Flowlab Project Challenge: Table Tennis

🚀 Flowlab Basics | ⏳~ 90 minutes | 🎓Grades: 6 to 8 | _____ ❤️ | 🖨️ PDF

One of the first commercially successful arcade video games, *Pong* was manufactured by Atari and released in 1972[1]. Pong is part of the permanent collection at the Smithsonian Museum[2] but you don't have to wait to enjoy this classic. You can build it today!

🔎 Learning Objectives 🔎

I can use Flowlab to program a moving paddle and ball.
I can use a filter to adjust the speed of the ball in my code.
I can use a program to simulate a **Player2** paddle as an opponent.
I can add music effects and text to keep score.
I can identify the supplementary, complementary, vertical, and adjacent angles created by the path of the ball using the emit behavior block (Extension Objective)

💡 Standards addressed 💡

ISTI - 1.4c - Students develop, test, and refine prototypes as part of a cyclical design process.
ISTI - 1.5d - Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

Extension Application (Math - Geometry) - Introduction

CCSS.MATH.CONTENT.7.G.B.5
Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

[1] Video Game History - Smithsonian
[2] Electronic Game, Telegames Super-Pong - Smithsonian

📜 Introduction and Skills

🧭 Exploration 🧭

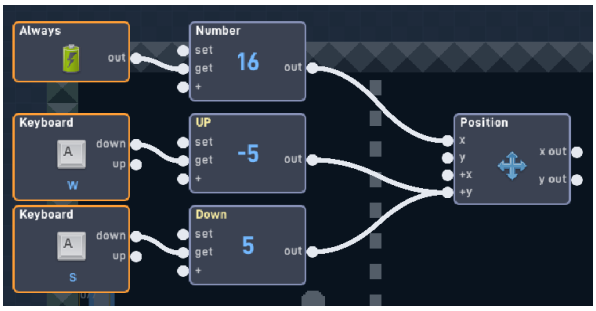
Do:

- ☐ Open the following example program: https://flowlab.io/game/view/2125777
- ☐ Explore the game and game code (2 minutes)

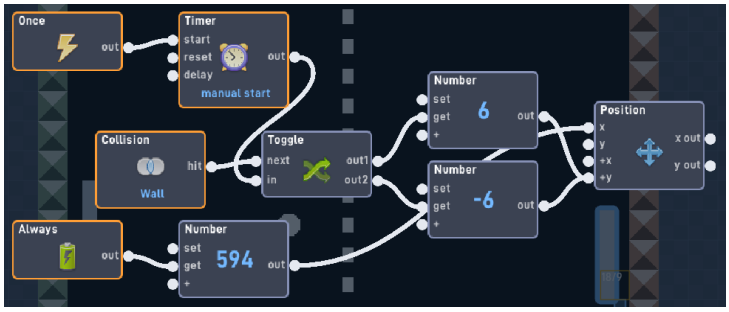
Discuss with a partner, group, or class (10-15 minutes):

- *What differences do you see in between the **Player1** paddle behaviors and the **Player2** paddle behaviors code?*

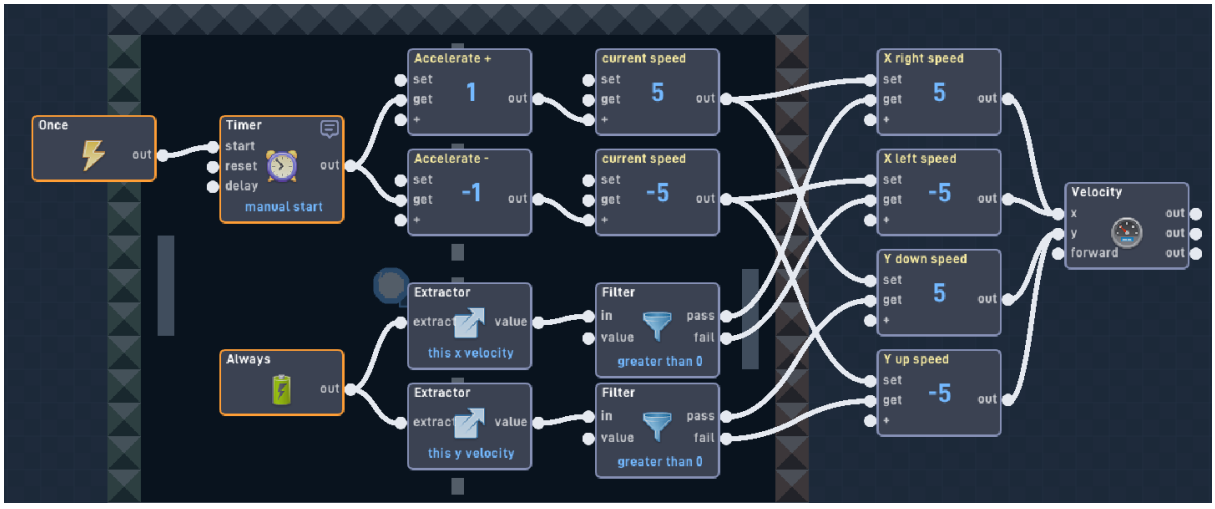
Player1



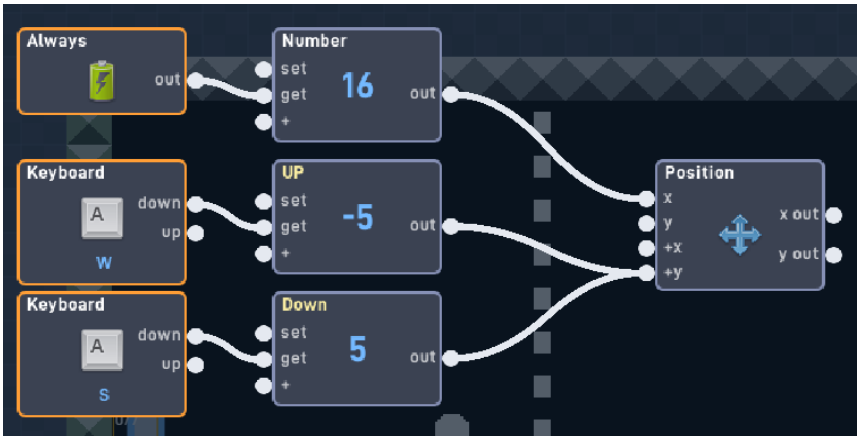
Player2



- *How does the ball appear to be coded to work?*



- *In the behavior code below why does the x remain constant?*



🔁 Skill Review 🔁

Read (1 minute):

Pong is a two-player game. It has two control paddles. Our **Table Tennis** is one player and relies on **Player2** being emulated by some code. This algorithm (set of instructions) will give the **Player2** paddle the movements of a simulated opponent. The current algorithm is a move up and down without any adaptation to the ball location or **Player1** inputs. You are going to change the code for **Player2** to play with a fellow student.

Do:

- ☐ Remove and add your own code to the **Player2** paddle so that you can have a two-player game (15 minutes).
- ☐ Challenge a partner in your class to play your game with them (5 minutes).

Discuss with a partner, group, or class (5 minutes):

- What behavior blocks did you add for your **Player2**?
- What changes did you make to the ball behavior blocks and Why?

🔨 Skill Building 🔨

Read (1 minute):

Our **Table Tennis** is now ready to have some more adaptive code for the **Player2** to create a computer player that is an improvement on the existing code you replaced. You are going to change the code for **Player2** to be automated or adjust to the ball location.

Do:

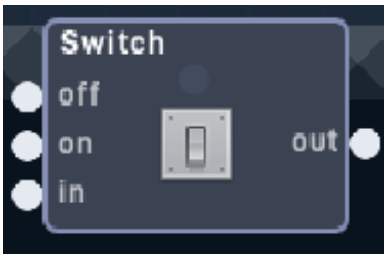
- ☐ Make a new copy of your game (2 minutes).
- ☐ Using the following starter code, add at least 4 additional behavior blocks to make your **Player2** a unique opponent (20 minutes).

Idea Starters:

- Use the RayCast behavior block to 'look for your ball' as **Player2** to direct your motion.

- Use the Global behavior block to record the position of the "Ball" and use that value to guide your **Player2** motion.

- Use the switch behavior block to turn off and on a basic movement pattern as needed.



An example of a simple but very challenging **Player2** behavior setup using the global block solution can be found on the "Ball" and **Player2** in the following game: https://flowlab.io/game/view/2130767

Discuss with a partner, group, or class (5 minutes):

- What behavior blocks did you add for your **Player2**?
- What changes did you make to the ball behavior blocks and Why?

♟️ Challenge

❔ Problem ❔

Read (2 minutes):

Your challenge is to continue to build your own version of Table Tennis using what you have learned so far. Your game must incorporate the following essential elements:

- ☐ Be a one-player game with an adaptive opponent.
- ☐ A ball that bounces off walls and surfaces predictably.
- ☐ **Player1** is controlled with the keyboard or device position
- ☐ **Player2** is adaptive to ball location but moves predictably
- ☐ Game includes elements of feedback for the player (ideas: sound, scores, visual effects).
- ☐ **Player2** is a more challenging virtual player over time.

The essential problem is how to make your **Player2** opponent behave in a manner that is progressively more challenging.

📏 Rubric 📏

Element	Progress	Points Possible
Table Tennis Table		5
Player 1 moves with keyboard or device position		5
Ball bounces predictably		5
Player 2 moves predictably		5
Player 2 becomes more challenging over time		5
Game has 2 elements of feedback.		5
Game has peer feedback		5
Comments:		35

🕵️ Example Peer Review Sheet 🕵️

Flowlab Game Peer Review Sheet

Name of Student Designer:

Name of Peer Evaluator:

Game Name:

In each of the categories rate the game on a scale of 1-4 as follows:
1 = not at all | 2 = somewhat | 3 = mostly | 4 = yes!

In the space provided for comments, explain the reason for the mark, give praise, or suggest improvements.

Ease of Play: Was the game easy to get into and play?

1 2 3 4

Comments:

Game Concept: Is the game concept an integral part of the game and what design elements complement it?

1 2 3 4

Comments:

Production: Are the objectives of the challenge complete (identify missing items to help the designer)?

1 2 3 4

Comments:

Fun: This game is fun! It held my interest because (complete the sentence)..

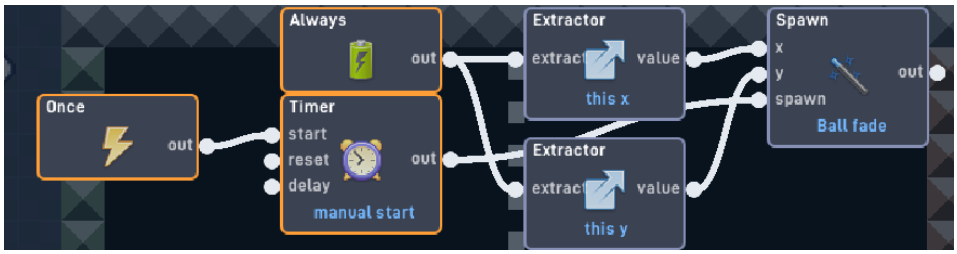
1 2 3 4

Comments:

👾 Extensions (For teachers)

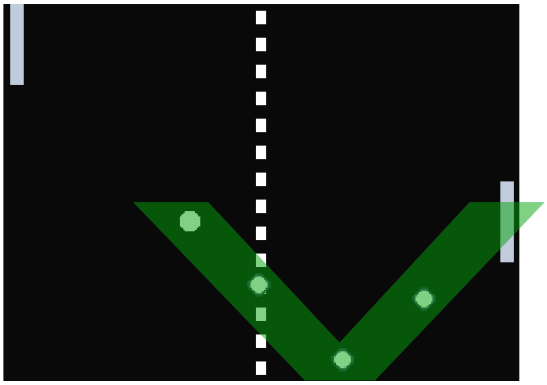
This activity could be paired with a math inquiry of angles given the Ball's path on walls or paddles. Using a Spawn Block you can have students review the resulting path of the ball as it interacts with surfaces.

Example:



Key areas of focus could include determining the triangles created when the ball strikes a surface and the resulting transversals created between the two parallel sides.

Have students take a screenshot of their ball in motion and measure the angle of the incoming and outing paths. Do the same for the opposing parallel wall when it completes its path across.



Key Actions:

- Build a triangle between the two walls of the game?
- Label the supplemental, complementary, vertical, and adjacent in the triangle you created.
- Experiment with triangles built from collisions between perpendicular sides of the game.

CCSS.MATH.CONTENT.7.G.B.5
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