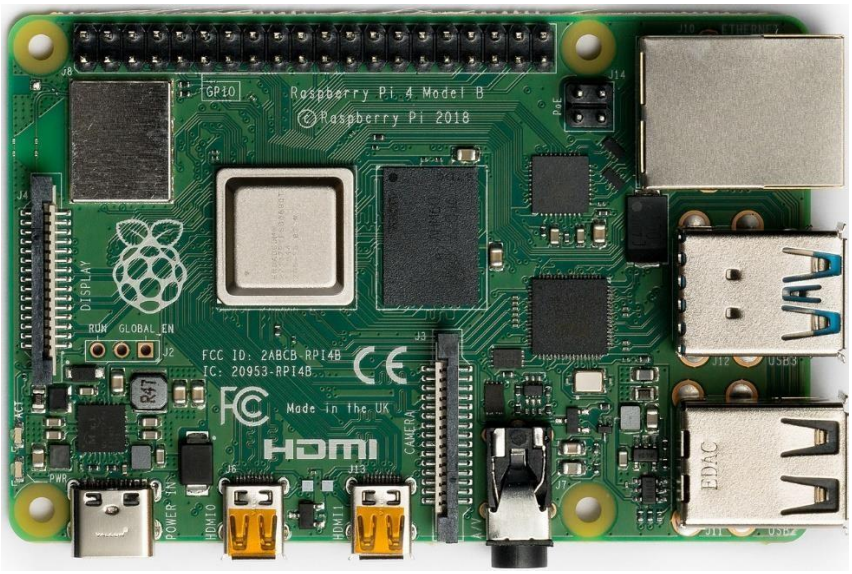
PRACTICAL 1

Aim : Preparing Raspberry Pi: Hardware preparation and Installation Components

Used in IOT

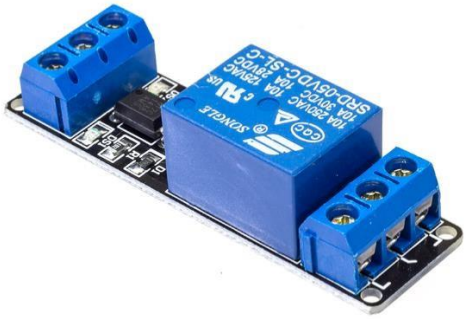
1. **Raspberry Pi Kit :** The Raspberry Pi is a series of single-board computers They are low-cost, high-performance and the size of a credit card. The Raspberry Pi was developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi Foundation's goal is to "advance the education of adults and children, particularly in the field of computer, computer science and related subjects. use an SD Card or MicroSD card for the operating system and file storage. They also have a 40-pin General-Purpose Input/Output (GPIO) connector, which can be used for controlling other electronics.



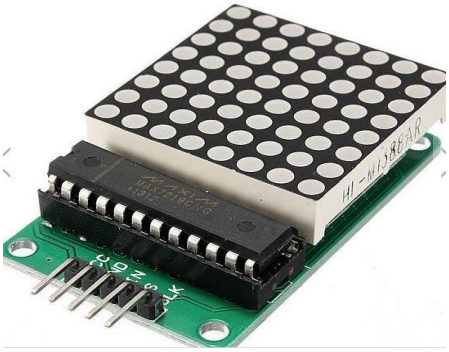
2. **HDMI Cable : High-Definition Multimedia Interface** (**HDMI**) is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device.[3] HDMI is a digital replacement for analog video standards.

3. **Speakers :**Speakers are standard output devices used with computer systems that enable the listener to listen to a sound as an outcome. Some speakers are used once they have been linked to a computer, while others may be connected to any type of sound system.

4. **Relay :** A **relay** is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.



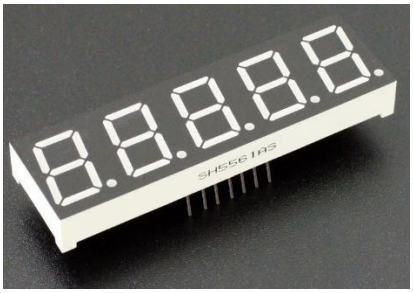
5. **LED GRID :** A LED matrix is a two-dimensional array of LEDs that can be used to create visual displays. They are commonly used in electronic signage and consumer electronics, such as televisions, clocks, and video walls.



6. **GPS :** GPS sensors are receivers with antennas that use a satellite-based navigation system with a network of 24 satellites in orbit around the earth to provide position, velocity, and timing information

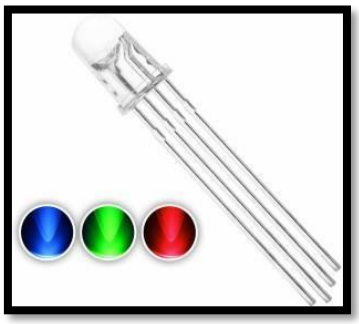
7. **Sensors :** A sensor is a device that detects and responds to some type of input from the physical environment. The input can be light, heat, motion, moisture, pressure or any number of other environmental phenomena. The output is generally a signal that is converted to a human-readable display at the sensor location or transmitted electronically over a network for reading or further processing.

8. **Display :** A seven-segment LED is a digital display module specialized to display numerical information. Light-emitting diodes (LEDs) arranged in the shape of numbers offer an easily visible display. They are sometimes called "seven-segment displays" or "seven-segment indicators."



9. **RFID Reader :** An RFID reader is a radio frequency device that emits a signal through an antenna. This signal is received by RFID tags that respond to interrogation by the reader. Responses are read by the reader, and through a variety of protocols the reader can communicate with all the RFID tags in its field.

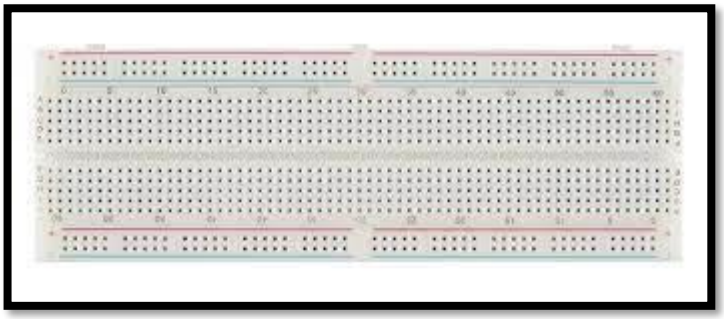
10. **LED :** Light-emitting diode (LED) is a widely used standard source of light in electrical equipment. It has a wide range of applications ranging from your mobile phone to large advertising billboards. They mostly find applications in devices that show the time and display different types of data.



11. **Clock Modular :** The clock module is much like an exciter. It brings homogeneity among many modules of your design. You would want all of your design components to work synchronously, that's where clocks come in.

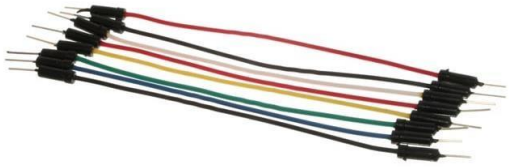
12. **Web Camera :** A **webcam** is a video camera which is designed to record or stream to a computer or computer network. They are primarily used in video telephony, live streaming and social media, and security. Webcams can be built-in computer hardware or peripheral devices, and are commonly connected to a device using USB or wireless protocols.

13. **Breadboard :** A **breadboard**, **solderless breadboard**, or **protoboard** is a construction base used to build semi-permanent prototypes of electronic circuits. Unlike a perfect board or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable.



14. **VGA Cable :** A video graphics array (VGA) cable is a type of computer cable that carries visual display data from the CPU to the monitor. A complete VGA cable consists of a cable and a connector at each end, and the connectors are typically blue.

15. **Jumper Wires :** Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.



16. **Other Device :**

KeyBoard - A computer keyboard is an input device used to enter characters and functions into the computer system by pressing buttons, or keys. It is the primary device used to enter text.

Mouse - A mouse is a small device that a computer user pushes across a desk surface in order to point to a place on a display screen and to select one or more actions to take from that position.

Monitor - A **computer monitor** is an output device that displays information in pictorial or textual form. A discrete monitor comprises a visual display, support electronics, power supply, housing, electrical connectors, and external user controls.

PRACTICAL 2

Aim : Linux Commands: Exploring the Raspbian

LS

The ls command lists the content of the current directory (or one that is specified). It can be used with the -l flag to display additional information (permissions, owner, group, size, date and timestamp of last edit) about each file and directory in a list format. The -a flag allows you to view files beginning with . (i.e. dotfiles).

CD

Using cd changes the current directory to the one specified. You can use relative (i.e. cd directoryA) or absolute (i.e. cd /home/pi/directoryA) paths.

PWD

The pwd command displays the name of the present working directory: on a Raspberry Pi, entering pwd will output something like /home/pi.

MKDIR

You can use mkdir to create a new directory, e.g. mkdir newDir would create the directory newDir in the present working directory.

RMDIR

To remove empty directories, use rmdir. So, for example, rmdir oldDir will remove the directory oldDir only if it is empty.

CP

Using cp makes a copy of a file and places it at the specified location (this is similar to copying and pasting). For example, cp ~/fileA /home/otherUser/ would copy the file fileA from your home directory to that of the user otherUser (assuming you have permission to copy it there). This command can either take FILE FILE (cp fileA fileB), FILE DIR (cp fileA /directoryB/) or -r DIR DIR (which recursively copies the contents of directories) as arguments.

MV

The mv command moves a file and places it at the specified location (so where cp performs a 'copy-paste', mv performs a 'cut-paste'). The usage is similar to cp. So mv ~/fileA /home/otherUser/ would move the file fileA from your home directory to that of the user otherUser. This command can either take FILE FILE (mv fileA fileB), FILE DIR (mv fileA

/directoryB/) or DIR DIR (mv /directoryB /directoryC) as arguments. This command is also useful as a method to rename files and directories after they've been created.

CAT
You can use cat to list the contents of file(s), e.g. cat thisFile will display the contents of thisFile. Can be used to list the contents of multiple files, i.e. cat *.txt will list the contents of all .txt files in the current directory

SUDO
The sudo command enables you to run a command as a superuser, or another user. Use sudo -s for a superuser shell. For more details see Root user / sudo

TAR
Use tar to store or extract files from a tape archive file. It can also reduce the space required by compressing the file similar to a zip file. To create a compressed file, use tar -cvzf *filename.tar.gz* *directory/* To extract the contents of a file, use tar -xvzf *filename.tar.gz*

MAN
Show the manual page for a file with man. To find out more, run man man to view the manual page of the man command.

GREP
Use grep to search inside files for certain search patterns. For example, grep "search" *.txt will look in all the files in the current directory ending with .txt for the string search. The grep command supports regular expressions which allows special letter combinations to be included in the search.

KILL
A KILL process is a command that is used in computer operating systems to terminate a running process.

CHDIR
The chdir command is a system function (system call) that is used to change the current working directory. This command is used as an alias for the shell command cd.

LN
The ln command links the file designated in the source file parameter to the file designated by the target file parameter or to the same file name in another directory specified by the target directory parameter. By default the ln command creates hard link.

YUM

Yum is command-line package manager for RPM-based Linux systems, such as Red Hat Enterprise Linux, CentOS, Fedora, and Oracle Linux. It stands " Yellowdog Updater, Modified" and was originally developed by Yellowdog Linux as a way to easily manage packages on their distribution.

PRACTICAL 3

Aim : GPIO: Light the LED with Python

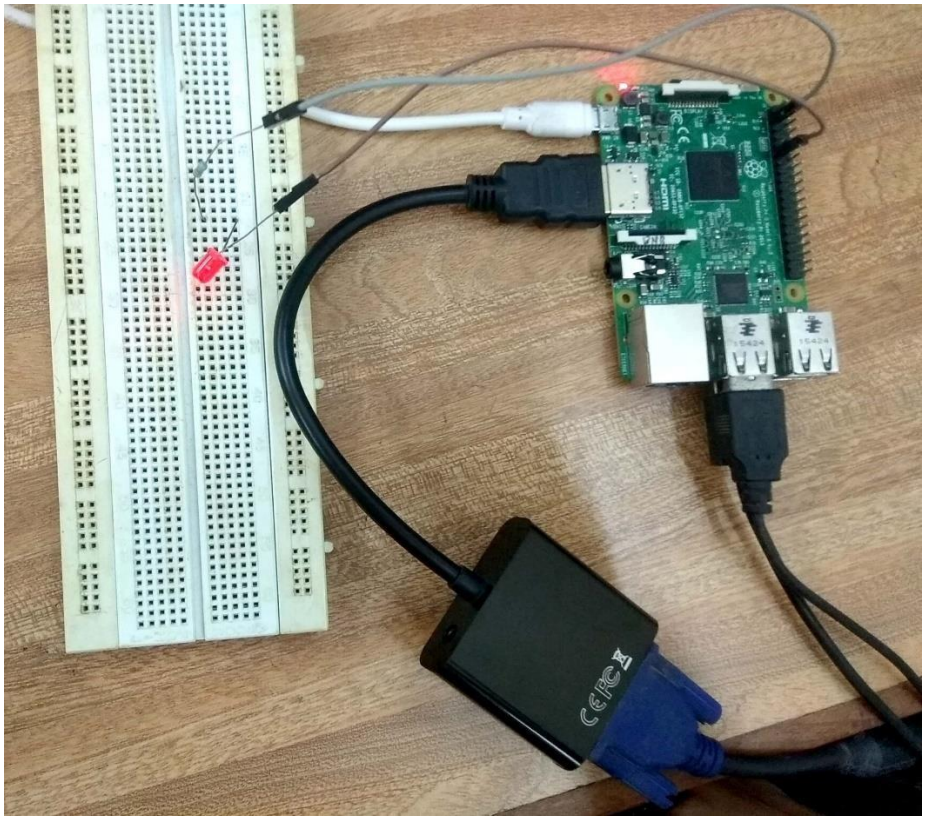
Hardware Requirement :

1. Raspberry Pi Kit
2. Breadboard
3. LED
4. Register
5. Power supply
6. HDMI Cable
7. Resistor
8. Jumper Wire
9. VGA Cable
10. SD Card

Procedure :

1. Insert SD card in Raspberry Pi Kit.
2. Connect VGA cable to HDMI cable and HDMI cable in Raspberry Pi.
3. In breadboard , connect LED and resistor using Jumper Wires.
4. Connect Jumper Wires in port number 3 and 11.
5. Connect keyboard and Mouse.
6. Connect Power Supply.

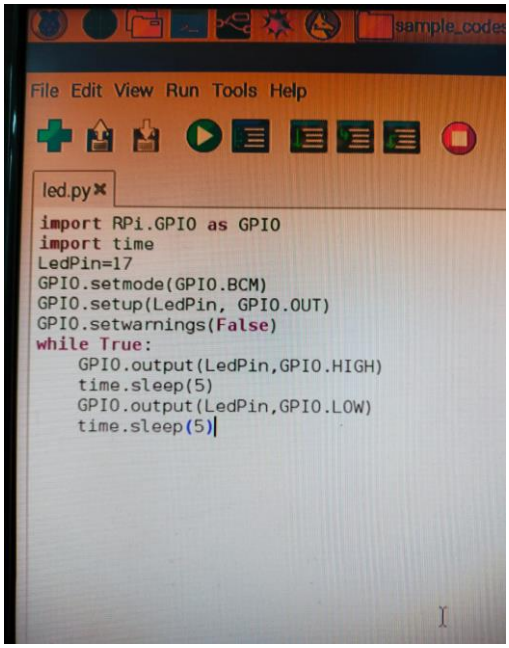
Connection Diagram :



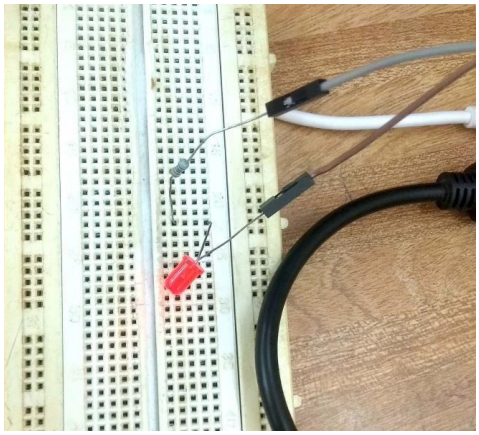
Program : cd

/home/p1/sample codes

python led.py



Outut :



LED glowing

PRACTICAL 4

Aim : GPS Module Interfacing with Raspberry Pi.

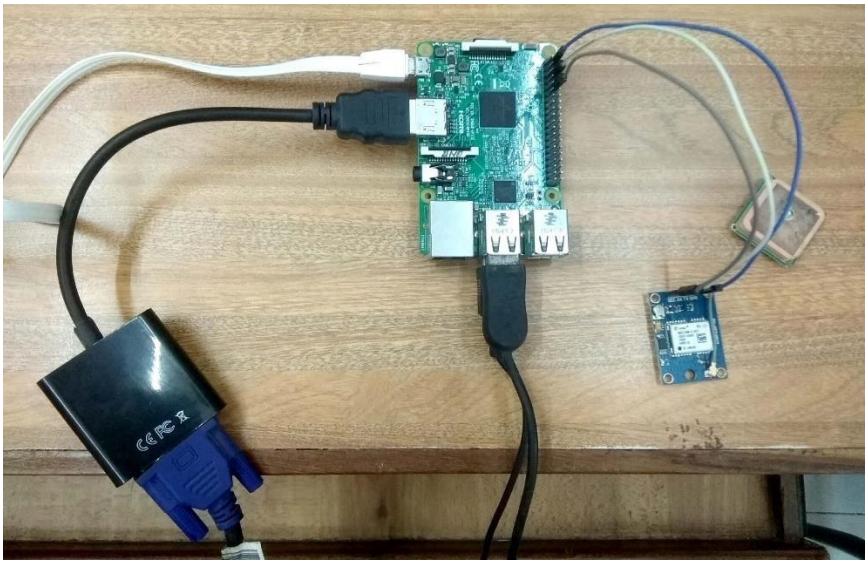
Hardware Requirement :

1. Raspberry Pi Kit
2. GPS
3. Power supply
4. HDMI Cable
5. Jumper Wire
6. VGA Cable
7. SD Card

Procedure :

1. Insert SD card in Raspberry Pi Kit.
2. Connect VGA cable to HDMI cable and HDMI cable in Raspberry Pi.
3. From GPS connect Jumper wires in 1,2,4 and Connect those wires in port number 2, 6 and 8 in kit.
4. Connect keyboard and Mouse.
5. Connect Power Supply.

Connection Diagram :

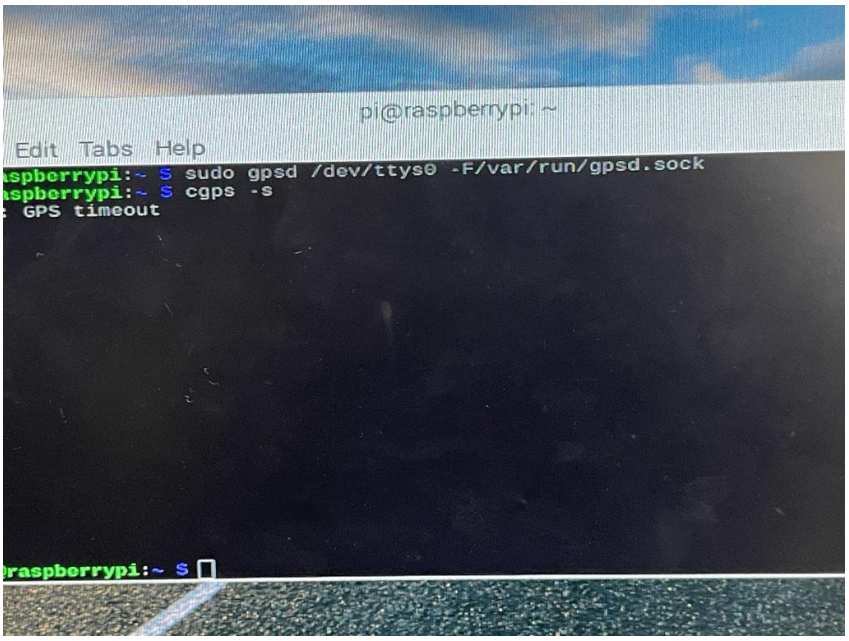


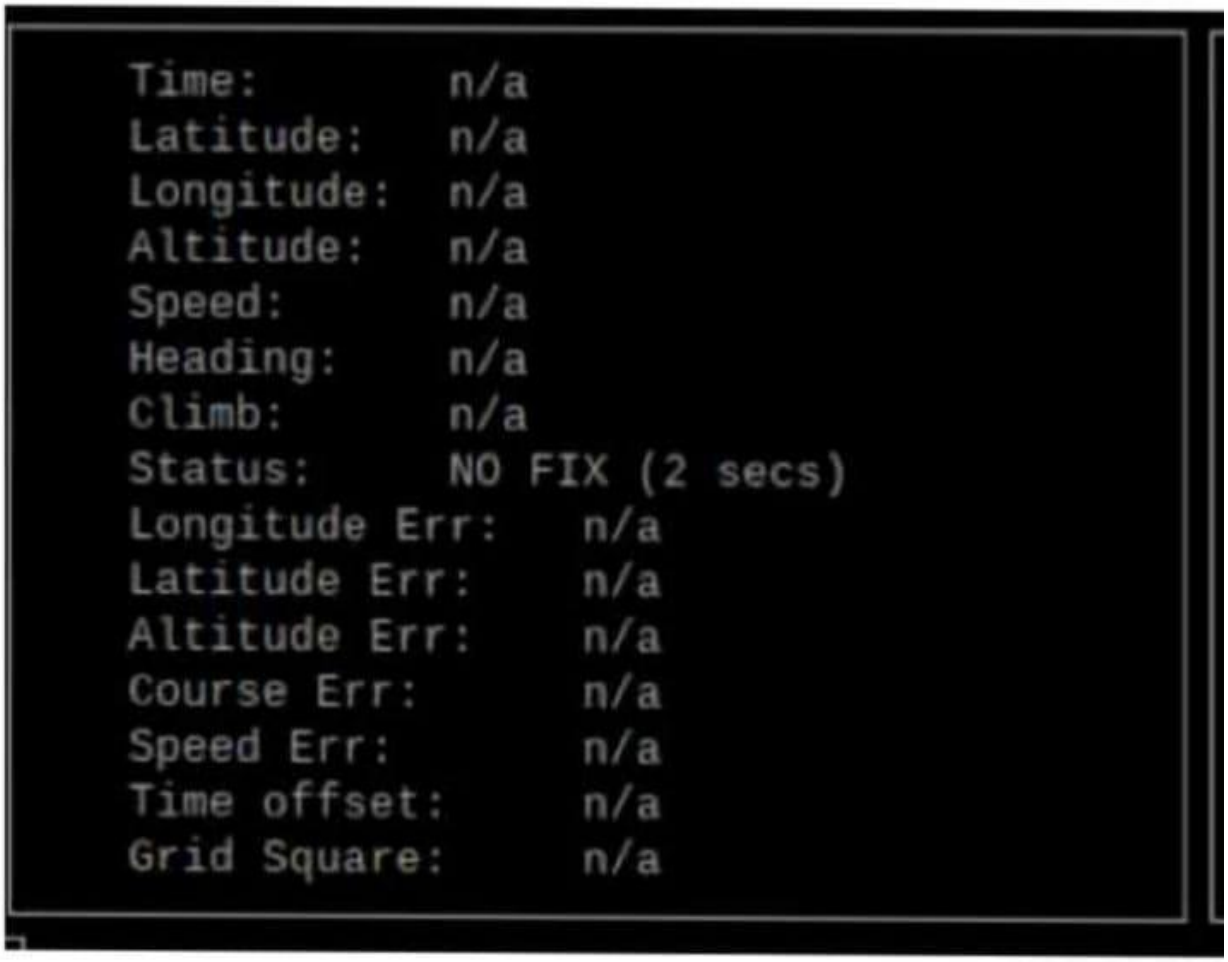
Program :

sudo gpsd /dev/ttys0 -F /var/run/gpsd.sock cgps

-s

Output :


pi@raspberrypi: ~
Edit Tabs Help
aspberrypi:~ $ sudo gpsd /dev/ttys0 -F/var/run/gpsd.sock
aspberrypi:~ $ cgps -s
GPS timeout
raspberrypi:~ $


Time: n/a
Latitude: n/a
Longitude: n/a
Altitude: n/a
Speed: n/a
Heading: n/a
Climb: n/a
Status: NO FIX (2 secs)
Longitude Err: n/a
Latitude Err: n/a
Altitude Err: n/a
Course Err: n/a
Speed Err: n/a
Time offset: n/a
Grid Square: n/a