

# SPACE BATTLE GAME GUIDE

## INITIALIZATION and CONTROLS

Install Python 2.7.5 and pygame 1.9.1 (recommended) prior to launching the game. Make sure the “resources” folder is downloaded in the same directory as the game program.

### ARDUINO CONTROLLER (JOYSTICK & BUTTON)

Download the “joystick” folder and load “joystick.ino” onto the Arduino. When launching the game, specify the controller’s serial port (e.g. “COM3” or “/dev/tty/ACM0”) as a command-line argument. Use the joystick to orient and move the spaceship and the button to fire a bullet. Press the “p” key to pause the game and the escape key to exit.

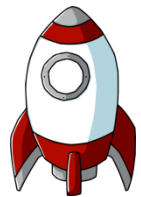
### KEYBOARD CONTROL

Use the arrow keys to orient and move the ship – up/down move the ship forward/back and left/right turn the ship counterclockwise/clockwise. Pressing the spacebar will fire a bullet. Press the “p” key to pause the game and the escape key to exit.

## THE PLAYER/SHIP

The player controls a ship with 100HP (health points) to begin with. This is displayed in the top-right corner along with an accuracy percentage (ACC) and the wave number.

The ship may be maneuvered to fire at UFOs which will then take damage (base value of 5HP). Powerups may be used to increase damage dealt. When a UFO bullet hits the player, the player will also take damage (according to the wave number, see “Waves, UFOs, and Bosses”). The player’s health may be replenished by health balls (see “Powerups”). The player may even be overhealed to a maximum of 150% of the base health; however, the overheat will drain at 1HP per 50 ticks. When the player’s health reaches 0HP, the game will end! (Theoretically, the game can continue indefinitely, but will become unfeasibly difficult and/or lag excessively).



HP: 45/100  
ACC: 66.7%  
WAVE 1

The top-left corner displays the player’s score which increases as the player damages and destroys UFOs and decreases as the player takes damage.

## WAVES, UFOs and BOSSES

When no UFOs remain on-screen, the game advances to the next wave  $w$ . The player regains maximum health if not overhealed. If the player is overhealed, the player will retain the overheat. In addition, the player gains  $100(w-1)$  points.  $\lfloor w/5 + 1 \rfloor$  UFOs are created in random positions every wave with the following properties:

**Velocity:** components in a random range  $[-\min(10, w/2), \min(10, w/2)]$

**Fire rate:**  $\max(1, 50-w)$  (the UFO fires if  $(\text{tick } \#) \bmod (\text{fire rate}) = 0$ )



**Inaccuracy:**  $\max(0, 50-w)$  (error in aiming in a random range  $[-\text{inaccuracy}, \text{inaccuracy}]$ )

**Health:**  $10w+100$

A health bar is displayed above UFOs indicating the percentage of health remaining:  $\geq 50\%$ : green,  $\geq 20\%$ : yellow,  $>0\%$ : red. When a UFO is destroyed, it releases score and health balls.

Note: When a UFO spawns, it will not fire for 75 ticks to allow the player to flee if they are too close.

A boss will appear every 10 levels. The boss and its bullets are 4 times as large as a normal UFO's. The boss has the following properties:

**Velocity:** components in a random range  $[-1, 1]$

**Fire rate:**  $2 \cdot \max(1, 50-w)$

**Inaccuracy:** 0

**Health:**  $5(10w+100)$



The boss also has a 1 in 20 chance of firing a “mini-crit” bullet which will deal twice the damage. In addition, the boss will regain health equivalent to the damage of the bullet, regardless of whether the bullet hits the player or not.

Upon defeating a boss, the player's maximum health increases by 50. A large amount of score and health balls will be released at a high speed.

## POWERUPS

Powerups are special small “bullets” which spawn occasionally with a random velocity. When collected, the following effects are applied:

Powerup	Effect	Duration (ticks)	Spawn Chance (ticks)
Score Ball	+100 score	N/A	1/500
Health Ball	+20-50% HP		1/1500
Critical Hits Ball	Bullet speed doubled Bullets deal 10x damage	500	1/4000
Invulnerability Ball	Enemy bullets deflected	700	1/5000
Homing Projectiles Ball	Bullets chase enemies Bullets deal 2x damage Overrides critical hits	700	1/4500
Speed Ball	Ship speed doubled	1000	1/3500

For effects with a limited duration, a coloured bar will be displayed in the bottom-left indicating the time remaining until the effect wears off.

