SYNTHIAM

Control Meccano Meccanoid

Connect a Meccanoid to your EZ-B by using an Arduino as the translator.

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Ⓢ Introduction

You may have seen some of the EZ-Robot community converting the Meccano Meccanoid to use EZ-Robot parts to add real robot features to the Meccanoid toy. While most users prefer to replace the low torque and twitchy Meccano servos with HDD Servo. Some users may wish to keep the Meccano servos to use with the EZ-B.

The Meccano servos use a modified UART protocol with 1 start bit and 2 stop bits, which is not compatible with the EZ-B natively. The solution is to use an Arduino and the provided sketch as a translator between the EZ-B and Meccano servos.

For those interested in what can be accomplished by changing the servos, check tezsmith's EZ-Robot'd Meccanoid out: http://www.ez-robot.com/Community/Forum/Thread?threadId=9320

If you wish to continue using the Meccano servos, keep reading the rest of this tutorial.

ⓢ Program and Connect Arduino

The Meccanoid servos use a different serial protocol than standard. The difference is that there is 1 start bit and 2 stop bits. The way around this is to program an Arduino to become a translator for the EZ-B.

1. Connect UART1 TX to Arduino RX

2. Connect Arduino pins to servo chains:

   - Pin 5 (chain1): Left Arm
   - Pin 6 (chain2): Head
   - Pin 7 (chain3): Right Arm

*Note: The meccanoid servo communication requires a pull-up resistor, according to the manual. Check the manual for the appropiate pull-up schematic.

The MeccaBrain™ will see the 0xFE reply and realize that there is a Smart Module at Position 1.   Then the MeccaBrain™ will change the data byte to 0xFC

{0xFF, **0xFC**, 0xFE, 0xFE, 0xFE, Checksum/Module ID}

The byte 0xFC tells the Smart Module to reply back with its *module type*.

Smart Servos have a module type = 0x01

Smart LEDs have a module type = 0x02

Once the MeccaBrain™ has received the Smart Module's module type, the process is complete.   The next bytes that the MeccaBrain™ sends to the module are purely data.

When a module is unplugged, the MeccaBrain™ will be able to recognize that no data is being returned. This is because the Smart Module uses pulse widths of HIGH for 1's and 0's. If the data level is completely LOW, then no data is being returned and the module has been unplugged.

Currently a pull-up resistor circuit is needed when interfacing with the Smart modules (shown below). We are working on ways to improve so that this is not needed in the future.
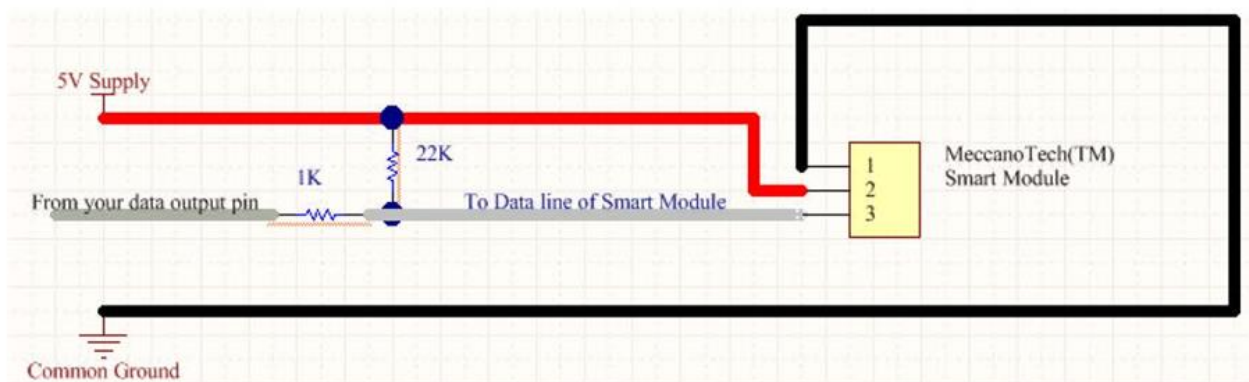
The Arduino sketch below will listen to serial commands from the EZ-B and send the commands to the appropriate Meccanoid servo chain. Each command is 3 bytes long (command, param1, param2).

The commands are:

- Command 0: set servo color
- Command 1: set servo position

For more details of the commands, examine the comments in the Loop().

Download the following libraries for the arduino sketch: meccanoid-library.zip

Here is the program for the Arduino Sketch: MeccanoidEZB.zip

S EZ-Builder Code

The EZ-B will now send commands to the Arduino over Serial at 9600 using the first UART port. Of course, you can change that UART to any other UART of the EZ-B v4, as long as you update the script.

Here is an example ez-script to move the left shoulder to 90 degrees. ``` UARTInit(0, 0, 9600)

definearray($mecaSend, 3)

$mecaSend[0] = 0x01 # move servo $mecaSend[1] = 0x00 # LEFT_ARM_PITCH $mecaSend[2] = 90 # 90 degrees

UARTWriteBinary(0, 0, $mecaSend) ```

Here is an example ez-script to change the color of the right shoulder to red. ``` UARTInit(0, 0, 9600)

definearray($mecaSend, 3)

$mecaSend[0] = 0x00 # change color $mecaSend[1] = 0x05 # RIGHT_ARM_PITCH $mecaSend[2] = 0xf1 # JOINT_RED

UARTWriteBinary(0, 0, $mecaSend) ```

*Note: in the examples, the UARTInit() is called for each example. This command only needs to be called one time. It is only placed in each example to demonstrate the UART initialization command. You can place this command in your CONNECT script for the EZ-B. The CONNECT script is located in the connection control by pressing the GEAR icon.

The EZ-Robot [2.5 Amp Motor Controller](#) will power the Meccanoid's movement motors just fine. Consult the HBridge ARC manual for more information:

With PWM (recommended: http://www.ez-robot.com/Tutorials/Help.aspx?id=192

Without PWM: http://www.ez-robot.com/Tutorials/Help.aspx?id=70