Space Shooter

Python Foundations

Time: 60 mins

Introduction

In this class, students will add finishing touches to the space shooter game. By the end of the class, they can add game states, disable key events, update and display scores and lives.

Python Commands Introduced

- game_state = "play" Assigns "play" as the game state.
- game_state = "over" Assigns "over" as the game state.
- if(game_state == "play"): Checks if the game_state is "play"
- screen.tracer(0) Turns the animation off to load the game faster.
- screen.update() Updates the new position of the turtle.
- if(lives == 0): Checks if lives are 0.
- score = score + 1 Increases the score by 1
- lives = lives - 1 Decreases the lives by 1
- ("Score: " + str(score, font=("Arial", 20, "bold"))
  str() converts the number to text and '+' operator adds it to the text "Score: "

Vocabulary

- **Game states:** A series of game events at an instant make up a game state.
- **Relational Operator(==):** A relational operator returns true if both the operands are equal.
- **String concatenation:** Two strings can be concatenated in Python using the '+' operator between them.

Learning Objectives

Student(s) should be able to:

- ***Explain*** how to enable and disable arrow keys by changing game states to “play” and “over” respectively.
- ***Describe*** the logic to increase score and decrease lives.
- ***Display*** the score and the lives on the game screen.

Activities

1. **Class Narrative:** *(2 mins)*
   - Showcase and allow students to play the game created in the previous class and encourage them to use right and left arrow keys after the spaceship blasts.

2. **Concept Introduction Activity:** *(2 mins)*
    - Lead them to think of disabling the key controls after the collision of the asteroid with the spaceship.
    - Introduce students to adding finishing touches to the game by displaying ‘Score’ and ‘Lives’.

3. **Activity 1: Add Game States** *(12 mins)*

    Teacher Activity:
    - Recall the use of variables to keep track if the bullet is fired or loaded. Relate it to game_state = “play” to enable key controls to play and game_state = “over” to disable key controls after the lives are over.
    - Explain how to move the spaceship left when the game state is “play”.

    Student Activity:
    - Guide the student to move the spaceship right when the game state is “play”.
    - Guide the student to set the game state to "over" when the asteroid and the spaceship collides.
    - Help the students to load the game faster and update the new position of the turtle.

4. **Activity 2: Add Score and Lives** *(10 mins)*

    Teacher Activity:
    - Introduce the mechanism to increase score on the spaceship shooting the asteroid and decrease the lives on collision of spaceship with the asteroid.
    - Explain the use of ‘Score’ as a global variable to update and display score.

    Student Activity:
    - Explain the use of ‘Lives’ as a global variable to update and display lives.
    - Guide the students to decrease lives from 5 to 0 when the asteroid collides with the spaceship.
      Note: Remind the students to reset the asteroid until lives become zero.
    - Help the students to add an **if** condition to display a blast image when lives become zero.

5. **Activity 3: Reset the Asteroid position** *(12 mins)*

    Teacher Activity:
    - Recall the use of turtle.write() to write text on the screen.
    - Explain the use of ‘+’ operator to add and display a number and a text together, by converting the number to text using str(). Display Score on the screen.

    Student Activity:
    - Revise the steps to display the lives similar to displaying score.
    - Guide the student to display the lives on the screen.

6. **Introduce the Post class project:** *(2 min)*
    - In the soccer game, update the score as the goalkeeper at the goalpost saves the goal.

7. **Test and Summarize the class learnings:** *(5 mins)*
    - Check for understanding through quizzes and summarize learning after respective missions.
    - Summarize the overall class learning towards the end of the class.

8. **Additional activities:**
    - Encourage them to show a “Game Over” screen as lives become 0.
    - Encourage them to increase the score on shooting the coin and increase lives as the spaceship collects the coin.

9. **State the Next Class Objective:** *(1 min)*
    - You will learn to build more interesting games.

U.S. Standards:

CSTA: 1A-AP-10, 1A-AP-11, 1A-AP-12, 1B-10-10

Links Table		
Activity	**Activity Name**	**Link**
Class Presentation	Space Shooter	https://s3-whjr-curriculum-uploads.whjr.online/6cb3928d-dfae-41fa-85dc-d4d5b5498e6f.html
Playable Link	Play the Game	https://tynker.com/code/view/62bd35e89eacb751786eabe2/
Teacher Activity 1	Add a Game State	https://tynker.com/code/project/62bc327eb2fc0345fe6df4a2
Teacher Activity 1 Solution	Solution of TA1	https://tynker.com/code/project/62bbe76e50159c29665cdd62
Student Activity 1.1	Disable Key Events	https://tynker.com/code/project/62bc1470e4c5c64a4d55fec2
Teacher Reference: Student Activity 1.1 Solution	Solution of SA1.1	https://tynker.com/code/project/62bc0907a59dca37634f71d2
Student Activity 1.2	Update Screen	https://tynker.com/code/project/62bc16d3f7a802393322c0d2
Teacher Reference: Student Activity 1.2 Solution	Solution of SA1.2	https://tynker.com/code/project/62bbf0fb76cbfe6b6b364582
Teacher Activity 2	Add Score	https://tynker.com/code/project/62c2b5d2009e156f5d021492
Teacher Activity 2 Solution	Solution of TA2	https://tynker.com/code/project/62c2b69c0e853a67e466b642
Student Activity 2	Add Lives	https://tynker.com/code/project/62c2b72de258073518244d72
Teacher Reference: Student Activity 2 Solution	Solution of SA2	https://tynker.com/code/project/62c2b7b55b9c9a5f9238c812
Teacher Activity 3	Display Score	https://tynker.com/code/project/62befa42cafe001362460d72
Teacher Activity 3 Solution	Solution of TA3	https://tynker.com/code/project/62bc1404315a87512e489602
Student Activity 3	Display Lives	https://tynker.com/code/project/62bc171a97db3125e15eb852
Teacher Reference: Student Activity 3 Solution	Solution of SA3	https://tynker.com/code/project/62bc1330efe70c096e114387
Student Additional Activity 1	Game Over	https://tynker.com/code/project/62b5b1a8a21b6f0c1541fc32

Teacher Reference: Student Additional Activity 1 Solution	Solution of SAA1	https://tynker.com/code/project/62b5b0eb8adcd03ee735d722
Student Additional Activity 2	Power Up	https://tynker.com/code/project/62b5b5bd75708919730eef42
Teacher Reference: Student Additional Activity 2 Solution	Solution of SAA2	https://tynker.com/code/project/62b5b1f9c7505b7008295e72
Post Class Project	Complete the Soccer Game	https://tynker.com/code/project/62b5554479300335b93a17f2
Teacher Reference: Post Class Project Solution	Solution of Post Class Project	https://tynker.com/code/project/62b54fe03f1ccf7444387632