Programming Finch Robots for Kids

Bring:

- Masking tape
- Finches
- Handouts
- Talking points/script

BEFORE PROGRAM STARTS

1. Pull several books from branch's collection on computers/programming (Dewey: 000, 005, 794.8152)
2. Set up projector with IPS laptop and connect Finch
3. Set up chairs
4. Put down masking tape for race: start and finish lines
5. Line up the laptops either on a table or on the floor
6. Connect each Finch to a laptop with the USB cable (you must do this **before** opening the BirdBrain program)
    a. Connect to wi-fi so that you are able to access the sample scripts saved in the Cloud.
    b. Open the BirdBrain server application (this is the "lightbulb" icon on the desktop). It runs in a Web browser. Chrome is recommended for best experience.
    c. Choose Snap Programming Level 3—includes changing parameters and time (recommended level for grades 3-6)
    d. Clear SNAP program area, get rid of any pre-existing scripts/codes
    e. Have it ready to go!
    f. Login to the Cloud.
        i. **User name:** Sarah Kishler
        ii. **Password:** IPSrules

INTRODUCTION

- Welcome to the Programming Finch Robots Program
- My name is Michele and my colleague's name…
- We work at the Martin Luther King, Jr. Library in downtown San Jose
- Part of our job involves going out to all of San Jose's public libraries and presenting programs like…Finch Robots
- Does anyone know how many libraries?
- 23!
- Back to computers and robots, because that's why you're here!
- And we have a lot to do and learn
- Opening comments:
    - This program is only one hour long
    - We have a lot to do and cover
    - Parents who are here may be asked to assist if necessary
    - Please do not jump ahead

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- Initially we will work together figuring out the basics of how to move, stop, light-up and make the Finch buzz
- After the basics, you can experiment
- If we have enough time, we will have a race

PROGRAMMING BASICS

I am going to start with the basics

Does anyone have a computer at home?

- Use laptop as example

Does anyone have a robot at home?

- Use Finch as example

Has anyone used their computer to program their robot?

- First, what do I mean by "program?
- Program:
  - Giving a computer a set of instructions to perform in order
  - Today, we are going to give instructions to the computer to make the robot do something
- It will be fun!
- If you would like more information about programming and computers, you can find them in the library: Hello World, explain where they can find other coding books in the library (in the 000 section of Dewey)

Today we are going to use computers to program robots.

- We need computers to program robots because robots won't listen to me. It doesn't know English language.
- Can I tell this robot to go forward, turn right and stop? Will it listen to me?
- If I tried in a different language: Spanish? Vietnamese? French?
- Does that make a difference?
- No, you have to use programming language
  - Communicate instructions to a machine, like a computer
  - Language used to control behavior of machine

Does anyone know any programming languages? Or has anyone used programming language?

- Basic and Pascal – In 1992, I learned Pascal, long time ago!
- C++ - Very powerful writes many computer programs incluing Microsoft Office, Google Chrome, Apple Safari (web browsers)
- Perl – Craigslist, IMBD, TicketMaster
- Java?
- LOGO
- Kodu – Makes Xbox 360 games
- Pythoon

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- Scratch – Very popular in schools, had anyone used it?
- There are many programming languages

Today we will use the programming language called, "Snap"

- Snap is similar to Scratch and was designed to be used for people ages 8 to 16, but people of all ages can use it!
- Helps us create instructions for finch robot

Algorithm: Does anyone know the word, "algorithm?"

- Computer programs use algorithms
- Definition: Step-by-step instructions to perform tasks or solve problems, computer programmers use algorithms to plan out programs
- Let's work on algorithm for brushing your teeth: Seems easy, simple, you do it every day at least two times (I hope!), so what are some steps…
    - Turn on tap/faucet
    - Squeeze toothpaste onto brush
    - Use brush to clean teeth
    - Put cap on toothpaste
    - WHAT about: what kind of brush to use? Take cap off tube before squeezing? Turn off tap/faucet?
- In computer programming, you need to explain every step or else the computer won't know what to do
- Remember: Computers only understand simple instructions
- If you make a mistake the Finch won't understand; don't get upset, may take a few tries

ACTIVITY: Program Your Partner

- Before we start programming, we have a short activity using following two commands:
    - **STEP FORWARD** (take one step only)
    - **TURN LEFT** (turn 90 degrees, one quarter turn left)
- Work with my colleague as example: Trace out "L"
    - I am going to be the programmer
    - Colleague going to be computer
    - Trace out letter "L"
- Now it is your turn: (partner students)
    - One is programmer: Tell computer what to do using only "command steps"
    - One is computer
- Trace out "L"
- Switch roles and trace out "T"
- Trace square
- Programming languages are similar to this, they use very basic commands, but they use a lot of them!
- We only used two commands, but there are millions of commands in computer programming languages
- If you want to practice more with programming there are free online programs you can use, two we have copies of:

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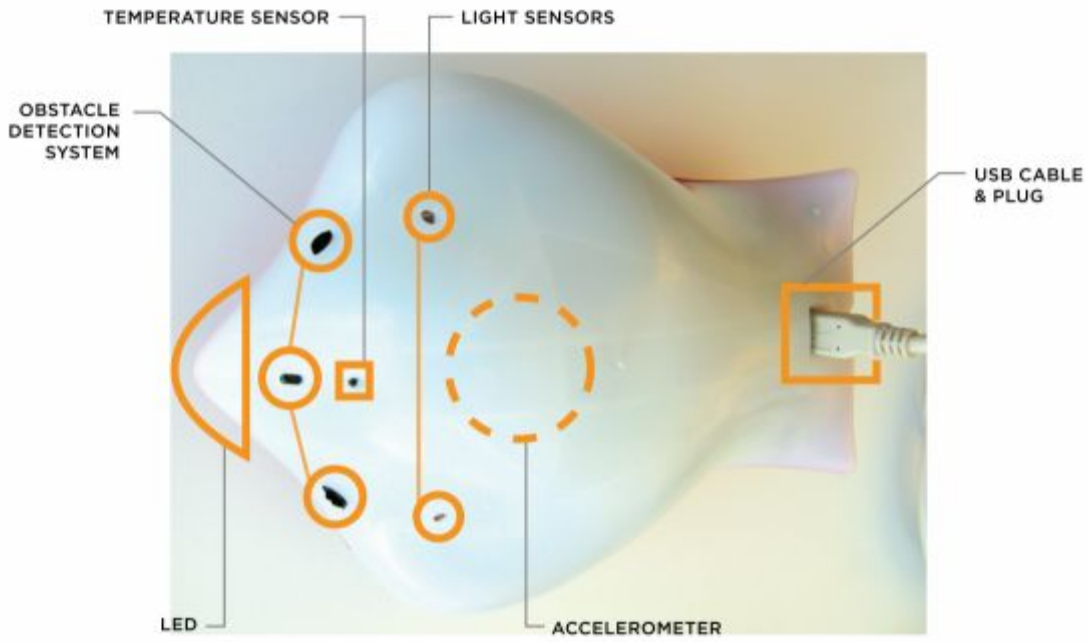
    - Scratch & Lightbot handout
- Alright, now back to the computers, the robots and Snap, the programming language.

FINCH ROBOT

- Show picture of bird finch
- Show picture of manta ray
- Short discussion of what robot really looks like



FINCH ROBOT: Hold up finch robot and point out features

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- Point out features
    - BEAK: LED: Red, green, blue
    - USB cable & plug
    - Will not be using
        - Accelerometer
        - Light sensors
        - Temperature sensors
        - Obstacle Detection System
- What are we going to do?
    - Move around
    - Make its beak light up different colors
    - If we have enough time, Play “Red Light, Green Light”
- How will we do it?
    - We’re going to use programming language: Snap

SNAP Basics

- Now we will take a quick look at Snap
- Demonstrate how to activate the Finch robot
    - When you get your Finch, also get an “Activating Finch Robot!” card
    - Insert cable to Finch Robot and USB Port of computer
    - Finch beak should flash colors
    - Activate BirdBrain Robot Server icon
    - Finch beak should stop flashing and BirdBrain Robot Server should show finch is ready to open Snap!
    - Click on orange button, “Open Snap!”
    - Select Snap! Programming Level 3
- Visual programming language
- I’ve opened to Programming Level 3, this is the level we will use today
- Take a look at what the Snap! programming environment looks like
    - Commands
    - Workspace: Program area
- There is a dialog box that explains the different blocks that are used.
- Also a sample program, see blocks snapped together make a stack
    - To run the program, press “Space” key
- Now, we will look at the blocks that are on the left bar of the screen, in the palette area (Put cards out by computers for reference)
    - LED: Set beak LED color: red, green, blue
    - Buzzer (lightning): Sets Finch to beep a note from A to G
    - Movement (arrows) – Sets Finch to go forward, back, left, right and set speed of wheels individually
    - Wait: Causes program to wait
    - Stop: Stops Finch

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PARTICIPANTS PLAY

Now, it's your turn to give the computer instructions and program the robot by:

- Come up to get a Finch robot and "Activating Finch Robot!" card
- We will all practice:
  - Dragging and dropping blocks into the program area
  - Snapping blocks together to create programs
  - Adding removing blocks
  - Change values (color intensities, sound of buzzer, speed, etc)

- **GROUP ACTIVITY 1:** Stop (s)
- **GROUP ACTIVITY 2:** Forward (f)
- **GROUP ACTIVITY 3:** Backward (b)
- **GROUP ACTIVITY 4:** Change color of beak
- **GROUP ACTIVITY:** Turn in a circle
- **GROUP ACTIVITY:** Turn right (or left) (Use turn arrow, wait and another movement arrow)
- **GROUP ACTIVITY 5:** Make buzzer sound three different notes
- **GROUP ACTIVITY:** Finch Race!

Other challenges:

Challenge: Program a little dance for the finch to do.

Challenge: Change the beak light to purple or yellow.

Challenge: Turn beak light off after a certain number of seconds

Challenge: Make the finch move slower or faster.

FINCH ROBOT RACE

- Put down start and finish line
- Program Finch to blink nose and go forward and backward
- If a lot of participants, break into smaller groups

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- Need teams of two: One person programming, one person holding cable