Getting Started: Programming Starter with mBlock

mBlock is an innovative way to learn and experiment with programming. It is a custom build upon Scratch – the de-facto standard of graphical programming software taught in many schools. Its functions include but not limited to:

- "Write" your program by dragging and dropping blocks
- Draw pictures, tell stories, write interactive projects and make games with code
- Control your Ranger, Makeblock Starter Kit, Makeblock Ultimate Kit, and more projects built upon Makeblock's RJ-25 Wiring System
- Upload programs to your Makeblock robots so they can run by themselves
- Convert your block-based program to full Arduino program and learn advanced programming skills
- Express creativity with software-hardware combined projects such as games using human bodies as controllers.

Step 1: Download mBlock

The first steps are downloading and installing mBlock. We provide both Windows, Mac, Chromes and Linux versions of the software. The instruction below mainly focus on Windows and Mac users.

Step 2: Install USB Drivers

If it is the first time you install and open mBlock, you need to install USB drivers otherwise USB cables won't work on robots.

For Windows users, please select "Connect", "Install Arduino Driver" as the picture shown below.

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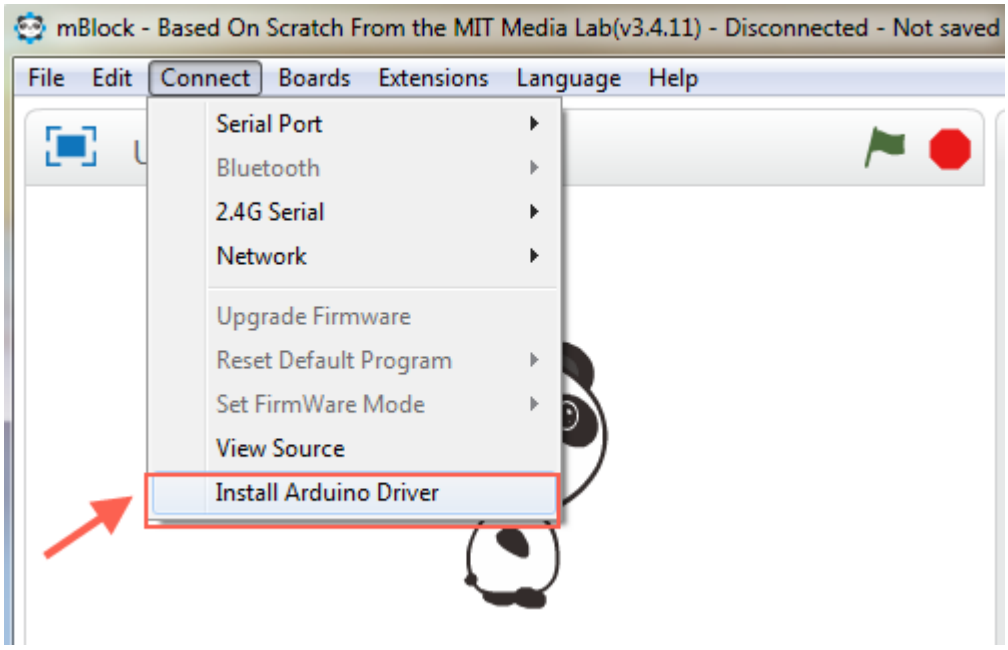

For Mac OS Sierra users, please refer to the instruction on this link to install Arduino driver.

For other MAC OS users, including Mac OS High Sierra, please install Arduino drivers for Mac OS.

Step 3: Connect Your Robot

mBlock provides two ways to connect your Starter to the computer. USB cables are recommended for first time users and you can update firmware/reset default program only through USB cables; if your computer support Bluetooth and you have a Me Bluetooth module, you can try Bluetooth connection.

Here are the steps:

1. Use a USB cable to connect between your Orion board and your computer.
2. Always keep the buzzer off on Orion board.

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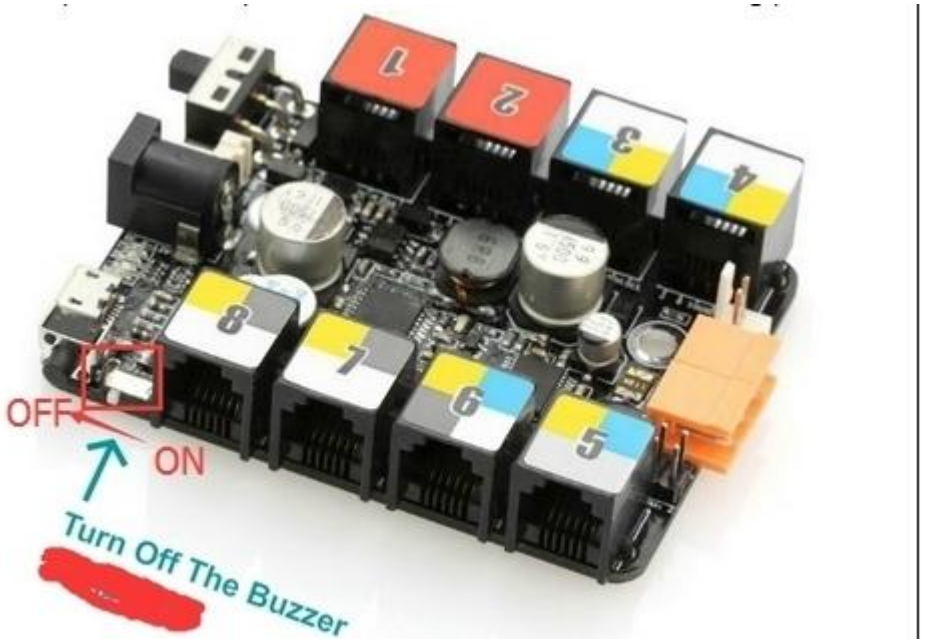
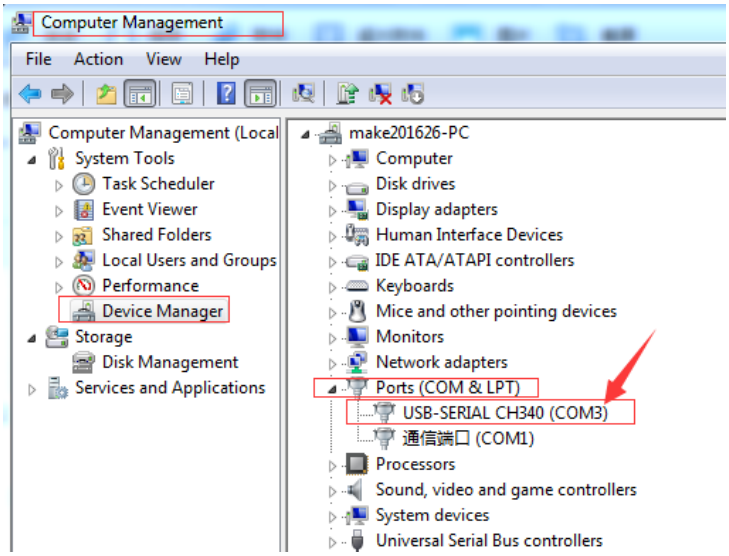
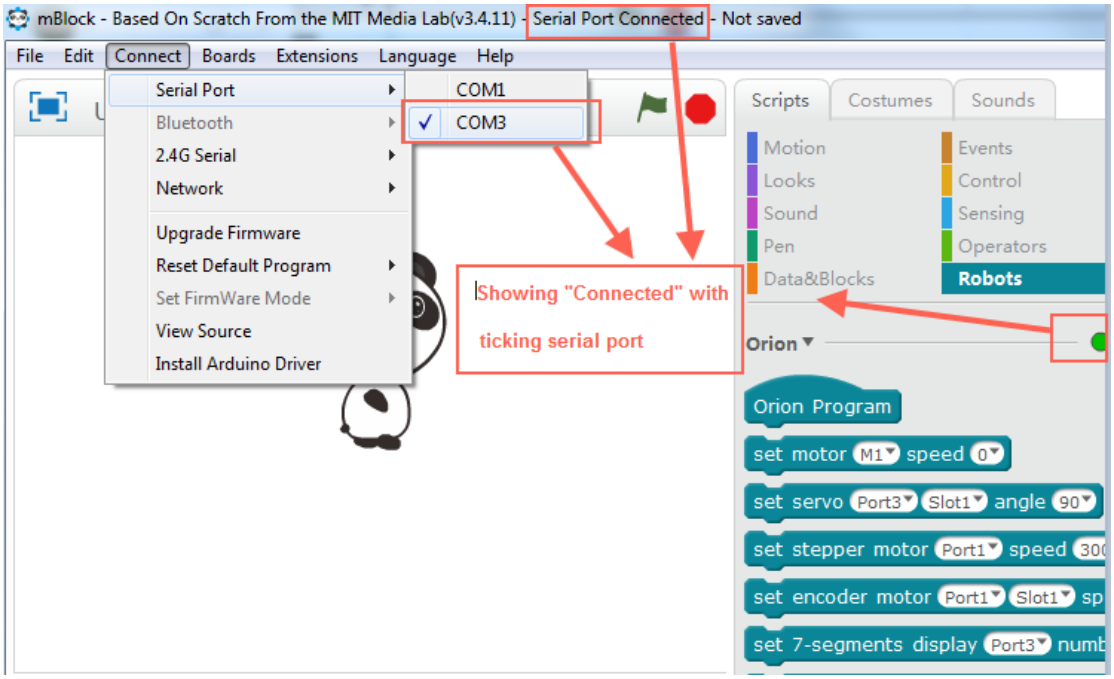


3. Select “Connect”, “Serial Port”, and then select the corresponding board to your robot. If you are using Windows, it should be something like “COM” and a number;

   (Here my Starter’s serial port is COM3, and you can check your Starter serial port under your computer's Device Manager->Ports (COM&LPT))





If you are using a Mac, please select port starts like “/dev/tty.wchusbserial 1410”.

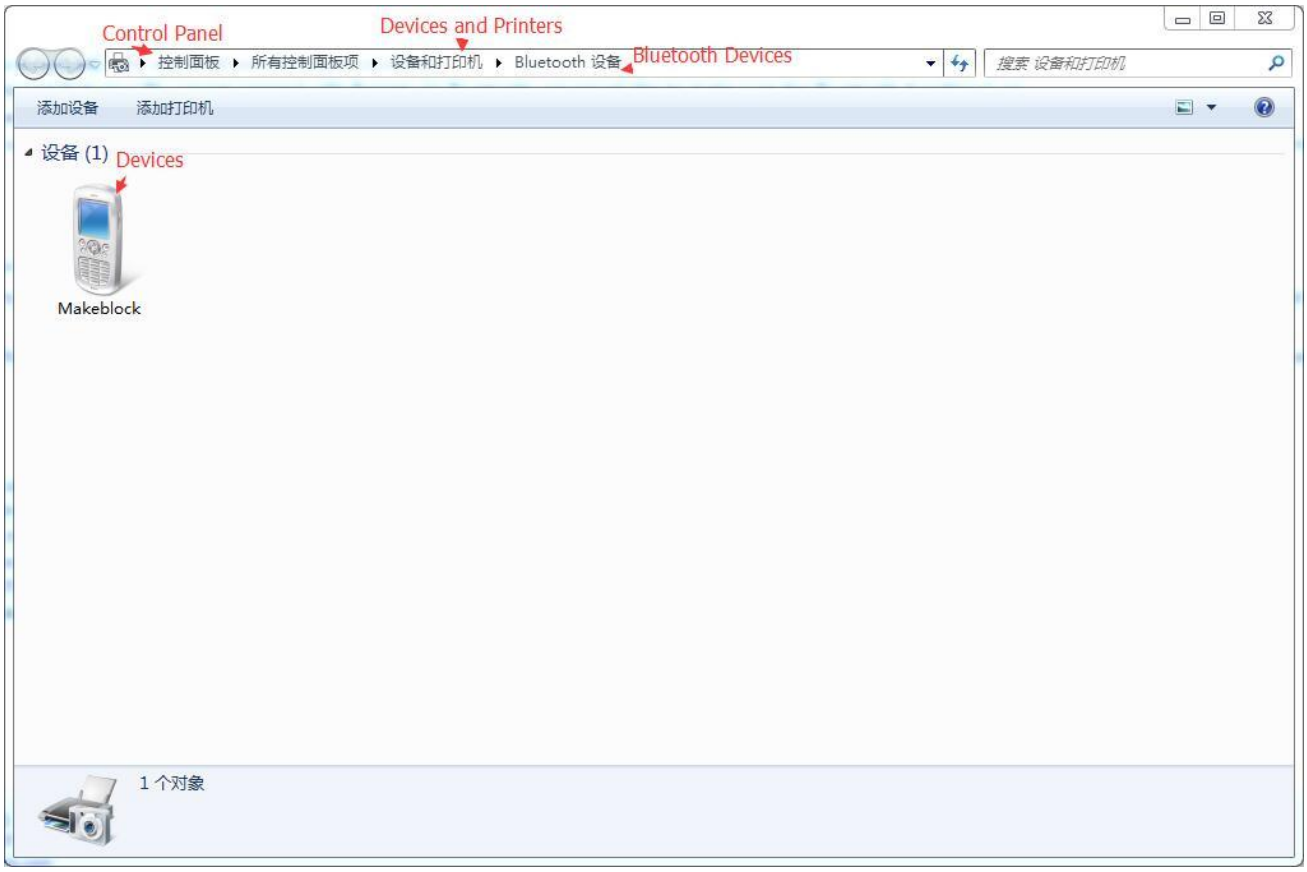
Connect Your Robot Through Bluetooth

If your computer supports Bluetooth and you have Bluetooth Modules for Starter or Orion, you can control and program your robot online wirelessly. (For more information regarding the difference of “online” and “offline” programming, please see “6. What are “online” and “offline” programming?” on this link)

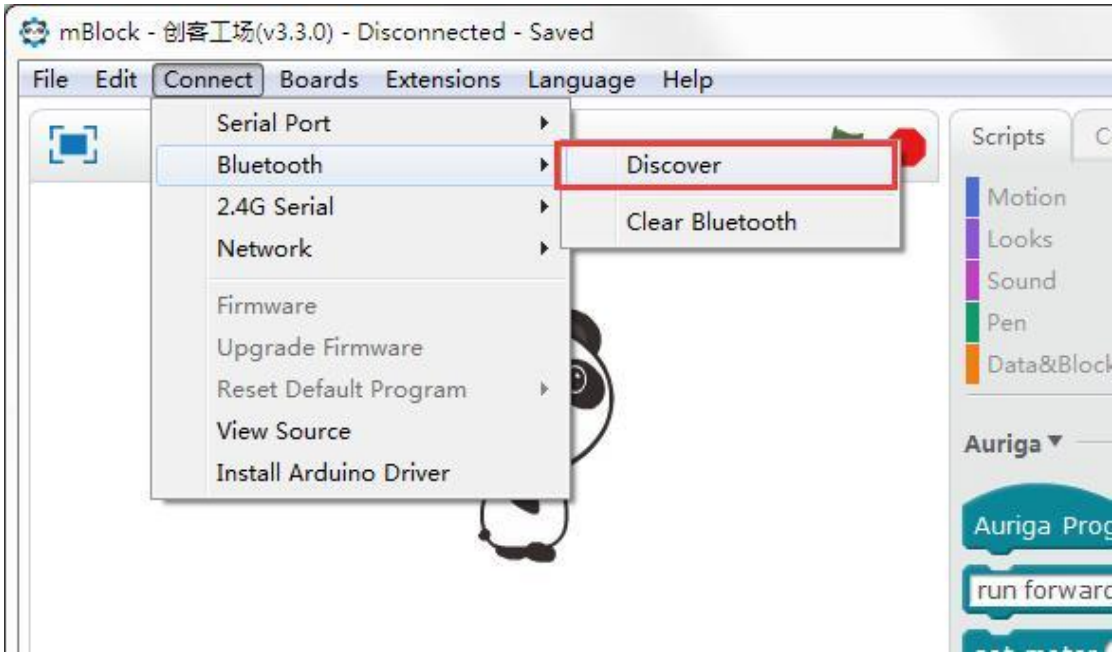
Before connecting your Starter through Bluetooth, we need to upgrade firmware for Starter first, then unplug the USB cable from Starter.

For Windows Operating system, please follow the instructions below.

1) Please enable Bluetooth function on PC, and add Makeblock device on Bluetooth devices list.



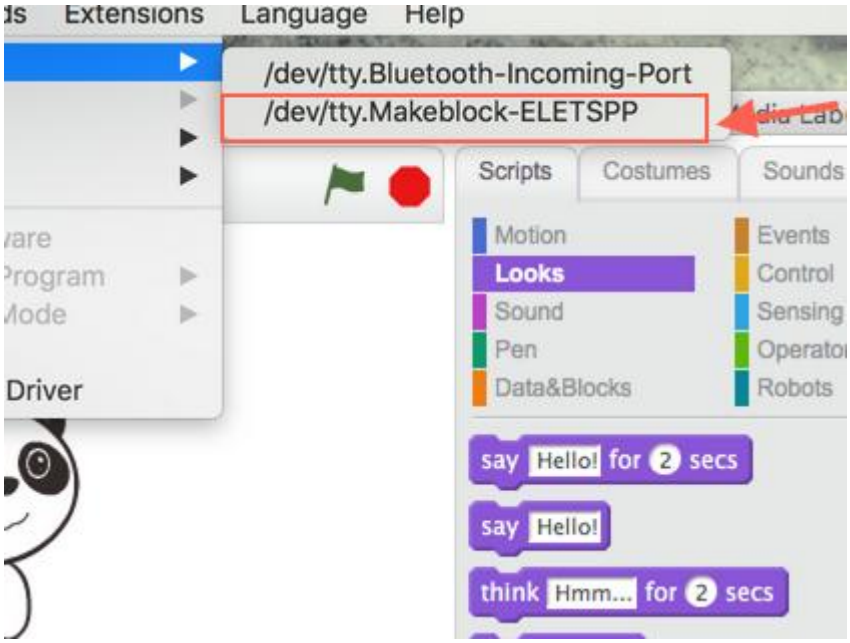
2) Power up your robot, select Connect->Bluetooth->Discover, select your device discovered in the list, then you are free to go.



3) When the Bluetooth module blue LED light becomes solid on, the Starter has been connected to PC via Bluetooth connection successfully.

For Mac OS X users, please follow the instructions below.

4) Enable the Bluetooth function of your Mac.
5) Power up robot, and select serial port **/dev/tty.Makeblock-ELETSPPP** on Serial Port menu, which is the Starter Bluetooth port on Mac.
6) When the Bluetooth module blue LED light becomes solid on, the Starter has been connected to Mac via Bluetooth connection successfully.



Step 5: Upgrade Firmware

Before controlling your robot with mBlock, you need to upload/update the firmware of your Starter or Orion controller board. Select Connect->Upgrade Firmware to complete

(Please note, upgrade firmware is required via USB cable connect the robot to computer. Please visit this link for specific instruction to upgrade firmware for Stater)

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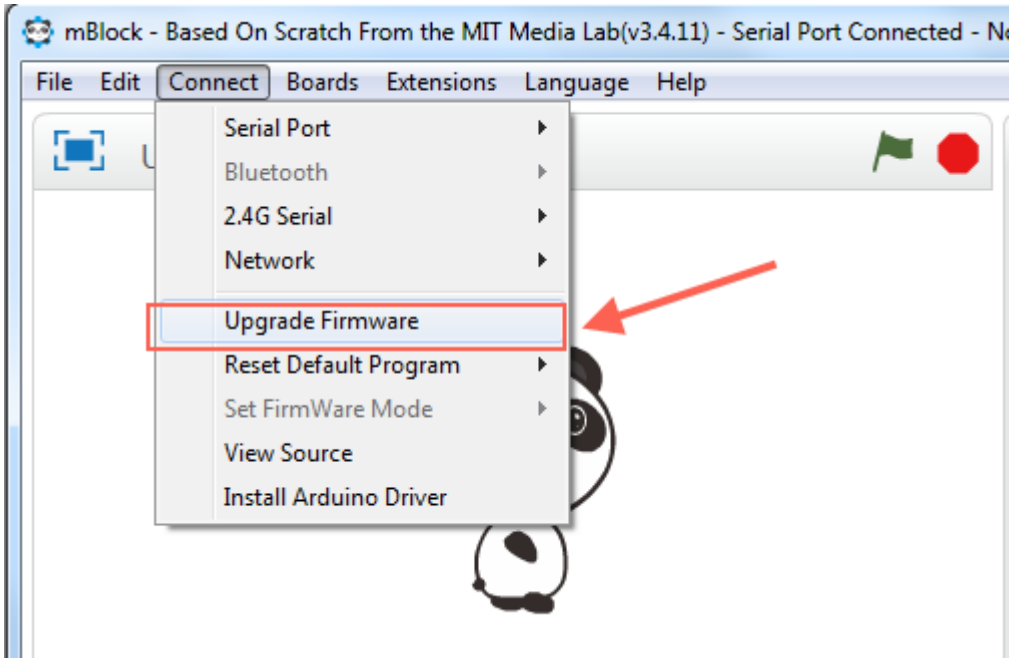
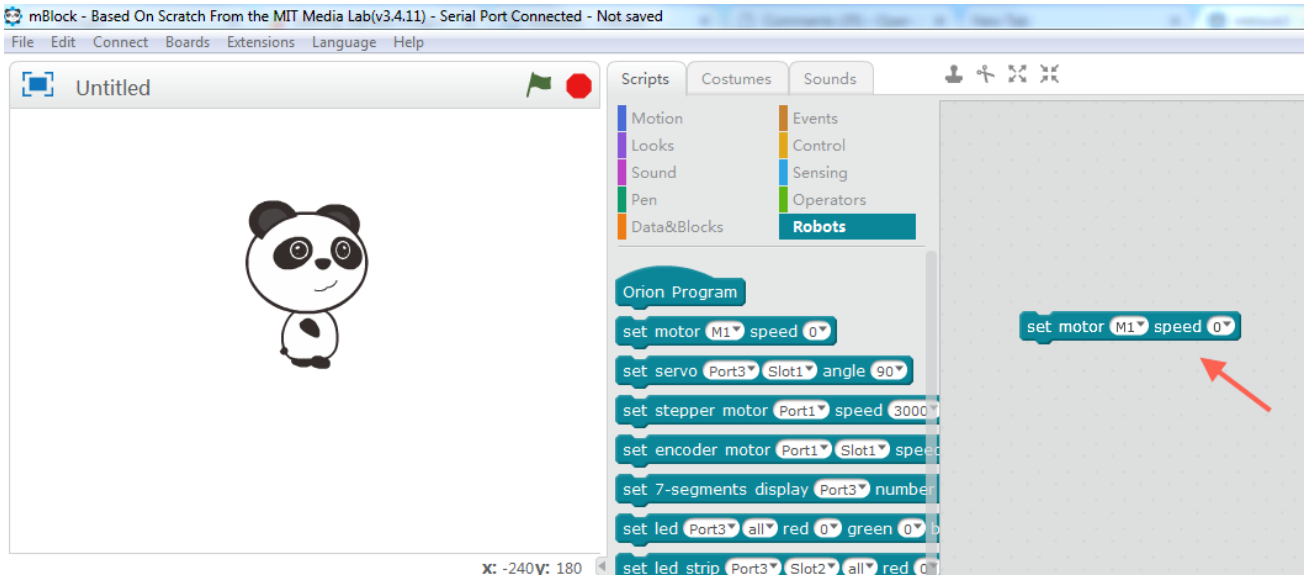
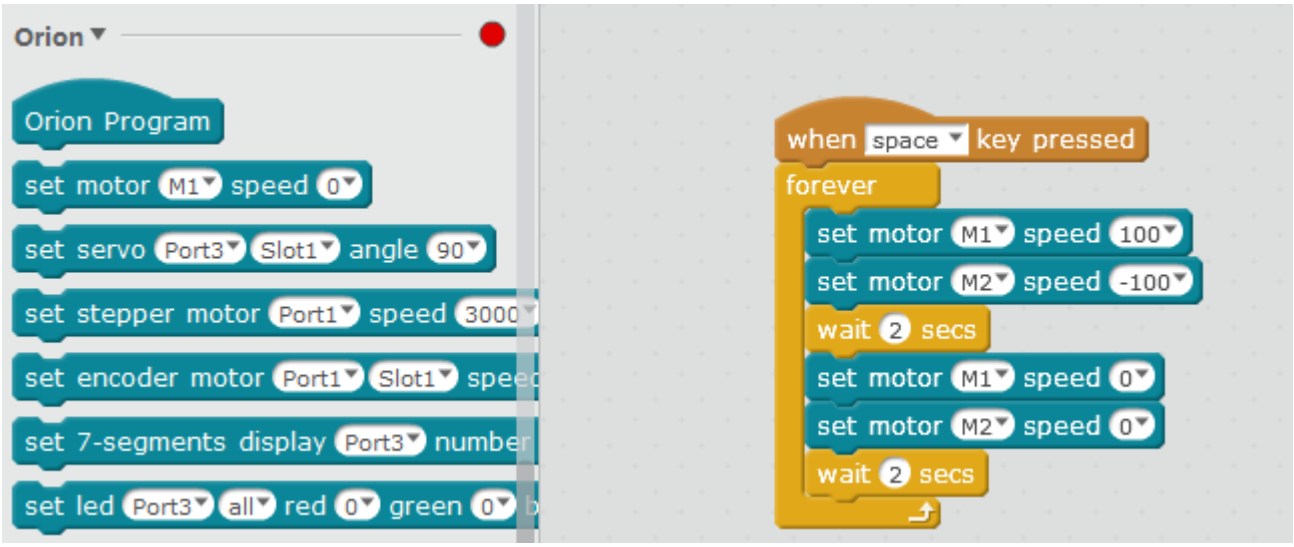


Step 6: Write your First Program for Your Robots

Now you may enjoy controlling your robots with mBlock. Basically, mBlock is based on Scratch. It includes all the command blocks from Scratch and it can run Scratch programs. Robot-related commands are located on “Robots” section. You can drag a block from this section and double click it to run. See if you own a Starter, you may drag then double click a “run forward at speed 100” block to let the robot run (at speed 100).



If you would like to control the operation of the entire program, you could use the block “when space key pressed” as the example 1 shown below.



(Example 1)

Here is another example 2 of letting the Panda say the distance of ultrasonic sensor detects.

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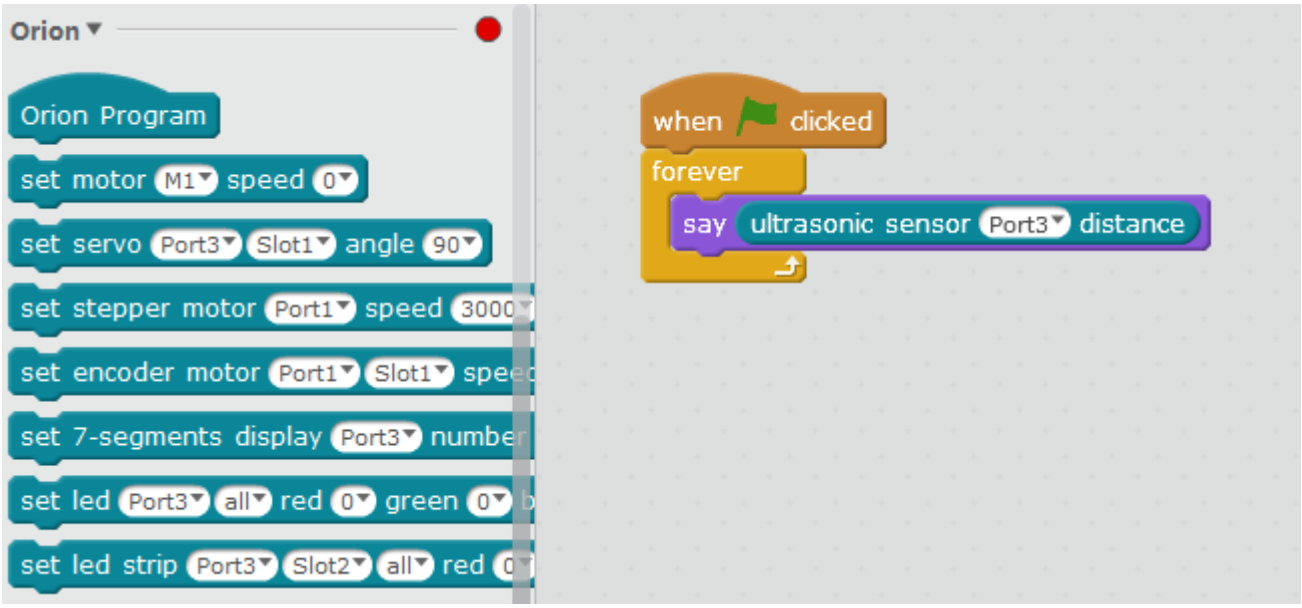


(Example 2)

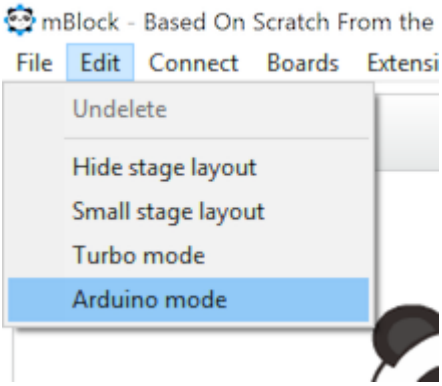
Feel free to explore different command blocks and combinations in mBlock – endless possibilities awaits you!

Step 7: Upload your Program to your Robots

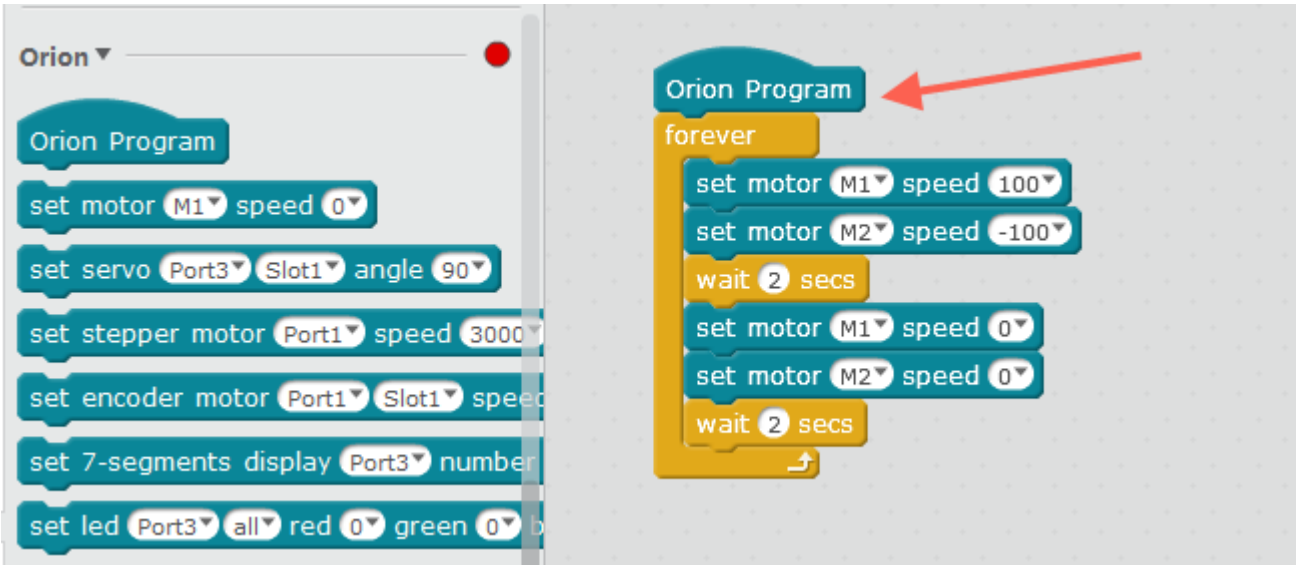
What truly amazed me is that programs written in mBlock may be uploaded into robots and run without a computer. This is particularly useful if you want to build a robot that runs on its own or you what to build a device (such as Christmas decoration) that works without always having a computer at its side.

Please note, to upload program to Arduino must through USB cable connection. The Bluetooth connection doesn't allow upload your programs to your Starter.

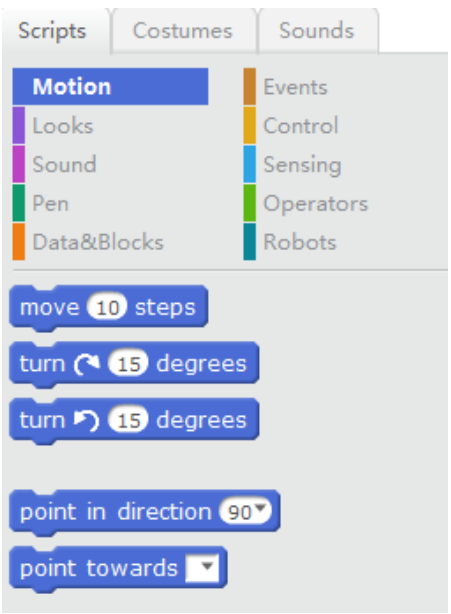
The steps to upload programs are easy: First, select "Edit->Arduino Mode" to switch to Arduino Mode:

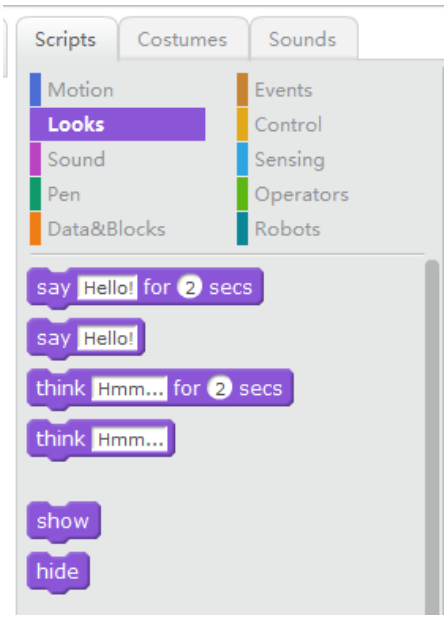


Second, you may see the Arduino code generated by mBlock. Arduino is a programming language used to control electronic devices, mainly used by makers. If you are curious, you can see how Arduino code change as you drag and arrange new blocks in mBlock. There is one thing you need to know: your program need to start with a corresponding robot "header block" to work before uploading to the robot. As the example 1 we have shown above, we need to change the header block as "Orion program" in order to upload the program to the robot.



Some Scratch native blocks only support online programming, such as the blocks from “Motion” and “Looks”, etc. If you try to upload these blocks to Arduino, mBlock will remind you to remove the “unsupported block” from the program.





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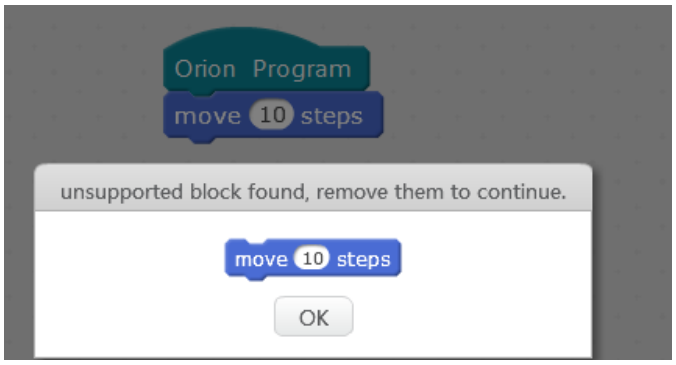

Step 8: Start from some lessons

We have created some lessons about graphical programming and robotics to help teachers or kids get started easier. We suggest you start learning graphical logical programming with *Scratch 2.0 The Adventures of Mike,* then learn how to use Scratch2.0 to interact with Starter with the book *The Mars Adventure of Mark.* Here is the link to access the book.

You could also refer to the instruction of programming with mBlock on this link.

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