Space Surfer

Python Foundation

Time: 60 mins

Introduction

In this class, students will start building a space shooter game and will create a spaceship and add a background image and also learn to add key controls to the spaceship.

Python Commands Introduced

- screen.register_shape("image") Registers the image to the screen.
- turtle.shape("image") Assign the image to the turtle.
- screen.listen() Set focus on the turtle screen to collect key events.
- screen.onkey(function, key) Binds the "function" to the key release of "key".
- turtle.xcor() Returns the value of x-coordinate of the turtle.
- turtle.ycor() Returns the value of y-coordinate of the turtle.
- turtle.goto() Repositions the turtle position.
- screen.bgpic("image") Adds a background image to the game screen.

Vocabulary

- **Events** are actions that are triggered when a certain key/s is hit on the keyboard (Key press Events) or a mouse is clicked and/or moved (Mouse Events). We can listen for events and call functions to execute whenever such events are listened to.
- **Operators:** Operators are symbols that help carry out arithmetic or logical operations. Arithmetic operators like +, -, *, / can be used for addition, subtraction, multiplication and division respectively.

Learning Objectives

Student(s) should be able to:

- ***Define*** the concept of loops.
- ***Describe*** how to assign an image to the turtle and add a background image.
- ***Explain*** the use of key events.
- ***Create*** the first stage of a space shooter game with a spaceship, controlling its movements using arrow keys and a background image.

Activities

1. **Class Narrative:** *(2 mins)*
    - Showcase and allow students to play the space shooter game and encourage them to observe the different game elements.

2. **Concept Introduction Activity:** *(2 mins)*

- Lead them on how they can start building the game by creating the main game element spaceship and controlling its movement using arrow keys.

3. **Activity 1: Create a spaceship:** *(5 mins)*

   Teacher Activity:
   - Introduce and showcase the steps to transform a turtle into a spaceship using **screen.register_shape()** and **turtle.shape()** commands.

   Student Activity:
   - Guide them to create a spaceship.
   - Help the students navigate the tutorial and guide them when they face any difficulty.

4. **Activity 2: Move the spaceship:** *(12 mins)*

   Teacher Activity:
   - Explain the concept of moving the turtle to the right with help of changing the current coordinate of the spaceship.
     Note: To move it right, the teacher leads the student that x-coordinate changes as it moves horizontally and hence we define a function **move_right()** to get the current turtle position and update it using operators and make the turtle go to the updated position.
     Note: Teacher explains about **screen.listen()** and **screen.onkey()** commands required to register and use the key events for controlling the spaceship.

   Student Activity:
   - Guide the student to move the spaceship left.

5. **Activity 3: Set the theme** *(7 mins)*

   Student Activity:
   - Guide the student to set the background image using **screen.bgpic()** command.

6. **Introduce the Post class project:** *(2 min)*
   - Create a football game with a goalkeeper defending the goalpost and moving using key controls.

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.
     Note: If time permits, ask the students to justify their answers to the probing questions or the quizzes presented on the slides

8. **Additional activities:**
   - Encourage the student to move the spaceship up and down by defining a function **move_up()** and **move_down()** to get the current turtle position using **xcor(), ycor()** commands and update it using operators and make the turtle go to the updated position using **goto()** command.
   - Encourage the student to rotate the spaceship left and right.
     Note: Probe the student to share that y coordinate changes when the turtle moves up or down.

9. **State the Next Class Objective:** *(1 min)*
   - You will learn to add asteroids and make them fall infinitely.

U.S. Standards:

CSTA: 2-AP-10, 2-AP-11, 2-AP-14

Links Table		
Activity	**Activity Name**	**Link**
Class Presentation	Space Surfer	https://s3-whjr-curriculum-uploads.whjr.online/50805338-57ba-4df7-aa20-15bd382ce441.html
Explore Activity	Space Surfer Playable Link	https://tynker.me/code/view/62bc1330efe70c096e114387/
Teacher Activity 1	Create a Spaceship	https://tynker.com/code/project/62bb02d1bbb835098e111052
Teacher Activity 1 Solution	Solution of TA1	https://tynker.com/code/project/62bb034bbbb835098e111057
Student Activity 1	Create a Spaceship	https://tynker.com/code/project/628f1a6d4384e90db6199632
Teacher Reference: Student Activity 1 Solution	Solution of SA1	https://tynker.com/code/project/62bf0702ebc7c217d06d4222
Teacher Activity 2	Move the Spaceship to Right	https://tynker.com/code/project/62877f86290a981eb36402b2
Teacher Activity 2 Solution	Solution of TA2	https://tynker.com/code/project/62877c3587af744ac30e4522
Student Activity 2.1	Move the Spaceship to Left	https://tynker.com/code/project/628f1da679d26e12d546b702
Teacher Reference: Student Activity 2.1 Solution	Solution of SA2.1	https://tynker.com/code/project/628f1e001a1e0223d7648a12
Student Activity 2.2	Record the Keypress	https://tynker.com/code/project/62b5816e2d8e01324e68be72
Teacher Reference: Student Activity 2.2 Solution	Solution of SA2.2	https://tynker.com/code/project/62b580dc765b2d67552f3407
Student Activity 3	Set the Theme	https://tynker.com/code/project/628f1e53981598522f2fc632
Teacher Reference: Student Activity 3 Solution	Solution of SA3	https://tynker.com/code/project/628f1e8e6c7a3332a17335b4
Student Additional Activity 1	Thrust it Up!	https://tynker.com/code/project/628cae046e6cd477964bcd23

Teacher Reference: Student Additional Activity 1 Solution	Solution of SAA1	https://tynker.com/code/project/628cac5ae766d1309e5b5c72
Student Additional Activity 2	Reposition and Rotate the Spaceship	https://tynker.com/code/project/628cc9bf5797164e5207abb7
Teacher Reference: Student Additional Activity 2 Solution	Solution of SAA2	https://tynker.com/code/project/628cca88822bf82b2729ae22
Post Class Project	Move the Goalkeeper	https://tynker.com/code/project/62b1b5ee38112c5552137d02
Teacher Reference: Post Class Project Solution	Solution of Post Class Project	https://tynker.com/code/project/62b1b4fbe4ccba2c3372d452