

GirlsSolveIT

Quest 2



Materials Required:

- Large Sheet of Paper
- Markers
- Cups
- Forest Cut Outs
- Squirrel Tail
- Glue Dots

Quest 2 Competition

Concepts Covered:

- LED Lights: <https://learn.birdbraintechnologies.com/finch/snap/program/6-1>
- **Finch Beak LED Block**
 The Finch Beak block is used to control the full color LED in the Finch's beak.
 - A full color LED is 1 bulb with 3 color components: red, green, and blue. When combined, these 3 colors can make any color.
 - Set the brightness (0%-100%) for each color (red, green, and blue).
 - To turn off the LED, set all values to 0%.

Finch Beak R 0 % G 0 % B 0 %

- Similarly, the Finch Tail LED block is used to control the LEDs on the tail.

Finch Tail all ▾ R 0 % G 0 % B 0 %

- Moving & Turning: <https://learn.birdbraintechnologies.com/finch/snap/program/3-1>

- **Finch Move Block**

The **Finch Move block** is used to control your Finch's forward or backward movement.

- Use the drop down arrow to select "Forward" or "Backward."
 - Set the distance your Finch will travel by typing a number into the ___ cm space. (Finch distance is measured in centimeters.)
 - Set the speed your Finch will move (0%-100%) in the ___% space.
- The marks on the side of the wheels allow you to see wheel rotation for yourself.



- **Finch Turn Block**

The **Finch Turn block** is used to control the angle and speed of your Finch's turn.

- Use the drop down arrow to select "Right" or "Left."
- Set the angle your Finch will turn (0-180) by typing a number into the ___ degrees space.
- Set the speed your Finch will move (0%-100%) in the ___% space.



- Drawings: <https://learn.birdbraintechnologies.com/finch/snap/program/5-1>

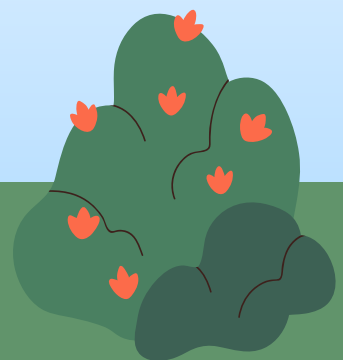
- **Pen Mount**

- Insert a writing tool into the top of your Finch.
- Adjust the writing tool so that both of your Finch's wheels touch the ground and the writing tool drags lightly on your drawing surface.

- Light Sensors: <https://learn.birdbraintechnologies.com/finch/snap/program/10-1>

- **Finch Light Sensor**

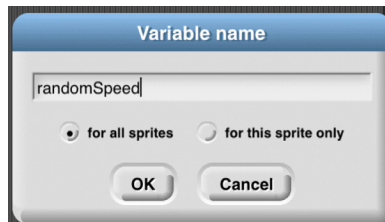
- The light sensors are located on the top of your Finch's head, on either side of center.
- The light sensors measure the amount of light that reaches the sensor through your Finch's shell.
- The range of the light sensor is 0%-100% brightness.
- Use the drop down menu to select right or left light sensor.



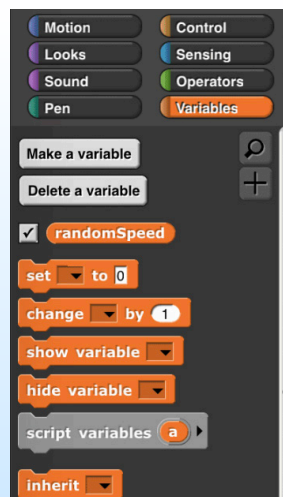
- Variables: <https://learn.birdbraintechnologies.com/finch/snap/program/18-1>
- **Creating a Variable**
 - To create a variable in Snap!, go to the Variables menu and then click **Make a Variable**.



- Give your variable a name. You should choose a name that describes what your variable is. In this case, let's name our variable **randomSpeed**.



- Notice that the Variables menu changes once you have created a variable. You will see a block for your variable.



- Conditional statements: <https://learn.birdbraintechnologies.com/finch/snap/program/13-1>

- **If-Else Block**

The if-else block from the gold Control menu is another block designed to work with Boolean data. Boolean values are values that can only be true or false.

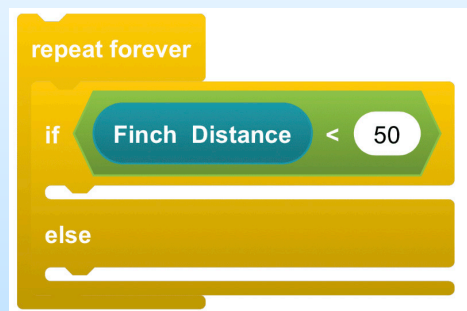
- You will tell the Finch what to do when the Boolean value is true in the first slot under 'if', and what to do when the condition is false in the second slot under 'else'.
- The if-else block needs to be inside a repeat forever loop in order for the computer to be checking whether the Boolean block is true or not over and over again.



- You can also use sensors that return number values with if-else blocks, by using comparison blocks.
- There are three comparison blocks, less than ($0 < 0$), greater than ($0 > 0$), and equals ($0 = 0$). These blocks return true if the comparison is true, and false if it is not.



- To use comparison blocks with a sensor, you would put the sensor block in one of the number slots, and compare its value with a number you select, which is your threshold. In the example below, the threshold is 50, and the block will be true if the distance sensor is less than 50 and false otherwise:
- To use the comparison block with an if-else block to make decisions, you would place the comparison block inside the if, and then wrap the if-else in a repeat forever loop to make sure the program continually checks if the condition is true:



- **If Block**

The if block from the gold Control menu is another block designed to work with Boolean data. It works like the if-else block from the previous step, but you may only specify what the program should do if the Boolean value is 'true'. Like the if-else block, the if block is usually used in a repeat forever loop.



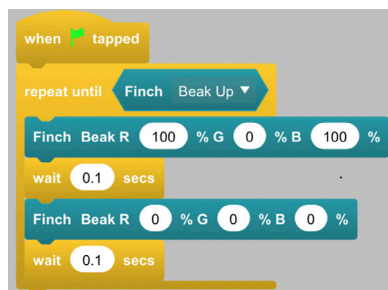
- **Wait Until and Repeat Until**

Two other blocks that you can use are the wait until and repeat until blocks. Each block has a space for a boolean block.

- The wait until block pauses the program until the Boolean block inside it is true.
- The repeat until block has a space for a Boolean block. This loop repeats the blocks inside it until the Boolean block is true.



For example, this program makes the Finch blink its beak until the Finch's beak points up:



Below are more details on the concepts we'll use in this challenge. Please read through these before beginning the challenge.

Unit Conversion

We will be learning to do Unit Conversions in this challenge! Here's a video to explain what it is and how to do it! When we program a robot, it is important to understand unit conversion. This means changing measurements from one unit to another, like inches to centimeters. By learning unit conversion, we can make sure that our robot moves the right distance and at the right speed. But unit conversion is not just useful for programming robots. We can also use it when we travel to a different country, when we cook, or when we work in construction. For example, we might need to convert miles to kilometers to understand how far we are driving, or teaspoons to tablespoons to make sure we use the right amount of ingredients. So, unit conversion is a very important skill to have in many different fields!

Unit Conversion the Easy Way (Dimensional Analysis) - YouTube: <https://www.youtube.com/watch?v=HRe1mire4Gc&themeRefresh=1>

- **Variables**

Variables are like little containers that hold information in programming. We can give them a name and put something inside of them, like a number or a word. Then, we can use that name throughout the instructions to refer to the thing inside the container. This allows us to store and use information in a flexible way when programming a robot.

- **Code Smells**

Code smells are signs that our computer program might not be working the way it should because it's not written in the best way possible. Just like how we need to clean out our fridge to get rid of bad smells, we need to clean up our code to get rid of code smells, which makes our program easier to work with and helps it run better!

- Using variables can help fix code smells because it makes our code easier to read and understand. Instead of repeating the same value or word over and over again in our code, we can store it in a variable with a meaningful name. This makes our code shorter, simpler, and easier to modify in the future if we need to change the value or word.
- Here are some examples of code smells:
 1. Repeating the same code repeatedly
 2. Giving confusing names to variables or blocks
 3. Using too many blocks in a single program
 4. Not leaving any comments to explain what the code does
 5. Not testing the program to see if it works correctly
- These code smells can make the code harder to understand and maintain and can cause errors in the program. It's important to learn good coding habits early on to write clean, efficient, and effective programs.



Review some programming terminology and concepts before continuing to Challenge 3

- **Debugging**

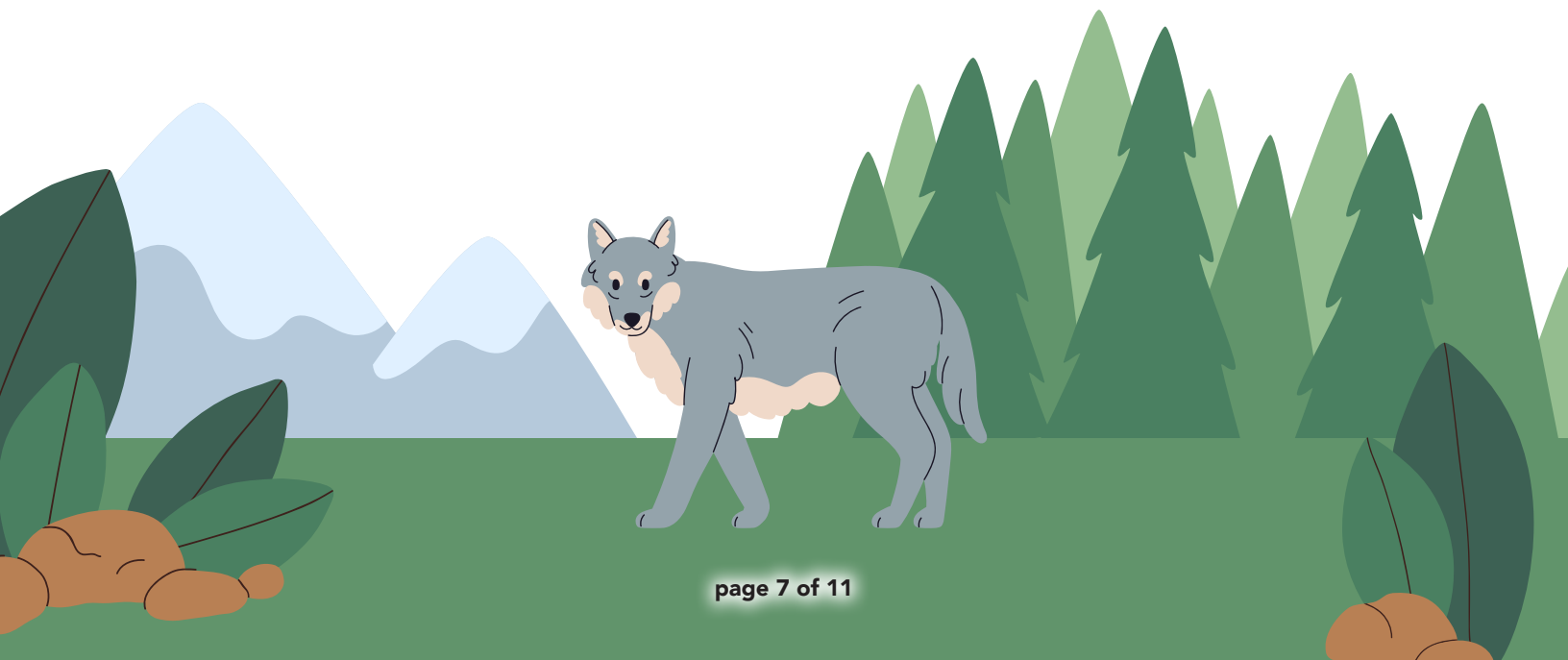
Debugging is like being a detective who is trying to solve a mystery. In programming, we use debugging to find and fix mistakes in our code.

- Just like how a detective looks for clues and evidence to solve a case, we look for clues and evidence in our code to solve the problem. We might use special tools or techniques to help us find the mistake, like printing out information about what our program is doing or using a “debugger” program that helps us step through our code one line at a time.
- Once we find the mistake, we can fix it! This is like solving the mystery and catching the bad guy. We might need to change some code, add new code, or remove code that is causing the problem. And just like how a detective learns from each case they solve; we can learn from our debugging experiences to become better programmers in the future!
- One way to debug with Finch is to use the “Say” block. The say block can display the sensor value, or the value of a variable throughout your code.

- **Conditional Statements**

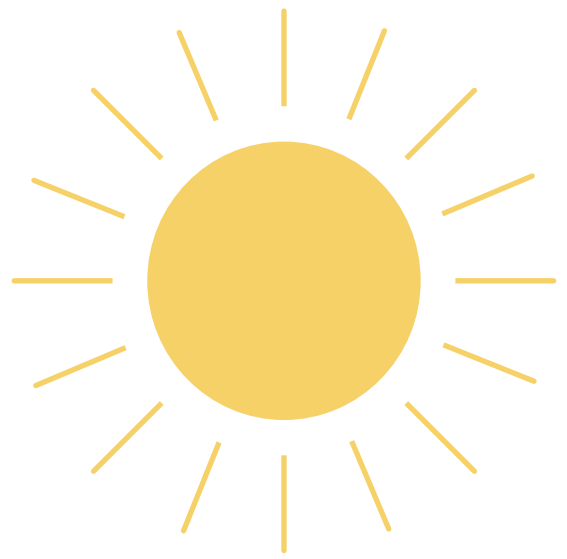
Conditional statements are like a set of rules that our program follows to make decisions. We can think of them like “if-then” statements.

- For example, let’s say we want to program a robot to move forward when the light is green, but stop when the light is red. We can use a conditional statement to do this! We might say, “if the light is green, then move forward. If the light is red, then stop.”
- Conditional statements help our program make decisions based on certain conditions or situations. They allow us to write more complex and flexible programs that can respond to different situations in different ways. So, they are a very important concept to understand in programming!



Quest 2

Finch is starting the road trip after refueling the car! She was initially nervous about her car trouble, but now she's super excited to finally start her trip. Challenge 1 is about expressing her emotions!



Challenge 1

- To show Finch's happiness for the trip, switch from a sad to a happy expression on Finch's Face
- **Show a sad face with blue LEDs for 15 seconds**
- **Switch to a happy face with yellow LEDs and hold for at least 15 seconds**



Challenge 2

- The fastest way to get to Florida is using I-75, which goes from the top of Michigan to the bottom of Florida! She had a couple options of pit stops on her way from Michigan to Florida. She decided on Knoxville, Tennessee, which is halfway to Florida!
- The fastest route to Knoxville, TN is around 670 miles (using I-75). Assign 50 miles to X centimeters (choose a number for X) and calculate how many centimeters you need to travel to get to Knoxville. Draw her path from Michigan to Knoxville.
- **Create Variable (Miles) equal to 50.**
- **Create a Variable (Total Miles) equal to**
 1. **The distance from your current location to Knoxville**
 2. **OR use 670 miles.**
- **Create a variable (Centimeters) that represents X (as defined above), or the number of mile chunks each centimeter will represent**
- **Create a variable DistanceCM. DistanceCM should equal the scaled distance, so using the Centimeters variable you defined above, and the TotalMiles variable, calculate the total centimeters required to reach your destination. Compute the variable's value in code.**

Example: If 50 miles = 3 centimeters, then 750 miles = 45 centimeters

- **Place a cup the determined distance away from Finch on the drawing paper to travel to Tennessee.**
- **Place a marker inside of Finch.**
- **Place the blank sheet of paper on the floor. On Finch's journey to TN, Finch should draw the path traveled with the marker attached.**
- Finch has now made it to Knoxville, Tennessee!

Challenge 3

Have you ever been to Tennessee before?

Tennessee is one of the most bordered states in the US. It has a border with 8 different states!

Finch is going to travel to the most visited National Park in the entire United States, Smoky Mountain National Park. They say there are more than 200 species of birds, 66 species of mammals, 50 species of fish, 39 species of reptiles, and 43 species of amphibians! Welcome to the Great Smoky Mountains, where the trees are tall, and the squirrels are quick! At Smoky Mountain National Park, Finch decides to do some hiking and meets a new friend on the trail. Her friend is Hickory the squirrel, named after one of the most common trees in Smoky Mountains. Finch tries acting like her new friend!

Your challenge today is to program a SquirrelBot that can outsmart the hungry birds of prey in the area. Your SquirrelBot must stay alert and take evasive action when it senses the dark shadow of a hawk above it. Are you ready to help your SquirrelBot survive another day?

To complete this challenge, you will need to learn about Sensor Overview and Conditional Statements. **The Finch must detect when a shadow falls on either the left or right light sensors.**

- **When there is no shadow, Finch should be still.**
- **When a shadow is detected, Finch must make an escape maneuver.**
- **The maneuver should be different depending on which sensor was shadowed.**

So, let's get started and program your SquirrelBot to outsmart those hungry birds of prey!

To achieve this,

1. **Create at least two conditional statements that check if the light sensor is below a certain threshold.**
2. **The threshold can be determined by you and how your bot is reacting to the light.**
3. **Inside the conditional statement you must include a movement but may add additional actions to be creative!**

Finch has to then leave her new friend and continue on her trip down to Florida. 650 miles to go! See you next time, Tennessee!





Bonus 1:

- Re-do the SquirrelBot by creating random maneuvers after the bot detects a shadow.

Bonus 2:

- Redo Challenge 2 but decrease the speed of the Finch, the closer you get to the cup.
- Here are some instructions on how to do that with Finch. <https://learn.birdbraintechnologies.com/finch/snap/program/12-1>

To submit the Quest:

- Record the entire Quest in one continuous and complete video.
- Upload the video to YouTube – be sure the account is public.
- Upload pictures or videos to Instagram for extra points – be sure the account is public.
- Screenshot all the Snap code used to complete the quest – be sure the screenshots are clear.
- Submit the quest with a link to your public YouTube video, and upload screenshots of the code.
- Remember, all underlined actions are being graded. Be sure to complete them all for an opportunity for full credit.

