



Girls Solve IT

Quest 4



Materials Required:

- None

NOTE: Actions that are underlined are graded. All Challenges are mandatory for full credit. Bonus Challenges will earn your team extra points! Bonus challenges determine the winner in case of a tie! Extra points will be awarded to teams for their creativity.

Quest 4 Competition

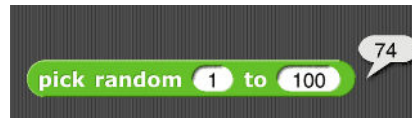
Concepts Covered:

- **Variables** - <https://learn.birdbraintechnologies.com/finch/snap/program/18-1>
 - As covered in earlier Quests.
- **Loops** - <https://learn.birdbraintechnologies.com/finch/snap/program/16-4>
 - As covered in Quest 2.
- **Light Sensors** - <https://learn.birdbraintechnologies.com/finch/snap/program/10-3>
 - Finch Light Sensor
 - The light sensors are 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.

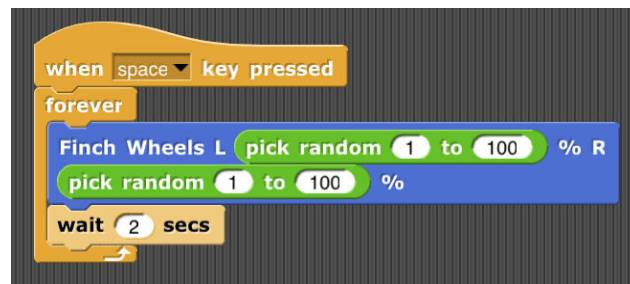


- **Random Block** - <https://learn.birdbraintechnologies.com/finch/snap/program/17-2>

- Using the Pick Random Block
- The pick random block is on the Operators menu in Snap!. This block randomly chooses a number between the two limits given. For example, this block generates a number between 1 and 100. Each time you click the block, it will give you a different number.



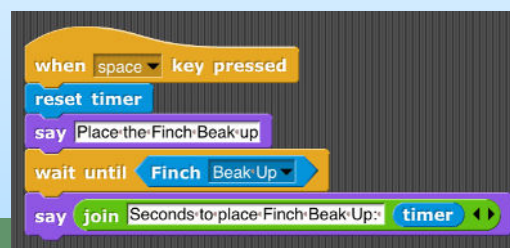
- You can use the pick random block anywhere that you would use a number in your program. For example, this program sets the speed of each wheel to a random number every two seconds. Notice that each wheel gets a different random number, so the Finch will mostly turn but sometimes move straight.



- **Timer** - <https://learn.birdbraintechnologies.com/finch/snap/program/20-2>

- **The Timer Block**

- You can find the **timer** block on the **Sensing** menu. This block measures the amount of time in seconds that has passed since the timer was reset. To use the **timer** block in Snap!, you should always first use the **reset timer** block.
- As an example, this program measures the time that it takes the user to place the Finch in the Beak Up position. First, the program resets the timer and tells the user what to do. Then it waits until the Finch is in the Beak Up position. After the Finch is placed in that position, the program tells the user the value of the timer, which is the amount of time between the beginning of the program and the Finch being placed Beak Up. The **join** block is used to combine pieces of information to display them on the screen; you can find it on the **Operators** menu.



- **Accelerometer** - <https://learn.birdbraintechnologies.com/finch/snap/program/10-6>
 - Finch Accelerometer
 - The accelerometer sensor is in the micro:bit in Finch's tail. It detects acceleration along 3 axes. The X axis goes from wheel to wheel, the Y axis goes from beak to tail, and the Z axis goes from top to bottom. One type of acceleration we experience on Earth is gravity, and this can be used to measure the orientation of the Finch. For example, when the Finch is resting on a flat surface the X and Y accelerometers will read near 0, while gravity will pull down Z at a value of -10 meters per second squared. When the Finch's beak is pointed at the floor, X and Z will measure 0, while Y will measure -10.
 - The range of the accelerometer for each axis is -30 to +30. You can get numbers above 10 or below -10 by shaking the Finch. The values are measured in meters per second squared.
 - Although the micro:bit mounts onto the Finch at an angle, we have recalibrated the accelerometer to read the Finch's position, rather than the micro:bit itself.



STORYLINE

Finch finally arrived in Florida after driving over 700 miles and making a few stops! She meets up with her friend, Ozobot. They then go to the carnival and Finch gets to see the sights and sounds. Finch enjoys the sights, sounds, and smells of the carnival before picking her first ride.



Challenge 1

Finch decides to ride the Gravitron ride at the carnival. Gravitrons work by spinning so fast that you don't have to touch the ground through centrifugal force. Centrifugal force points from the center of the ride to the outside and helps hold you in place. The Gravitron can exert a force that can be up to 3 times the force of gravity! Finch has a lot of fun on the ride but is feeling a little dizzy and green after the ride.

Create a program where Finch spins around like she is on a gravitron. Her beak should go from yellow to green as she feels a little green after the ride. She then goes from spinning in circles to spirals to moving straight as she feels better. Once she's feeling better, she stops, and her beak goes back to yellow. To make Finch spin in spirals, Finch must move one wheel faster than the other wheel, but if one wheel isn't moving, then she spins in a circle.

1. Create a variable named RWheelSpeed that is the percent speed of the Right wheel.
2. Create a variable named LWheelSpeed that is the percent speed of the Left wheel.
3. Turn Finch Beak LED to Yellow
4. Set Finch Wheels with the LWheelSpeed = 50% and RWheelSpeed = 0 %
5. Wait for a Duration of 3 seconds
6. Set Finch Wheels with the LWheelSpeed = 0% and RWheelSpeed = 0%
7. Turn Finch Beak LED to Green
8. Create a repeat loop for increasing the Right wheel Speed
 - Set Finch Wheels with the LWheelSpeed = 50% and RWheelSpeed
 - Hold Duration for 0.3 seconds
 - Increase Right Wheel Speed ever iteration from 0 to +50% by 10%
9. Stop Finch once through the loop.
10. Turn Finch Beak LED to Yellow

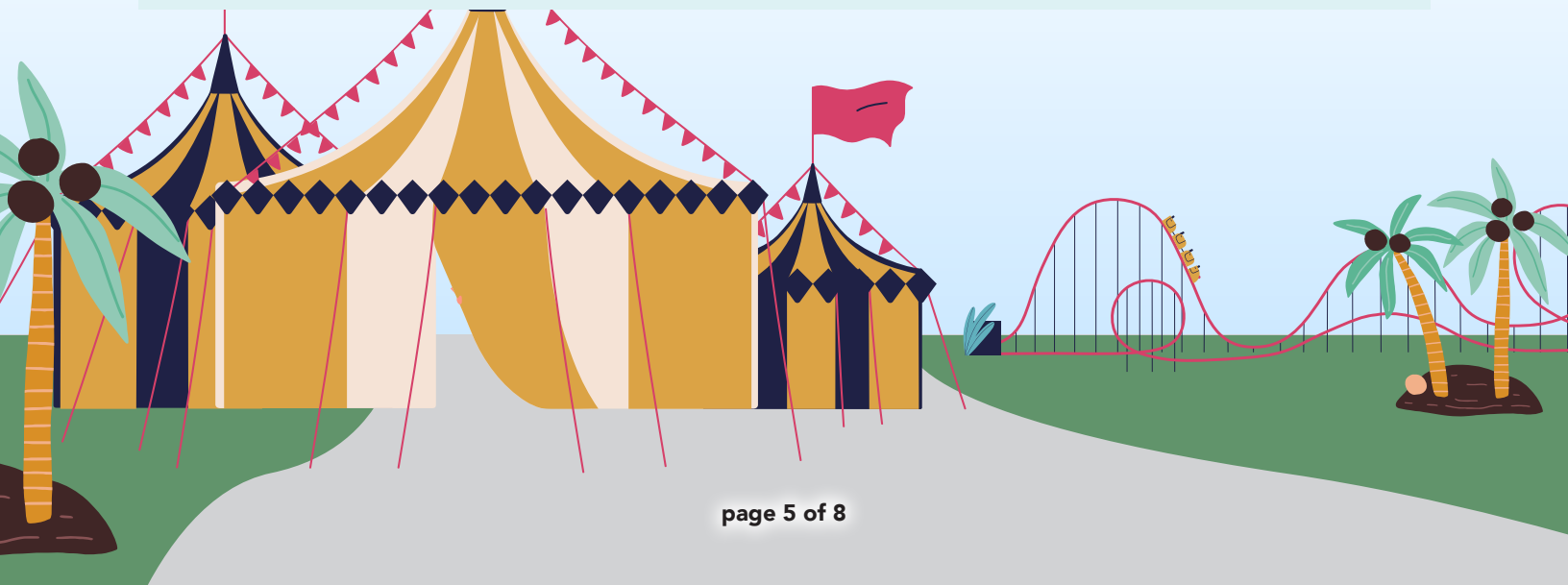


Challenge 2

Finch isn't quite ready for another ride after getting dizzy on the Gravitron so she decides to play some carnival games. There are a couple games at the carnival and Finch decides to play a game that measures her reaction time.

Create a program that when Finch is level, Finch will wait for a random duration and then change color from red to green. Once she changes color, the user must pick her up from her level position. The user's reaction time will then be measured.

1. Create a variable called ReactionTime
2. Say "Place Finch in Level Position" for a duration of 2 seconds
3. Set Finch's tail all to Red 100%
4. Set Finch's beak to Red 100%
5. Wait until Finch is Level
6. Wait a random duration between 1-5 seconds
7. Reset Timer
8. Set Finch's tail all to Green 100%
9. Set Finch's beak to Green 100%
10. Wait until Finch is not level
11. Set Finch's tail all to 0% all
12. Set Finch's beak to 0% all
13. Add timer to ReactionTime
14. Say ReactionTime

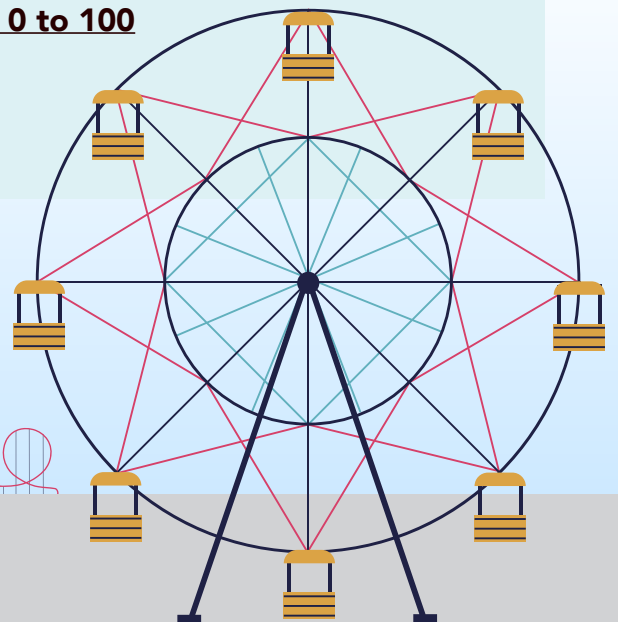


Challenge 3:

Finch had a long, fun day at the carnival. The carnival has fireworks once it gets dark so Finch and Ozobot watch the fireworks.

Create a function that flashes colors for a short duration. This function will be used in a loop while the light sensors are reading zero light and stop when the light sensors sense more than 50% light.

1. Create 3 Variables: Red, Green, and Blue.
2. Create a Function named Light Show
 - Set Finch's tail all to have variables Red, Green, and Blue as the percentages.
 - Set Finch's beak to have variables Red, Green, and Blue as the percentages.
 - Set a Duration between 0.1 - 0.3 seconds.
 - Set Finch's tail to 0% on all.
 - Set Finch's beak to 0% on all.
 - Set a Duration between 0.1 - 0.3 seconds.
3. Create a loop that repeats until the light sensors read a value higher than 50% light
 - Set Red to pick a random number from 0 to 100
 - Set Blue to pick a random number from 0 to 100
 - Set Green to pick a random number from 0 to 100
 - Use Function Light Show



Bonus Challenge (Optional):

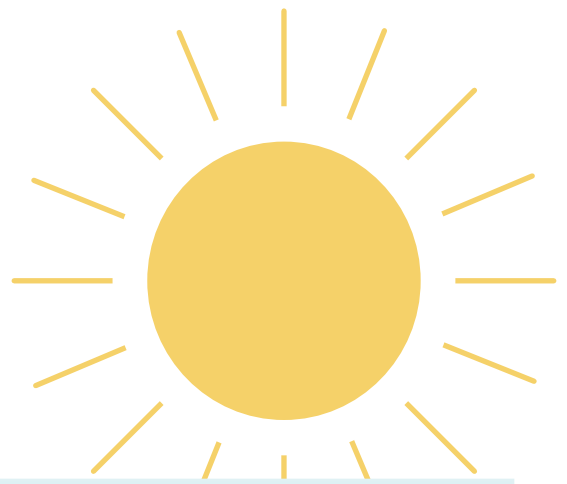
Think of AI (Artificial Intelligence) and ML (Machine Learning) as ways to make computers or machines smart. Just like you learn new things by reading, watching, and practicing, AI and ML are ways to teach computers to learn from information and experiences. So, when we talk about AI and ML, we mean giving machines the ability to learn from data, make decisions, and solve problems without being explicitly programmed for each task. It's like helping them think and act on their own!

In this bonus quest you are going to train an audio detection model using artificial intelligence!

Follow this challenge: <https://learn.birdbraintechnologies.com/finch/snap/ai/activity-2-audio-recognition-snap>

Please be sure to record the audio recognition and submit a screenshot of the code (which they provide to you), a screenshot of the trained model using teachable machine, and a screenshot where we can see you are using your trained model.





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.
- If reviewers are unable to read your screenshots or access your team's YouTube Video because the url is not set to public, your team will receive zero points for those items.
- Remember, all underlined actions are being graded. Be sure to complete them all for an opportunity for full credit.

