

Howto-UWB trilateration experiment

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This document describes how to do an UWB trilateration experiment using ROS pkg_drone_uwb package (ver: 20170919_1).

1. Hardware Setup

There are two major hardware setup: GCS & UWB stations. Both setup can be done independently.

* Intel NUC: computer in the drone

[Power prerequisites]

- Batteries for GCS laptop & RangeNet laptop
- Battery for Wifi router
- Batteries for UWB stations
- Battery for Intel NUC & UWB receiver

[GCS setup]

(1) Install GCS.

- Turn on Wifi router, 24-inches monitor, and GCS laptop.

(2) Connect between Intel NUC and GCS laptop.

- Turn on Intel NUC with 24-inches monitor, a keyboard and a mouse.
- Connect Intel NUC to the Wifi router. (through wireless connection)
- Access Intel NUC through VNC of GCS laptop.

[UWB station setup]

(1) Install four UWB stations (Unit 100, 101, 102, 103)

- Make sure of the following things:
 - All the UWB stations are powered on.
 - Set all the UWB stations to 'ranging' mode.
 - Make all the UWB stations have different height.
 - Install stations with the following configuration:

[102] [103]
[100](0,0), [101](xxx,0)

- The unit 104 will be used as a receiver.

(2) Run RangeNet auto-survey for getting positions of all the UWB stations

- Unit 100 will be at (0,0), and Unit 101 will be at (xxx, 0).

2. Checking connection between UWB receiver and Intel NUC

Make sure that unit 104 is connected with Intel NUC.

In the terminal, run the following command:

```
$ dmesg | grep tty
...
[ 3678.375082] cdc_acm 1-4:1.0: tttyACM0: USB ACM device
...
```

Then, you should see a message for ttyACM0, as in the above.

3. Setting parameters & Building the 'pkg_drone_uwb'

(1) Opening an editor

You can run QtCreator 5.7. Or, you can use gedit.

In the terminal, run the following command to run QtCreator 5.7:

```
$ sudo /opt/qt57/bin/qtcreator
```

(2) Setting the parameters

In [node_drone_uwb.cpp], you have to set the following parameters:

- operation mode
> const int mode_run
- yes/no for saving log
> const bool b_save_log_as_file
- positions of UWB stations
> double pos_x_station[], double pos_y_station[], double pos_z_station[]
- threshold for determining an outlier of UWB range
> const double thres_range_err_valid

(3) Building the package

Press 'Build' button in QtCreator 5.7.

In case of not using the QtCreator, you may be able to build the package using the following command:

```
$ catkin_make --cmake-args -G 'CodeBlocks - Unix Makefiles'
-DCMAKE_BUILD_TYPE=Release
```

4. Running the 'pkg_drone_uwb'

To run the package, please follow the three steps:

(1)

```
$ sudo -s
```

(2)

```
$ roslaunch pkg_drone_uwb.launch
```

(3)

In Rviz, please add 'RobotModel' to see the drone model.