Earthquake Pi

2016-04-23 R.Grokett
version 0.1

Overview

There are a number of earthquake detector projects for the raspberry pi. These are good for anyone living in an area prone to earthquakes or for those that want to try to detect distant quakes themselves.

This project is not focused on detecting quakes, but uses USGS earthquake data to make an interesting little alerting system. Sure, you can always go to your PC and browse the USGS maps for the latest data, but you are a Maker and this is a project for Makers!

What does it do?

- It collects the USGS earthquake data for the past 15 minutes.
- It rattles its box and flashes its lights to the magnitude of the quake
- It displays location, magnitude and other data on a small LCD screen
- It plays earthquake sounds (optionally)

You set the minimum magnitude level you wish it to alarm on. But note, if you set to below 2.0, it will probably go off almost constantly!

You can use other GPIO pins for controlling other devices. Even interface it with cloud Internet of Things (IOT) services such as IFTTT (http://ifttt.com/)

Hardware

- Raspberry Pi running Raspian and python 2.
  Any Pi will do. Even a $5 Pi Zero
- Ethernet connector or WiFi dongle for above Raspberry.
- A vibrating motor such as
  From an old battery toothbrush (see below)
  From a pager
  or buy one similar to https://www.adafruit.com/products/1201
- A I2C compatible LCD display 20 char x 4 line
  https://www.adafruit.com/products/198
  or from Amazon http://amzn.com/B01799UUGS 2004 I2C LCD
- A wooden box (such as from craft stores like Michaels)

- 100 ohm resistor
- 5v power supply for Raspi
- Optionally, add external speaker (and amp) to Raspi audio.

Software

Raspian Linux with Python 2.X

Software from GITHUB: https://github.com/rgrokett/earthquakepi

TODO – Add any dependencies

Hardware Installation

For the vibrating motor, I used an old toothbrush such as the Oral B battery powered brush. Open it up and you will find a tiny "vibrator" motor. Alternately, pick up a vibrating motor from numerous sources.

Note that you may need to adjust the settings in the python earthquake.py program to get the "best" vibration desired. The idea is to have it crescendo quickly and then fade over several seconds, with the volume and length determined by the magnitude of the quake.

TODO – Add diagrams

TODO – Add wiring info details for Motor
TODO – Add LCD display wiring

Software Installation

This assumes you already have your Pi set up with Raspian, python and connected to the Internet.

Install packages:

```
$ sudo apt-get update
```

```
$ sudo apt-get install aplay git python-pip python-dev
```

Install Adafruit LCD lib & dependencies from

https://github.com/adafruit/Adafruit_Python_CharLCD

Verify the display works using their test programs.

If you use audio, set the maximum volume on your speaker using:

```
$ sudo amixer sset PCM,0 95%
```

```
$ aplay /home/pi/earthquake.wav
```

Adjust your speaker/amplifier to make this LOUD as this is equivalent to a magnitude 9.0 earthquake! The program will range from barely audible 2.0 quakes upwards to your maximum volume you set.

Next install and test the earthquake program:

1. `$ cd /home/pi`
2. `$ git clone https://TBD`
3. `$ cd earthquakepi`
4. `$ sudo python earthquake.py`
5. An initial test of the display, motor and audio will occur

The program defaults to magnitude 4.5 or greater which occur several times per day. You can edit the earthquake.py program to change this higher or lower. Set to 1.0 to wear out it and your nerves.

Once tuned, turn off DEBUG mode by editing the program

```
DEBUG = 0         # Debug 0 off 1 on
```

TODO – Add Operating details