

# Alien Shooter!! – Game Documentation & User Manual

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## 1. Introduction

Space Wars!! is a 2D top-down alien shooter built with PyOpenGL and GLUT. The game emphasizes algorithmic rendering: all visual elements (ships, bullets, stars, power-ups) are drawn with rasterization algorithms (Bresenham's line, midpoint circle). No sprites or textures are used — only OpenGL primitives.

The objective is simple: shoot alien ships, collect power-ups, avoid penalties, and survive as long as possible while the difficulty increases.

## 2. System Requirements

### Software

- Python 3.8 or newer
- PyOpenGL and PyOpenGL\_accelerate
- GLUT implementation (e.g., freeglut)

### Hardware

- Any modern CPU (dual-core or higher recommended)
- At least 2 GB RAM
- Basic GPU that supports OpenGL 2.1+

## 3. Installation

1. Install Python 3.8+
2. Install dependencies:  
`pip install PyOpenGL PyOpenGL_accelerate`
3. Install freeglut (Linux/macOS via package manager, Windows via binaries or MSYS2).
4. Run the game:  
`python space_wars.py`

## 4. Game Elements

- Player Ship: Positioned at the bottom, controlled with arrow keys.
- Enemy Ships: Fall from the top. If they reach the bottom or collide with the player, penalties apply.
- Bullets: Fired by the player with the Space key. Used to destroy enemies and stars.

- Power-ups:
  - Star: Shoot it to gain +100 points.
  - Plus (green): Increases bullet size.
  - Minus (red): Decreases bullet size.
  - Speed (pink): Slows down enemy fall speed.
  - Love (heart): Grants an extra life (max 10).

## 5. Controls

### Keyboard

- Arrow keys (←, →, ↑, ↓): Move ship
- Space: Shoot bullet
- y: Change ship color to Yellow
- p: Change ship color to Pink
- o: Change ship color to Orange
- i: Change ship color to Indigo-Blue

### Mouse

The game includes a top bar with clickable buttons:

- Cyan Arrow: Restart the game
- Orange Square: Pause/Resume
- Red X: Quit

## 6. Gameplay Rules

### Scoring

- +1 point for destroying an alien ship
- +100 points for shooting a star

### Lives

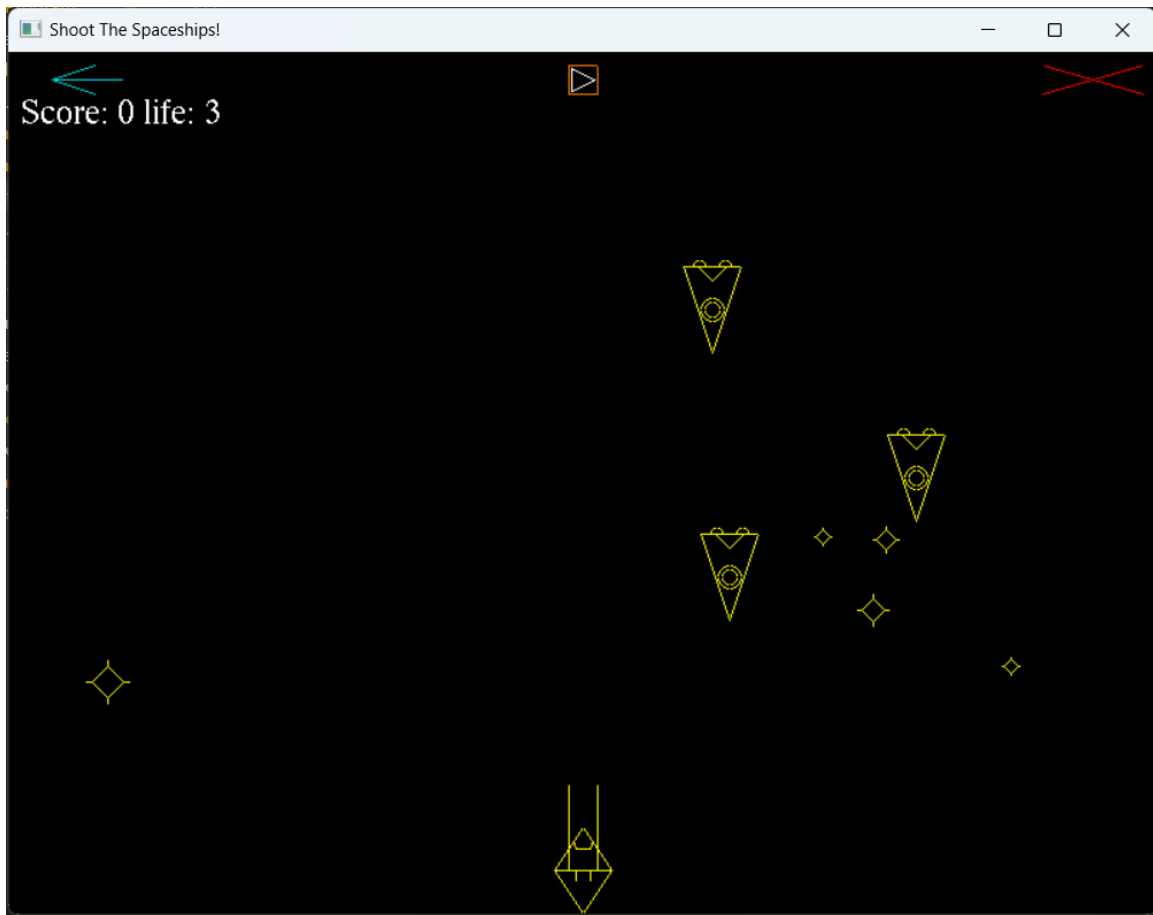
- Start with 3 lives
- Can increase up to 10 by collecting hearts
- Lose 1 life if:
  - 5 enemy ships reach the bottom, or
  - 5 misfires (missed bullets or invalid key presses while unpaused)

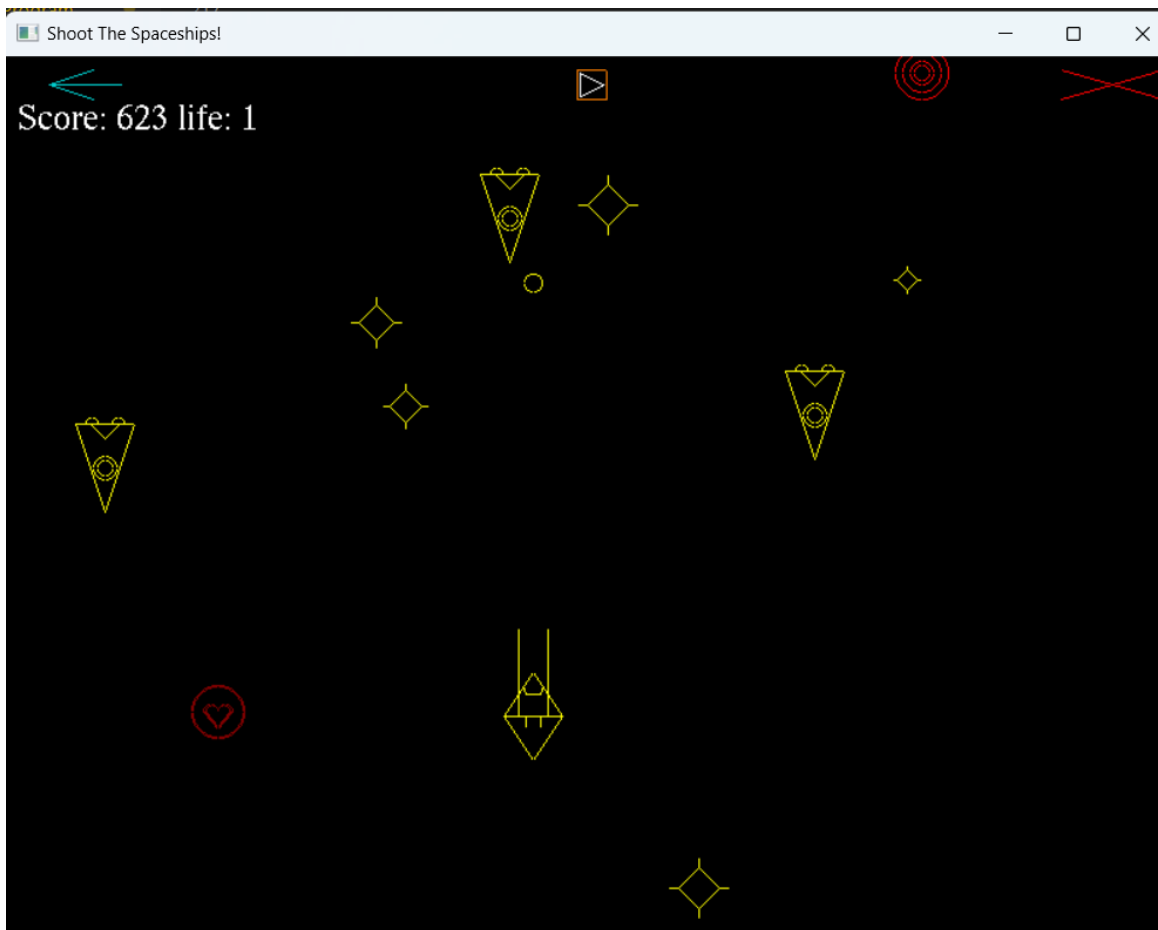
### Difficulty

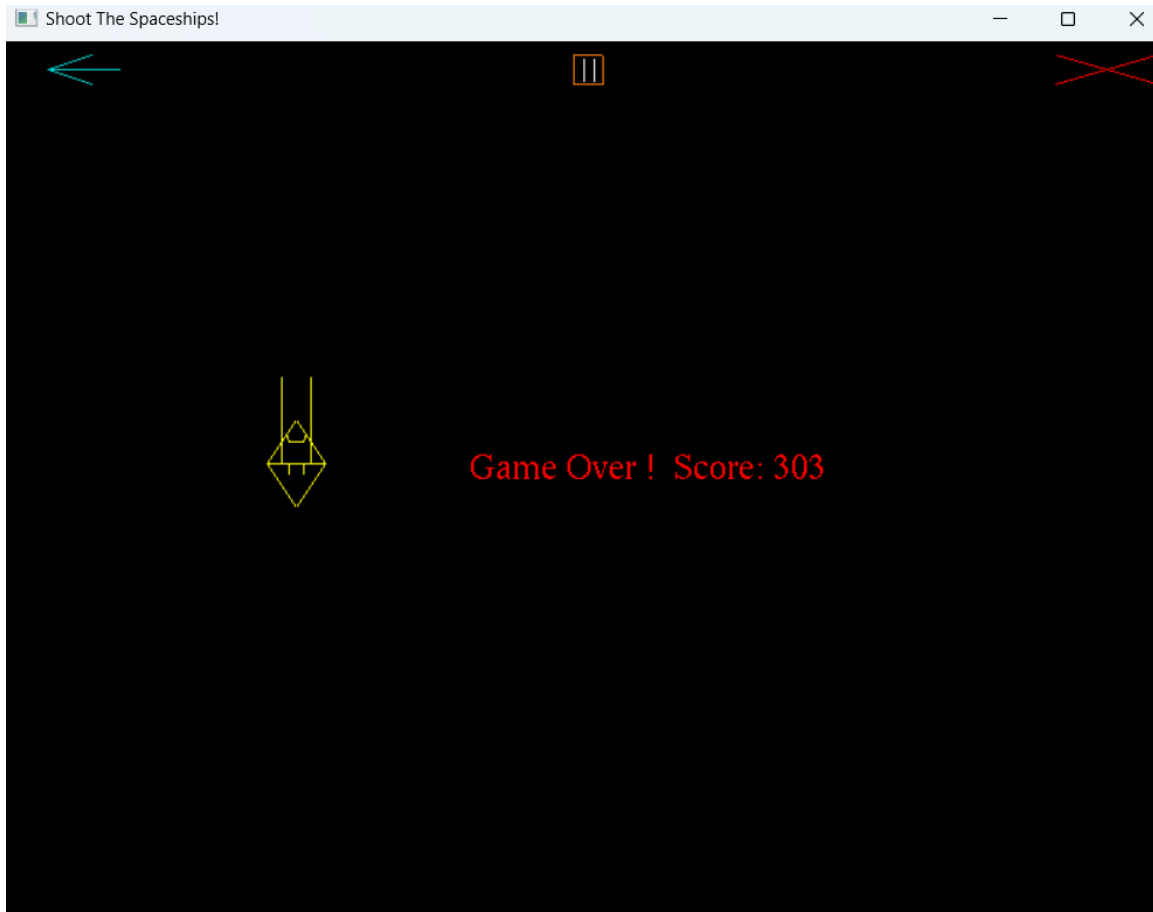
- Each alien destroyed increases fall speed slightly
- Collecting Speed power-ups decreases fall speed

## 7. Visuals

Screenshots of gameplay:







## 8. Troubleshooting

- Game window not opening → Ensure freeglut is installed correctly.
- Lag or poor performance → Install PyOpenGL\_accelerate for optimized rendering.
- Black screen → Your system may not support the required OpenGL version. Update GPU drivers.

## 9. Developer Notes

- Graphics are generated using GL\_POINTS.
- Ships are wireframes drawn with Bresenham's line algorithm.
- Circles and semicircles are drawn with midpoint circle rasterization.
- Game state is handled via global variables, GLUT callbacks, and timers.

## 10. License

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## 11. Credits

Developed using Python, PyOpenGL, and freeglut.

All visuals are procedural — no textures or sprites were used.