Controlling Our World

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Introduction

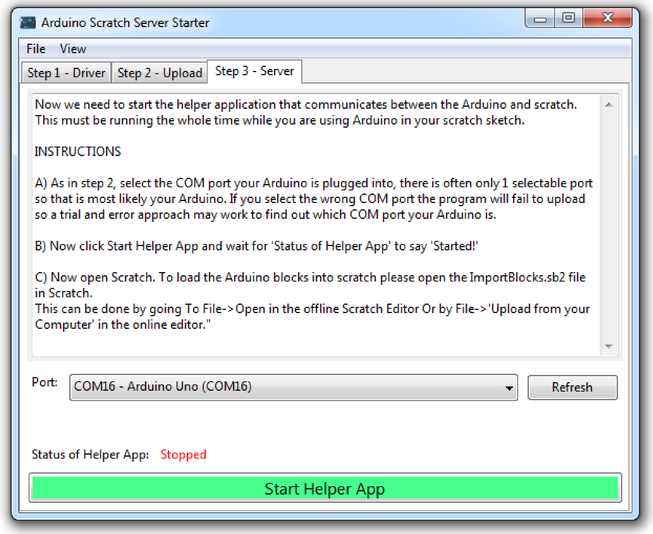
Programmers are increasingly trying to make applications more immersive by controlling the world around us. Examples such as motors to give force feedback and new tactile technology that allows you to feel textures on screens have caused programming to not be just about inputs but also about controlling the world around us and now you can do so with Scratch too!

Aim

The aim of this poster session is to provide you with the knowledge and resources to start using outputs with Scratch, and to show how interactions with these outputs can be fun and interesting. We achieve this via the use of an Arduino hooked up to Scratch V2.0 and some basic electronics.

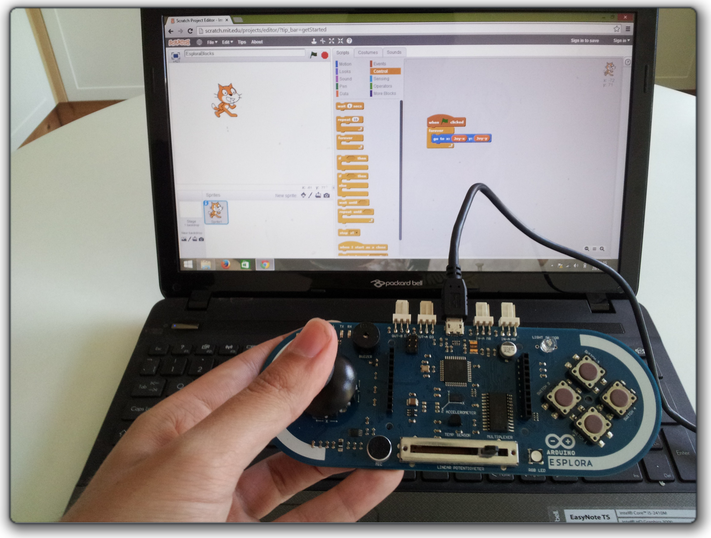
Using Arduino with Scratch (A4S)

To make it super easy to get started using Arduino with Scratch I have developed a program that requires the user to have no knowledge of how to program an Arduino. The program is called A4S and available from http://thomaspreece.com under the Arduino tab. Alternatively scan the QR code at the bottom right to go straight to the website.
Note: It only currently works on Windows XP / 7 / 8



Controlling the Scratch Cat

The Arduino Esplora is a perfect board for Arduino beginners. It has tonnes of sensors and outputs built in to the board so requires little to no electronics knowledge to use. Just plug in and go.
Some of the items on the board include lights, buzzer, temperature and light sensor and accelerometer.
The A4S program also comes with a Scratch project file to help access all the sensors.



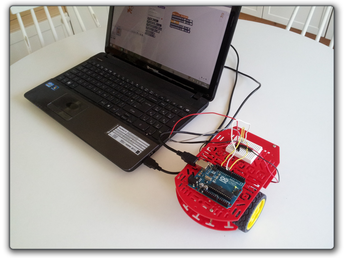
Advantages Vs Other Hardware

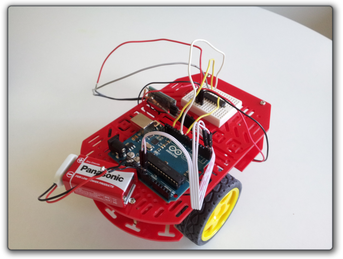
Lego WeDo/Lego Mindstorms
- WeDo has a limited selection of sensors and outputs. Arduino can handle everything the WeDo can do and more.
- Children can easily learn electronics by using Arduino with Scratch
- Lego is expensive. Arduinos and parts can be picked up very cheaply

ScratchBoard/PicoBoard
The ScratchBoard can only take inputs whereas the Arduino can take all the inputs that a ScratchBoard can and it can also use outputs such as motors and lights.

Robots

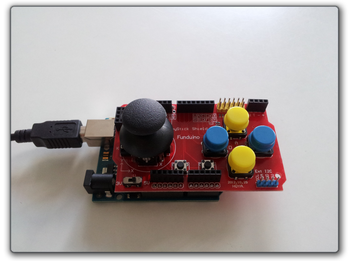
The Arduino in the left picture is attached to two motors and can be controlled via scratch. The right picture has the same robot with an added bluetooth module attached allowing for wireless control via Scratch.

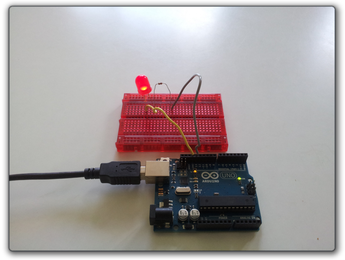




Adding Sensors and Outputs

With the Arduino being well established it has many extension boards called shields. The left picture below shows one such shield which cheaply adds a joystick and some buttons to your Arduino. These are again useful if you don't want to learn too much electronics and are easily used in Scratch. They are also very sturdy unlike breadboard electronics.
The right picture shows a simple LED circuit that flashes on and off and is being controlled by Scratch. You learn a lot more from constructing your own circuits and there are some tutorials covering the basics on the resources website.





Worksheets

Several worksheets can be found on my resources page. These include constructing basic electronics to use with Arduino and Scratch, using the Arduino Esplora with Scratch and using ScratchBoard homemade sensors with Arduino and Scratch.

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Link to resources page