

Block Invaders

Computer Programming 1

Description:

Use Block Invaders as a template for creating a game. Problems 1-6 are worth 10 points each. To earn the remaining points, choose any of the optional features to implement. Point totals vary based on difficulty. You can earn up to 110%.

No more than three people may work on a project together. Projects submitted by two people will receive a 10-point deduction and three-person projects will receive a 15-point deduction. You can make up for the deduction by implementing enough extra features so that your group's grade is over 100% prior to deduction being taken.

Cannon

1. Modify the `draw()` function so that the `Cannon` is interesting looking. Be sure to adjust the width and height in the `__init__()` function so that the hitbox dimensions match the graphics. When designing the `Cannon`, take into consideration that `rect_rect` collision detection is used. Try to create a shape where 'false hits' occur infrequently or are less noticeable.

____ Drawing changed, cannon is interesting, hitbox dimensions match drawing. False hits are less noticeable. (10)
____ Drawing minimally changed or hitbox does not agree or false hits still a problem. (6)
____ Drawing minimally changed and hitbox does not agree. (4)
____ No changes made. (0)

2. Add edge detection to the game so that the `Cannon` cannot go off the edge of the screen.

____ Cannon stops on edges of screen with cannon edge exactly on edge. (10)
____ Cannon stops on edges, but cannon edge not exactly on screen edge. (6)
____ Cannon still can go off screen. (0)

Aliens

3. Change the dimensions of the `Alien` so that it is smaller. Then modify the new `draw()` function so that the `Alien` is interesting looking. Be sure to adjust the width and height in the `__init__()` function so that the hitbox dimensions match the graphics.

____ Drawing changed, alien is interesting, hitbox dimensions match drawing. (10)
____ Drawing minimally changed or hitbox does not agree. (6)
____ Drawing minimally changed and hitbox does not agree. (4)
____ No changes made. (0)

4. Add more aliens to the game. Also create an interesting formation for the aliens rather than just using a rectangular grid.

____ More aliens added and non-rectangular formation created. (10)
____ More aliens added but no formation created. (6)
____ No aliens added and no formation created. (0)

Game play

5. Allow for a key to restart the game (perhaps 'r') from the game over screen. Don't use space to restart because it is also used to shoot and could be pressed accidentally.

____ Game restarts. Player is given full lives and score/level reset to zero. (10)
____ Game restarts, but not all game stats are reset. (6)
____ Game does not restart. (0)

Documentation

6. Create a READ_ME file. Your file should explain the object of the game, scoring system, lives/extra lives, and controls. Be sure to give yourself credit for the game in the READ_ME.

- ____ File clearly includes all required topics. (10)
- ____ All required topics included, but content is unclear or unorganized. (6)
- ____ Not all required topics are included. (4)
- ____ No file created. (0)

Optional features

- A. Enhance game play by modifying the velocity of objects and/or adjusting the `refresh_rate`. (5 points)
- B. Change dimensions of the game window. Adjust coordinates in drawing code so that ground is still near bottom of screen and initial positions of alien fleet and cannon are centered. (5 points)
- C. Create an interesting backdrop for the game, perhaps with random stars, planets, etc. (5 points)
- D. Have Cannon icons in the corner in the ground representing the number of lives remaining. (5 points)
- E. Modify the scoring system so that the point value for shooting an alien increases as rounds advance. For example, 10 points for all aliens in round 1, 20 in round 2, and so on. (5 points)
- F. Add music to the game. The music should be in the .ogg file format and should restart at the beginning of each level. (5 points)
- G. Award extra lives after certain point milestones are achieved, perhaps every 1000 points. (5 points)
- H. Add a pause feature to the game where pressing 'p' during game play pauses the game and pressing it again resumes. While paused, all motion should stop and the text "Game paused" should appear on screen. (10 points)
- I. Track hit percentage by recording both hits and total shots fired. Then give an accuracy bonus each time a level is cleared. (10 points)
- J. Track high scores. During game play, both the high score and the current score should be displayed. High scores do not need to save so the high score can be set to zero when you first run the game. You could also have a default high score that persists until it is beaten. (10 points)
- K. Add Bunker objects to the game. The bunkers do not need to take damage when they are hit, but they should detect collisions and both bombs and bullets should be removed when they hit a bunker. (10 points)
- L. Create a UFO object that flies across the top of the screen and award points when it is hit. One method for having the UFO flying across the screen at a desired could be to spawn the UFO very far off the screen, perhaps several thousand pixels, when the game starts. (15 points)
- M. Track and save high scores. When a new high score is achieved, the score should be written to a text file. During game play, both the high score and the current score should be displayed. If a player earns a new high score, allow the player to enter their initials which should be saved along with the high score. (15 points)
- N. Create different types of Aliens that extend the Alien class. Each alien should have a different draw function. Also, add an attribute point value which is different for each alien type. When an Alien is hit, its point value should be added to the players score. (15 points)