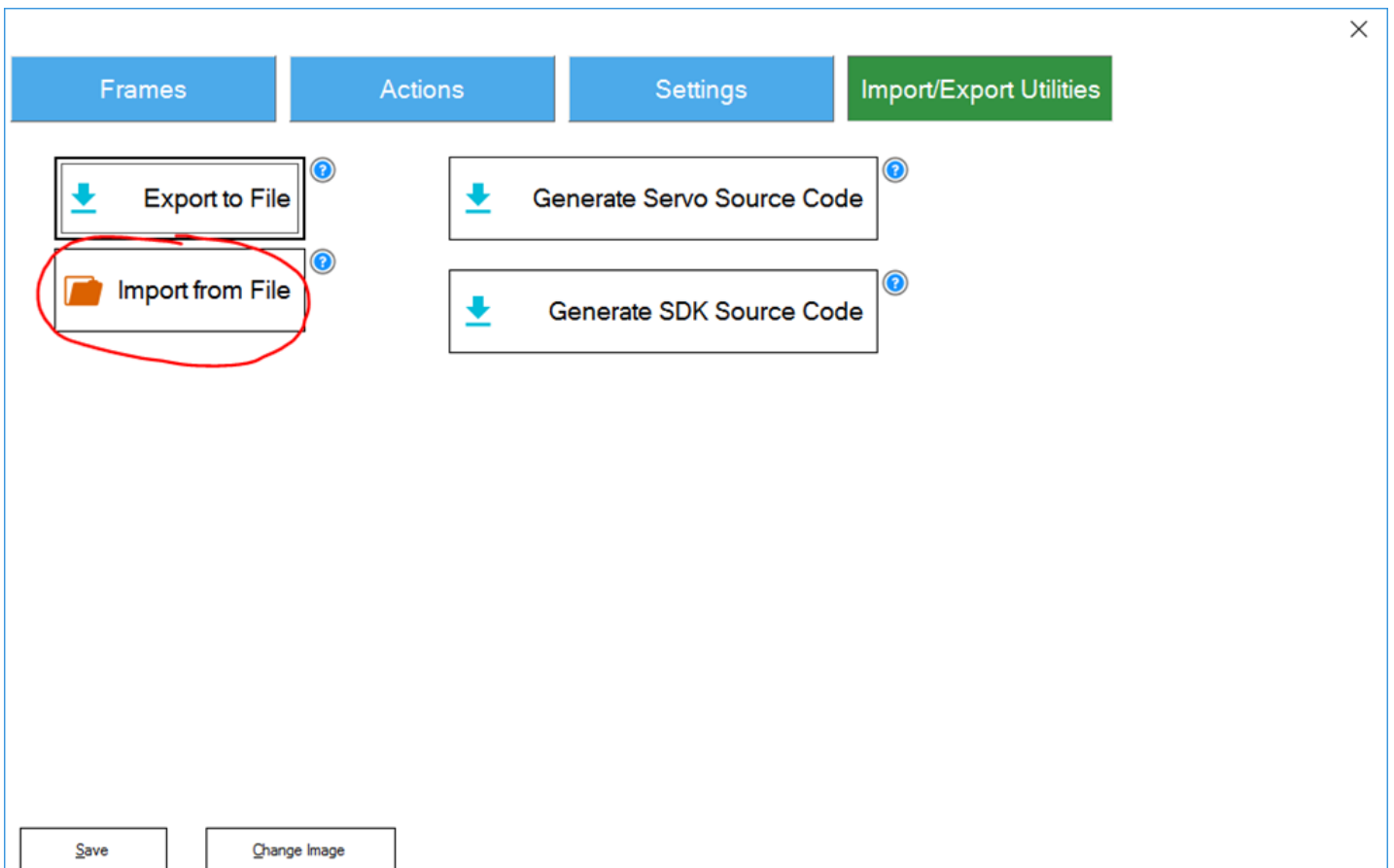
Step 2 Press the Config button on the Auto Position.



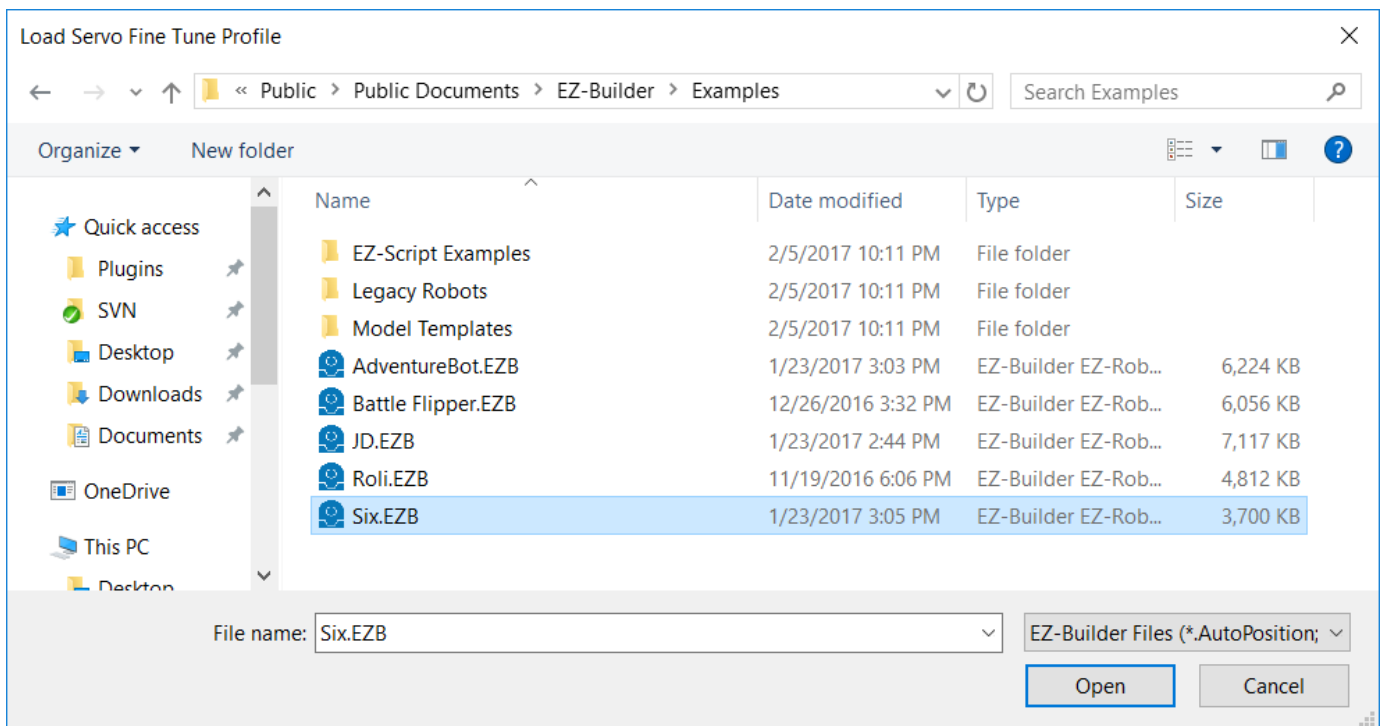
Step 3 Select the IMPORT/EXPORT tab



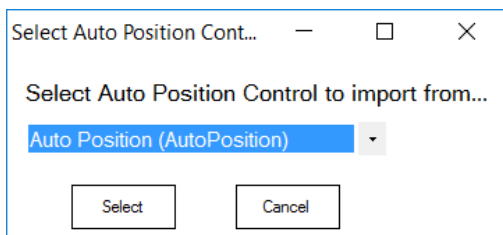
Step 4 Select IMPORT FROM FILE button



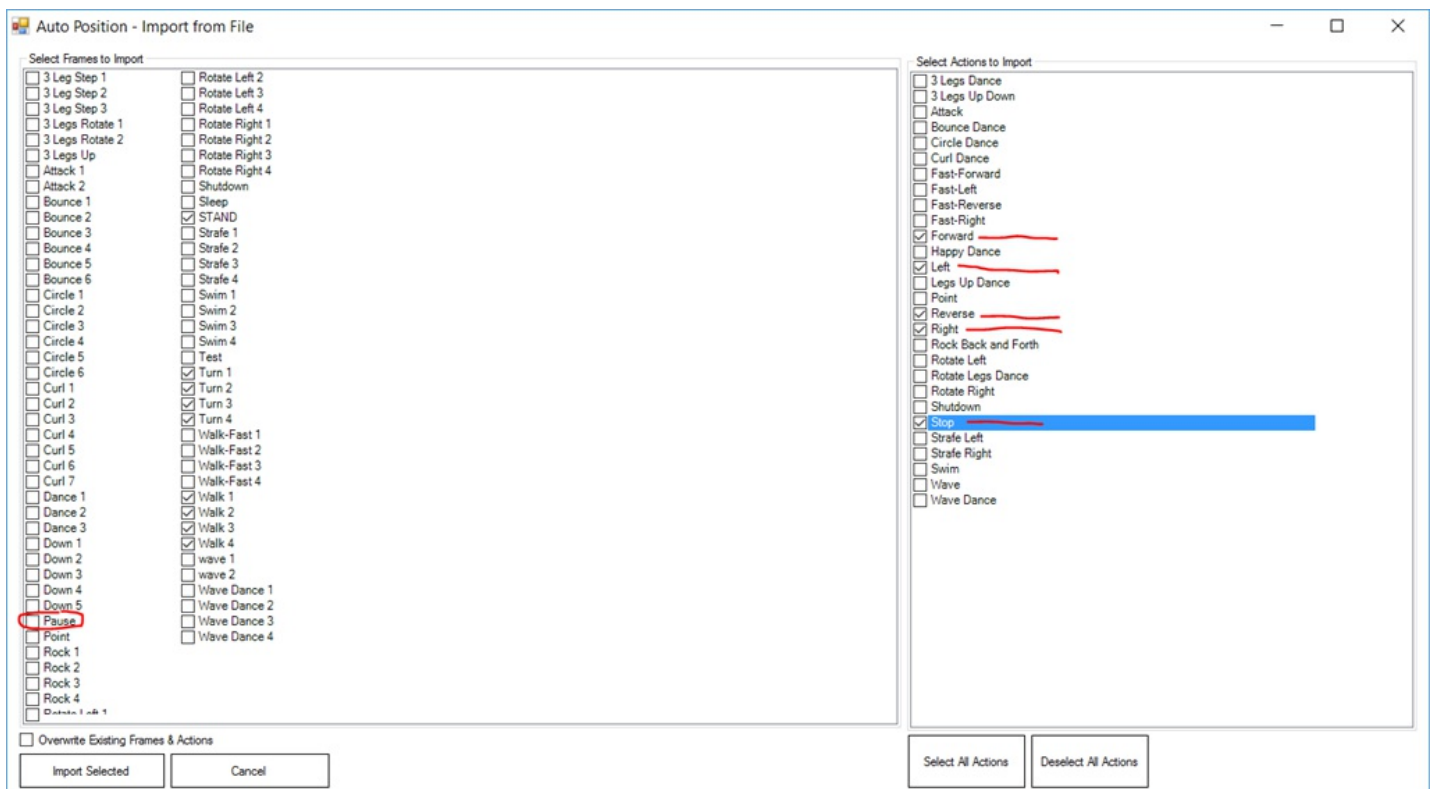
Step 5 Navigate to the appropriate project and select it. If using the public Six and JD projects, they will be located in C:\Users\Public\Documents\EZ-Builder\Examples. Again, remember that in this example we are adding SIX for EZ-B index 0 & 1. JD is for EZ-B index 2 & 3. So this first time we will be loading a SIX project.



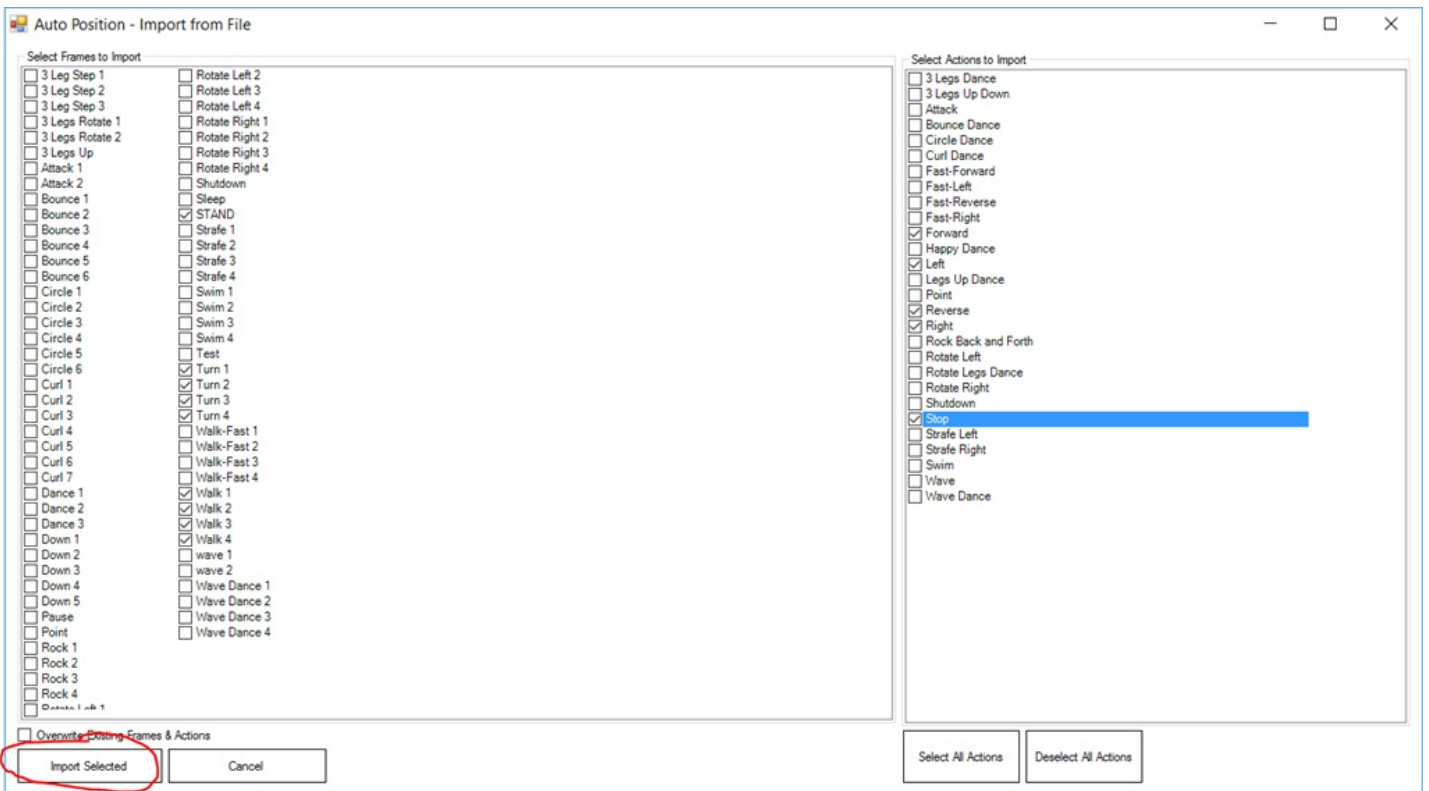
Step 6 A dialog will display prompting which Auto Position control to import the settings from. There will be only one control in the default SIX and JD projects, so simply press SELECT.



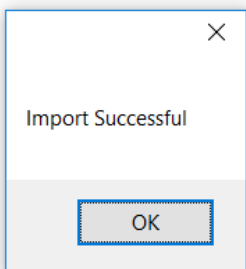
Step 7 A window will be displayed with all ACTIONS and FRAMES of the auto position control. Select the FORWARD, LEFT, RIGHT, REVERSE, and STOP actions. Ensure the PAUSE is UNCHECKED in the FRAMES list. This is because PAUSE is a default frame and cannot be imported.



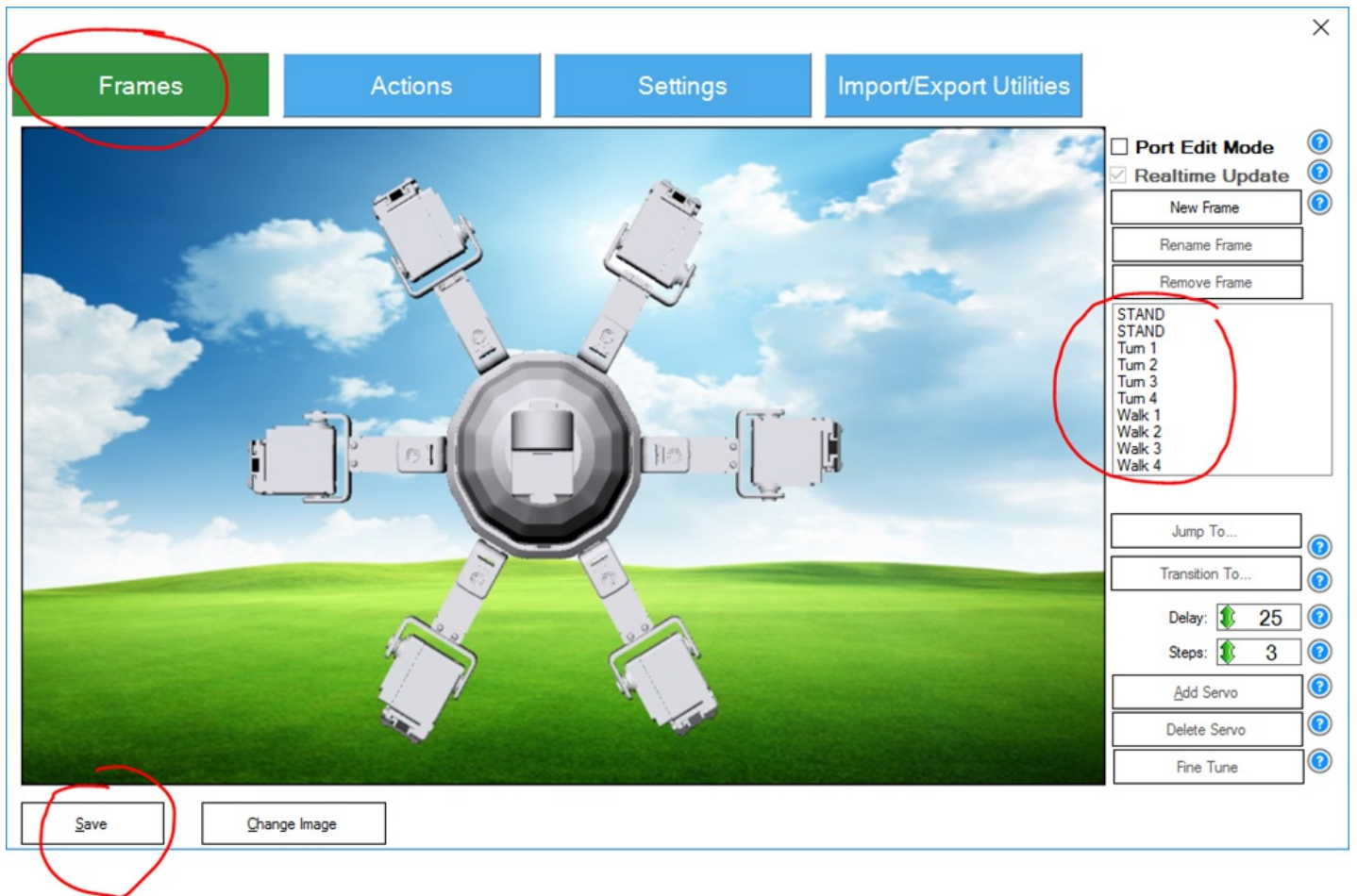
Step 8 Press IMPORT SELECTED



Step 9 Import should now be successful



Step 10 You may now press FRAMES tab to view that all frames have been loaded. And press SAVE to save this configuration.



REPEAT Repeat these steps for each robot, remembering that Index 0 & 1 is SIX, and index 2 & 3 is JD. When complete, your project should look like...

EZ-Builder - Version 2017.02.05.00

File Project Options **Controls** Window Help

Smart Arrange Restore All Minimize All

Auto Position Auto Position 3 Connection
Auto Position 2 Auto Position 4

Connection

0	Connect	192.168.1.5:23	(↑)	(↓)	(⚙)
1	Connect	192.168.1.2:23	(↑)	(↓)	(⚙)
2	Connect	192.168.1.3:23	(↑)	(↓)	(⚙)
3	Connect	192.168.1.4:23	(↑)	(↓)	(⚙)
4	Connect	192.168.1.1:23	(↑)	(↓)	(⚙)

Auto Position

Actions

Frames

STAND

Jump To...

Speed: 5

Steps: 2

Execute Transition To...

Stop Settings Panic

Auto Position 2

Actions

Forward
Left
Reverse
Right
Stop

Frames

STAND
STAND
Turn 1
Turn 2

Jump To...

Speed: 5

Steps: 2

Execute Transition To...

Stop Settings Panic

Auto Position 3

Actions

Forward
Left
Reverse
Right
Stop

Frames

STAND
STAND
Stop
Walk 1

Jump To...

Speed: 5

Steps: 2

Execute Transition To...

Stop Settings Panic

Auto Position 4

Actions

Forward
Left
Reverse
Right
Stop

Frames

STAND
STAND
Stop
Walk 1

Jump To...

Speed: 5

Steps: 2

Execute Transition To...

Stop Settings Panic

Movement Panel

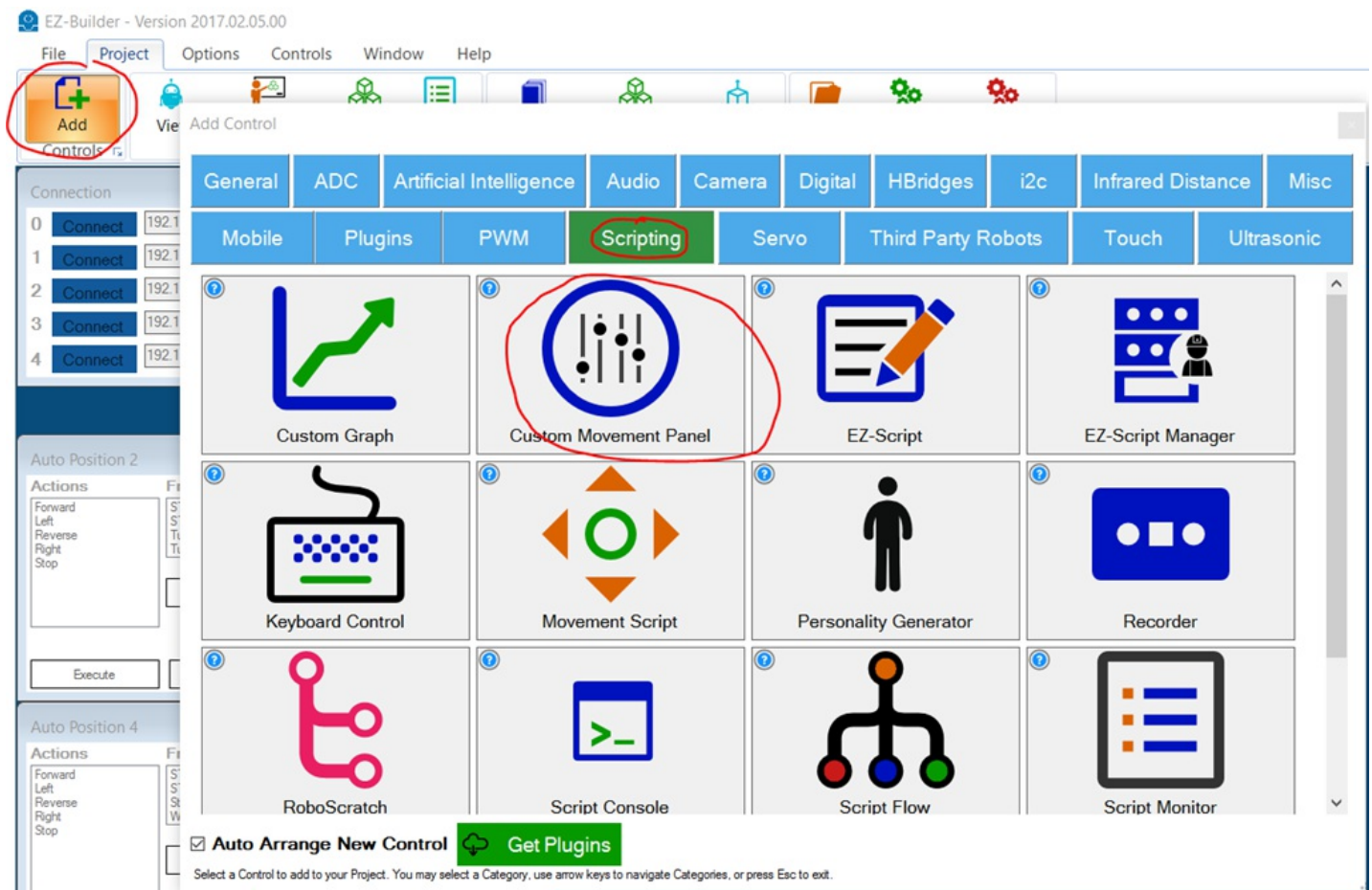
We're now going to add a movement panel which will control all of the robots at the same time. The movement panel that we will use is a Custom Movement Panel, which allows custom ez-script to be added. Each Auto Position will be instructed to execute movement actions using the `ControlCommand()`.

*For more information about `ControlCommand()`, view this tutorial here: <http://www.ez-robot.com/Tutorials/Lesson/78?courseId=6>

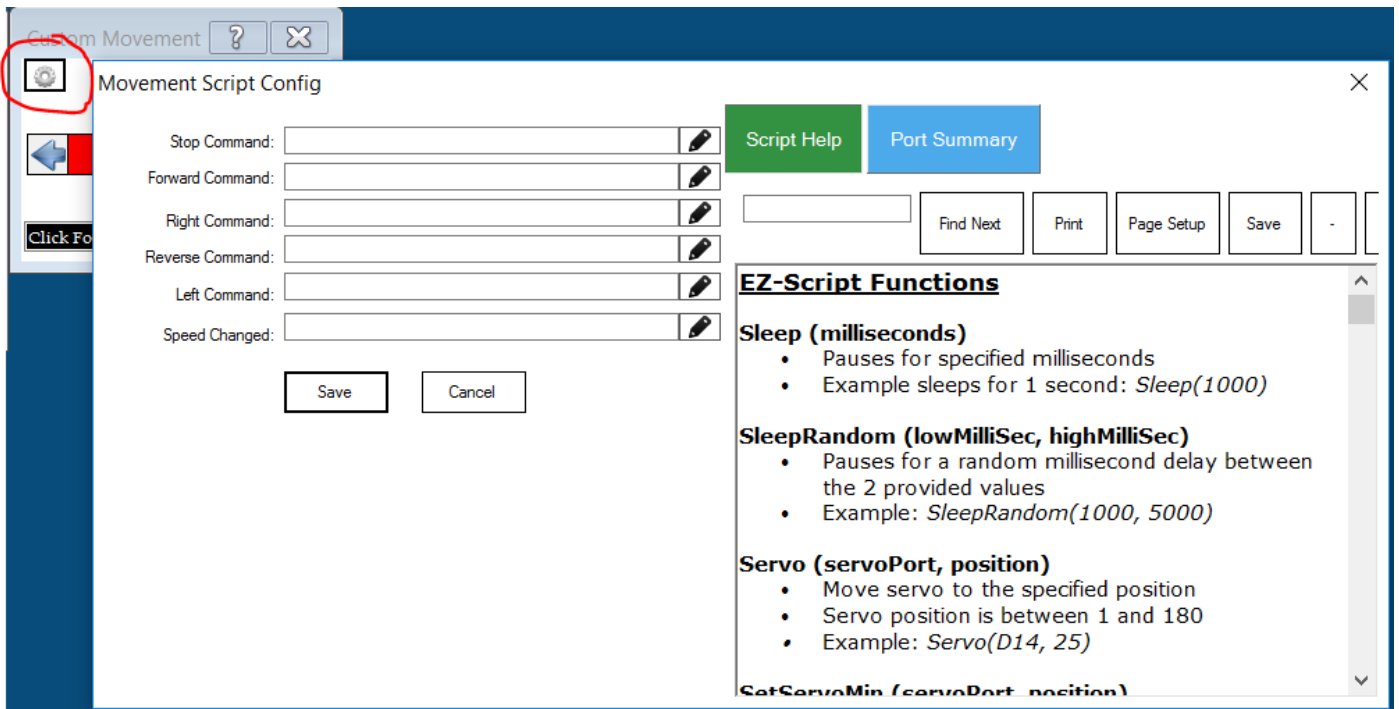
*For more information about Movement Panels, view this tutorial here: <http://www.ez-robot.com/Tutorials/Lesson/77?courseId=6>

Actually, you really should have already read the Activity Guide here: <http://www.ez-robot.com/Tutorials/Course/6>

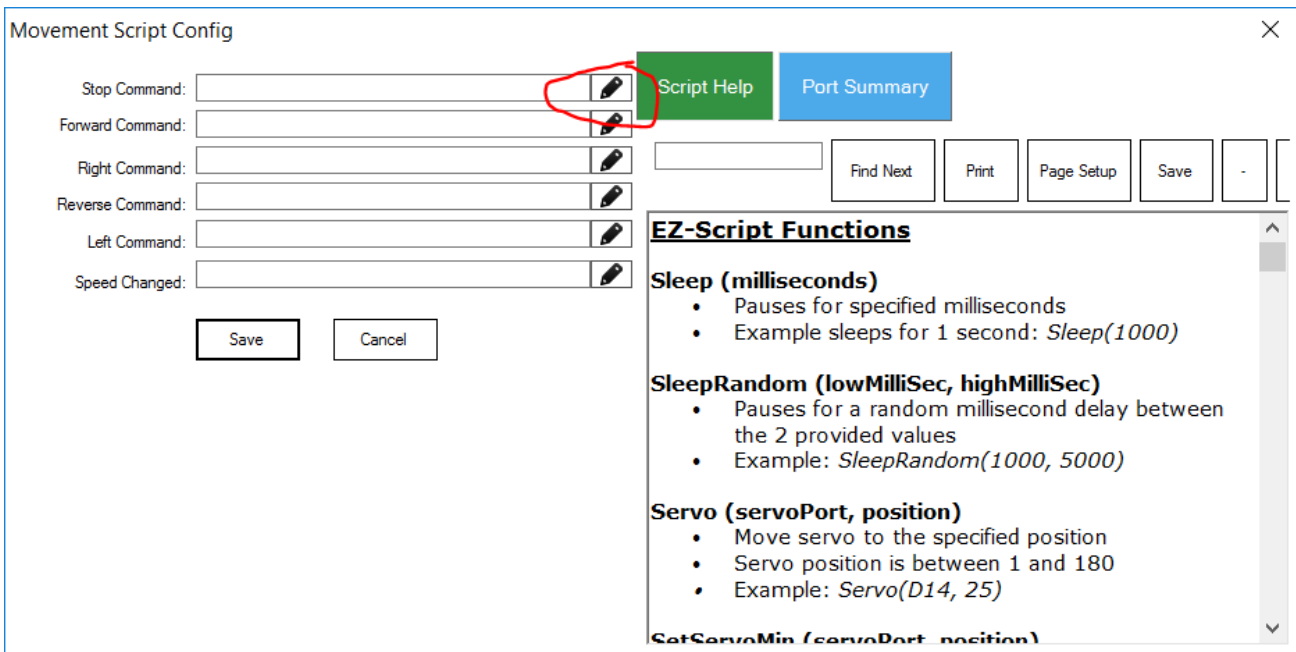
Step 1 Add Control->Scripting->Custom Movement Panel



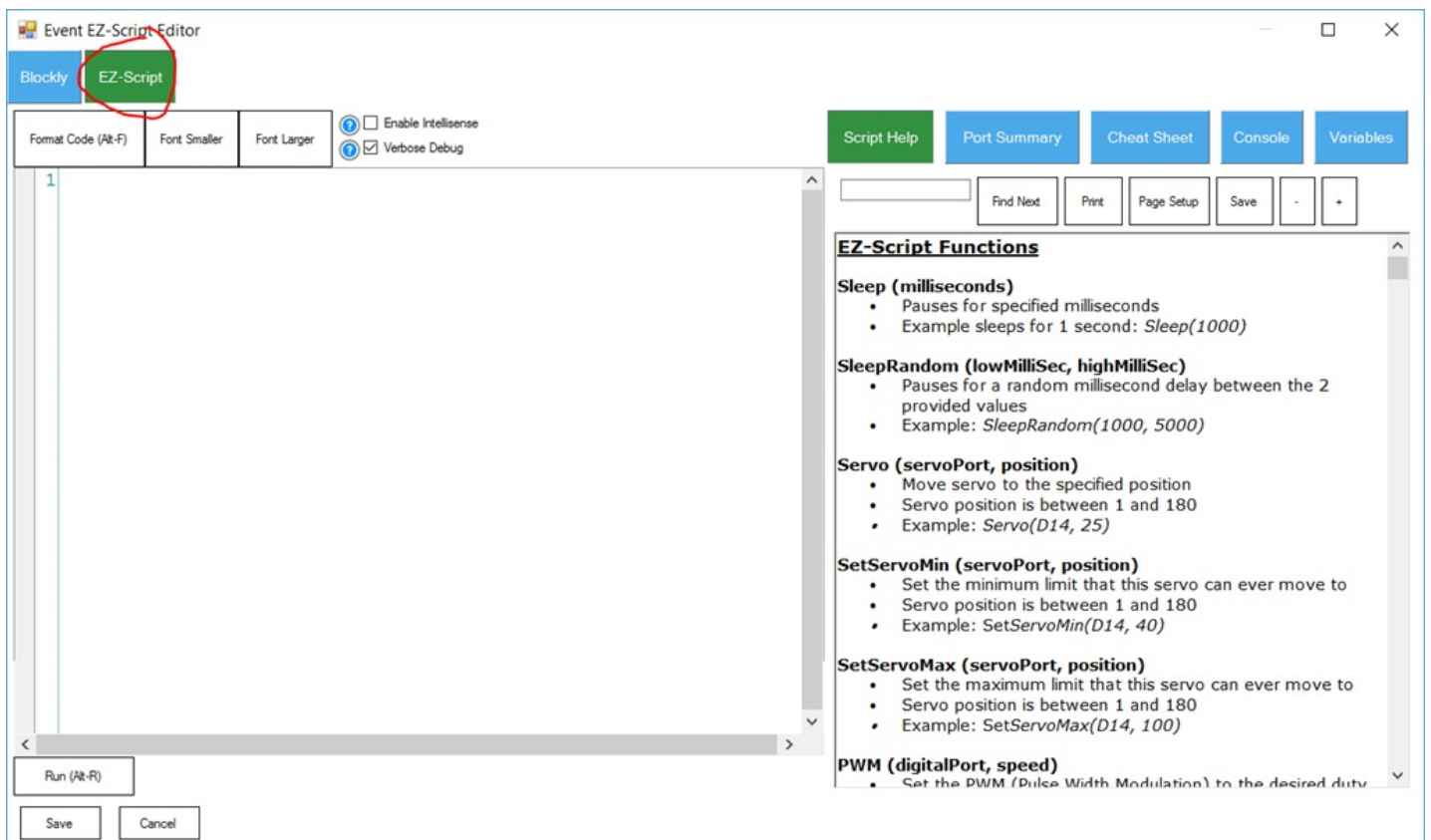
Step 2 We will now press configure on the movement panel. The window that opens is the configuration, which allows you to edit code that will be executed for each movement direction.



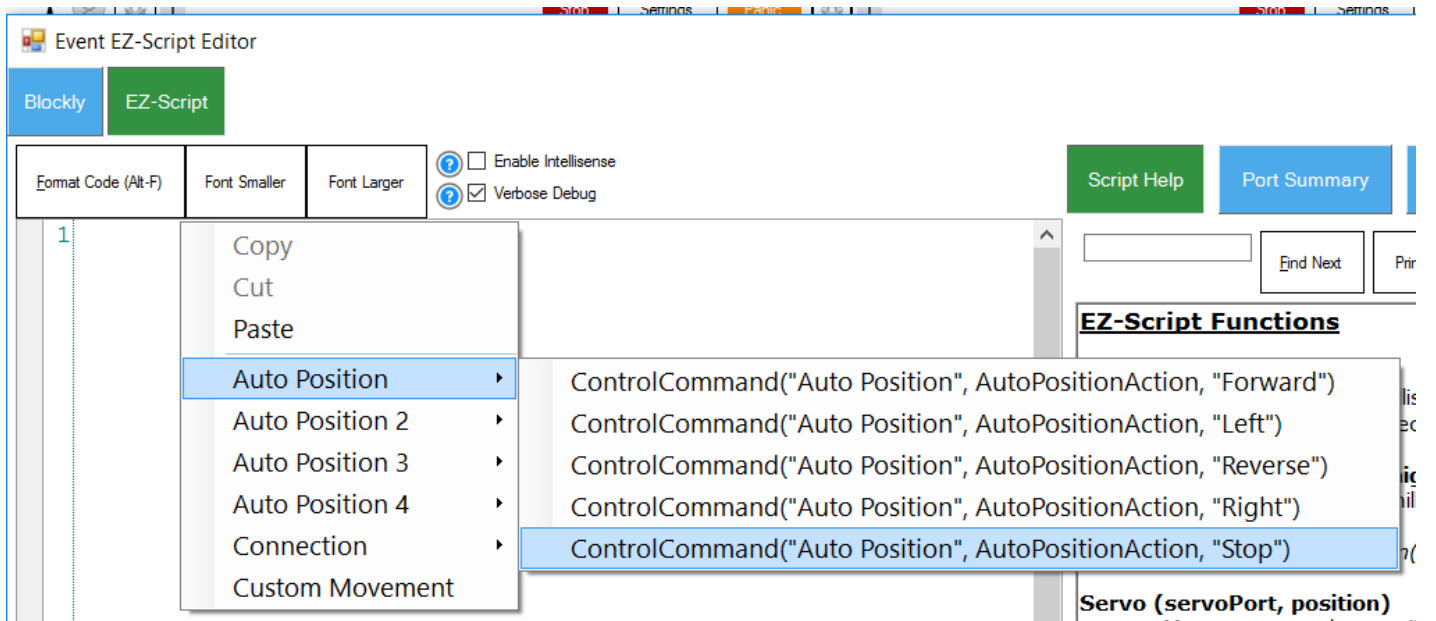
Step 3 Let's start by demonstrating how to add STOP commands for each Auto Position. Press the EDIT button on the STOP command.



Step 4 Depending on what your default editor is configured, either BLOCKLY or EZ-SCRIPT editor will be displayed. Press the EZ-SCRIPT tab, because we will be editing ez-script for this example.



Step 5 Right-click in the editor window and locate the first Auto Position, and select the STOP option.



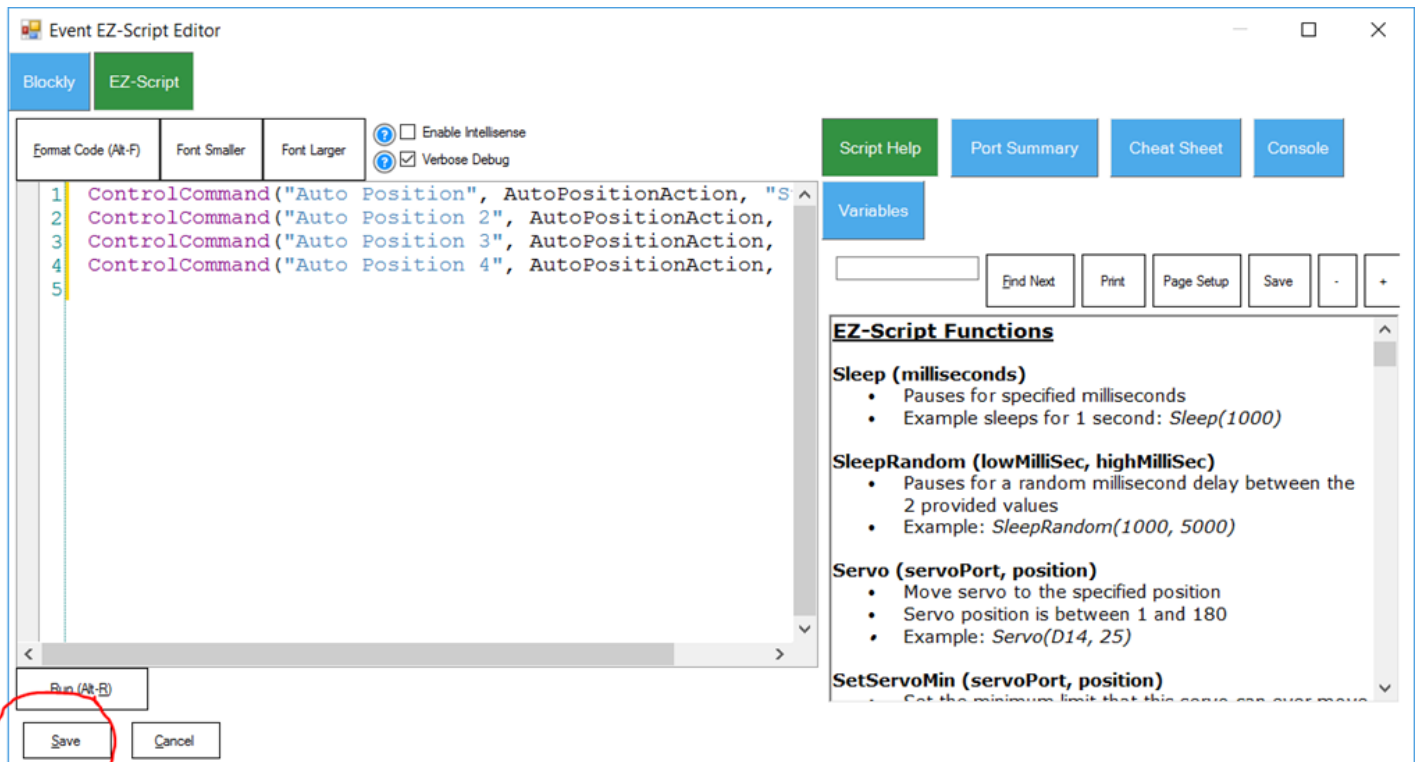
Step 6 Now repeat the same process for each of the Auto Position Controls, so your code will look like this...

```

1 ControlCommand("Auto Position", AutoPositionAction, "Stop")
2 ControlCommand("Auto Position 2", AutoPositionAction, "Stop")
3 ControlCommand("Auto Position 3", AutoPositionAction, "Stop")
4 ControlCommand("Auto Position 4", AutoPositionAction, "Stop")
5

```

Step 7 Save the script

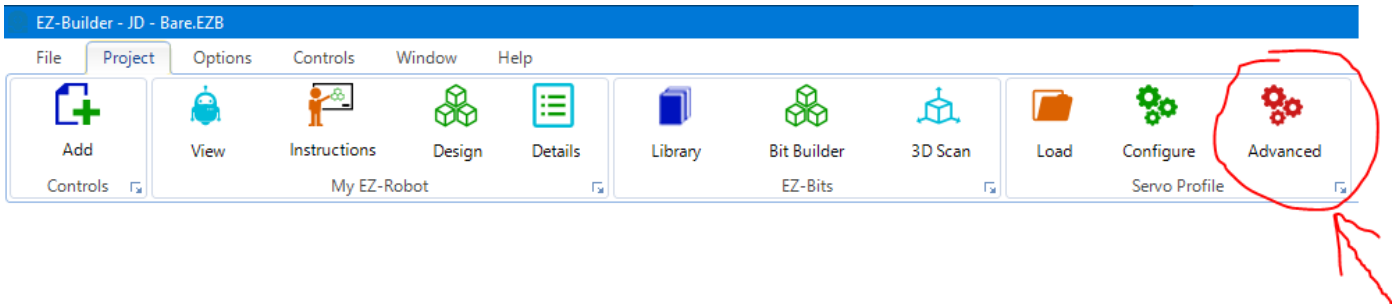


REPEAT You guessed right, this process must be repeated for each movement (forward, left, right, reverse, stop).

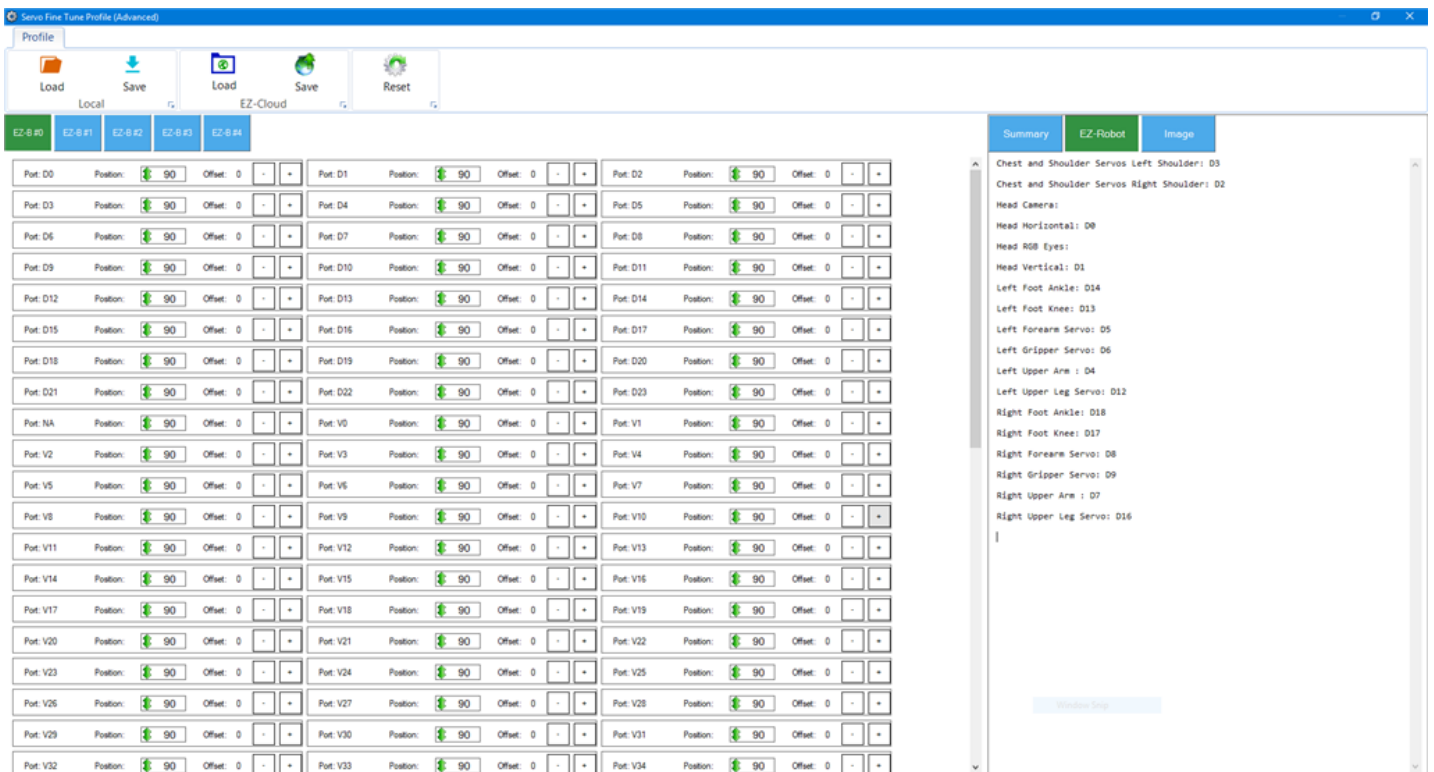
Each robot may require a servo profile to fine tune the servo resting position. The process of creating a servo profile for multiple EZ-B's at the same time can be achieved by using the "Advanced Servo Profile" editor.

Because only one 3D Robot design can be stored in a project, the Advanced Servo Profile editor does not display the graphical representation of the robots. This means you will need to know what servo ID (i.e. D0, D2, D8, etc.) maps to each joint for adjustment.

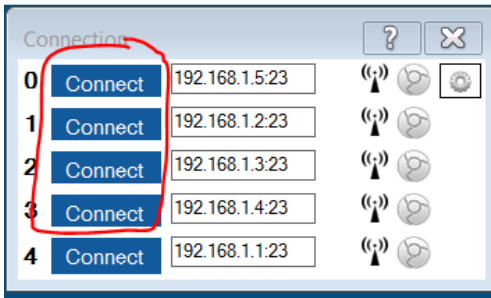
To access the Advanced Servo Profile editor, press the button from the top ribbon menu of EZ-Builder.



The Advanced Servo Profile editor contains a tab for each EZ-B and each servo port. See the image below...



Hey, you're done. All you have to do is press CONNECT on each EZ-B index of the Connection Control. Use the Custom Movement Panel and the robots will all respond to the commands.



If you want an example of this project, here it is: [MultiRobotExample.EZB](#)