Getting Started with EV3 Programming

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Maine Robotics
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Mindstorms for the EV3

Programming was originally a collaborative project between

- The LEGO Group
- Massachusetts Institute of Technology (Media Lab)
- And the Tufts University - Center for Engineering Education and Outreach (CEEO)

Now the software is a collaboration between the LEGO Group and LabView.

Changes over the years

Some major revisions to the software, mostly mimicking the changes in hardware:

- Robotic Invention System (RIS, 1 and 2)
- RoboLab (1, 1.5, 2, 2.5, 2.9)
- Mindstorms for NXT
- Mindstorms for EV3

As well as a number of other products out there (some free, some not)

And at least 7 others that run on the EV3 and 18 that run on the NXT brick.

Projects and Programs

With the EV3, which is running a version of Linux, you can now have an almost unlimited number of grouped programs.

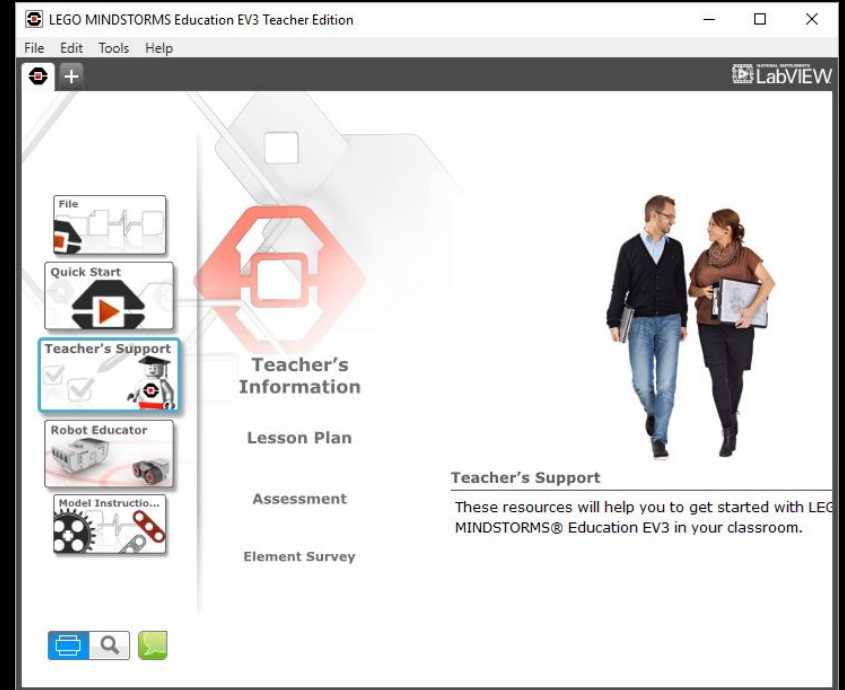PROJECT

- Program 1
- Program 2
- Etc

NOTE: It's easy to change the name of the programs, a little harder to change the name of the project. The project is the FOLDER and the programs are the FILES.

Starting a program

You will start up with the basic Mindstorms window.

Windows and Apple screens may look slightly different, but all of the functionality is the same.

Note the tutorials on the side

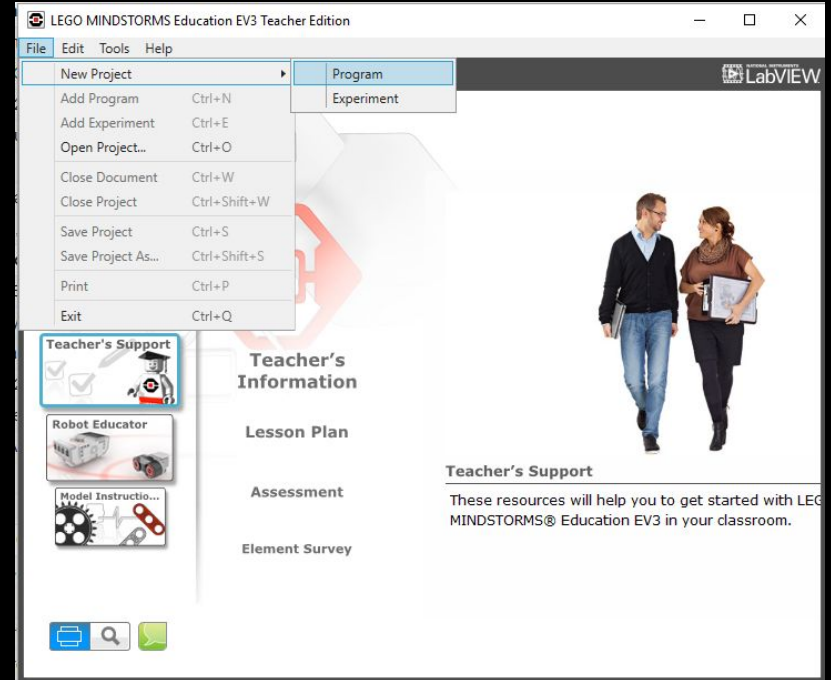(File/QuickStart/Teacher's/Robot Educator/Model Instructions)
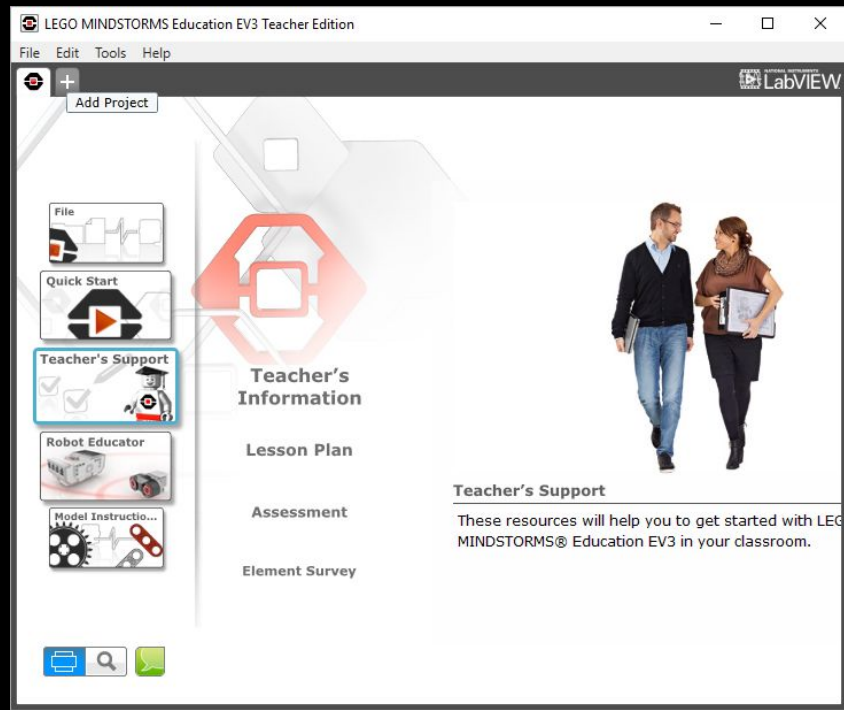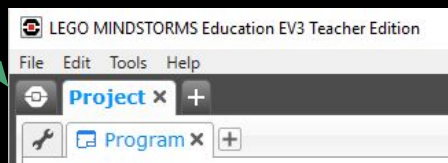
Start a Project

Use

File > New Project > Program

Note: Project will be called "Project" unless you later use the "Save As" option to give it a new name

Other way to start up

Use the "+" sign at the second level menu and it will start your first "Program" as an empty program.

NOTE: the icon next to the Project/+ tab will bring you back out to the main screen.

Your first Project & Program

Okay, you hit the + button or told it to start a new project...

This is what your next screen will look like. Couple of things:

You can close the CONTENT EDITOR (more on that in a different presentation) by clicking the uppermost right button (mouseover will say "close content editor") This will free up a lot of real estate on your screen.

You can also use the zoom in/zoom out buttons up top as well.
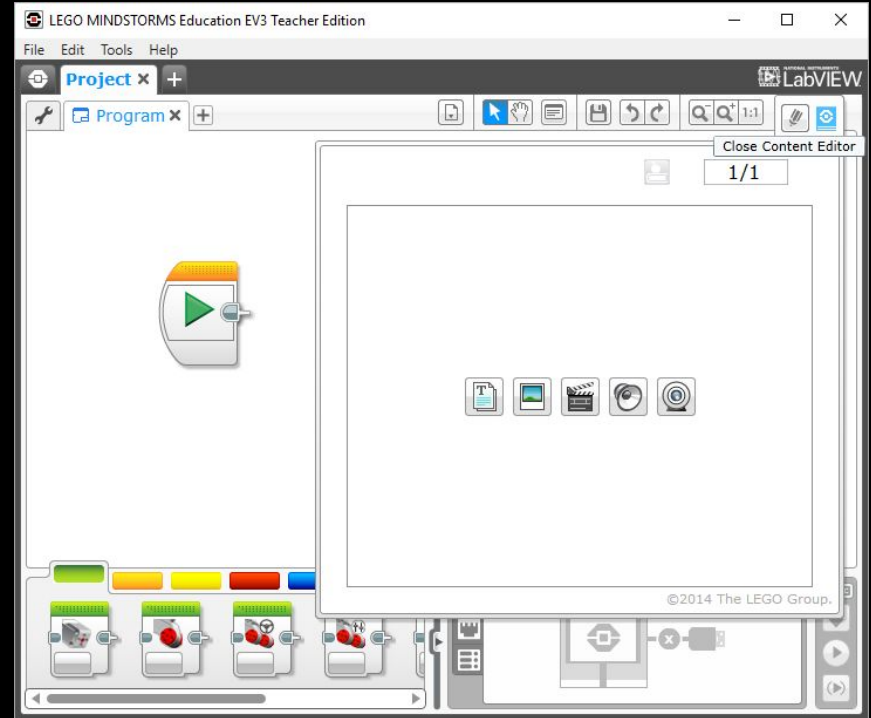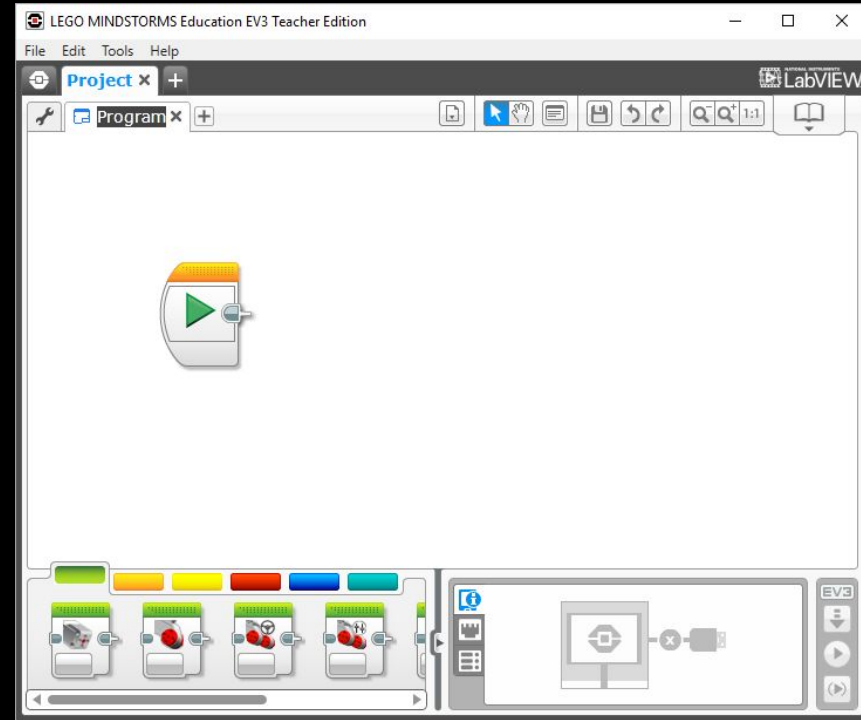
Your empty programming palette

We are now ready to program

The "Play" block is showing on your screen. Anything you attach to this will become your program

If you lose it (delete it, etc) we'll tell you later how to get it back

All of the pieces that make up the program are called "blocks"

The Block Menu at the Bottom of the Page

- ACTION
- FLOW CONTROL
- SENSOR
- DATA OPERATIONS
- ADVANCED
- MY BLOCKS

Most simple robot programs only use
the ACTION and FLOW CONTROL menu
items. So let's click on the green
ACTION menu tab at the bottom.

Blocks found in the ACTION menu

1. Action Blocks:
    a. Motor Controls:
        i. Medium Motor Control
        ii. Large Motor Control (single)
        iii. Large Motor Control (dual - steering drive)
        iv. Large Motor Control (dual - tank drive)
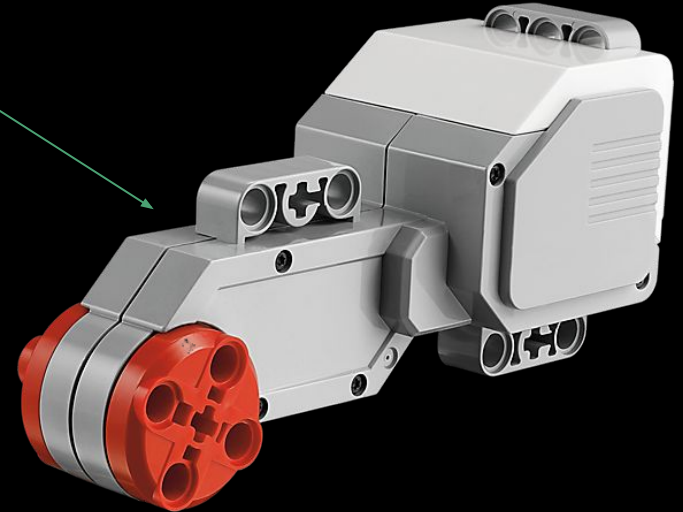   b. Display
        i. Display block (text, objects, files)
    c. Sound
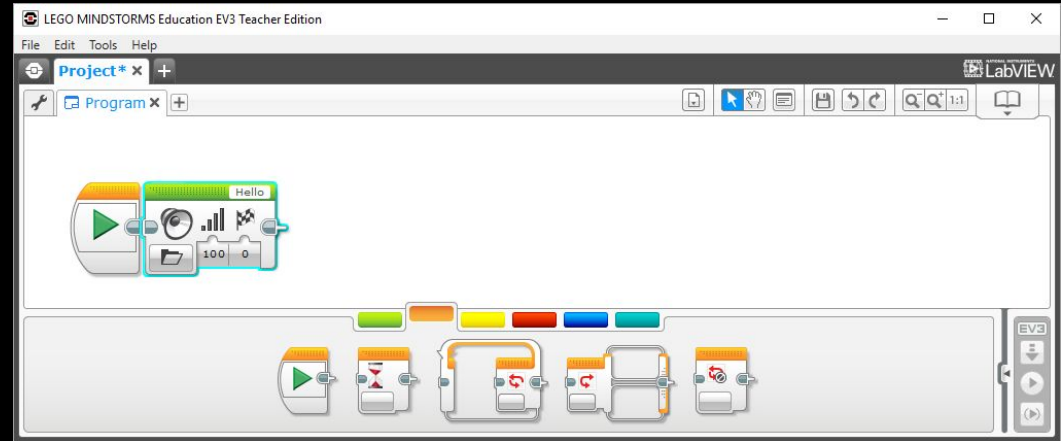   i. Sound block (tones, notes, files)
    d. Brick Status Light
        i. Brick Status Light block (on/off, red/orange/green)

Adding a Sound Block

One of the simplest programs is to just get the robot to make a noise. So let's add a Sound Block. It can be found on the ACTION menu at the bottom

Just drag it until it drops next to the PLAY/START block.

Each Block Has Variables

The Sound Block:

- Main block options
    - Action:
        - Stop
        - Play File
        - Play Tone
        - Play Note
    - Volume
    - End Control
        - Wait for completion
        - Play once (but don't wait)
        - Play over and over (you select the number)
- If you select "Play File" you then use the upper empty window (says "Hello" in example), to select from a wide range of files.
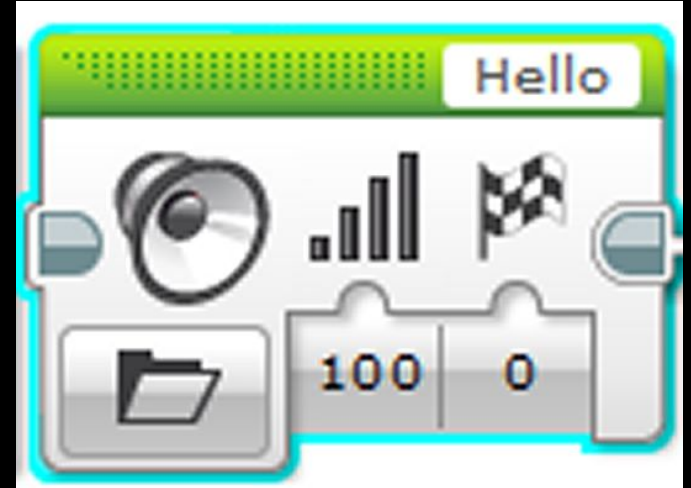
Connecting to your EV3

- EV3 is turned on
- EV3 is plugged into your computer using a USB cable
  (note, you can also connect via Bluetooth if that is available, and turned on, on the EV3 and computer. Pairing is required)
- First time users may have to update Firmware, but it is a simple "follow the directions" task.
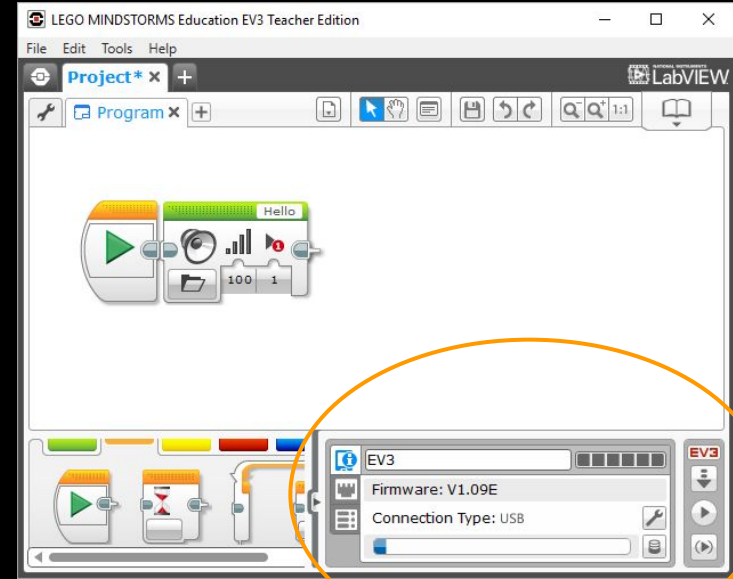
The EV3 Connection

There are three tabs on the left of the EV3 area

NOTE: an EV3 is called a brick... Think LEGOs

- Brick information
- Port information (values)
- Available bricks
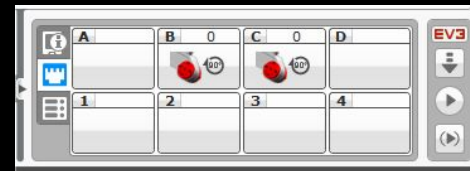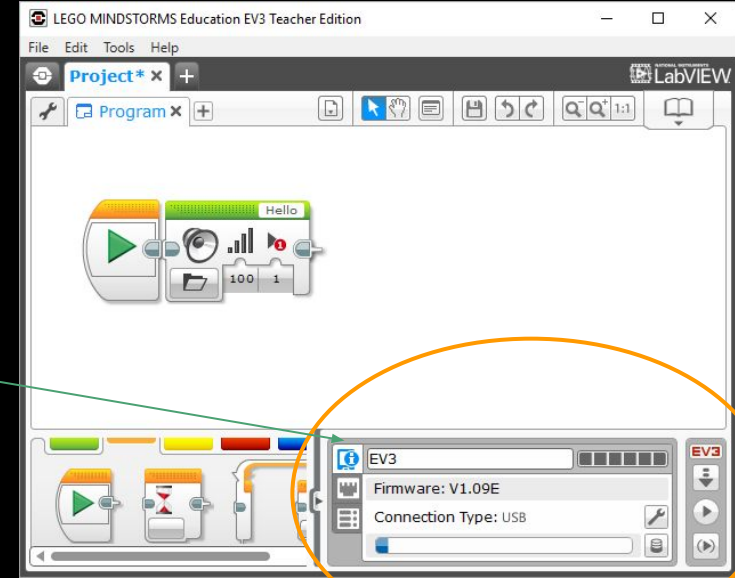
Communicate with the EV3

You can do the following:

- Rename the EV3 (you try keeping 10 "EV3" straight. Would be like having 10 Kevins in the same classroom

- DOWNLOAD your program
- Download and RUN your program
- RUN selected blocks
- Note shown is STOP, which would show if your robot was running
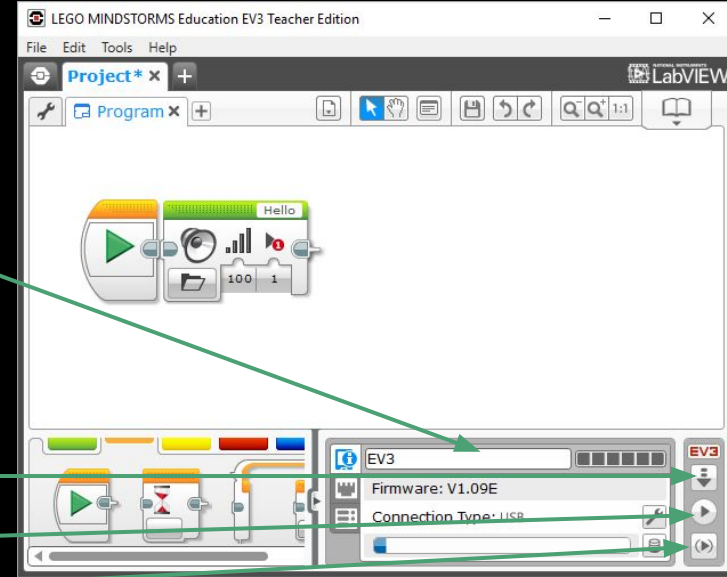
You're all done!

You can either run your program from the computer, or download and run from the EV3

A simple Motor Block program

Turn the motors on

- Forward, 50% power, for 1 rotation, then stop

- Turn to the right, 50% power, for 0.75 rotations, then stop

- Play a note, A5 note, 1 second, 100% power, wait for completion

- Program ends