



Drexel-SDP GK-12 ACTIVITY

Mouse Game Programming Activity

Subject Area(s) Problem Solving

Associated Unit Scratch computer programming

Associated Lesson None

Activity Title Scratch Mouse Game Programming Activity

Header

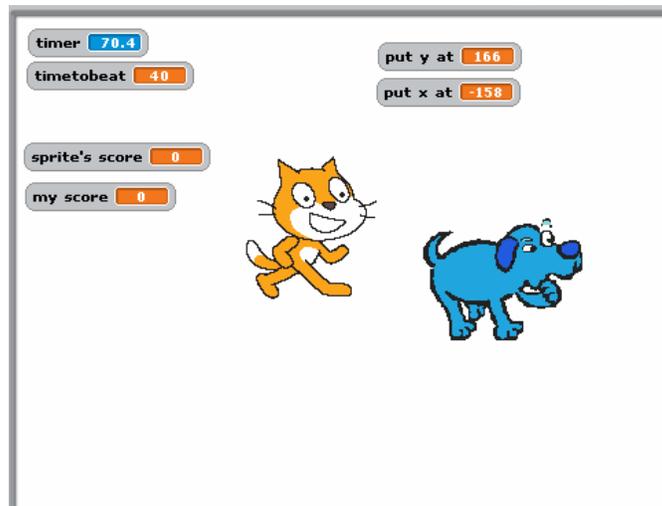


Image 1

ADA Description: Picture shows a screenshot of the Scratch mouse game students will design.

Caption: A screenshot of the Scratch mouse game students will design.

Image file name: screenshot.jpg

Source/Rights: Drexel GK-12 program

Grade Level _6_ (_5_-7_)

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Activity Dependency None

Time Required Three, 30 minute classes

Group Size Individual

Expendable Cost per Group \$0

Summary

In this activity, students will use the Scratch computer programming environment available for free download from MIT. The objective is for students to understand that multiple events can occur at the same time (e.g. in a first-person shooter game, they are shooting at an opponent, and an opponent is firing back at them at the same time). This is called concurrency. Where the game players are positioned on the screen can be described by their coordinates – their position along horizontal and vertical lines. In this activity, students will apply the concepts of concurrency and x-y coordinates to create a game.

Students will be following instructions to design a single-player game, where the opponent is the computer, to test the player’s ability to maneuver the mouse to a randomly-chosen x-y coordinate on the Scratch stage.

Engineering Connection

Students will be doing the job of a computer scientist or computer programmer – designing a single player game where the opponent is the computer.

Keywords

Computer, computer programming, computer science, technology, computer-aided instruction, mathematical reasoning, Scratch

Educational Standards (PA)

- Science: Technological Devices 3.7 (A. Tools, C. Computer Software)
- Math: Mathematical Reasoning and Connections 2.4

Pre-Requisite Knowledge

None

Learning Objectives

After this lesson, students should be able to:

- **Explain what x and y coordinates are**
- **Explain what the Cartesian plane is**
- **Explain what concurrency is**

Materials List

Each group needs:

- A computer with the Scratch programming environment installed

Each class needs:

- A projector for showing the image on a large screen

Introduction / Motivation

There is so much in your school, play, and home life that would not be possible without computers. Imagine not having any computer generated graphics in the movies. No *Batman*? No *Finding Nemo*? No *Transformers*? Unthinkable! Imagine life without calculators. Would we use an abacus? Our fingers? Paper and pencil?

Computer programs are made by people just like us who understand how to tell a computer what to do in language that the computer understands. The instructions have to be short and very, very simple. How would we tell a computer to find the lunchroom if it didn't have "eyes?"

Computer programs use a lot of the logic and repeated instructions that we use every day and just don't realize it. For example, how do you decide to take an umbrella? ("If it is raining, or if my Mom tells me that it might rain, then I take an umbrella. Else, I leave the umbrella at home.") How do you know how many shoes to put on? ("For each foot, put on one shoe.") You already use the everyday logic that is necessary to tell a computer how to do it. In this activity, we will build an animated game using computer language.

Vocabulary / Definitions

Word	Definition
Computer science	A field of study based on information storage and processing systems including hardware, software, basic design principles, and user requirements.
Computer programming	Creating a sequence of instructions that cause the computer to do something
Concurrency	When two or more events are occurring at the same time
X coordinate	A point on a horizontal number line, from negative to positive values of x
Y coordinate	A point on a vertical number line, from negative to positive values of y
Cartesian plane	A two-dimensional area in which any point can be described in terms of x and y coordinates

Procedure

Background

Because all of the Drexel instructors for this activity are in some field of computing, talk briefly about our work, how we became interested in it, and why we enjoy it. Talk about all the great places (exotic conference locations, away to college) that our studies have taken us. Close with some statements about how the field of computing is changing rapidly as we see it, and all the opportunities for the students in their future (gaming, movie special effects, satellite programming, military operations, etc).

Before the Activity

Define the vocabulary words and then discuss how the students will take on the job of a computer programmer for this activity.

With the Students

1. Explain to the students the objective of the game: to design a single-player game, where the opponent is the computer, to test the player's ability to maneuver the mouse to a randomly-chosen x-y coordinate on the Scratch stage.
2. Use the following screen shots, showing the set of instructions for the player and the computerized opponent. Simply ask the students to follow your instructions, step by step, in laying out the game:

Variables you will need:

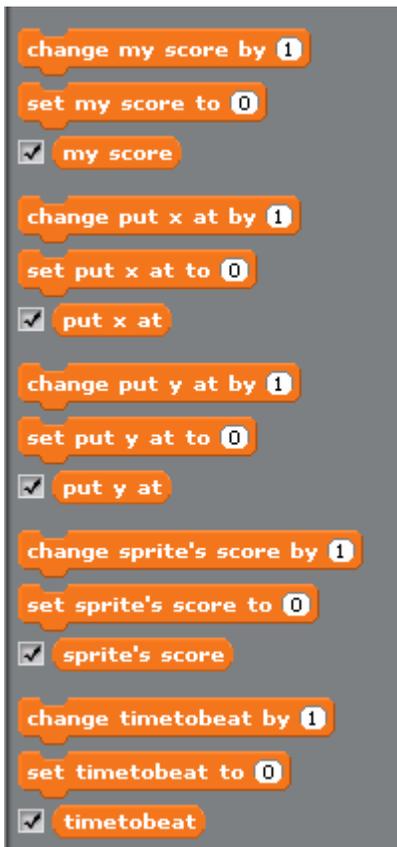


Image 2

ADA Description: Picture shows a screenshot of the variables to set up for the Scratch mouse game.

Caption: A screenshot of the variables to set up for the Scratch mouse game.

Image file name: screenshot2.jpg

Source/Rights: Drexel GK-12 program

Sprite 1:

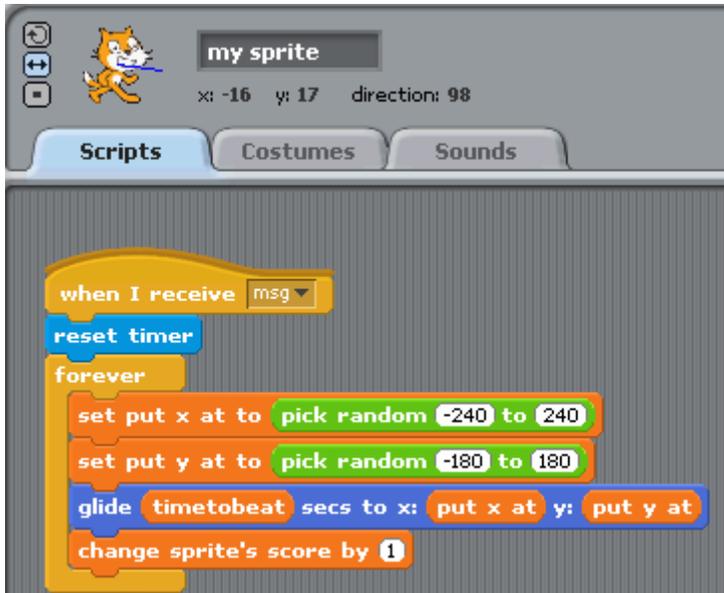


Image 3

ADA Description: Picture shows a screenshot of the code for Sprite 1 of 2 for the Scratch mouse game.

Caption: A screenshot of the code for Sprite 1 of 2 for the Scratch mouse game.

Image file name: screenshot3.jpg

Source/Rights: Drexel GK-12 program

Sprite 2:

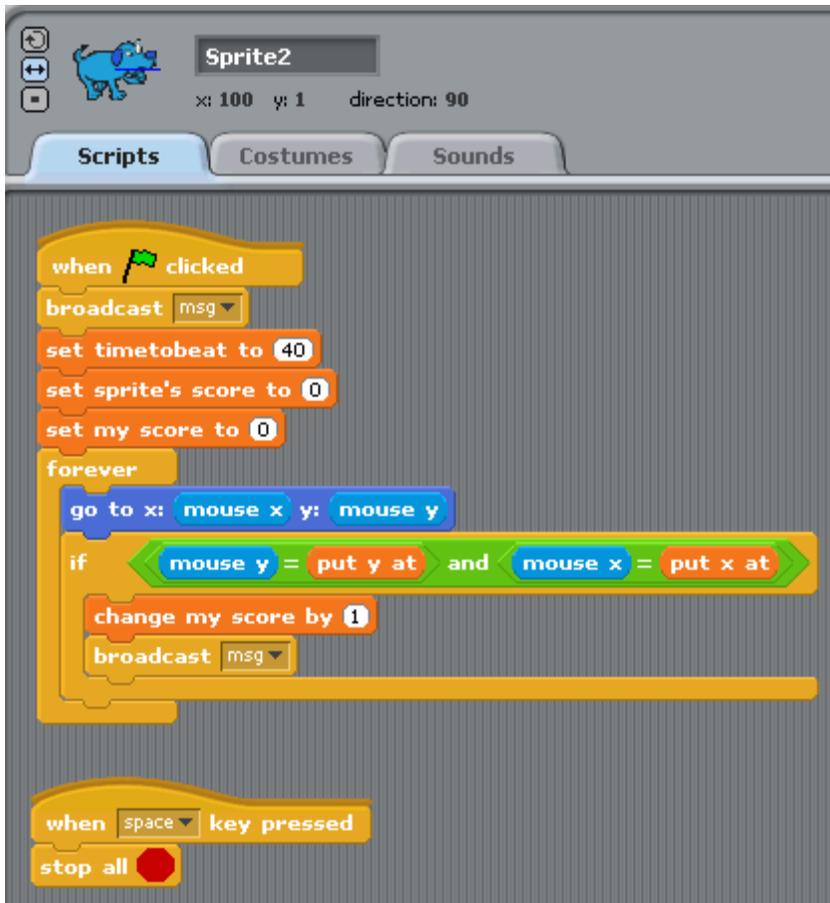


Image 4

ADA Description: Picture shows a screenshot of the code for Sprite 2 of 2 for the Scratch mouse game.

Caption: A screenshot of the code for Sprite 2 of 2 for the Scratch mouse game.

Image file name: screenshot4.jpg

Source/Rights: Drexel GK-12 program

3. Walk around the room, or have a helper walk around the room to correct any mistakes in the students' programs as they work.
4. Ask the students to play the game and watch the behavior of the sprites. Generally, it will be obvious to the students when something is wrong with their game. Provide them with handouts of the
5. Ask the students if they think they would enjoy a career as a computer programmer who designs games. Challenge them to come up with a game of their own. For example, can they program a tic-tac-toe game?

Safety Issues

- None

Troubleshooting Tips

If the students get themselves into a code state, if you have the knowledge to help them debug it, then do so, if not, give have the student work with another student who is able to help them.

Investigating Questions

What kinds of toys and entertainment do computer programmers have a role in? What would our life be like without computer programming and computer scientists? For how many years has the computer been available for everyday household use? What did the first computers look like?

Assessment

Pre-Activity Assessment

Scratch programming project pre-test on vocabulary

Activity Embedded Assessment

Are the students able to keep up with the pace of instruction?

Post-Activity Assessment

Evaluate the students according to your own rubric on the following. Were the students able to follow instructions to completion, to make a correctly functioning program?

Activity Extensions

Let the students create their own program, any activity that involves concurrent behavior of two or more sprites (Scratch characters). There is ample room for the students creativity with the Scratch environment.

URL

MIT's Scratch website where the environment is available for free download.
<http://scratch.mit.edu/download>

Owner

Drexel University GK-12 Program

Contributors

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