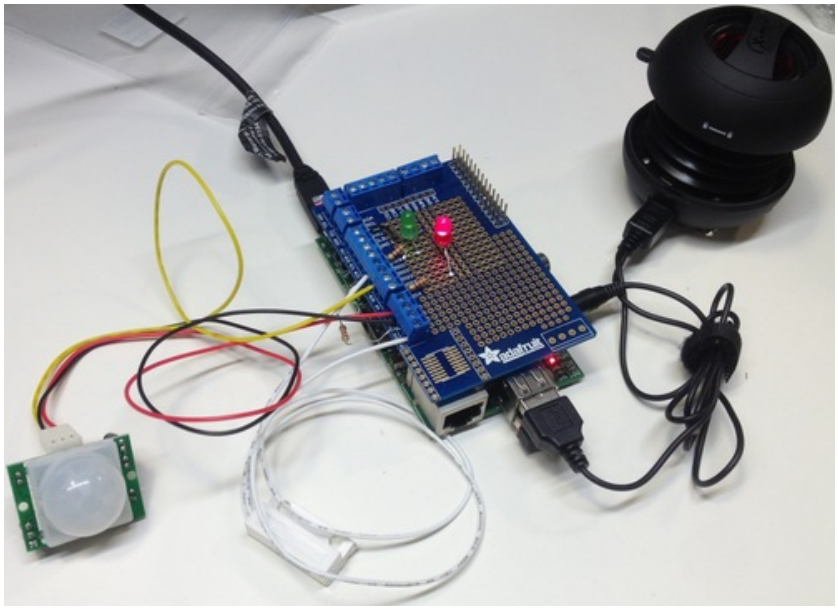
adafruit learning system

Sitcom SFX Door Trigger

Created by James DeVito



Guide Contents

Overview

This guide is for people that wish they had a soundtrack to their life. Using a PIR sensor and magnetic door switch with a Raspberry Pi, you'll be able to play a sound file every time you open a door. More specifically, it will play a pre-recorded sound file based on whether you are entering (applause!) or leaving (booooo!).

This project was conceived and executed along with George Michael Brower (http://adafru.it/aU5).

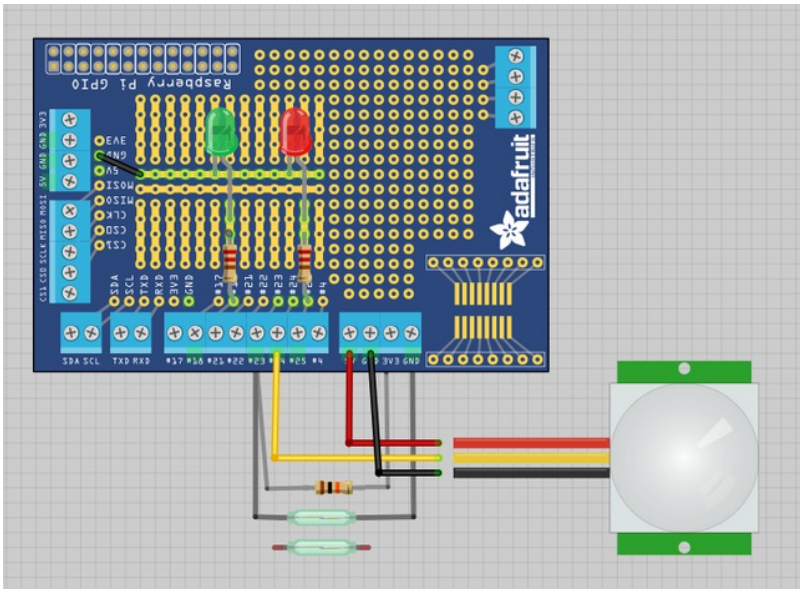
Getting Started

Items used:

- Raspberry Pi (http://adafru.it/998)
- SD Card (http://adafru.it/102) (loaded with Occidentalis) (http://adafru.it/998)
- Magnetic Door Switch (http://adafru.it/375)
- PIR Motion Sensor (http://adafru.it/189)
- Some sort of speaker to playback audio, I recommend a portable speaker (http://adafru.it/aTY), since it can be powered directly from the USB port
- Pi Plate (http://adafru.it/801)
- (1) Red & (1) Green LED
- (2) 220ohm & (1) 10k ohm resistors
- Raspberry Pi VESA Mount (http://adafru.it/986) - meant for mounting to the back of HDTV's, but mounts to walls just as well :)

Before we get into the fun stuff, make sure to have Adafruit's Occidentalis OS (http://adafru.it/aNv) installed, as well as our WebIDE (http://adafru.it/aRn). Follow the links for how to's.

Wire it



Connections on Prototyping Pi Plate:

PIR Sensor

- Red -> 5V
- Yellow Data -> input 24
- Black -> Ground

Door Switch

- One wire to ground, the other to input 23, with a 10k pull-up resistor to 3v3

Indicator LEDs

- Green connected to output 18 through a 220ohm resistor, will correspond to motion detection
- Red connected to output 25 through a 220ohm resistor, will correspond to an open magnetic door switch

And of course, some sort of stereo or portable speaker in the 1/8in jack so you can hear it!

That's it! Now on to the code...

Code

Log in to your Raspberry Pi using the Adafruit WebIDE (http://adafru.it/aRn) and create a new file. Mine's called SitcomSFX.py

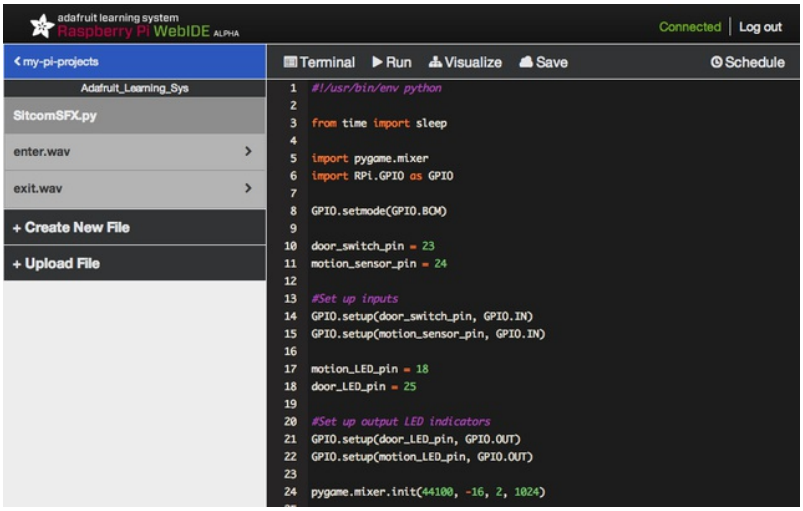
Upload two audio files to that directory, one named "enter.wav" the other "exit.wav"

You can find pretty decent sound clips here (http://adafru.it/aTZ) & here (http://adafru.it/aU0), and more professional ones here (http://adafru.it/aU1).

MP3'S WILL NOT WORK WITH PYGAME!

> If you are using the 1/8inch audio jack, you'll need to ssh into your Pi and run this command to route audio to that output

```
$ sudo amixer cset numid=3 1
```




```
#!/usr/bin/env python

from time import sleep

import pygame.mixer
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BCM)

door_switch_pin = 23
motion_sensor_pin = 24

#Set up inputs
GPIO.setup(door_switch_pin, GPIO.IN)
```

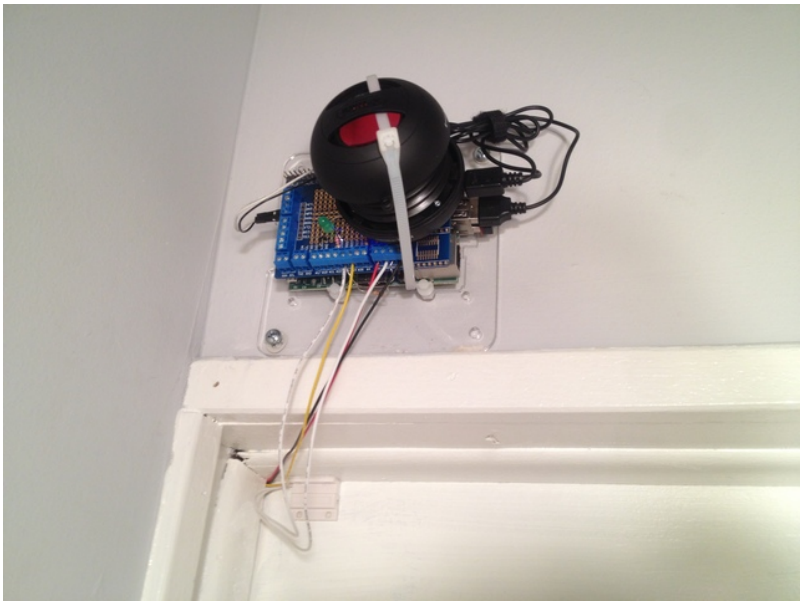
```
GPIO.setup(motion_sensor_pin, GPIO.IN)

motion_LED_pin = 18
door_LED_pin = 25

#Set up output LED indicators
GPIO.setup(door_LED_pin, GPIO.OUT)
GPIO.setup(motion_LED_pin, GPIO.OUT)

pygame.mixer.init(44100, -16, 2, 1024)

prev_door = False

#sound files expect to be in the same directory as script
enter = pygame.mixer.Sound("./enter.wav")
exit = pygame.mixer.Sound("./exit.wav")

while True:
 #Update sensor and LED states each loop
 door = GPIO.input(door_switch_pin)
 motion = GPIO.input(motion_sensor_pin)

 GPIO.output(motion_LED_pin, motion)
 GPIO.output(door_LED_pin, door)

#When the door is opened, if there is movement outside, it means that someone is entering. If not
 if door and not prev_door:
  if motion:
   enter.play()
  else:
   exit.play()

 prev_door = door

 sleep(0.01)
```

Run the code on your Pi and make sure it works. If the green LED is lit (motion detected) it should play enter.wav when the door switch is opened, and exit.wav if there is no motion detected.

The PIR sensor has two physically adjustable potentiometers on it, I've found it's best to set it to max sensitivity and minimum retrigger time. For more info, check out the PIR tutorial (http://adafru.it/aU2)

Now lets mount it!

Mount it



Pi, Pi plate, and speaker all stacked together on the VESA mount above the door.

Magnetic door switch contacts have sticky foam, or screws for a more permanent install.

Mounted PIR sensor with some Sugru (http://adafru.it/436)

Test it

Now its testing time. The Pi looks for the two sensor inputs: the first one is the magnetic door switch, when that opens it knows that someone is entering or leaving. The PIR sensor is used to tell what side of the door they're on - that's what determines which WAV to play.

Here's a little video of my roommate trying out both entering and leaving: