How to use Easy GNSS

A: GNSS pre-config

1. Turn on the switch to start the GNSS.

2. To connect with a NTRIP caster in the rover mode, an Internet connection via Wi-Fi is needed.

3. Click on the Easy GNSS logo on the desktop. The application opens with the following menu:

B: Easy GNSS menu

You have 5 main options on the menu:

- Use the Rover mode
- Use the Base mode
- See satellites
- Do post-processing
- Quit/Shutdown

Rover mode

Select “Rover” tab, and push “Config”. Now, configure the different parameters:

- Calculus
    - Acquisition Type: Choose the method to determinate the position of the Rover
        - Single: Single point positioning. Less precise (some metres), but you need only one receiver.
        - DGPS/DGNSS: Code-based differential GPS, which provides improved location accuracy, in the range of operations of each system, from nominal GPS accuracy. The rover can either move or be fixed, the base is fixed.
        - Kinematic: Carrier-based Kinematic positioning. The rover moves, the base is fixed.
        - Static: Carrier-based Static positioning. The rover and the base are both fixed.
        - Moving Base: The rover and the base move. Useful for GNSS with drones for example.
        - Fixed: Little used, thus not advised.
        - PPP-Kinematic: Precise Point Positioning with Kinematic mode. Precise Point Positioning (PPP) is a global navigation satellite system positioning method that calculates very precise positions (less than 80 cm), with errors as small as a few centimeters under good conditions. The rover moves, the base is fixed.
        - PPP-Static: Precise Point Positioning with Static mode. The rover and the base are fixed.
        - PPP-Fixed: Little used, thus not advised.
    - Antenna height: Height of the rover’s antenna, in meter.
    - Satellites System: Choose the constellations you want to use.
        - GPS: American satellite navigation system. It provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Obstacles such as mountains and buildings block the relatively weak GPS signals.
        - SBAS: Satellite augmentation system. It supports wide-area or regional augmentation through the use of additional satellite-broadcast messages. Using measurements from the ground stations, correction messages are created and sent to one or more satellites for broadcast to end users as differential signal. Thus it should be used as a type of acquisition but RTKLIB mentions it as a satellite system.
        - GLONASS: Russian satellite navigation system. It provides an alternative to GPS and is the second navigational system in operation with global coverage and of comparable precision.

        - GALILEO: European satellite navigation system. It provides horizontal and vertical position measurements within 1-metre precision, and better positioning services at higher latitudes than other positioning systems.
        - QZSS: Japanese satellite augmentation system. It provides highly precise and stable positioning services in the Asia-Oceania region, compatible with GPS.
        - BEIDOU (COMPASS): Chinese satellite navigation system. It consists of two separate satellite constellations which offer limited coverage and navigation services, mainly for users in China and neighboring regions.

➢ BasePos

- Base Position Type: Type of input of the base's position
    - RTCM: the base communicates its position via radio.
    - LLH: the user need to specify the base's position with the next parameters.
- Latitude: Latitude (in decimal degree) of the base.
- Longitude: Longitude (in decimal degree) of the base.
- Height: Height above the ellipsoid (in meter) of the base.
- Antenna Height (in meter) : height of the base's antenna in relation to the ground.

➢ Solution

- Enable: Permit to save the positions calculated with RTKLIB. Useful if you want to do post-processing afterwards.
- Coordinates Type:
    - LLH: geographical coordinates (latitude, longitude, height above the ellipsoid)
    - XYZ: cartesian coordinates
    - ENU: planar coordinates in projection
- Coordinates Format:
    - All: All measures
    - Single: Only one measure
- Output File Name: Relative path of the solution file (.pos)

- Log
    - Enable: Permit to save the stream of observations. Useful if you want to do post-processing afterwards.
    - Output File Name: Relative path of the log file at the UBX format.

- Input 1
    - Port: Device associated with the port connected to Raspberry. By default, it is “tty-ACM0”.
    - Bit Rate: Number of bits that are conveyed or processed per unit of time. By default, it is “115200”.
    - Byte Size: Number of bits in a byte. A byte made with 8 bits is an octet. By default, it is “8 bits”.
    - Parity: None, even or odd. The parity of pre-defined sets of bits is checked against a field containing the parity computed at transmission and sent within the navigation message. Any discrepancies would imply that there was at least one error in the message. By default, it is “None”.
    - Stop Bits: An extra stop bit can be a useful way to add a little extra receive processing time. By default, it is only 1 bit.
    - Flow Control: Process of managing the rate of data transmission between two nodes to prevent a fast sender from overwhelming a slow receiver. It provides a mechanism for the receiver to control the transmission speed, so that the receiving node is not overwhelmed with data from transmitting node. By default, it is “None”.

We recommend you not to change these parameters.

- Input 2: Information associated to the NTRIP
    - Enable: Permit to bring corrections from a base with different protocols.
    - Type: Protocol used. By default, it is “NTRIP”.
        - NTRIP Caster: Real server element in the overall NTRIP system. It takes data from one or more data stream sources (Base Stations referred to as NTRIP Servers) and provides this data to one or more rovers, the NTRIP Clients. If you need to send data to more than one client at a time, or have more than one data stream, you will need a Caster.
        - TCP Protocol: Provides reliable, ordered, and error-checked delivery of a stream of octets (bytes) between applications running on hosts communicat-

ing via an IP network. Major internet applications such as the World Wide Web, email, remote administration, and file transfer rely on TCP.

- Format: RTK Standards. By default, it is “RTCM3”
  - RTCM2 & RTCM3 (Radio Technical Commission for Maritime Services) : The internationally accepted data transmission standards for DGNSS are defined by the RTCM. The protocol is a binary one designed to optimize the communication throughput.
  - BINEX (BINary Exchange) : Binary format standard for GNSS research and operational purposes. The format has been designed to grow and allow encapsulation of any data or metadata allowed in the common ASCII exchange formats such as RINEX, IONEX, SP3, SINEX, and so on, including GNSS-related data and metadata as encountered.
  - UBX (U-Blox): Binary format standard for GNSS research and operational purposes.
- Address: address of the NTRIP Caster
- Port: port used on the Caster
- Mountpoint: Data Flow
- User-ID: login to connect to the NTRIP Caster
- Password: password to connect to the NTRIP Caster

Push “Start”. The processing with RTKLIB will start and positioning results will be shown on the bottom of the screeen. You will have the latitude, the longitude, the height above the ellipsoid of the rover, a quality code from 1 (best positionning quality) to 5 and the calculus mode really used by RTKLIB for the processing. A log file and a position file will be created at the specified path if the user enabled it in the parameters.

Push “Stop”. The processing with RTKLIB will stop.

Base mode

Select “Base” tab, and push “Config”. Now, configure the different parameters:

➢ BasePos

- Latitude: Latitude (In degrees), X (In meters) or East (In meters), of the base. It depends on the type of coordinates you choose.

- Longitude: Longitude (In degrees), Y (In meters) or North (In meters), of the base.
- Height: Height (In meters), Z (In meters) or Up (In meters), of the base.
- Antenna Height (In meters)

➢ Log

- Enable: Permit to save the logs on the USB port. Useful if you want to do post processing after.
- Output File Name: Relative track of the output file (.ubx)

➢ Input

- Port: Device associated with the port connected to Raspberry. By default, it's "ttyACM0".
- Bit Rate: Number of bits that are conveyed or processed per unit of time. By default, it's "115200".
- Byte Size: Number of bits in a byte. A byte made with 8 bits is an octet. By default, it's "8 bits".
- Parity: None, even or odd. The parity of pre-defined sets of bits is checked against a field containing the parity computed at transmission and sent within the navigation message. Any discrepancies would imply that there was at least one error in the message. By default, it's "None".
- Stop Bits: An extra stop bit can be a useful way to add a little extra receive processing time. By default, it's only 1 bit.
- Flow Control: Process of managing the rate of data transmission between two nodes to prevent a fast sender from overwhelming a slow receiver. It provides a mechanism for the receiver to control the transmission speed, so that the receiving node is not overwhelmed with data from transmitting node. By default, it's "None".

➢ Output 2:

- Enable: Permit to save the data on the USB port.
- Type: Protocol used. By default, it's "NTRIP".
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  - UBX (U-Blox): Binary format standard for GNSS research and operational purposes
- Address: For ENSG students, it's "rgp-ip.ign.ip"
- Port: By default, it's "2101".
- Mountpoint: Data Flow. It's "TRS" by default
- User-ID: For ENSG students, it's "eleves"
- Password: For ENSG students, it's "CCps5W254h" until June

➢ Output 1:

- Enable: Permit to save the data on the USB port.
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Push "**Start**". GNSS data will be stored or broadcasted.

Push "**Stop**". GNSS raw data are stored in the USB memory.

Quit/Shutdown

After the acquisition, push "Quit" to exit from EasyGNSS and return to the GNSS menu.

You can also push "Shutdown" instead, to quit and turn off the GNSS directly. Don't forget to turn off the two switches after.