

THORMANG3

THORMANG3 Tutorial

Operating PC



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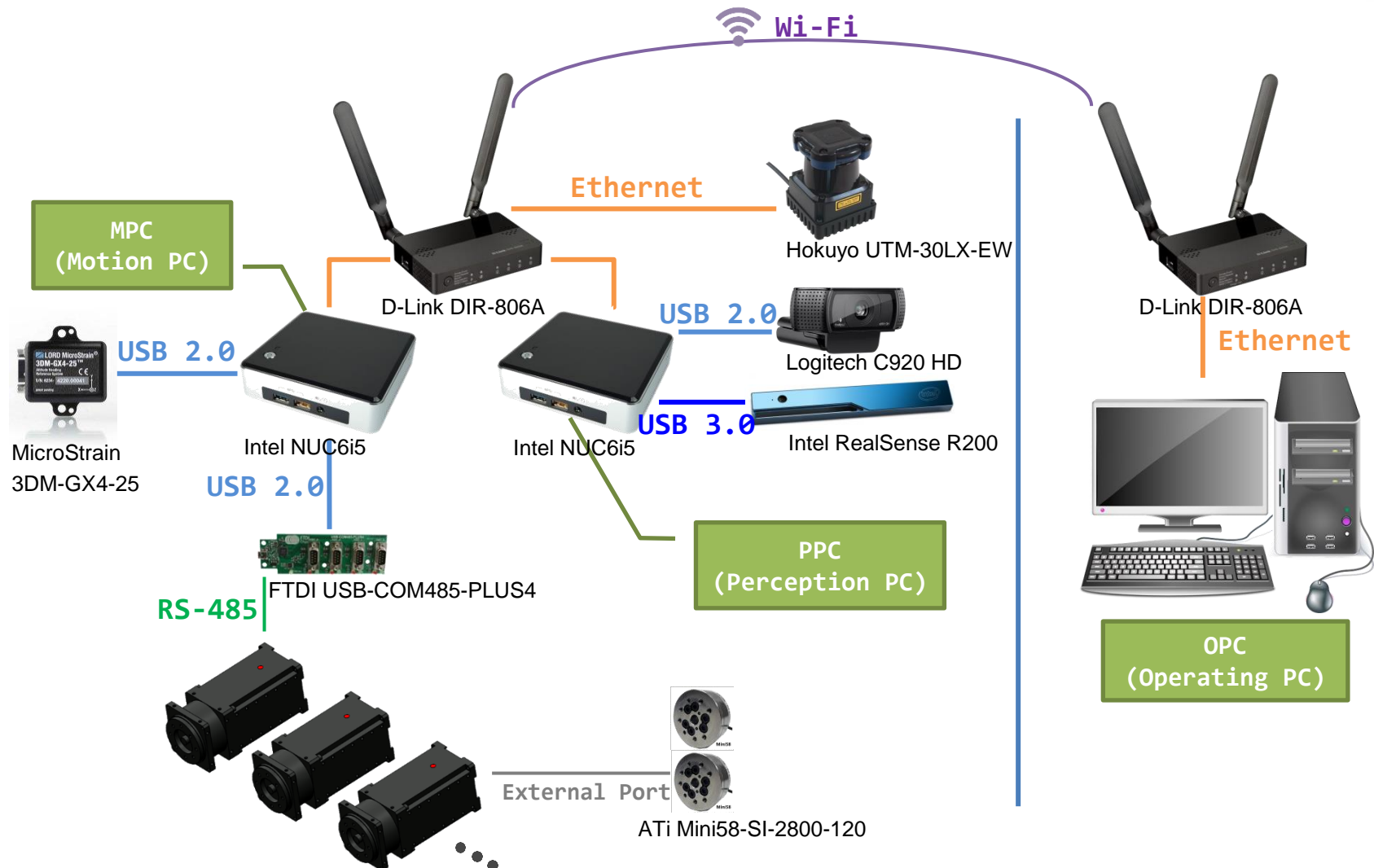
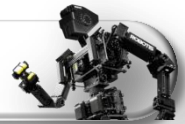
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1. Introduction



1. System Configuration





2. What is OPC



- **OS**

- Linux



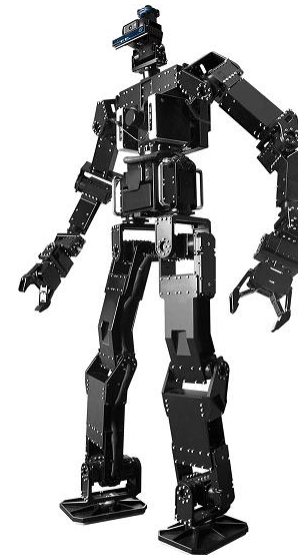
- **ROS(Robot Operating System)**

- Version : above indigo
- Installation (Desktop-Full)
- Environment setup



- **ROBOTIS ROS Package**

- ROBOTIS-THORMANG-OPC
- ROBOTIS-THORMANG-msgs
- ROBOTIS-THORMANG-Common
- ROBOTIS-Framework-msgs



THORMANG3



2. What is OPC



- **Additional Package for THORMANG OPC**
 - [humanoid_navigation](#)
 - map-server
 - nav-msgs
 - humanoid-nav-msgs
 - octomap, octomap-msgs, octomap-ros, octomap-server
 - [sbpl](#)
 - [qt_ros](#)

2. How to set OPC



1. Ubuntu Installation



- **Overview**

- The pc for remote control is recommended Ubuntu 16.04 LTS.



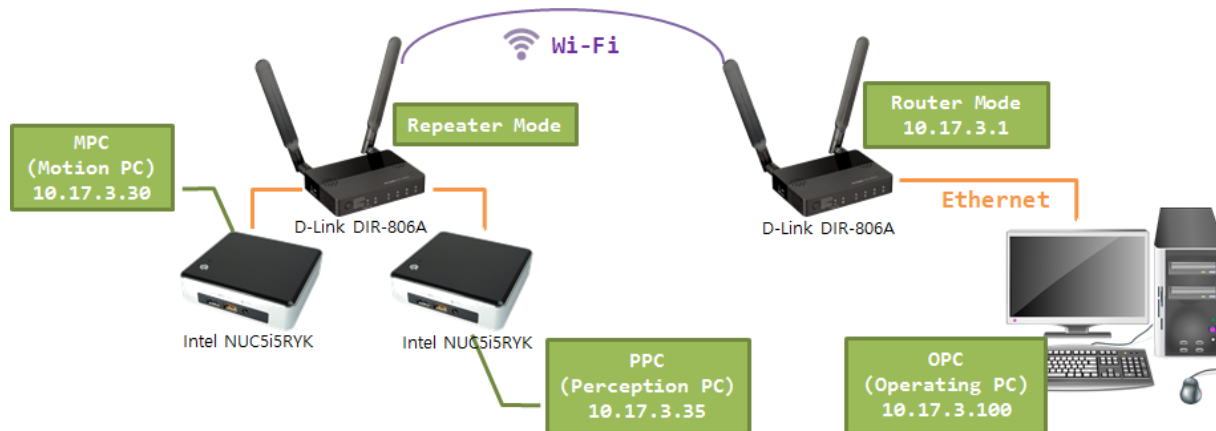
ubuntu

- **Installation**

- Using USB

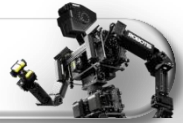
- **Network Setting**

- [WIKI](#)



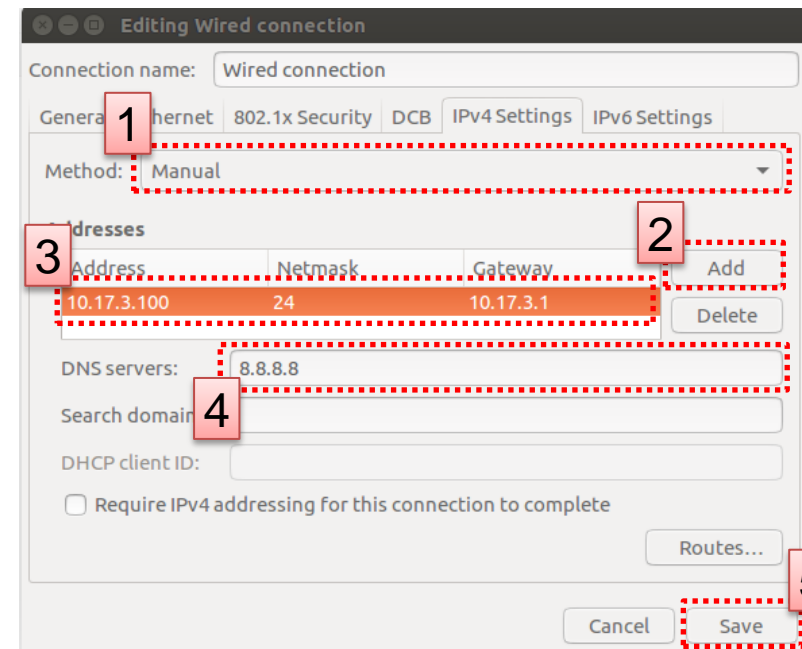
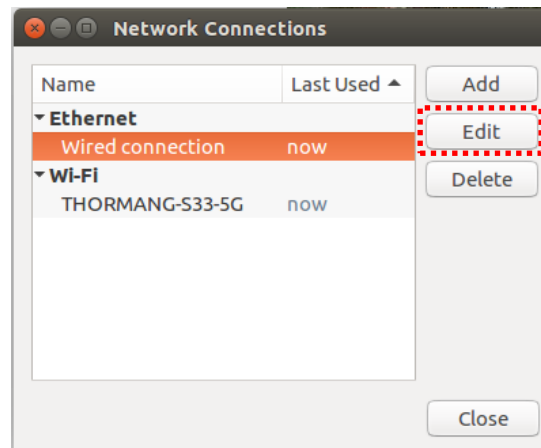
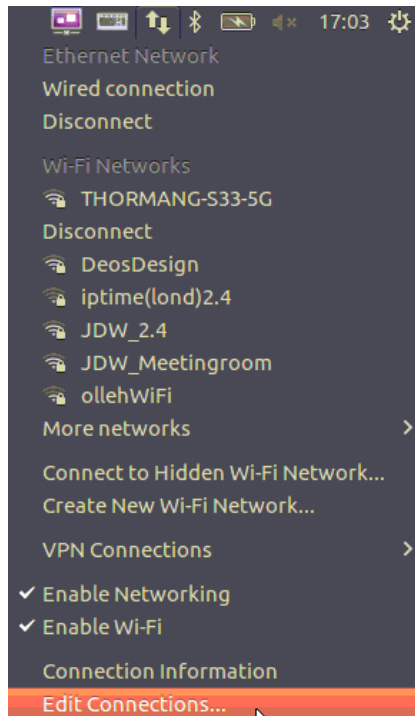
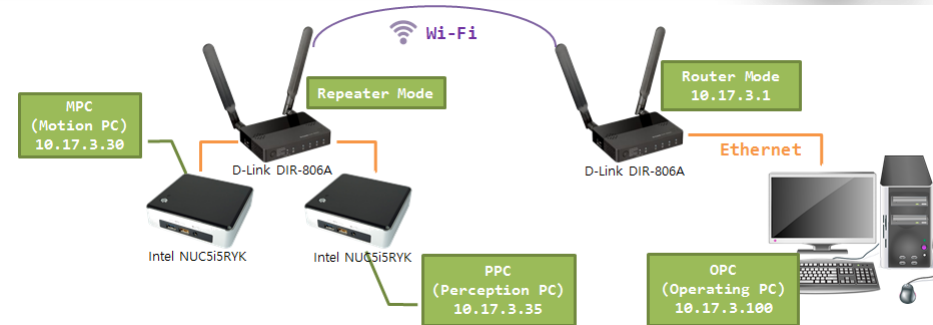


1. Network Setting



• OPC Network Setting

- Go Network -> Edit connections
- Select Network type and Edit
- Set to Manual and type as following





2. ROS Installation & Environment Setup



- **Overview**

- Version : kinetic

- **Installation(Desktop-Full)**

- Setup your sources.list

```
$ sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" >
/etc/apt/sources.list.d/ros-latest.list'
```

- Set up your keys

```
$ sudo apt-key adv --keyserver hkp://ha.pool.sks-keyservers.net --recv-key
421C365BD9FF1F717815A3895523BAEEB01FA116
```

- Installation

```
$ sudo apt-get update
$ sudo apt-get install ros-kinetic-desktop-full
```

- Initialize rosdep

```
$ sudo rosdep init
$ rosdep update
```

- Getting rosinstall

```
$ sudo apt-get install python-roscpp
```



2. ROS Installation & Environment Setup



- Configuring Your ROS Environment

- Managing Your Environment

- Check

```
$ printenv | grep ROS
```

- Setup

```
$ source /opt/ros/kinetic/setup.bash
```

- Create a ROS Workspace

- Create a catkin workspace

```
$ mkdir -p ~/catkin_ws/src  
$ cd ~/catkin_ws/src  
$ catkin_init_workspace
```

- Build

```
$ cd ~/catkin_ws  
$ catkin_make
```

- Setup

```
$ source ~/catkin_ws/devel/setup.bash
```



2. ROS Installation & Environment Setup



- Environment setup for OPC

- Open '~/.bashrc'

```
$ gedit ~/.bashrc
```

- Append below contents

```
# Set ROS Kinetic
source /opt/ros/kinetic/setup.bash
source ~/catkin_ws/devel/setup.bash

##### Set ROS Network #####
# PPC CORE(10.17.3.35)
export ROS_MASTER_URI=http://10.17.3.35:11311

# local ROS IP
export ROS_IP=10.17.3.100
```

- ROS_MASTER_URI : PPC (10.17.3.35), roscore
- ROS_IP : OPC (10.17.3.100)

- Apply

```
$ source ~/.bashrc
```



3. THORMANG OPC Package



- THORMANG OPC Package : [WIKI](#)
- Additional Package

- [humanoid_navigation](#)

- Dependencies : map-server, nav_msgs, humanoid-nav-msgs, octomap, octomap-msgs, octomap-ros, octomap-server

```
$ sudo apt-get install ros-kinetic-map-server ros-kinetic-nav-msgs ros-kinetic-humanoid-nav-msgs ros-kinetic-octomap ros-kinetic-octomap-msgs ros-kinetic-octomap-ros ros-kinetic-octomap-server
```

- Dependencies : [sbpl](#)

```
$ cd ~/catkin_ws/src
$ git clone https://github.com/sbpl/sbpl.git
$ cd sbpl
$ mkdir build
$ cd build
$ cmake ..
$ make
$ sudo make install
```

- Build

```
$ cd ~/catkin_ws/src
$ git clone https://github.com/AravindaDP/humanoid\_navigation.git
$ cd ~/catkin_ws
$ catkin_make
```

- [qt_ros](#)

```
$ sudo apt-get install ros-kinetic-qt-ros
```



3. THORMANG OPC Package



- **THORMANG OPC Package**

- Download source

```
$ cd ~/catkin_ws/src  
$ git clone https://github.com/ROBOTIS-GIT/ROBOTIS-Framework-msgs.git  
$ git clone https://github.com/ROBOTIS-GIT/ROBOTIS-THORMANG-OPC.git  
$ git clone https://github.com/ROBOTIS-GIT/ROBOTIS-THORMANG-msgs.git  
$ git clone https://github.com/ROBOTIS-GIT/ROBOTIS-THORMANG-Common.git
```

- Build

```
$ cd ~/catkin_ws  
$ catkin_make
```

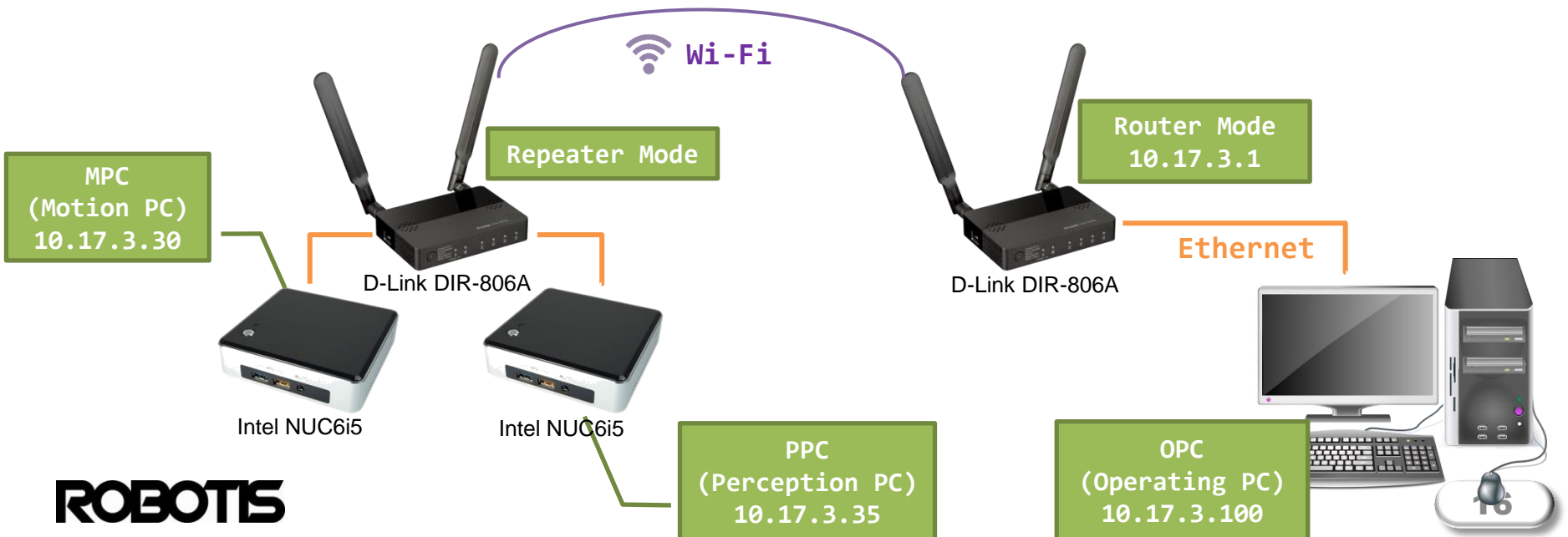
3. How to run THORMANG3



How to connect to THORMANG3



- Connecting THORMANG3
From your computer go to your LAN settings and set static IP to the same network (Example: 10.17.3.xxx)
- Connection Information
 - 1) MPC (Motion PC) IP : **10.17.3.30**
 - 2) PPC (Perception PC) IP : **10.17.3.35**
 - 3) MPC & PPC user name : **robotis**
 - 4) MPC & PPC password : **111111**

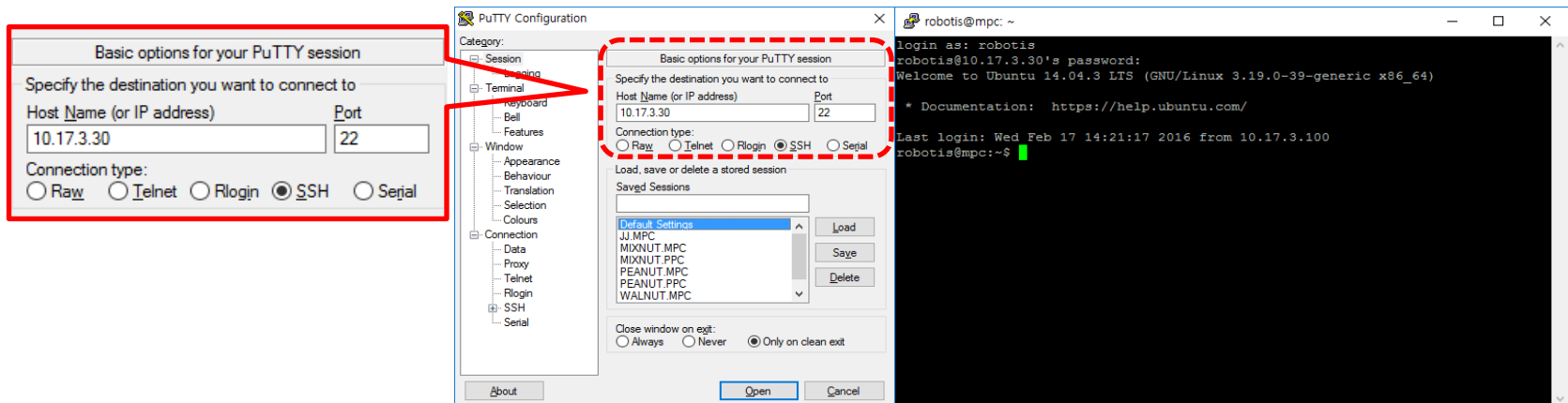




How to connect to THORMANG3



- Example with SSH Client (Windows)
 - 1) Execute SSH client program (ex: PuTTY)
 - 2) Input THORMANG 3 MPC's IP address : **10.17.3.30**
 - 3) Select **SSH** as a connection type and then open it.
 - 4) Input THORMANG 3 MPC's user name : **robotis**
 - 5) Input THORMANG 3 MPC's password : **111111**
- ROBOTIS recommends that users connect via SSH client.





How to connect to THORMANG3



- Example with SSH Client (Ubuntu)
 - 1) Open terminal window
 - 2) Input SSH command with user name and MPC's IP address :
`$ ssh robotis@10.17.3.30`
 - 3) Input THORMANG 3 MPC's password : `111111`

```
robotis@mpc: ~  
thor@thor-OPC:~$ ssh -l robotis 10.17.3.30  
robotis@10.17.3.30's password:  
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.19.0-39-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com/  
  
545 packages can be updated.  
150 updates are security updates.  
  
Last login: Wed Feb 17 13:31:15 2016 from 10.17.3.110  
robotis@mpc:~$
```

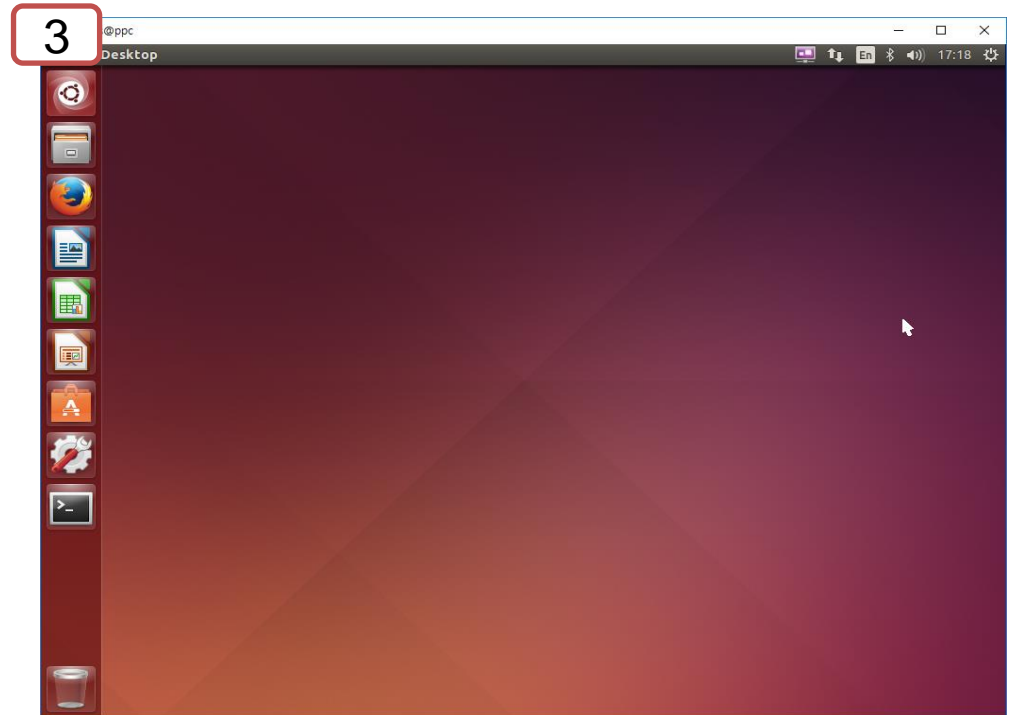
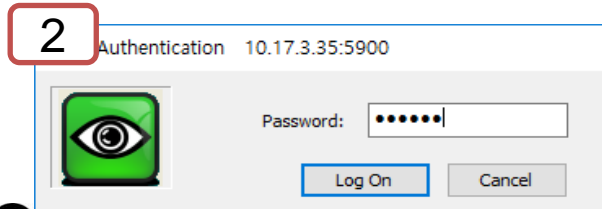
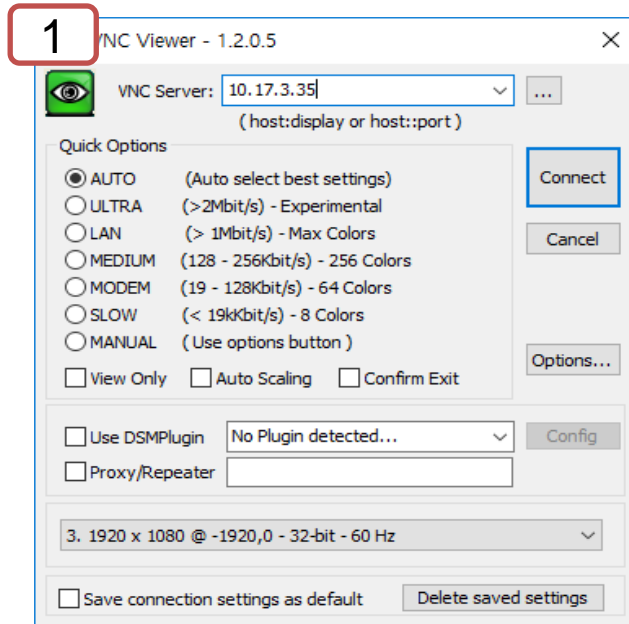


How to connect to THORMANG3



- Example with VNC client (Windows)
 - 1) Execute VNC client program (ex: Ultra VNC Viewer)
 - 2) Input THORMANG 3 MPC's IP address : **10.17.3.30**
 - 3) Input THORMANG 3 MPC's password : **111111**

Accessing THORMANG3 MPC via remote desktop may result in slower performance.





AP Server Information



- **Account**

- User : admin
- PW : admin

- **Network**

1. IP : 10.17.3.1
2. Mode : Router
3. Wireless
 - 5G
SSID : THORMANG-SXX-5G
PW : 11111111
 - 2.4G
SSID : THORMANG-SXX
PW : 11111111

- **Mode Description**

- Orange : Router
- Green : Repeater
- Red : AP
- RESET : 10 sec





1. Connection to THORMANG3



- **Connect to the MPC(Motion PC)**

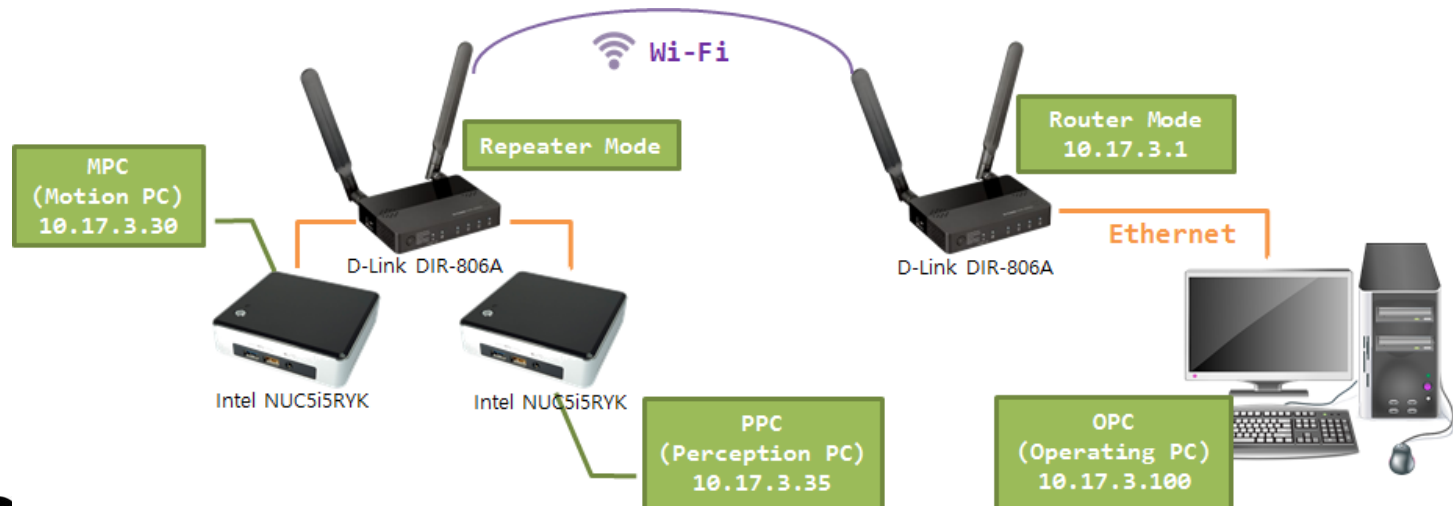
- via ssh
open terminal and type as following (*pw : 111111*)

```
$ ssh robotis@10.17.3.30
```

- **Connect to the PPC(Perception PC)**

- via ssh
open terminal and type as following (*pw : 111111*)

```
$ ssh robotis@10.17.3.35
```





2. Time Synchronization



- Timing Issues
- **MPC : Synchronize time with the PPC**
 - Connect to the MPC
 - Synchronize time
 - If this is the first synchronization, create the script file.

- Create the script file

```
$ gedit ~/timesync
```

- Type below contents

```
#!/home/robotis  
sudo date --set='-2 secs'  
sudo ntpdate 10.17.3.35  
sudo hwclock -w
```

- Add execute permission

```
$ sudo chmod +x ~/timesync
```

- Run the script

```
$ ~/timesync
```



3. Running THORMANG3



- [WIKI](#)
- **Execute the programs on the PPC**
 - **roscore** (ROS_MASTER_URI)
 - Connect to the PPC
 - Launch [roscore](#)

```
$ roscore
```

- **thormang3 sensors**
 - Connect to the PPC
 - Execute [thormang3_sensors.launch](#) file

```
$ roslaunch thormang3_sensors thormang3_sensors.launch
```



3. Running THORMANG3



- Execute the programs on the MPC
 - **thormang3 manager**
 - Connect to the PPC
 - Execute [thormang3_manager.launch](#) file

```
$ roslaunch thormang3_manager thormang3_manager.launch
```




4. Remote Control



- [WIKI](#)
- **OPC : Synchronize time with the PPC**
 - Synchronize time
 - If this is the first synchronization, create the script file.

- Create the script file

```
$ gedit ~/timesync
```

- Type below contents

```
#!/home/robotis  
sudo date --set='-2 secs'  
sudo ntpdate 10.17.3.35  
sudo hwclock -w
```

- Add execute permission

```
$ sudo chmod +x ~/timesync
```

- Execute the script

```
$ ~/timesync
```



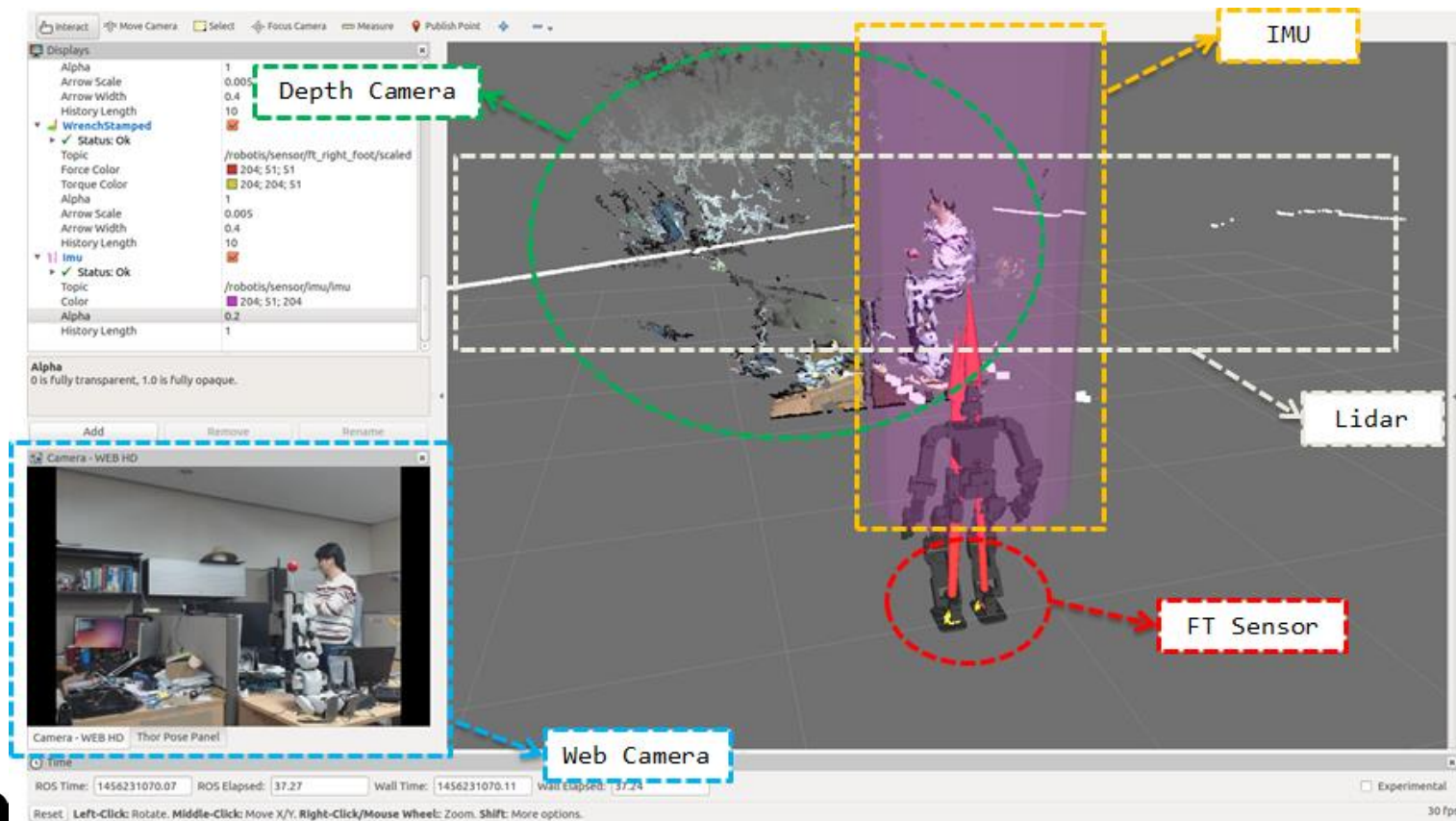
4. Remote Control



- **Visualization Tool**

- After running THORMANG3, Run Visualization Tool
 - Open a terminal and Type as following

```
$ roslaunch thormang3_description thormang3_opc.launch
```





4. Remote Control



- **GUI Demo**

- After running THORMANG3, Execute [thormang3_demo](#)
 - Open a terminal and Type as following

```
$ roslaunch thormang3_demo thormang3_demo.launch
```

