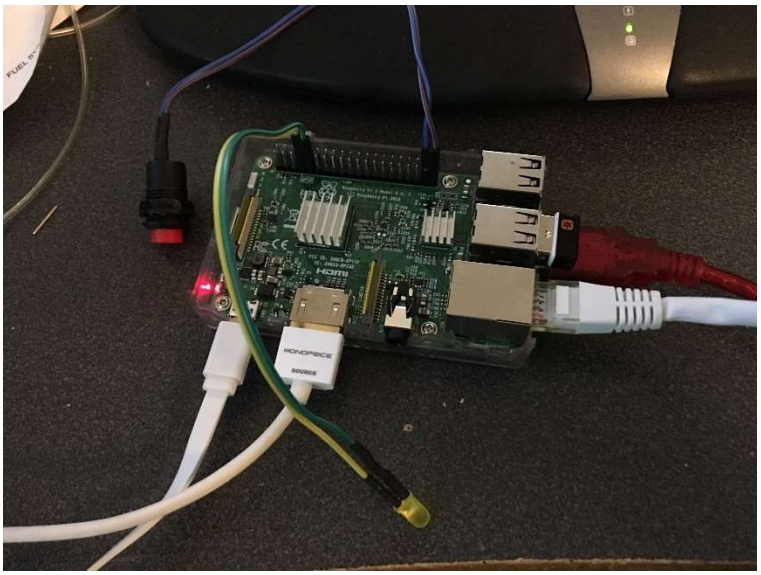
MEGR3241 Advanced Motorsports Instrumentation.

Raspberry pi logger project.

A CRAS# course in linux/python/gps and going faster.

V0.02 11/13/19



Logger build guide:

Parts:

Raspberry pi 3 or 4

UBLOX Neo 7 or 8 chipset USB GPS

HDMI LCD

Logitech K400 or similar keyboard/trackpad

USB micro cable for pi 3.

HDMI to HDMI for pi 3

USB C cable for pi 4

Micro HDMI to HDMI for pi 4

** High quality micro USB cables required, low quality cables can result it random reboots. Shorter cables generally have less voltage drop and are more reliable. A yellow lightning bolt on the upper right hand screen indicates low voltage. Undersized USB power supplies can also be problematic.

You will likely find this project easier with a HDMI display and a usb keyboard. These are not required. You can also use a video input into a radio head unit but text can be difficult to read.

If those are not available, you should be able to login via SSH using a program called Putty. The Pi supports bonjour by default. This means you can access it by typing the hostname.local from FTP, SSH or other client. Your hostname is likely obdpi.local if you have modified it. If you have not, it will default to raspberrypi.local

For Example, use filezilla to download you logs over a network connection. Hostname:Sftp://obdpi.local User:pi Pw:gofast You cannot recover this password if you forget and you must start over. Proceed with caution.

You can use realVNC to remotely login via a phone or PC once your pi is setup and the VNC is enabled.

You will need to know the IP address or the hostname of the pi (as discussed above) to continue and login to your pi via putty over Ethernet.

Install NOOBS to your SD card first. Download NOOBS to a PC, then copy the unzipped files to the blank SD card.

https://www.raspberrypi.org/downloads/noobs/

Connect pi to hdmi, micro usb power and attach keyboard. A TV with HDMI works great as a monitor.

Install raspbian with pixel if you installed noobs.

(20-30 minutes)

Login the first time.

The default login on a new install is always

user:pi

Password:raspberry

Open terminal. You now will see a “console”

When you see a like the one below, type it into the console and press enter. Leave out the #

#sudo raspi-config

Change password. For the class images will have a password of “gofast”

Under network, setup your wifi connection. You can also plug in an ethernet cable and no config is necessary. The ethernet may need to be plugged in when it boots for everything to work properly. You

can also modify config.txt on the micro SD card from a pc and setup the wifi. The gui with a HDMI lcd and keyboard is probably the easiest.

#sudo rpi-update

(This will take a while and need an internet connection)

Using sudo raspi-config under advanced, Change hostname to “obdpi”

Change keyboard to US, English. IMPORTANT**

Turn on rdp (remote desktop)

Sudo raspi-config and open advanced settings.

Turn on RDP

Turn on SSH

Enable SPI

Enable I2C

If you have a custom HDMI LCD, you may need to edit the config.txt file in /boot Refer to your particular LCDs Instructions.

This file can also be edited from a PC on the SD card. Do not reformat your card on the PC if prompted. You will have to start over and lose many hours of work!

Use this tutorial and install the software

From the pi directory, use

sudo git clone https://github.com/macsboost/independend-python-gps-logger-for-airodump-ng.git

from the pi directory run this command to give write permissions and access to every user

sudo chmod 777 independend-python-gps-logger-for-airodump-ng

Change the Directory to go into the independend-python-gps-logger-for-airodump-ng folder

Install GPSD (GPS Daemon)

Your ublox Neo 7/8 chipset GPS when plugged into your Pi will show up as /dev/ttyACM0

Linux devices show up as “folders”

sudo apt-get install gpsd gpsd-clients python-gps

sudo nano /etc/default/gpsd

Make sure the following lines are there:

START_DAEMON=”true”

GPSD_OPTIONS=”/dev/ttyACM0”

DEVICES=””

USBAUTO=”true”

Save, then

sudo /etc/init.d/gpsd restart

You can view the raw gps data by typing

cat /dev/ttyACM0

You should see some GPRMC and other messages fly by rapidly.

Press Control C to exit.

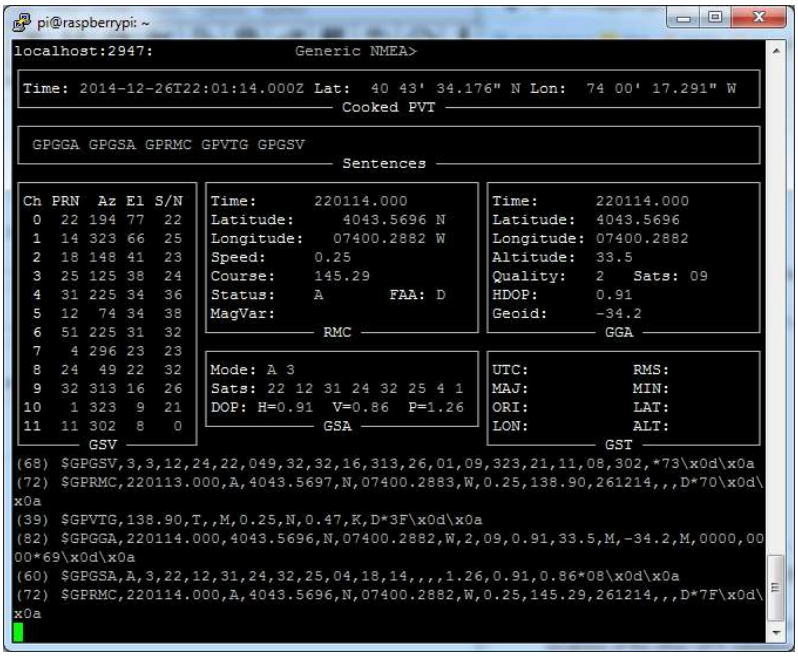
You can run

gpsmon

xgps

cgps

To view parsed gps data.



By using GPSD, many programs can access the gps hardware at one time. GPS can even be accessed remotely over an ethernet connection.

https://cdn-learn.adafruit.com/assets/assets/000/021/936/original/adafruit_products_gpsmon.png?1419631337

If you would like to log your data run:

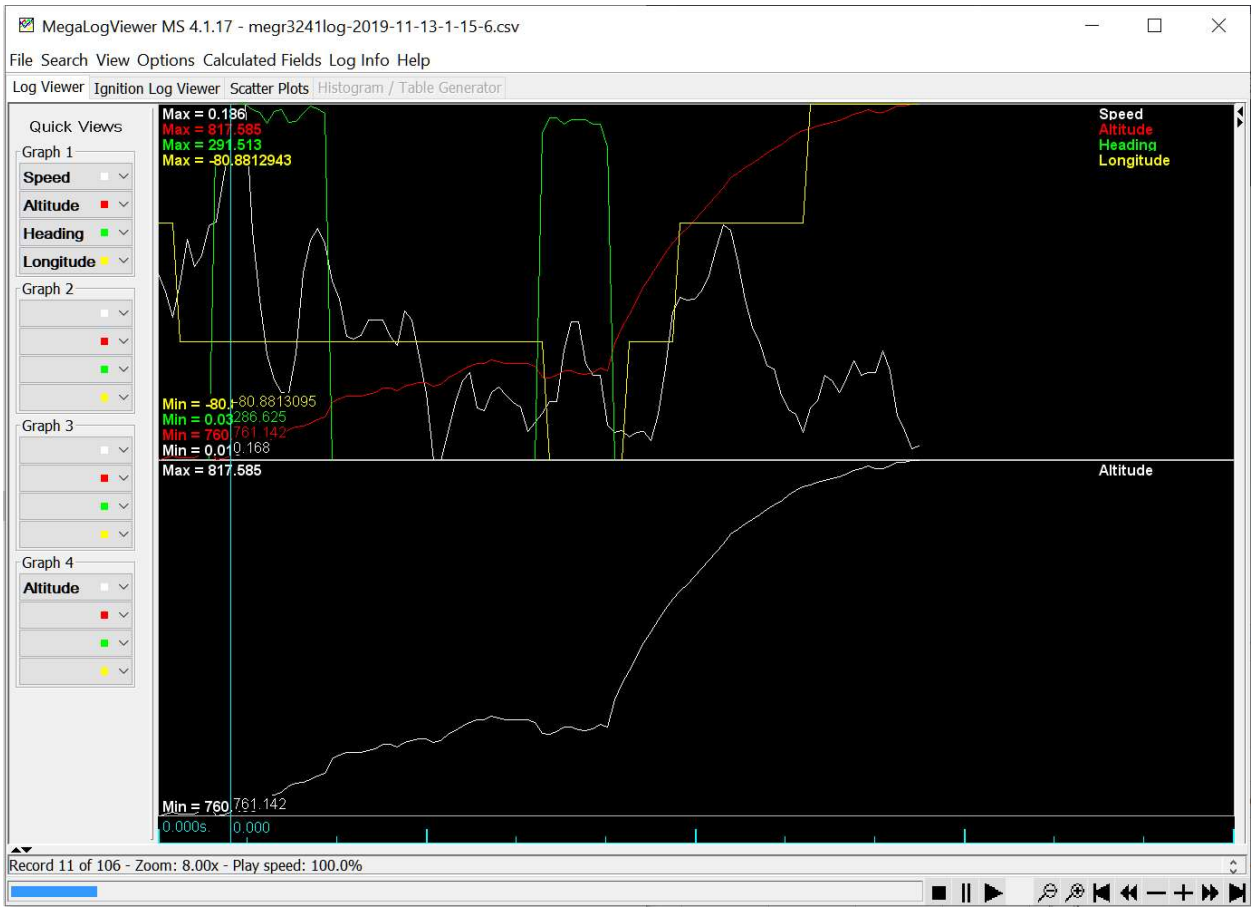
sudo python gpslog2.py

You can easily copy files from this directory to your google drive using the pi's web browser. Once on your drive they can be viewed from a PC.

You can also use a usb thumb drive.

data can be analyzed with megalogviewer, dataloglab or modified and viewed with Mclaren Atlas.

Racerender can be used to overlay logged CSV data with video.



To update your operating system periodically run the following commands.

```
sudo apt-get update
sudo apt-get upgrade
sudo rpi-update
```

Helpful info:

http://www.makeuseof.com/tag/15-useful-commands-every-raspberry-pi-user-should-know/

http://www.cowfishstudios.com/blog1.html

http://www.cowfishstudios.com/blog/obd-pi-raspberry-pi-displaying-car-diagnostics-obd-ii-data-on-an-aftermarket-head-unit

to start pi gui # startx

to configure options: # sudo raspi-config

the software is installed in "/home/pi/pyobd-pi"

Our USB adapters show up as "ttyUSB0" under the root folder /dev

Change directory # cd pyobd-pi

To go back a directory # cd ..

To go back to your user home director # cd ~

To make a directory # mkdir

To remove a directory # rmdir

To close a program <Ctl C>

To start the gui # startx

Use "sudo" to increase your permission level to allow a program to execute. i.e. # sudo reboot

Display raspi IP address:

ifconfig eth0

Or

ip a

Iphone tools:

Fing – network scanner

Or, use raspberrypi.local or obdpi.local, depending on your hostname.

Webssh – ssh terminal

`/boot/config.txt` Remoter pro $4.99 for graphical login over wifi to the xrdp server.

Connect your pi to your phone and use your phone as a remote control.

GIT:

To update our software, go Into the pyobd-pi folder and execute

sudo git pull

To configure git,

#sudo git config –global user.email email@uncc.edu

To save your changes:

sudo git commit

When you are ready to push to the git server

sudo git commit

To add a file to the repository

sudo git add filenametoadd.example

Getting the python script to auto run on boot:

I have created a new script that responds to GPIO input to trigger logging.

This script is called obdlog.py. This does not require a logging switch. I recommend plugging in the OBD2 adapter to the car, boot the pi, then run this python script to log.

Alternatively, the latest script that uses a switch is called obdgpslog2.py The obdgpslog2 script can be used without a gps. You must use a logging switch to start logging with this version.

(follow the steps in this guide for auto load on boot, but look at the line below for the actual crontab command)

http://www.instructables.com/id/Raspberry-Pi-Launch-Python-script-on-startup/step3/Add-logs-directory/

To edit the crontab script use the following command

sudo crontab -e

add one of the following lines to crontab script

Without GPS:

@reboot sleep 20 & sh /home/pi/pyobd-pi/launcher.sh >/home/pi/logs/cronlog 2>&1

With GPS:

@reboot sleep 20 & sh /home/pi/pyobd-pi/launchergps.sh >/home/pi/logs/cronlog 2>&1

You will need to create a /logs directory under /home/pi using the mkdir logs command.

** the sleep command is required to allow adequate time for devices to connect. It prevents the program from generating an exception if started too early in the boot process.

To stop your progam after boot, should you need to, open the terminal and type in

sudo killall python

You may want to do this to kill the program, modify it so that you can reload it without a reboot.

When auto started, you can view the terminal output by pressing ctl-alt-F2. You can get back to the gui by pressing ctl-alt-F7

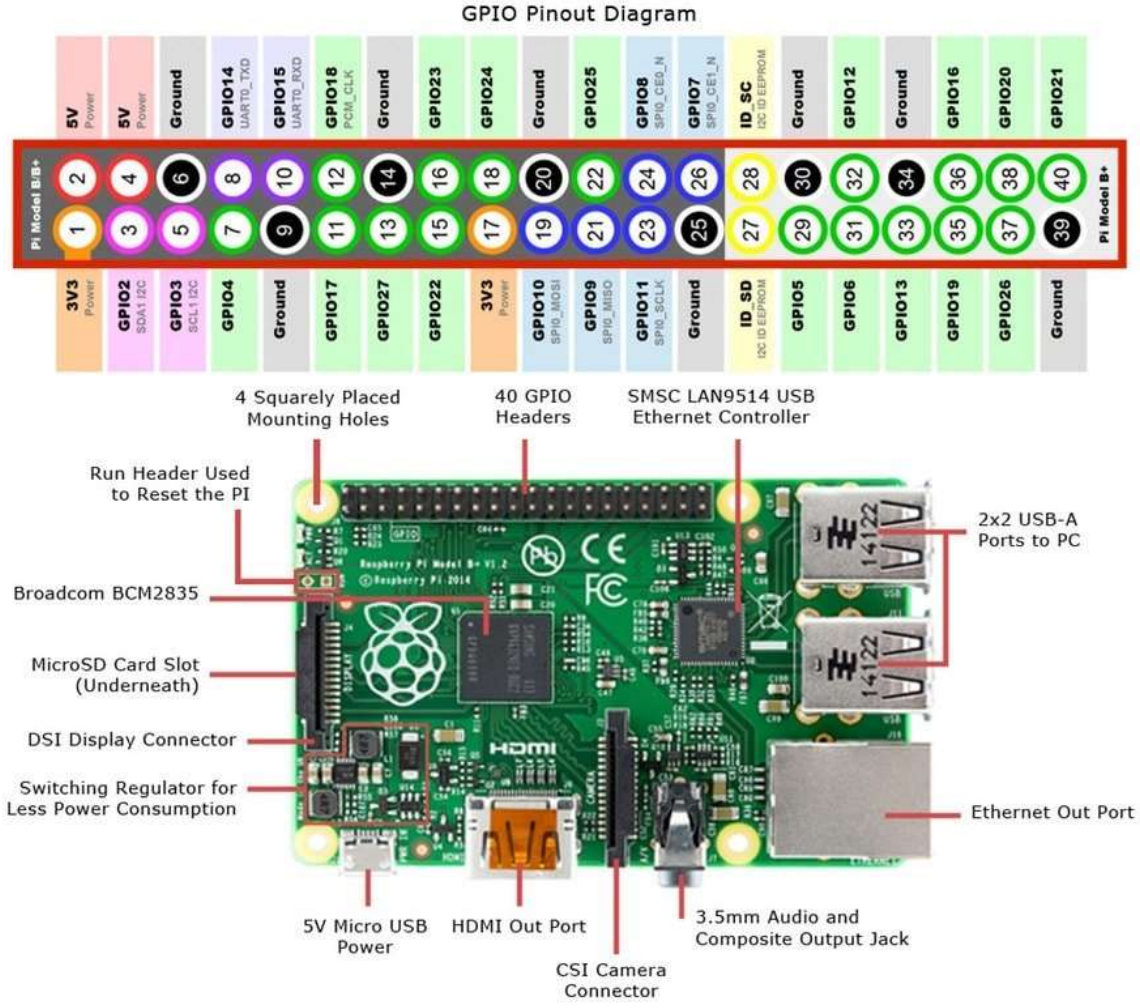
Logging triggers (not implemented in 2019 Feel free to modify the code and create your own fork!):

The gpslog2.py will log on start by default. It can be changed by changing the bootup log variable to False.

The obdgpslog2.py script will by default log when pins 37 and 39 on the pi are shorted. You need an SPST switch if you want to use a switch. Wire each leg of the switch to each pin. The pin is setup with an internal pull up. The switch shorts out the two pins and pulls the sense pin to ground. The script waits for the transition and then starts logging. If the system boots with the switch pressed in it will not log. It requires being unswitched and then rearmed.

If you wish to add an LED for indicating the python script is logging, it can be added between pins 33, 34 along with the appropriate resistor. . A 220-500 ohm resistor should work.

The positive side of the LED should point to pin 33.



Default behavior can be changed for either script by editing the script files with a text editor.

If a HDMI monitor is not attached to the pi at boot, it defaults to the RCA or headphone jack video output.

To force the HDMI on at boot you can modify this file

/boot/config.txt

and add these two lines:

hdmi_force_hotplug=1

hdmi_drive=2

To have permissions to write this file use

cd /

cd boot

sudo nano config.txt

Use PS to determine if your program is running

sudo ps axg | grep python

You will see a list of 3 processes, two with python if it is running properly.

GPS Fixes:

by **amrbekhit** » Wed Apr 16, 2014 11:10 am

I know this is quite an old post, but it shows up frequently in search results related to gpsd problems on bootup.

Here's a simpler solution than messing around with udev.

As brodieh rightly pointed out, running **ps aux | grep gps** shows that gpsd is not being started up with the correct paramters, despite the **/etc/defaults/gpsd** file being set up "correctly" via **dpkg-reconfigure gpsd**.

A simple way to fix that is to modify **/etc/default/gpsd** so that rather than the device name being placed under the DEVICES option, place it under the GPSD_OPTIONS option instead. For example, do this:

CODE: SELECT ALL

```
# Default settings for gpsd.
# Please do not edit this file directly - use `dpkg-reconfigure gpsd' to
# change the options.
START_DAEMON="true"
GPSD_OPTIONS="/dev/ttyACM0"
DEVICES=""
USBAUTO="true"
GPSD_SOCKET="/var/run/gpsd.sock"
```