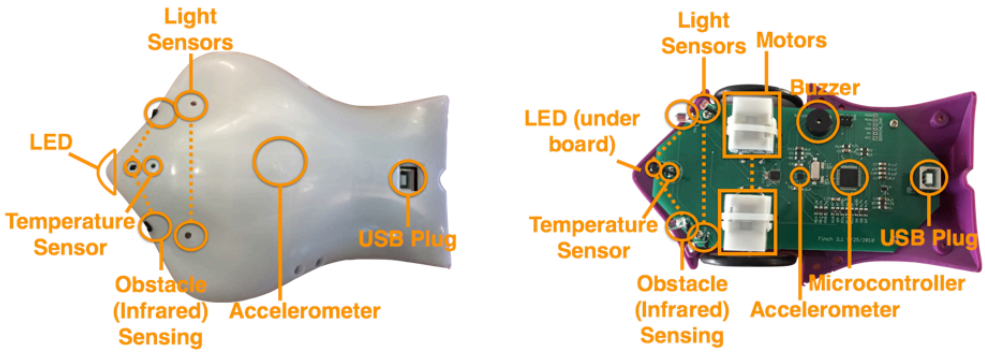
Finch Robot ($89-99)
https://www.finchrobot.com/

Programming Software https://www.finchrobot.com/software-overview



Sensors

Light. The Finch uses two photoresistors to detect ambient light levels. These sensors are analog with 8 bits of resolution and can easily differentiate sunny and cloudy days and brightness of various indoor light sources. These sensors are commonly used as either input devices or to allow the Finch to track towards or away from light sources.

Temperature. The Finch has a single thermistor sensor that detects the ambient temperature. The sensor can also determine the temperature of an object if the object is placed in contact with the sensor. The temperature sensor is accurate to within 2 degrees Fahrenheit.

Obstacle Detection. The Finch has two Infrared sensors. These sensors can detect obstacles in front of the Finch. The sensors are digital and so act as virtual bumpers - they do not provide information on the distance to an obstacle, but simply register whether an obstacle exists. The sensor detection range is between 3 and 12 inches. Due to the limitations of this type of sensor very narrow objects or objects made of certain black plastics may not register as obstacles.

Accelerometers. The Finch uses a Freescale MMA7660FC 3-axis MEMS accelerometer to detect acceleration. The sensor can detect accelerations of +/- 1.5 gees. The primary use of the accelerometer is to detect the direction of gravity, so as to know how the Finch is oriented (flat on the ground, upright, etc). It is also possible to detect spikes in acceleration caused by tapping or shaking the Finch.

Motors

The Finch has two gear motors and uses its tail as a slide caster. It can turn in place around the axis of the motor's shafts. The wheels are press-fit onto the motor shafts. The Finch's top speed is roughly 15 inches per second.

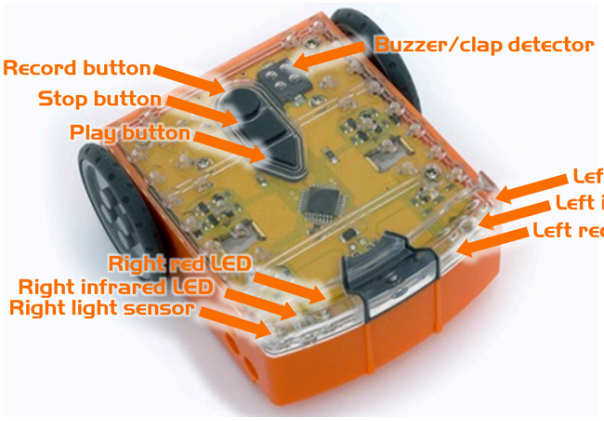
Light & Sound

The Finch has a full-color LED embedded in its 'beak'. This LED contains red, green, and blue elements. By setting the intensity of each element the LED can be controlled to make any color. There are 256 settings for intensity for each color element.

The Finch has an on-board buzzer which is capable of playing sounds with frequencies between 100 Hz and 10 KHz. Software that comes with the Finch also allows the programmer to control computer speakers so as to play synthesized speech, wav files, or musical notes.

Edison ($33-49)
https://meetedison.com

Programming Software https://meetedison.com/robot-programming-software/edblocks/



Play button – Press to start program
Stop button – Press to stop a program
Record button – 1 press = download program, 3 presses = read barcode

Edison's line tracking sensor is made up of two parts a red LED light and a light sensor.
The line tracking sensor also reads special barcodes that activate pre-installed programs.

Programs are downloaded to Edison using the EdComm cable. The EdComm cable is the special cable used to download programs to Edison robots from any of the Edison robotics programming languages. The EdComm cable is how you connect your Edison robot to a computer or tablet. The EdComm cable plugs into the computer's headphone jack and carries a pulsed audio signal to a high-efficiency infrared (IR) LED. The IR LED converts the pulsed audio signal into light that is received by Edison's line tracker phototransistor and loads the program into the processor.

Sensors and Inputs

Obstacle detection: Infrared using 2 IR LEDs (top front left and right) and IR receiver module (doubles as the IR data comms and remote-control receiver)
Remote control: IR receiver module (which operates at 38kHz) allows Edison to learn IR codes from most standard TV/DVD remote controls
Infrared data comms: IR receiver module (double as obstacle detection sensor and IR remote receiver)
Line tracker: Red LED and phototransistor (doubles as barcode reader and programming port)
Light sensors: 2 phototransistors (top front left and right)
Sound sensor: Piezo transducer (doubles as sounder)

Activities for Either Robot

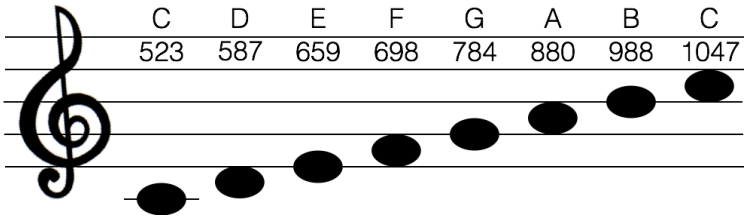
1) Synchronized Dance

Choose a piece of music that is at least 20 seconds long (you can use part of a longer piece). Then, use your imagination as you make your robot dance to the music! Use short moves and turns that match the rhythm of the music. You can also use the built-in buzzer to add to your musical selection. For the Finch you can the beak color on beat as well. For Edison, you can make the lights blink.

2) Play Music

Use the robot to play a song!

Notes and Frequencies in Hertz



3) Driving Challenge

Create a driving challenge for your robot and write a program for it. Examples:

- Drive around an obstacle, such as a cup or pencil case
- Drive around the border of a desk without driving off the edge
- Create a maze on a large piece of paper for the robot to drive through
- Create a maze using building blocks for the robot to drive through

4) Light Sensing

https://www.finchrobot.com/learning/scratch-project-4-light-follower
https://meetedison.com/robotics-lesson-plans/10-robotics-lesson-plans/respond-to-light/

- Program the robot so that it sounds an alarm when the lights in the room are turned on/off.
- Program the robot so that it follows a light source (e.g., the flashlight on a mobile phone).
- Program the robot so that it searches an area for a bright light source.

Finch Specific Activities

1) Finch Tag https://www.finchrobot.com/teaching/finch-tag

To play tag, your robot must be able to do the following:

1. Move forward when the up arrow is pressed.
2. Move backward when the down arrow is pressed.
3. Turn left when the left arrow is pressed.
4. Turn right when the right arrow is pressed.
5. Make a four-toned noise when it tags another robot. (Pick a key to press when this occurs.)
6. Have a red beak when it is “it.” (Pick a key to press)
7. Have a green beak when not “it.” (Pick a key to press)

2) Finch Simon Says https://www.finchrobot.com/teaching/snap-grades-9-12

Create a simple version of Simon Says with the Finch! Generate a random number from 0-5, where a number corresponds to one of the six possible Finch orientations (Beak Up, Beak Down, Left Wing Down, Right Wing Down, Level, and Upside Down). Have the Finch say the orientation corresponding to the number, and then give the user five seconds to put the Finch in that orientation. At the end of five seconds, check if the Finch is in the correct orientation, and then compliment the user (if correct) or insult them (if wrong).

3) Finch as a game controller (e.g., pong) https://www.finchrobot.com/teaching/finch-pong-i

Create a version of Pong using Sprites. A ball will fall from the top of the screen, and you will try to catch it with a sprite that you control with the Finch. To start, you will need two sprites, a ball and a paddle (or a basket, if you prefer). The sprites shown are from Scratch, but you can draw these sprites in Snap!.

4) Finch Shybot https://www.finchrobot.com/teaching/shybot

The ShyBot doesn't like anyone getting too close. When it senses someone is nearby, it changes the color of its beak, flashes its light faster, and beeps with higher notes.

For this project, the Finch should do the following:

1. Have a solid green beak and be quiet for "calm" (nothing is nearby).
2. Blink yellow slowly and beep a slow, low note for "slightly nervous" (one obstacle sensor is true).
3. Blink red rapidly and beep a fast, high note for "very uncomfortable" (both obstacle sensors are true).

When testing your program, remember that the Finch obstacle sensors can be a bit finicky - large, lightly-colored objects (like cardboard boxes) make the best obstacles. Also, remember that a Finch can only sense obstacles that are very close to it (2 to 4 inches away).

Edison Specific Activities

1) Clap Sensing

https://meetedison.com/robotics-lesson-plans/10-robotics-lesson-plans/robot-clap-sensing/

Write a program that has the Edison respond to clapping. For example, the robot might

- Drive forward in response to a clap.
- Flash an LED in response to a loud sound such as a clap.
- Dance or move in a particular sequence in response to a clap

2) Line tracking

Use the line tracking sensor to have the Edison follow a black path.

3) Sumo Wrestling

https://meetedison.com/robot-activities/youre-a-controller/robot-sumo-wrestle/

Create your own sumo wrestle ring using black electrical tape on a white surface. The ring should be around 40cm/16in in diameter. Place two Edisons inside the ring and press play on both at the same time. Each Edison is now slowly driving forward, staying inside the ring and '*looking*' for the opponent. If the opponent is detected Edison charges forward at full speed until the edge of the ring is detected. He then reverse back victorious and continues to look for another opponent.

4) Put multiple Edison's together along with Legos to build more complex machines

https://meetedison.com/edcreate/#EdCreate-resources