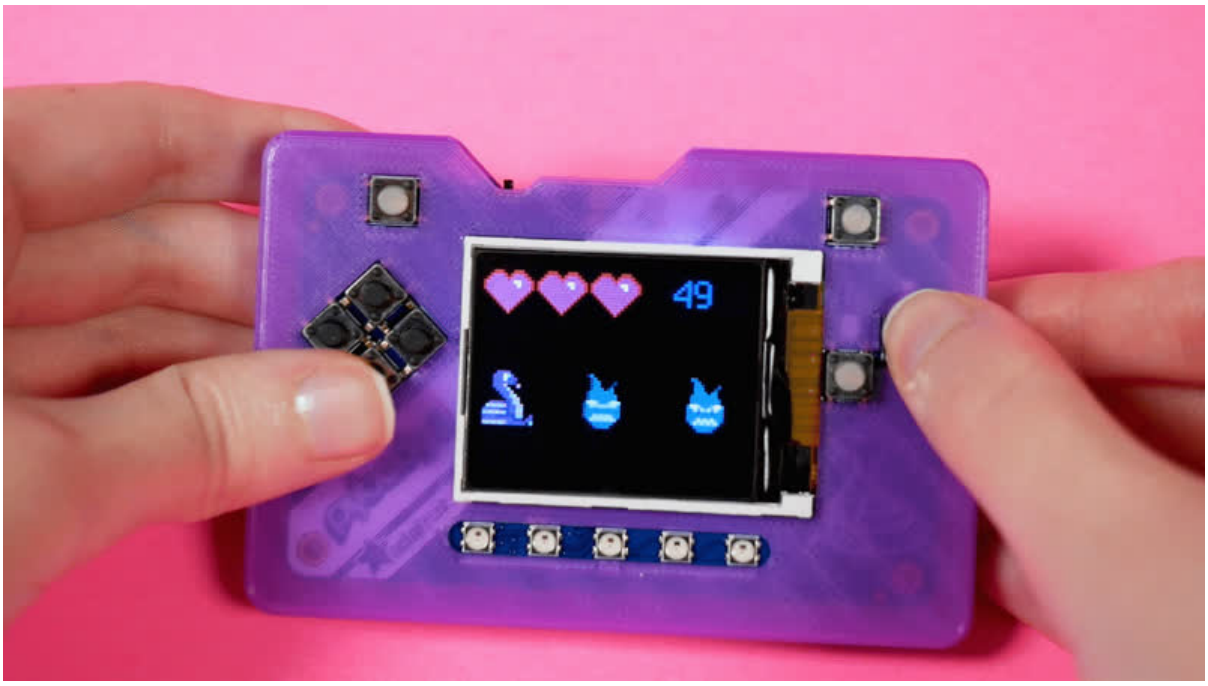
# Blinka Jump PyBadge Game

Created by Liz Clark




https://learn.adafruit.com/blinka-jump-pybadge-game

Last updated on 2024-11-12 03:58:51 PM EST

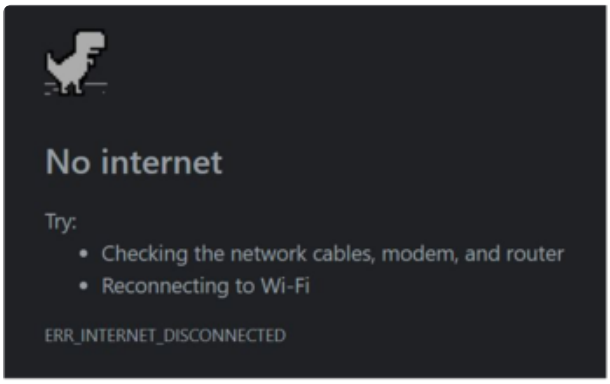
# Table of Contents

# Overview

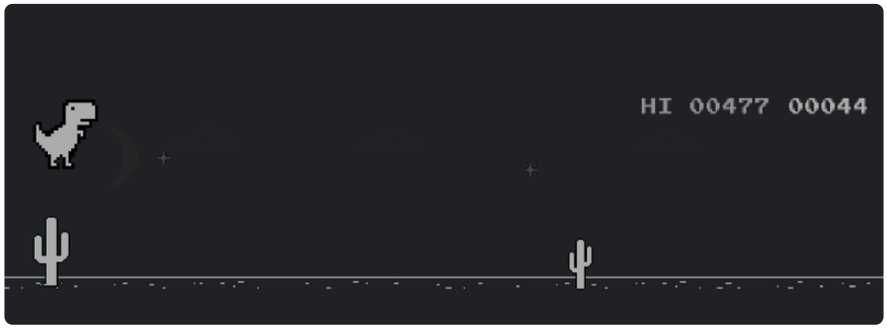

Blinka Jump is a video game created with CircuitPython. Using the **displayio** library you can use sprites, text and other features to build your own game.

The game was coded with the PyBadge in mind. The PyBadge board has everything you need onboard to be a compact handheld gaming device.

## Inspiration




This game is based on the Chrome browser's jumping dinosaur game Easter egg. In this version, Blinka needs to jump over the Sparky the Blue Smoke Monsters to save the circuits running on CircuitPython.



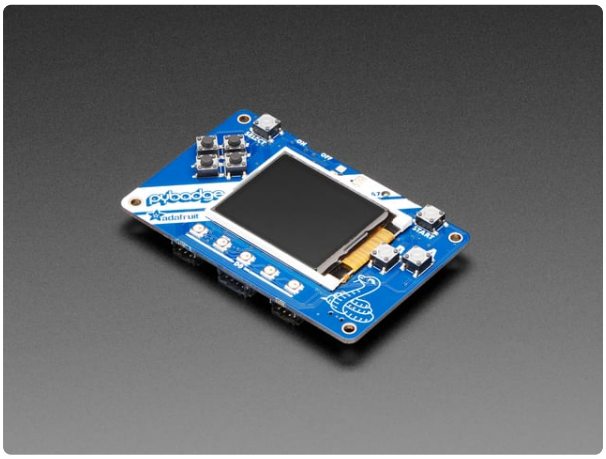
If you ever want to play the Chrome dinosaur game without any network issues, you can go to chrome://dino/ in your Chrome browser.

## Prerequisite Guides

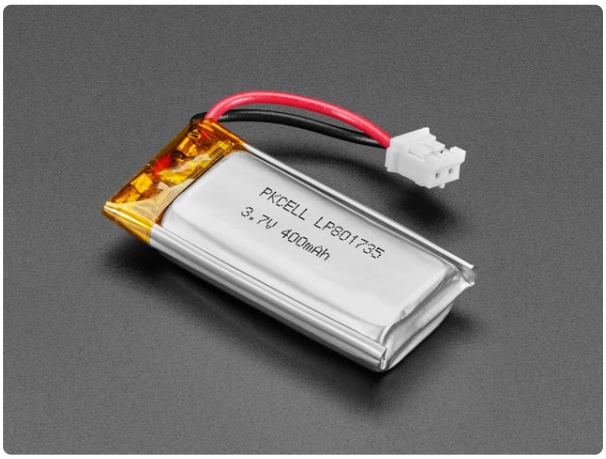
Before diving into this guide, it's recommend to look at the Creating Your First Tilemap Game with CircuitPython (https://adafru.it/L-C) Learn Guide by Tim C (https://adafru.it/L-D). It goes into detail about how the displayio mechanics work when coding a game.

For additional references, you'll also want to check out the CircuitPython Animated Sprite Pendents (https://adafru.it/L-E) guide and the CircuitPython Display Support Using displayio (https://adafru.it/EGh) guide.

## Supplies



Adafruit PyBadge for MakeCode Arcade, CircuitPython, or Arduino
What's the size of a credit card and can run CircuitPython, MakeCode Arcade or Arduino? That's right, its the Adafruit PyBadge! We wanted to see how much we...
https://www.adafruit.com/product/4200




Lithium Ion Polymer Battery Ideal For Feathers - 3.7V 400mAh
Lithium-ion polymer (also known as 'lipo' or 'lipoly') batteries are thin, light, and powerful. The output ranges from 4.2V when completely charged to 3.7V. This...
https://www.adafruit.com/product/3898

Pink and Purple Braided USB A to Micro B Cable - 2 meter long

This cable is super-fashionable with a woven pink and purple Blinka-like pattern! First let's talk about the cover and over-molding. We got these in custom colors,...

https://www.adafruit.com/product/4148

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# Installing CircuitPython

CircuitPython (https://adafru.it/tB7) is a derivative of MicroPython (https://adafru.it/BeZ) designed to simplify experimentation and education on low-cost microcontrollers. It makes it easier than ever to get prototyping by requiring no upfront desktop software downloads. Simply copy and edit files on the **CIRCUITPY** flash drive to iterate.

The following instructions will show you how to install CircuitPython. If you've already installed CircuitPython but are looking to update it or reinstall it, the same steps work for that as well!

## Set up CircuitPython Quick Start!

Follow this quick step-by-step for super-fast Python power :)

**Download the latest version of CircuitPython for PyBadge via circuitpython.org**

https://adafru.it/EF4

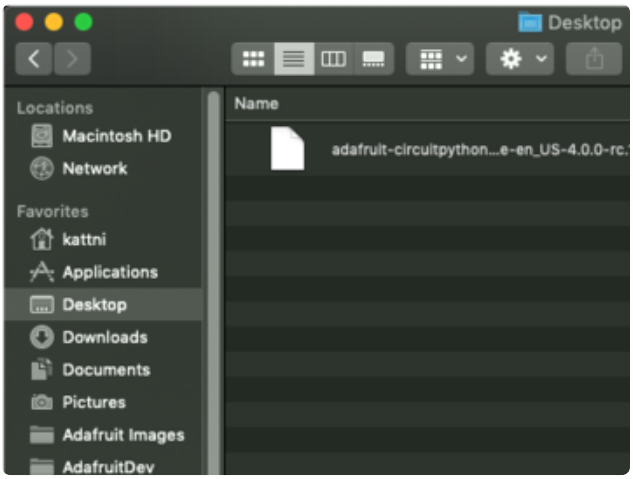
Or

**Download the latest version of CircuitPython for EdgeBadge via circuitpython.org**

https://adafru.it/LxF

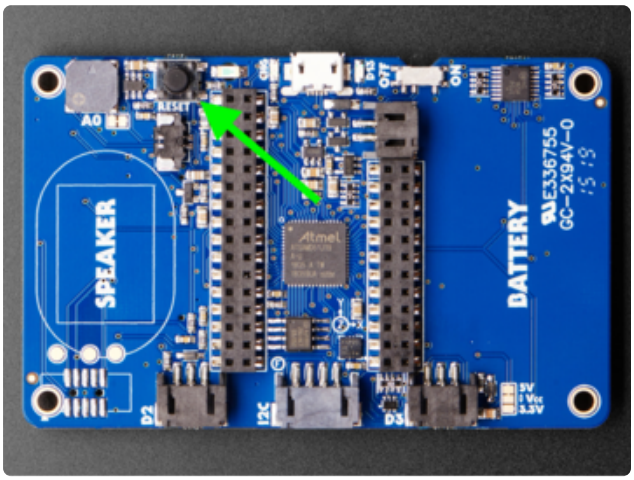
## Further Information

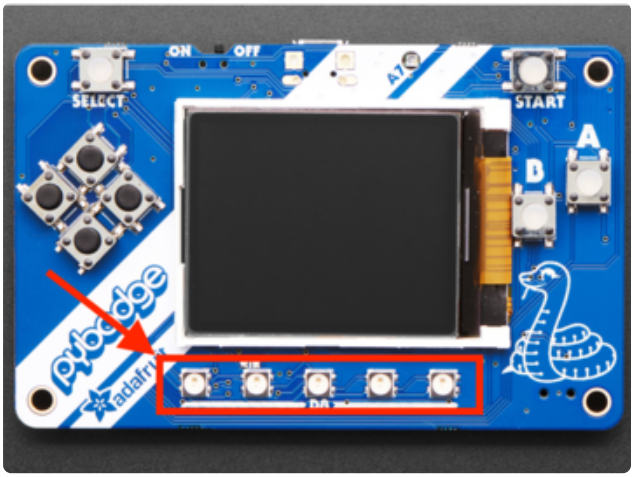
For more detailed info on installing CircuitPython, check out Installing CircuitPython (https://adafru.it/Amd).




**Click the link above and download the latest UF2 file.**

Download and save it to your desktop (or wherever is handy).



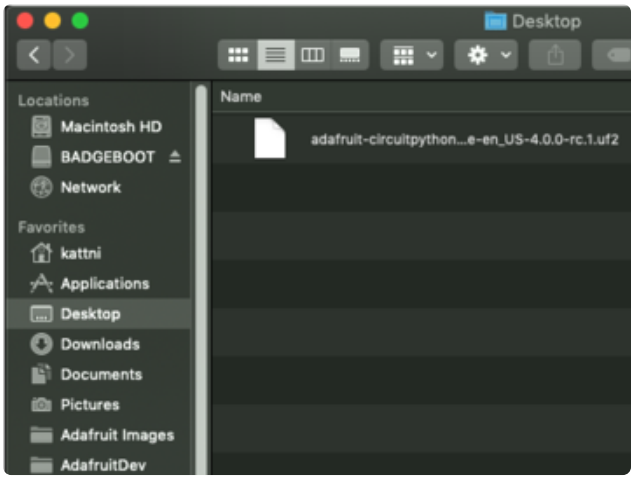

Plug your PyBadge into your computer using a known-good USB cable.

**A lot of people end up using charge-only USB cables and it is very frustrating! So make sure you have a USB cable you know is good for data sync.**

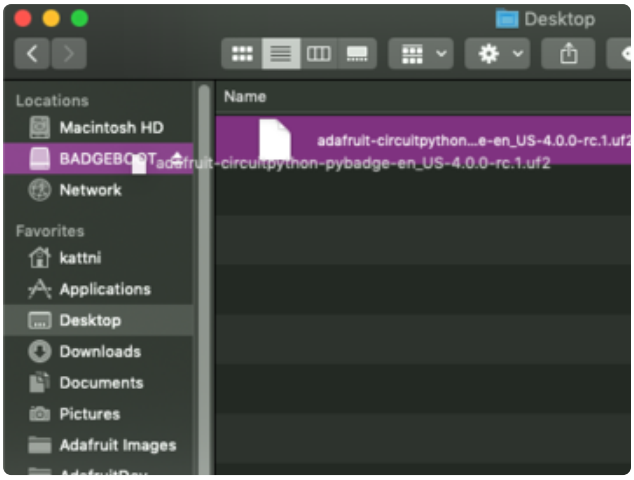
Double-click the **Reset button on the back** of your board (indicated by the green arrow in the first image). You will see an image on the display instructing you to drag a UF2 file to your board, and **the row of NeoPixel RGB LEDs on the front will turn green** (indicated by the arrow and square in the second image). If they turn red, check the USB cable, try another USB port, etc.

**Your reset button may be white or black!**

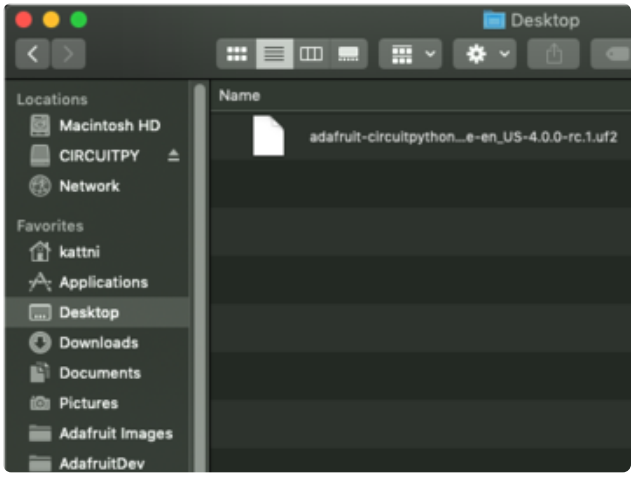
If double-clicking doesn't work the first time, try again. Sometimes it can take a few tries to get the rhythm right!




You will see a new disk drive appear called **BADGEBOOT**.




Drag the **adafruit_circuitpython_etc.uf2** file to **BADGEBOOT.**




The LED will flash. Then, the **BADGEBOOT** drive will disappear and a new disk drive called **CIRCUITPY** will appear.

That's it, you're done! :)

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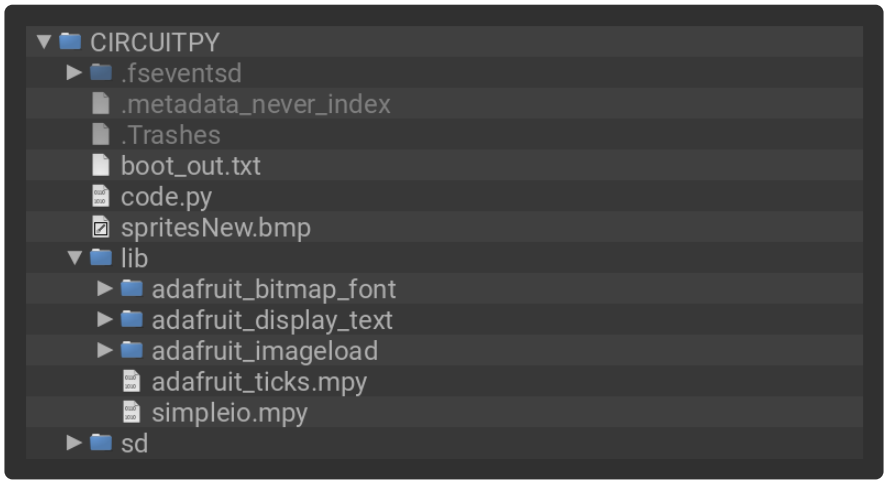
# Coding the PyBadge

To use with CircuitPython, you need to first install a few libraries, into the lib folder on your **CIRCUITPY** drive. Then you need to update **code.py** with the example script.

Thankfully, we can do this in one go. In the example below, click the **Download Project Bundle** button below to download the necessary libraries and the **code.py** file in a zip file. Extract the contents of the zip file, open the directory **PyBadge_Blinka_Ju**

**mp_Game/** and then click on the directory that matches the version of CircuitPython you're using and copy the contents of that directory to your **CIRCUITPY** drive.

Your **CIRCUITPY** drive should now look similar to the following image:




```
# SPDX-FileCopyrightText: 2020 Liz Clark for Adafruit Industries
#
# SPDX-License-Identifier: MIT

import time
from random import randint
from micropython import const
import board
import terminalio
import displayio
import adafruit_imageload
import digitalio
import simpleio
from keypad import ShiftRegisterKeys, Event
from adafruit_display_text import label

#  setup for PyBadge buttons
BUTTON_LEFT = const(7)
BUTTON_UP = const(6)
BUTTON_DOWN = const(5)
BUTTON_RIGHT = const(4)
BUTTON_SEL = const(3)
BUTTON_START = const(2)
BUTTON_A = const(1)
BUTTON_B = const(0)

pad = ShiftRegisterKeys(clock=board.BUTTON_CLOCK,
                    data=board.BUTTON_OUT,
                    latch=board.BUTTON_LATCH,
                    key_count=8,
                    value_when_pressed=True,
                    max_events=1)

latest_event = Event(key_number=8)
last_read = 0

#  enables speaker
speakerEnable = digitalio.DigitalInOut(board.SPEAKER_ENABLE)
speakerEnable.switch_to_output(value=True)

# Sprite cell values
EMPTY = 0
BLINKA_1 = 1
```

```
BLINKA_2 = 2
SPARKY = 3
HEART = 4
JUMP_1 = 5
JUMP_2 = 6

#  creates display
display = board.DISPLAY
#  scale=2 allows the sprites to be bigger
group = displayio.Group(scale=2)

#  Blinka sprite setup
blinka, blinka_pal = adafruit_imageload.load("/spritesNew.bmp",
                                             bitmap=displayio.Bitmap,
                                             palette=displayio.Palette)

#  creates a transparent background for Blinka
blinka_pal.make_transparent(7)
blinka_grid = displayio.TileGrid(blinka, pixel_shader=blinka_pal,
                                 width=2, height=1,
                                 tile_height=16, tile_width=16,
                                 default_tile=EMPTY)
blinka_grid.x = 0
blinka_grid.y = 32

blinka_group = displayio.Group()
blinka_group.append(blinka_grid)

#  first Sparky sprite
sparky0, sparky0_pal = adafruit_imageload.load("/spritesNew.bmp",
                                               bitmap=displayio.Bitmap,
                                               palette=displayio.Palette)
sparky0_pal.make_transparent(7)
sparky0_grid = displayio.TileGrid(sparky0, pixel_shader=sparky0_pal,
                                  width=1, height=1,
                                  tile_height=16, tile_width=16,
                                  default_tile=SPARKY)
#  all Sparky sprites begin off screen
sparky0_grid.x = 100
sparky0_grid.y = 32

sparky0_group = displayio.Group()
sparky0_group.append(sparky0_grid)

#  2nd Sparky sprite
sparky1, sparky1_pal = adafruit_imageload.load("/spritesNew.bmp",
                                               bitmap=displayio.Bitmap,
                                               palette=displayio.Palette)
sparky1_pal.make_transparent(7)
sparky1_grid = displayio.TileGrid(sparky1, pixel_shader=sparky1_pal,
                                  width=1, height=1,
                                  tile_height=16, tile_width=16,
                                  default_tile=SPARKY)
sparky1_grid.x = 100
sparky1_grid.y = 32

sparky1_group = displayio.Group()
sparky1_group.append(sparky1_grid)

#  3rd Sparky sprite
sparky2, sparky2_pal = adafruit_imageload.load("/spritesNew.bmp",
                                               bitmap=displayio.Bitmap,
                                               palette=displayio.Palette)
sparky2_pal.make_transparent(7)
sparky2_grid = displayio.TileGrid(sparky2, pixel_shader=sparky2_pal,
                                  width=1, height=1,
                                  tile_height=16, tile_width=16,
                                  default_tile=SPARKY)
sparky2_grid.x = 100
```

```
sparky2_grid.y = 32

sparky2_group = displayio.Group()
sparky2_group.append(sparky2_grid)

#  heart sprite group
life_bit, life_pal = adafruit_imageload.load("/spritesNew.bmp",
                                             bitmap=displayio.Bitmap,
                                             palette=displayio.Palette)
life_grid = displayio.TileGrid(life_bit, pixel_shader=life_pal,
                               width=3, height=1,
                               tile_height=16, tile_width=16,
                               default_tile=HEART)

life_group = displayio.Group()
life_group.append(life_grid)

#  adding all graphics groups to the main display group
group.append(blinka_group)
group.append(sparky0_group)
group.append(sparky1_group)
group.append(sparky2_group)
group.append(life_group)

#  text area for the running score
score_text = "      "
font = terminalio.FONT
score_color = 0x0000FF

#  text for "game over" graphic
game_over_text = label.Label(font, text = "         ", color = 0xFF00FF)
# score text
score_area = label.Label(font, text=score_text, color=score_color)
#  text for "new game" graphic
new_game_text = label.Label(font, text = "           ", color = 0xFF00FF)

# coordinants for text areas
score_area.x = 57
score_area.y = 6
game_over_text.x = 13
game_over_text.y = 30
new_game_text.x = 8
new_game_text.y = 30
# creating a text display group
text_group = displayio.Group()
text_group.append(score_area)
text_group.append(game_over_text)
text_group.append(new_game_text)
#  adding text group to main display group
group.append(text_group)

#  displaying main display group
display.root_group = group

#  state for hit detection
crash = False
#  states to see if a Sparky is on screen
sparky0 = False
sparky1 = False
sparky2 = False

#  array of Sparky states
sparky_states = [sparky0, sparky1, sparky2]
#  array of x location for Sparky's
sparky_x = [sparky0_grid.x, sparky1_grid.x, sparky2_grid.x]

#  function to display the heart sprites for lives
def life():
    for _ in range(0, 3):
```

```
        life_grid[_, 0] = EMPTY
        for hearts in range(life_count):
            life_grid[hearts, 0] = HEART

#  lives at beginning of the game
life_count = 3

#  variables for scoring
jump_score = 0
total_score = 0
bonus = 0
#  state for Blinka being in default 'slither' mode
snake = True
#  state to check if Blinka has jumped over Sparky
cleared = False
#  state for the end of a game
end = False
#  state for a new game beginning
new_game = True
#  state for detecting game over
game_over = False
#  variable to change between Blinka's two slither sprites
b = 1
#  variable to hold time.monotonic() count for Blinka slither animation
slither = 0
#  variables to hold time.monotonic() count to delay Sparky spawning
blue = 0
smoke = 0
monster = 0
# jump button press state
jump_pressed = False

while True:

    #  checks if button has been pressed
    if (last_read + 0.01) < time.monotonic():
        pad.events.get_into(latest_event)
        last_read = time.monotonic()
    #  new game
    if new_game and not game_over:
        #  graphics for new game splash screen
        blinka_grid.y = 16
        blinka_grid[0] = JUMP_1
        blinka_grid[1] = JUMP_2
        sparky0_grid.x = 5
        sparky1_grid.x = 40
        sparky2_grid.x = 65
        score_area.text = str(300)
        new_game_text.text = "BLINKA JUMP"
        life()
        #  if start is pressed...
        if latest_event:
            if  latest_event.key_number == BUTTON_START:
                #  prepares display for gameplay
                print("start game")
                new_game_text.text = "        "
                life_count = 3
                start = time.monotonic()
                new_game = False
                end = False
                sparky0_grid.x = 100
                sparky1_grid.x = 100
                sparky2_grid.x = 100
    #  if game has started...
    if not game_over and not new_game:
        #  gets time.monotonic() to have a running score
        mono = time.monotonic()
        score = mono - start
        #  adds 10 points every time a Sparky is cleared
```

```
total_score = score + jump_score
#  displays score as text
score_area.text = str(int(total_score))

#  puts Sparky states and x location into callable arrays
for s in range(3):
    sparky_state = sparky_states[s]
    sparky_location = sparky_x[s]

#  Sparkys are generated using a staggered delay
#  and matching an int to a random int
#  1st Sparky
if (blue + 0.03) < time.monotonic():
    if randint(1, 15) == 3:
        sparky_states[0] = True
    blue = time.monotonic()
#  2nd Sparky
if (smoke + 0.07) < time.monotonic():
    if randint(1, 15) == 7:
        sparky_states[1] = True
    smoke = time.monotonic()
#  3rd Sparky
if (monster + 0.12) < time.monotonic():
    if randint(1, 15) == 12:
        sparky_states[2] = True
    monster = time.monotonic()
#  if a Sparky is generated, it scrolls across the screen 1 pixel at a time
#  1st Sparky
if sparky_states[0] is True:
    sparky0_grid.x -= 1
    sparky_x[0] = sparky0_grid.x
    display.refresh(target_frames_per_second=120)
    #  when a Sparky is 16 pixels off the display,
    #  it goes back to its starting position
    if sparky0_grid.x is -16:
        sparky_states[0] = False
        sparky0_grid.x = 100
        sparky_x[0] = sparky0_grid.x
#  2nd Sparky
if sparky_states[1] is True:
    sparky1_grid.x -= 1
    sparky_x[1] = sparky1_grid.x
    display.refresh(target_frames_per_second=120)
    if sparky1_grid.x is -16:
        sparky_states[1] = False
        sparky1_grid.x = 100
        sparky_x[1] = sparky1_grid.x
#  3rd Sparky
if sparky_states[2] is True:
    sparky2_grid.x -= 1
    sparky_x[2] = sparky2_grid.x
    display.refresh(target_frames_per_second=120)
    if sparky2_grid.x is -16:
        sparky_states[2] = False
        sparky2_grid.x = 100
        sparky_x[2] = sparky2_grid.x

#  if no lives are left then the game ends
if life_count is 0:
    game_over = True

#  if the A button is pressed then Blinka is no longer in the default
#  slither animation aka she jumps
if latest_event.key_number == BUTTON_A:
    if latest_event.pressed:
        jump_pressed = True
        snake = False
    else:
        jump_pressed = False
```

```
                snake = True

        #  heart sprites are displayed to show life count
        life()

        #  if Blinka is slithering...
        if snake:
            #  Blinka default location
            blinka_grid.y = 32
            #  empty 2nd tile so that the jump sprite can be shown using
            #  the same tilegrid
            blinka_grid[1] = EMPTY
            #  every .15 seconds Blinka's slither sprite changes
            #  so that her slithering is animated
            #  b holds tilegrid position to display correct sprite
            if (slither + 0.15) < time.monotonic():
                blinka_grid[0] = b
                b += 1
                slither = time.monotonic()
            if b > 2:
                b = 1
            #  if a Sparky collides with Blinka while she is slithering...
            for s in range(3):
                if sparky_x[s] == 8 and blinka_grid.y == 32:
                    #  tone is played
                    simpleio.tone(board.SPEAKER, 493.88, 0.05)
                    simpleio.tone(board.SPEAKER, 349.23, 0.05)
                    #  lose a life
                    life_count = life_count - 1
        #  if the A button is pressed then...
        else:
            #  Blinka JUMPS
            #  y location changes one row up and both jump sprites are shown
            blinka_grid.y = 16
            blinka_grid[0] = JUMP_1
            blinka_grid[1] = JUMP_2
            #  if Blinka jumps over a Sparky...
            for j in range(3):
                if sparky_x[j] == 8 and not cleared:
                    #  10 points to the player
                    bonus += 1
                    jump_score = bonus * 10
                    cleared = True
                    #  special victory tone is played
                    simpleio.tone(board.SPEAKER, 523.25, 0.005)
                    simpleio.tone(board.SPEAKER, 783.99, 0.005)

        if not jump_pressed:
            #  resets back to Blinka animation
            snake = True
            #  resets that Blinka has not jumped over a Sparky
            cleared = False

    #  if there are no more lives, the game is over
    if game_over and not new_game:
        #  game over text is displayed
        game_over_text.text = "GAME OVER"
        score_area.text = "    "
        #  end game tone is played
        #  and then the screen holds with the last
        #  sprites on screen and game over text
        if not end:
            simpleio.tone(board.SPEAKER, 220, 0.05)
            simpleio.tone(board.SPEAKER, 207.65, 0.05)
            simpleio.tone(board.SPEAKER, 196, 0.5)
            end = True

        #  if the start button is pressed...
        if latest_event and game_over:
```

```
            if latest_event.key_number == BUTTON_START:
                #  display, states and score are reset for gameplay
                game_over_text.text = "         "
                life_count = 3
                start = time.monotonic()
                game_over = False
                end = False
                total_score = 0
                jump_score = 0
                bonus = 0
                score = 0
                blue = 0
                smoke = 0
                monster = 0
                sparky0_grid.x = 100
                sparky1_grid.x = 100
                sparky2_grid.x = 100
                #  game begins again with all Sparky's off screen
```

---

# Creating Sprites

All of the sprites in the game come from the single bitmap file. Different tilegrids are setup so that the sprites can move independently while still referencing the same file.

The bitmap file is created to be 16 pixels high by 112 pixels wide. This way it can be divided evenly into 16x16 squares to access the individual sprites. These sprites can then be called by index position, similar to an array.

The sprite names are assigned as variables to match their index positions on the bitmap.

```
EMPTY = 0
BLINKA_1 = 1
BLINKA_2 = 2
SPARKY = 3
HEART = 4
JUMP_1 = 5
JUMP_2 = 6
```

In total, there will be five tilegrids for the sprites: three for Blinka, Sparky the Blue Smoke Monster and one for a heart. Each of them are setup to use the **adafruit_imageload** library to load the bitmap file. All of their backgrounds are made to be transparent by eliminating the seventh color in their indexed color profile, which in this case is black.

All of them have a `tile_height` and `tile_width` of `16`, but their `width` and `height` will vary depending on how many sprites will be shown. For example, Blinka has a `width` of `2` and a `height` of `1` so that when Blinka jumps, there is enough space for the two sprites that create the Blinka jumping sprite. The `default_tile`

defines which sprite is shown as a default for each tilegrid and will also vary between tilegrids.

```
blinka, blinka_pal = adafruit_imageload.load("/spritesNew.bmp",
                                             bitmap=displayio.Bitmap,
                                             palette=displayio.Palette)

#  creates a transparent background for Blinka
blinka_pal.make_transparent(7)
blinka_grid = displayio.TileGrid(blinka, pixel_shader=blinka_pal,
                                 width=2, height=1,
                                 tile_height=16, tile_width=16,
                                 default_tile=EMPTY)
```

In finishing up each tilegrid's setup, the default position is setup by defining the `x` and `y` coordinates for each sprite on the display's grid. To finish up, a display group is created for each tilegrid and the tilegrid is added to that group. Later, the individual sprite's groups are added to the main display group. This allows you to have greater control over the sprites individually later in the code.

```
blinka_grid.x = 0
blinka_grid.y = 32

blinka_group = displayio.Group()
blinka_group.append(blinka_grid)
```

---

# Creating Text


There are three text objects for the game: the score, the game title and the game over text. All three are setup using the label class from the **adafruit_display_text** library.

The `score_text` will hold the score of the game and update constantly. `new_game_text` is shown when the PyBadge is booted up with the code to say "BLINKA JUMP" and `game_over_text` shows "GAME OVER" when you lose a game.

You can either hard code the text that will be displayed or leave it open so that it defaults to show nothing and can be updated later in the code. In the case of all three of these text objects, the default text is left empty by using `text = "          "`. The number of spaces between the quotation marks matters, since a string that is longer than the spacing will cause an error.

```
score_text = "      "
font = terminalio.FONT
score_color = 0x0000FF

#  text for "game over" graphic
game_over_text = label.Label(font, text = "         ", color = 0xFF00FF)
# score text
score_area = label.Label(font, text=score_text, color=score_color)
#  text for "new game" graphic
new_game_text = label.Label(font, text = "           ", color = 0xFF00FF)
```

After the setup, all of the text objects' default positions are defined with `x` and `y` coordinates. Following that, a display group for the text objects is created and all of the text objects are added to that group. Finally, the `text_group` is added to the main display group, which also has the sprites that were created earlier in the code.

```
# coordinants for text areas
score_area.x = 57
score_area.y = 6
game_over_text.x = 13
game_over_text.y = 30
new_game_text.x = 8
new_game_text.y = 30
# creating a text display group
text_group = displayio.Group()
text_group.append(score_area)
text_group.append(game_over_text)
text_group.append(new_game_text)
#  adding text group to main display group
group.append(text_group)
```

---

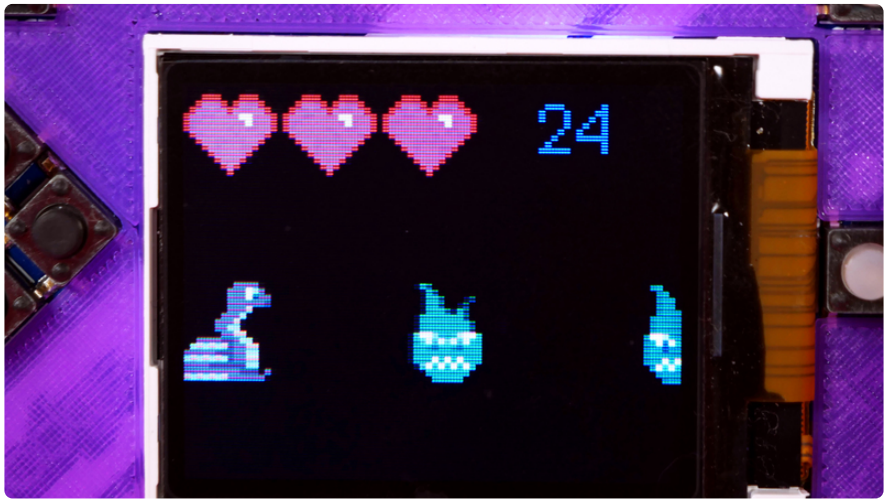
# Animate Blinka

When Blinka isn't jumping, she's happily slithering along. In the code, this is accomplished by quickly switching between two Blinka sprites: one where she is sitting in her usual coiled position and the second where her neck is outstretched.

Blinka slithers whenever the `snake` state is `True`. This state tracks whether or not Blinka is jumping. If you remember back to Blinka's tilegrid setup, her tilegrid is two tiles wide. As a result, the second square, or index `1`, of `blinka_grid` is set to be `EMPTY` when Blinka is slithering.

```
#  if Blinka is slithering...
if snake:
  #  Blinka default location
  blinka_grid.y = 32
```

```
  #  empty 2nd tile so that the jump sprite can be shown using
  #  the same tilegrid
  blinka_grid[1] = EMPTY
```





To switch back and forth between the two sprites, you could use `time.sleep(x)` to alternate between displaying the sprites with a delay. However, doing this actually delays the entire loop and slows everything down.

To get around this, you can use `time.monotonic()` to count time and change sprites after a certain amount of time has passed; in this case `0.15` seconds.

Every `0.15` seconds, Blinka's sprite is updated. The variable `b` holds the sprite index, alternating between `1` and `2` or `BLINKA_1` and `BLINKA_2`.

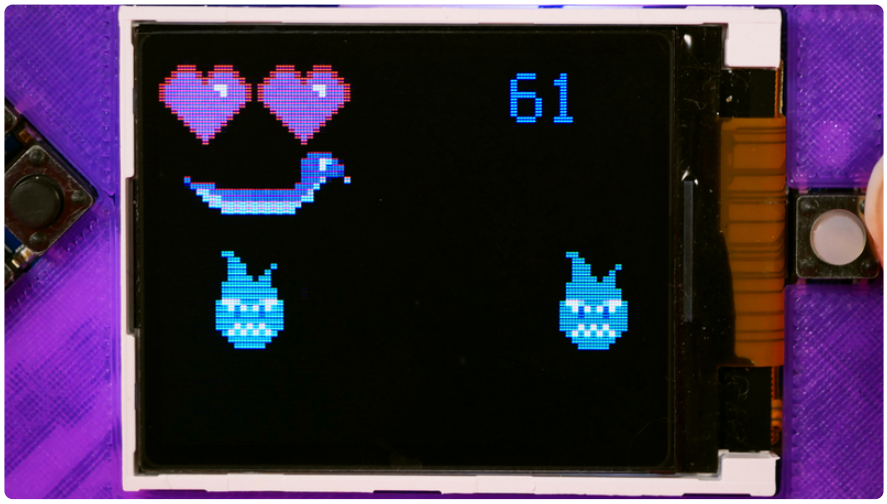
`slither` is reset each time to hold `time.monotonic()` to be able to compare to the current `time.monotonic()` count.

```
#  every .15 seconds Blinka's slither sprite changes
  #  so that her slithering is animated
  #  b holds tilegrid position to display correct sprite
  if (slither + 0.15) &lt; time.monotonic():
    blinka_grid[0] = b
    b += 1
```

```
    slither = time.monotonic()
    if b &gt; 2:
      b = 1
```

---

# Randomly Generate Blue Smoke Monsters




In total, there are three Sparky's that can be on the screen at any given time. To keep game play interesting, each of their appearances on screen are randomized.

The first way that they're randomized is by having varying delays using `time.monotonic()`, similar to how Blinka's animation is delayed without slowing down the loop. Each Sparky's generation is delayed by `0.03` seconds, `0.07` seconds and `0.12` seconds respectively. This allows their appearances to be staggered.

Once the defined time has elapsed, then there is a check to see if a random integer matches with a predefined integer: `3`, `7` and `12` respectively.

If the random integer matches, then the `sparky_state` for the corresponding Sparky sprite is updated to `True`, which allows them to appear on screen. If the random integer is not a match, then the `time.monotonic()` count begins again.

```
#  Sparkys are generated using a staggered delay
        #  and matching an int to a random int
        #  1st Sparky
        if (blue + 0.03) &lt; time.monotonic():
            if randint(1, 15) == 3:
                sparky_states[0] = True
            blue = time.monotonic()
        #  2nd Sparky
        if (smoke + 0.07) &lt; time.monotonic():
            if randint(1, 15) == 7:
                sparky_states[1] = True
            smoke = time.monotonic()
        #  3rd Sparky
        if (monster + 0.12) &lt; time.monotonic():
            if randint(1, 15) == 12:
```

```
                sparky_states[2] = True
            monster = time.monotonic()
```

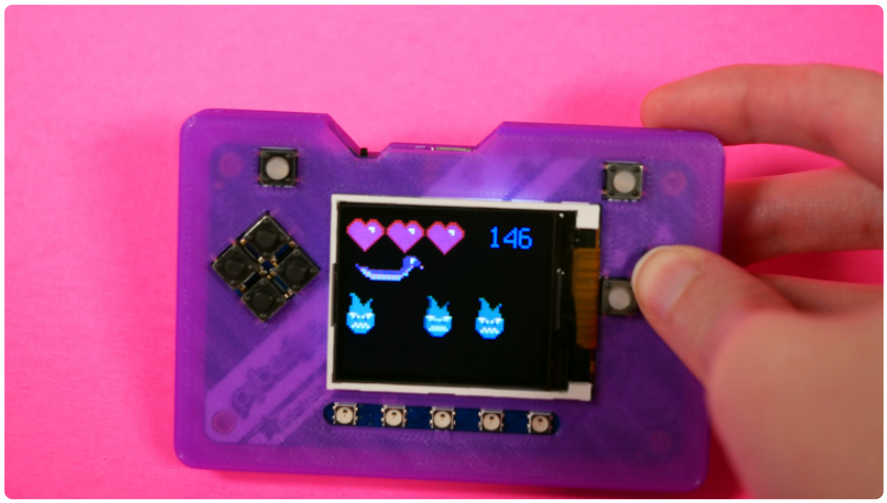
When a Sparky's state is `True`, their `x` coordinate location updates by 1 pixel continuously, allowing them to smoothly move across the screen.

The corresponding index in the `sparky_x` array is also updated to hold the `x` coordinate. This is used later in the loop for discerning whether Blinka and a Sparky have a collision.

Finally, when a Sparky's `x` location is `-16` pixels, which is off-screen, their `x` coordinate is reset to `100` to prepare them for the next time they have a random integer match.

```
if sparky_states[0] is True:
            sparky0_grid.x -= 1
            sparky_x[0] = sparky0_grid.x
            display.refresh(target_frames_per_second=120)
            #  when a Sparky is 16 pixels off the display,
            #  it goes back to its starting position
            if sparky0_grid.x is -16:
                sparky_states[0] = False
                sparky0_grid.x = 100
                sparky_x[0] = sparky0_grid.x
        #  2nd Sparky
        if sparky_states[1] is True:
            sparky1_grid.x -= 1
            sparky_x[1] = sparky1_grid.x
            display.refresh(target_frames_per_second=120)
            if sparky1_grid.x is -16:
                sparky_states[1] = False
                sparky1_grid.x = 100
                sparky_x[1] = sparky1_grid.x
        #  3rd Sparky
        if sparky_states[2] is True:
            sparky2_grid.x -= 1
            sparky_x[2] = sparky2_grid.x
            display.refresh(target_frames_per_second=120)
            if sparky2_grid.x is -16:
                sparky_states[2] = False
                sparky2_grid.x = 100
                sparky_x[2] = sparky2_grid.x
```

# Make Blinka Jump




Blinka jumps every time the A button is pressed on the PyBadge board. To do this, when a button press is detected from the A button, the `snake` state is set to `False`. You'll remember that whenever the `snake` state is `True`, then the Blinka sprite is in the default slithering animation.

```
if current_buttons != buttons:
            if buttons &amp;amp; BUTTON_A:
                snake = False
```

Once `snake` is `False`, then the Blinka sprite's `y` coordinate is updated to be `16`, or one row up, and the tilegrid's sprites are updated to be `JUMP_1` and `JUMP_2`.

```
else:
  #  Blinka JUMPS
  #  y location changes one row up and both jump sprites are shown
  blinka_grid.y = 16
  blinka_grid[0] = JUMP_1
  blinka_grid[1] = JUMP_2
```

# Game Lives


Blinka Jump uses a "three strikes and you're out" game play rule, where you have three lives to use during your game. These lives are represented by heart sprites at the top of the screen.

There is a function, called `life()`, that displays the heart sprites to represent game play lives. It references the variable `life_count` to display the correct number of heart sprites.

```
#  function to display the heart sprites for lives
def life():
    for _ in range(0, 3):
        life_grid[_, 0] = EMPTY
        for hearts in range(life_count):
            life_grid[hearts, 0] = HEART

#  lives at beginning of the game
life_count = 3
```

In the loop, the `life()` function runs to display the sprites and there is a check for when the `life_count` reaches `0`, since that ends the game.

```
#  heart sprites are displayed to show life count
        life()

#  if no lives are left then the game ends
        if life_count is 0:
            game_over = True
```


The `life_count` decreases by one every time that Blinka collides with a Sparky. This is detected when one of the Sparkys' `x` location is `8` and Blinka is slithering. When this occurs, the built-in speaker plays two tones (specifically a tritone, which sounds menacing) and `life_count` is updated to show the decrease.

```
#  if a Sparky collides with Blinka while she is slithering...
for s in range(3):
  if sparky_x[s] == 8 and blinka_grid.y == 32:
    #  tone is played
    simpleio.tone(board.SPEAKER, 493.88, 0.05)
    simpleio.tone(board.SPEAKER, 349.23, 0.05)
    #  lose a life
    life_count = life_count - 1
```

---

# Keep Score


The score in Blinka Jump is actually a count of the time that the game has been running using `time.monotonic()`. The score is displayed in the `score_area` text object and is updated constantly throughout the game.

```
#  gets time.monotonic() to have a running score
mono = time.monotonic()
score = mono - start
#  adds 10 points every time a Sparky is cleared
total_score = score + jump_score
#  displays score as text
score_area.text = int(total_score)
```

In addition to the `time.monotonic()` component of the score, every time Blinka jumps over a Sparky you get a 10 point bonus. The game counts a successful jump by checking if a Sparky is at `x` coordinate `8` and Blinka is jumping. This bonus score is stored in `jump_score` and is added to the running `total_score`.

Two tones are also played (a triumphant perfect fifth) every time Blinka clears a Sparky.

```
for j in range(3):
  if sparky_x[j] == 8 and not cleared:
      #  10 points to the player
      bonus += 1
      jump_score = bonus * 10
      cleared = True
      #  special victory tone is played
      simpleio.tone(board.SPEAKER, 523.25, 0.005)
      simpleio.tone(board.SPEAKER, 783.99, 0.005)
```

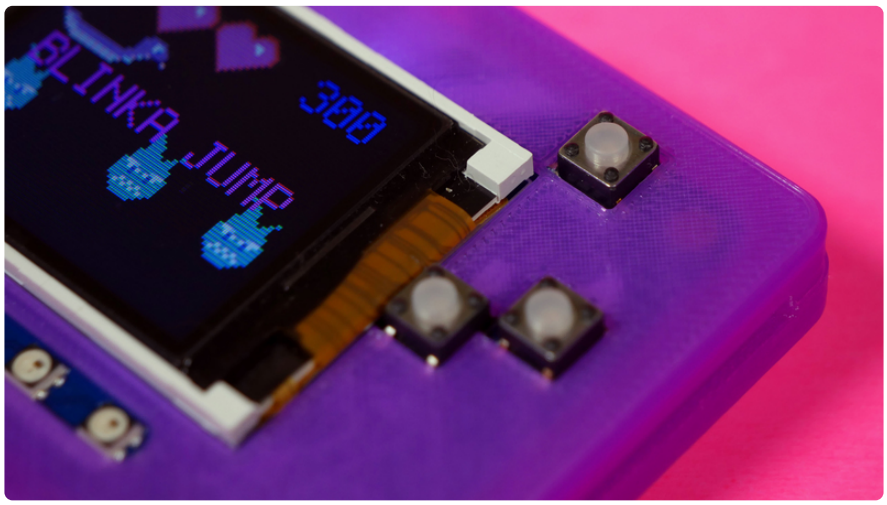
---

# Playing Blinka Jump


When you power up your PyBadge for a relaxing game of Blinka Jump, you are greeted with a new game splash screen.

```
#  new game
if new_game and not game_over:
  #  graphics for new game splash screen
  blinka_grid.y = 16
  blinka_grid[0] = JUMP_1
  blinka_grid[1] = JUMP_2
  sparky0_grid.x = 5
```

```
  sparky1_grid.x = 40
  sparky2_grid.x = 65
  score_area.text = 300
  new_game_text.text = "BLINKA JUMP"
  life()
```




To start the game, you press the start button at the top of the PyBadge. When the game detects the start button is pressed, the game components are reset to their starting states. The three Sparky's are sent off screen, `life_count` is reset and the `new_game_text` is emptied.

```
#  if start is pressed...
if current_buttons != buttons:
  if buttons &amp;amp; BUTTON_START:
    #  prepares display for gameplay
    print("start game")
    new_game_text.text = "        "
    life_count = 3
    start = time.monotonic()
    new_game = False
    end = False
    sparky0_grid.x = 100
    sparky1_grid.x = 100
    sparky2_grid.x = 100
```

Gameplay begins, utilizing all of the gaming mechanics discussed previously in the guide. You'll use the A button on the PyBadge to successfully help Blinka jump over all the of the Sparky the Blue Smoke Monsters.


When you run out of game lives, the game goes into the `game_over` state. The Blinka and Sparky sprites freeze in their positions at the time of the final collision being detected, `"GAME OVER"` text is displayed in the center of the screen and three tones (a sad chromatic slide) play.

```
if game_over and not new_game:
        #  game over text is displayed
        game_over_text.text = "GAME OVER"
        score_area.text = "    "
        #  end game tone is played
        #  and then the screen holds with the last
        #  sprites on screen and game over text
        if not end:
            simpleio.tone(board.SPEAKER, 220, 0.05)
            simpleio.tone(board.SPEAKER, 207.65, 0.05)
            simpleio.tone(board.SPEAKER, 196, 0.5)
            end = True
```

The game remains in this state until you press the start button again on the PyBadge to begin a new game. When that button press is detected, the game states are reset to their starting positions, similar to the initial new game mode when you first boot up the PyBadge.

```
#  if the start button is pressed...
if (current_buttons != buttons) and game_over:
  if buttons &amp;amp; BUTTON_START:
    #  display, states and score are reset for gameplay
    game_over_text.text = "         "
    life_count = 3
    start = time.monotonic()
    game_over = False
    end = False
    total_score = 0
    jump_score = 0
    bonus = 0
    score = 0
```

```
    blue = 0
    smoke = 0
    monster = 0
    sparky0_grid.x = 100
    sparky1_grid.x = 100
    sparky2_grid.x = 100
    #  game begins again with all Sparky's off screen
```