VLP Sensors on WSL2

Installing ROS2-Humble on Ubuntu 22.04

Prerequisites:
WSL2: Ubuntu 22.04.x Jammy

Reference: [https://docs.ros.org/en/humble/Installation/Ubuntu-Install-Debs.html]

The following shell commands have been tested with bash and zsh.
Set Locale

```
locale  # check for UTF-8

sudo apt update && sudo apt install locales
sudo locale-gen en_US en_US.UTF-8
sudo update-locale LC_ALL=en_US.UTF-8 LANG=en_US.UTF-8
export LANG=en_US.UTF-8

locale  # verify settings
```

Setup Sources

```
sudo apt install software-properties-common
sudo add-apt-repository universe
```

Add ROS2 GPG Key

```
sudo apt update && sudo apt install curl -y
sudo curl -sSL
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -o
/usr/share/keyrings/ros-archive-keyring.gpg
```

Add Repository to source list

```
echo "deb [arch=$(dpkg --print-architecture)
signed-by=/usr/share/keyrings/ros-archive-keyring.gpg]
http://packages.ros.org/ros2/ubuntu $(. /etc/os-release && echo
$UBUNTU_CODENAME) main" | sudo tee /etc/apt/sources.list.d/ros2.list >
/dev/null
```

Install ROS2 Packages

```
sudo apt update && sudo apt upgrade

sudo apt install ros-humble-desktop
```

Test Installation

```
ros2 wtf
```

To Enable ROS2 in your current shell:
On Bash:

```
source /opt/ros/humble/setup.bash
```

On Zsh:

```
source /opt/ros/humble/setup.zsh
```

Common Commands

ros2 --help

ros2 wtf

ros2 topic list

ros2 topic echo <topic>

ros2 topic list --no-daemon # Use this if you find that ros2 is hanging

ros2 topic echo <topic> --no-daemon

ros2 bag --help

```
ros2 bag record --help

ros2 bag record <topic>

ros2 bag play --help

ros2 bag play -l <bagfile>  # the -l flag will loop the bag recording indefinitely.
```

Setting up VLP Sensor on WSL2

Prerequisites:
USB to Ethernet Adapter
Windows 10+ x64 Architecture
Winget or Choco

References:

- [https://github.com/dorssel/usbipd-win]
- [https://wiki.ros.org/velodyne/Tutorials/Getting%20Started%20with%20the%20Velodyne%20VLP16]

In order for our WSL2 to see our local USB devices, we must use a tool called usbipd-win. The repository, which contains a detailed README on installation and use can be found in the reference section above:

To read data from the VLP sensor on WSL2, we need to connect the USB to Ethernet Adapter to our local system, then open the usb device for use on WSL2. From there we can set up the ethernet to be able to read LiDAR data.

Install: In powershell, install usbipd-win.

```
winget install usbipd
```

Once installed, you might need to restart powershell.

The following commands require powershell with administrator privileges

```
usbipd --help
```

List all USB Devices

```
usbipd list
```

To locate which USB is your USB to Ethernet adapter, you may find that it is easier to list all devices with and without the adapter connected to your system to be able to determine which is the adapter. Once you determine which device is your adapter **take note of the BUSID**.

Bind USB Device

```
usbipd bind --busid=<ADAPTER BUSID>
```

Attach device to WSL2

```
usbipd attach --wsl --busid=<ADAPTER BUSID>
```

Note: Attaching devices to a client is non-persistent. You will have to re-attach after a reboot, or when the device resets or is physically unplugged/replugged.
Back in your WSL2 Shell: Use the following command to ensure that a new network interface appeared, and take note of what the interface is called:

Check interfaces

```
ip link show
```

Enable the interface

```
sudo ifconfig <interface> 192.168.1.10 netmask 255.255.255.0 up
```

Note the IP address field 192.168.1.10 (“10” can be any number except in a range between 1 and 254, **except 201**)

Ensure that your VLP sensor is powered on and connected to the system via the USB to Ethernet adapter that you set up.

You should now be able to ping 192.168.1.201, which is the sensor itself. The lynx tool will show you the configuration site that the sensor uses, but you cannot configure the sensor from here.

```
ping 192.168.1.201

lynx 192.168.1.201
```

Setting up VLP Sensor on ROS2

Prerequisites:

ROS2-Humble installed

Install the ROS2 velodyne drivers

```
sudo apt-get install ros-humble-velodyne
```

Ensure that ROS2 is sourced

On Bash:

```
source /opt/ros/humble/setup.bash
```

On Zsh:

```
source /opt/ros/humble/setup.zsh
```

Start VLP ROS2 Nodes

```
ros2 launch velodyne velodyne-all-nodes-[sensor_version]-launch.py
```

Replace [sensor_version] with your sensor type. Must be from the list below:

- VLP16
- VLP16-composed
- VLP32C
- VLP32C-composed
- VLS128
- VLP128-composed

Visualizing LiDAR Data

In another shell (make sure you source ROS2 with the same commands as before), run RVIZ with the -f flag to tell RVIZ2 that the fixed-frame should match that of a velodyne sensor.

```
rviz2 -f velodyne
```

On the bottom left of the Displays section, click “Add”. Click the “By Topic” tab and select the “/velodyne_points” topic. You should now be able to see the VLP sensor data.

Optional: Back in the Displays section, click the dropdown arrow for PointCloud2, click the field for Style which is default as “Flat Squares” and change it to “Points”. This allows for more visibility for the pointcloud.