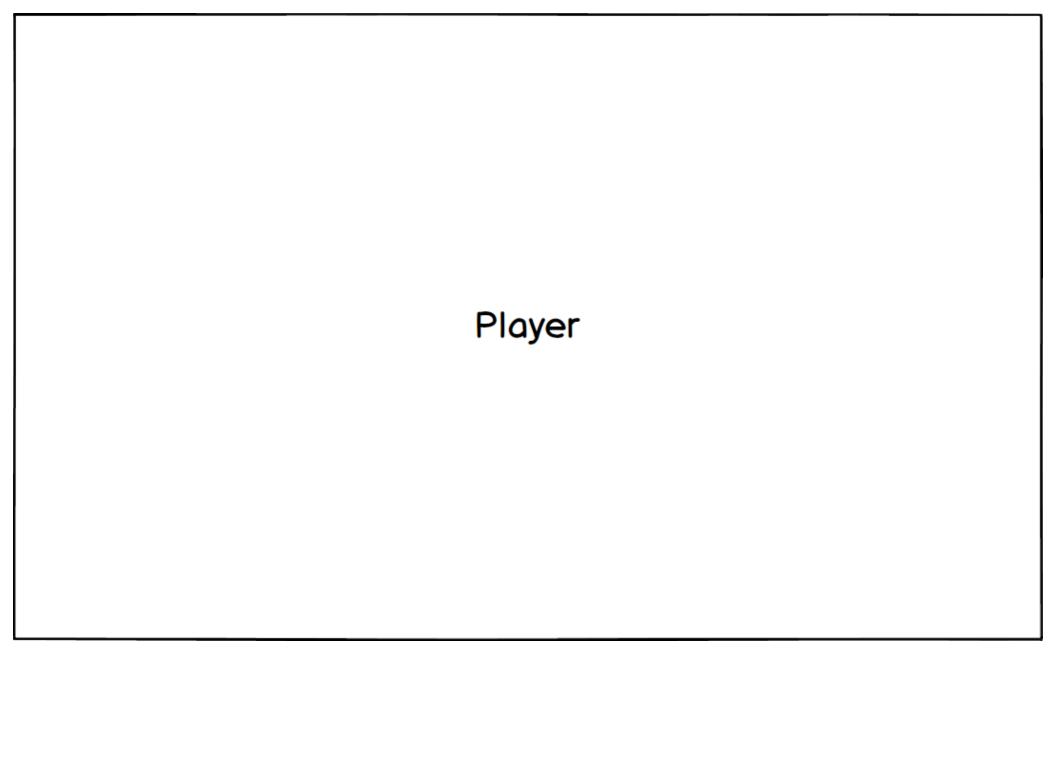
Programming a mini shooter



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Start code

```
import pygame, os
def main():
  # Load
  pygame.init()
  screen = pygame.display.set_mode((800, 600))
  font = pygame.font.Font(None, 24)
  path = os.path.abspath('.') + '/'
  quit_game = False
  while not(quit_game):
     # Inputs
     for event in pygame.event.get():
       if event.type == pygame.QUIT:
          quit_game = True
       if event.type == pygame.KEYDOWN:
          if event.key == pygame.K_ESCAPE:
             quit_game = True
     # Update
     # Draw
     screen.fill((0, 0, 0))
     pygame.display.update()
if __name__ == "__main__":
  main()
```



Display player

```
import pygame, sys

# Load
...
player = pygame.image.load(path+'player.png').convert_alpha()
...
while not(quit_game):
...
# Draw
screen.fill((0, 0, 0))
screen.blit(player, (0, 200))
pygame.display.update()
```

- · pygame.image.load(...) has one argument, which is the path to the image on your hard drive
- path + "player.png" concatenate the content of the path variable and "player.png"
- · convert_alpha() function change the pixel format of the image, to give the display surface format

Move player

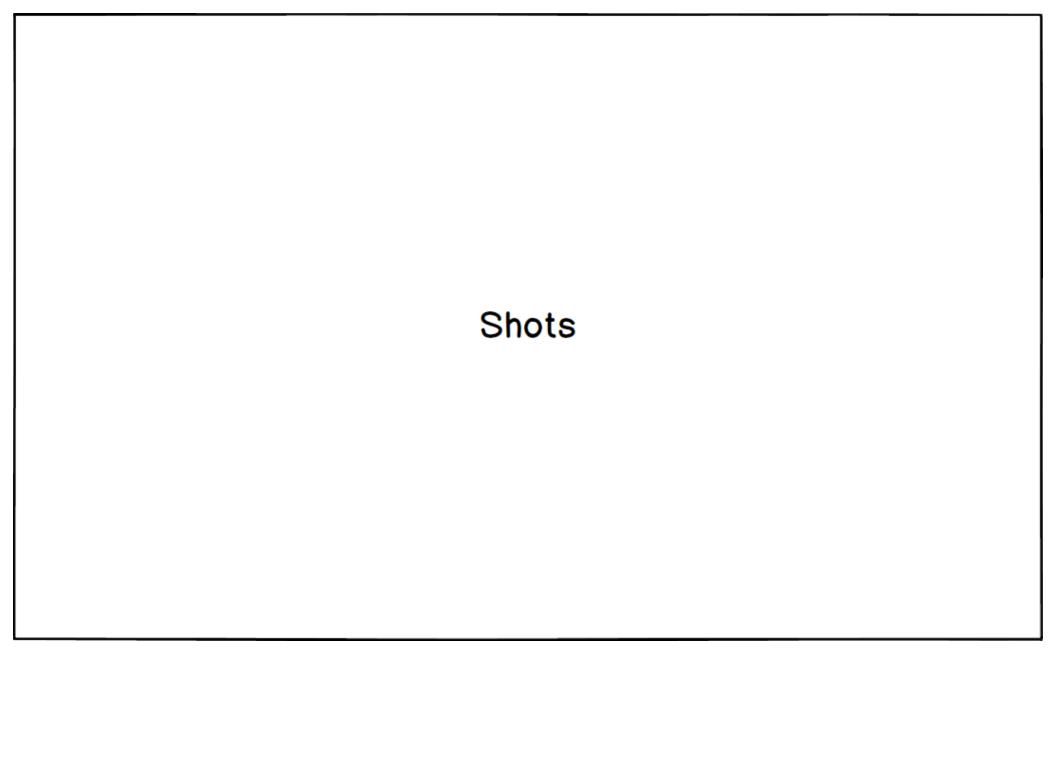
```
import pygame, sys
  # Load
  key_up = False
  key_down = False
  player_x = 0
  player_y = 200
  while not(quit_game):
     # Inputs
    for event in pygame.event.get():
       if event.type == pygame.QUIT:
          quit_game = True
       if event.type == pygame.KEYDOWN:
          if event.key == pygame.K_ESCAPE:
            quit_game = True
         if event.key == pygame.K_UP:
            key_up = True
         if event.key == pygame.K_DOWN:
            key_down = True
       if event.type == pygame.KEYUP:
         if event.key == pygame.K_UP:
            key_up = False
         if event.key == pygame.K_DOWN:
            key_down = False
    # Update
     if key_up:
       player_y = player_y - 5
    if key_down:
       player_y = player_y + 5
     # Draw
    screen.blit(player, (player_x, player_y))
```

Limit player move

- We want the player to stay at position 0 if position become inferior to 0
- Same if position go ever screen height (- player height)

Limit player move

```
# Load
player_y = 200
player_height = 120
screen_height = 720
screen_width = 1280
   # Update
   if player_y < 0:
     player_y = 0
   if player_y > screen_height - player_height:
     player_y = screen_height - player_height
```



Make the player shoot

- Player will shot projectiles. We want a function to create shots, and an other to draw shots.
- Projectiles are fired when the player presses Space.
- We will store projectile's variables in a map :

```
bullet = { 'x': 120, 'y': y, 'speed': 5, 'image': pygame.image.load(path+'bullet.png').convert_alpha() }
```

· We should have a list of projectiles

Make the player shoot

```
# Load
key_space = False
bullets = []
def create_bullet(y):
   bullet = { 'x': 120, 'y': y, 'speed': 5, 'image': pygame.image.load(path+'bullet.png').convert_alpha() }
   bullets.append(bullet)
def draw_bullets():
   for bullet in bullets:
     screen.blit(bullet['image'], (bullet['x'], bullet['y']))
   # Inputs
   if event.type == pygame.KEYDOWN:
        if event.key == pygame.K_SPACE:
           key_space = True
     if event.type == pygame.KEYUP:
        if event.key == pygame.K_SPACE:
           key\_space = False
    # Update
    if key_space:
       create_bullet(player_y)
    # Draw
     draw_bullets()
```

Make the shots move

- · Now we want bullets to move from the left to the right
- · We create a function that would move each bullet of the bullet list

Make the shots move

```
# Load
def move_bullets():
    for bullet in bullets:
        bullet['x'] = bullet['speed']

# Update
...
move_bullets()
```

One press one shot

- · Our player shoots every frame when space bar is pressed
- · We want the player to shoot only once when space bare is hit
- · Use a boolean to implement this behaviour

One press one shoot

```
# Load
already_shoot = False
def create_bullet(y):
   nonlocal already_shoot
   bullet = {'x': 120, 'y': y, 'speed': 5, 'image': pygame.image.load(path+'bullet.png').convert_alpha()}
   bullets.append(tir)
   already\_shoot = True
    # Inputs
   if event.type == pygame.KEYDOWN:
        if event.key == pygame.K_SPACE:
           key_space = True
           already_shoot = False
    # Update
    if key_space and not already_shoot:
      create_bullet(player_y + 50)
    move_bullets()
```

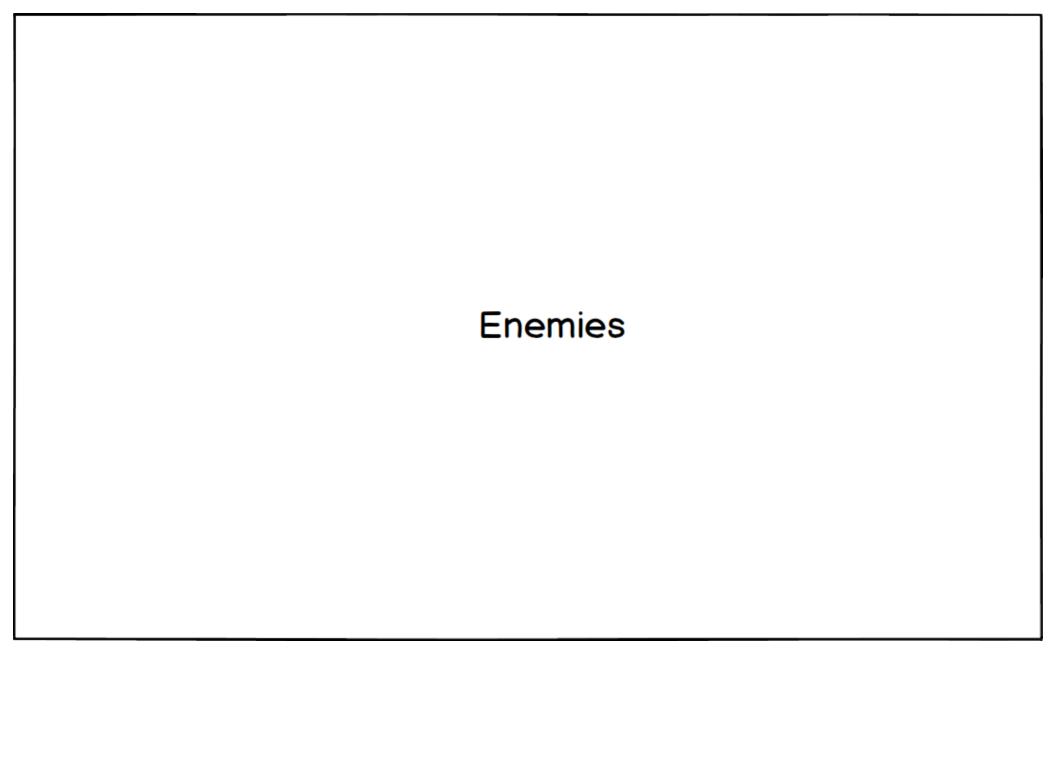
Erase shots to free memory

- · If our code is left like that, we would manage a growing number of shots
- · We want to erase shots when they get out the screen
- · We cannot erase shots while we are going through them
- · So we will register in a list the indexes of the shots we want to erase, then delete the shots with those indexes

Erase unused shots

```
# Load
bullets_to_erase = []
def move_bullets():
   for index, bullet in enumerate(bullets):
      bullet('x') = bullet('x') + bullet('speed')
      if bullet['x'] > screen_width:
        bullets_to_erase.append(index)
def delete_bullets(to_erase):
   for index in to_erase:
      del bullets[index]
   to_erase[:] = []
    # Update
    delete_bullets(bullets_to_erase)
```

```
def move_bullets():
    i = 0
    for bullet in bullets:
        bullet['x'] = bullet['speed']
    if bullet['x'] > screen_width:
        bullets_to_erase.append(i)
    i = i + 1
```



Create, draw, move and erase enemies

- · You can use the shot algorithm to create enemies
- · Use a counter variable to trigger enemy spawn: increment it by 1 each frame, when it exceeds 500, create an enemy
- · Enemies go from right to left

Create, draw, move and erase enemies

```
# Load
enemies = []
enemies_to_erase = []
def create_enemy(y):
  enemy = {'x': screen_width, 'y': y, 'speed': -3, 'image': pygame.image.load(path+'enemy.png').convert_alpha()}
  enemies.append(enemy)
def draw_ennemies():
  for enemy in enemies:
     screen.blit(enemy['image'], (enemy['x'], enemy['y']))
def move_enemies():
  for index, enemy in enumerate(enemies):
     enemy('x') = enemy('x') + enemy('speed')
     if enemy['x'] < 0:
       enemies_to_erase.append(index)
def erase_enemies(to_erase):
  for index in to_erase:
     del to_erase[index]
  to_erase[:] = []
enemy\_counter = 0
    # Update
    # Ennemis
    move_enemies()
    erase_enemies(enemies_to_erase)
    enemy_counter = enemy_counter + 1
    if enemy_counter > 500:
      create_enemy(300)
      enemy\_counter = 0
```

Create enemy at random position

- · Import random package and use random.seed() to generate a random series of number
- · random.randint(min, max) give a random integer between min and max
- · Make enemies appear at a random position

Create, draw, move and erase enemies

```
import random
...
# Load
...
random.seed()
...
# Update
...
if enemy_counter > 500:
    create_enemies(random.randint(0, screen_height - 120))
...
```

Detect player colliding with enemy

· Here is a code to detect collisions and trigger game over when there is a collision:

```
game_over = False

def collision_player_enemies():
    nonlocal game_over
    for i_enemy, enemy in enumerate(liste_ennemis):
        x1, y1, w1, h1 = player_x, player_y, player_width, player_height
        x2, y2, w2, h2 = enemy['x'], enemy['y'], enemy['image'].get_width(), enemy['image'].get_height()
        if(not(x1 + w1 < x2 or x2 + w2 < x1 or y1 + h1 < y2 or y2 + h2 < y1)):
        destroy_enemy(i_enemy)
        game_over = True</pre>
```

· Display a game over text when game is over

Display game over

Fixes

- $\cdot\;$ We don't wan't the player to shoot when he or she restarts game
- \cdot We want all enemies to be erased after game restart

Fixes

```
import random
  # Load
  def erase_all_enemies():
     enemies[:] = []
     enemies_to_erase[:] = []
  def collision_player_enemies():
          erase_all_enemies()
  # Update
 if not game_over:
  else:
       if key_space:
          game_over = False
          already\_shot = True
```