import pygame

import math

def **calculate\_x\_velocity**(position, target, velocity):

direction = math.atan2(target[1] - position[1], target[0] - position[0])

return velocity \* math.cos(direction)

def **calculate\_y\_velocity**(position, target, velocity):

direction = math.atan2(target[1] - position[1], target[0] - position[0])

return velocity \* math.sin(direction)

class **PlayerInput**:

def **\_\_init\_\_**(self):

self.stop = False

self.left = False

self.right = False

self.fire = False

def **update**(self):

events = pygame.event.get()

for e in events:

if e.type == pygame.QUIT:

self.stop = True

elif e.type == pygame.KEYDOWN:

if e.key == pygame.K\_LEFT:

self.left = True

if e.key == pygame.K\_RIGHT:

self.right = True

elif e.type == pygame.KEYUP:

if e.key == pygame.K\_LEFT:

self.left = False

if e.key == pygame.K\_RIGHT:

self.right = False

self.fire = pygame.mouse.get\_pressed()[0]

class **Player**:

def **\_\_init\_\_**(self):

self.playerImage = pygame.image.load("player.png").convert\_alpha()

self.playerShotImage = pygame.image.load("shot.png").convert\_alpha()

self.crosshairImage = pygame.image.load("crosshair.png").convert\_alpha()

self.rect = self.playerImage.get\_rect(bottomleft=(0, window.get\_height()))

self.alive = True

self.shots = []

self.player\_has\_fired = False

def **move**(self, player\_input):

if player\_input.left and self.rect.left > window.get\_rect().left:

self.rect.x = self.rect.x - 2

if player\_input.right and self.rect.right < window.get\_rect().right:

self.rect.x = self.rect.x + 2

for shot in list(self.shots):

shot.move()

if not shot.rect.colliderect(window.get\_rect()):

self.shots.remove(shot)

if not player\_input.fire:

self.player\_has\_fired = False

def **hit**(self):

self.alive = False

class **Shot**:

def **\_\_init\_\_**(self, rect, x\_speed, y\_speed):

self.rect = rect

self.x = rect.x

self.y = rect.y

self.x\_speed = x\_speed

self.y\_speed = y\_speed

def **move**(self):

self.x = self.x + self.x\_speed

self.y = self.y + self.y\_speed

self.rect.x = self.x

self.rect.y = self.y

class **Alien**:

def **\_\_init\_\_**(self, speed\_x):

self.alienImage = pygame.image.load("alien.png").convert\_alpha()

self.rect = self.alienImage.get\_rect(topright=(0,0))

self.x = self.rect.x

self.speed\_x = speed\_x

self.bounds = window.get\_rect()

self.direction = 1

self.alive = True

def **move**(self):

self.x = self.x + self.direction \* self.speed\_x

self.rect.x = self.x

if self.rect.right > self.bounds.right:

self.direction = -1

if self.rect.left < self.bounds.left:

self.direction = 1

def **hit**(self):

self.alive = False

class **GameState**:

def **\_\_init\_\_**(self):

self.player = Player()

self.alien = Alien(1.0)

self.player\_shots = []

self.player\_has\_fired = False

def **update**(self, player\_input):

self.player.move(player\_input)

self.alien.move()

for shot in list(self.player\_shots):

shot.move()

if not shot.rect.colliderect(window.get\_rect()):

self.player\_shots.remove(shot)

for shot in list(self.player\_shots):

if self.alien.rect.colliderect(shot.rect):

self.alien.hit()

if player\_input.fire and not self.player\_has\_fired and **len**(self.player\_shots) < 3 and self.player.alive:

self.player\_has\_fired = True

self.add\_shot()

if not player\_input.fire:

self.player\_has\_fired = False

def **add\_shot**(self):

pos = self.player.rect.center

new\_shot\_rect = self.player.playerShotImage.get\_rect(center=pos)

target = pygame.mouse.get\_pos()

velocity = 1.5

velocity\_x = calculate\_x\_velocity(pos, target, velocity)

velocity\_y = calculate\_y\_velocity(pos, target, velocity)

new\_shot = Shot(new\_shot\_rect, velocity\_x, velocity\_y)

self.player\_shots.append(new\_shot)

def **paint\_screen**(window):

window.fill((0,0,0))

window.blit(game\_state.player.playerImage, game\_state.player.rect)

if game\_state.alien.alive:

window.blit(game\_state.alien.alienImage, game\_state.alien.rect)

for shot in game\_state.player\_shots:

window.blit(game\_state.player.playerShotImage, shot.rect)

window.blit(game\_state.player.crosshairImage,

game\_state.player.crosshairImage.get\_rect(center=pygame.mouse.get\_pos()))

pygame.display.flip()

def **main\_loop**():

pygame.mouse.set\_visible(False)

while not player\_input.stop:

pygame.time.delay(20)

player\_input.update()

game\_state.update(player\_input)

paint\_screen(window)

pygame.display.quit()

pygame.quit()

pygame.init()

screen\_width = 800

screen\_height = 600

window = pygame.display.set\_mode((screen\_width,screen\_height))

player\_input = PlayerInput()

game\_state = GameState()

main\_loop()