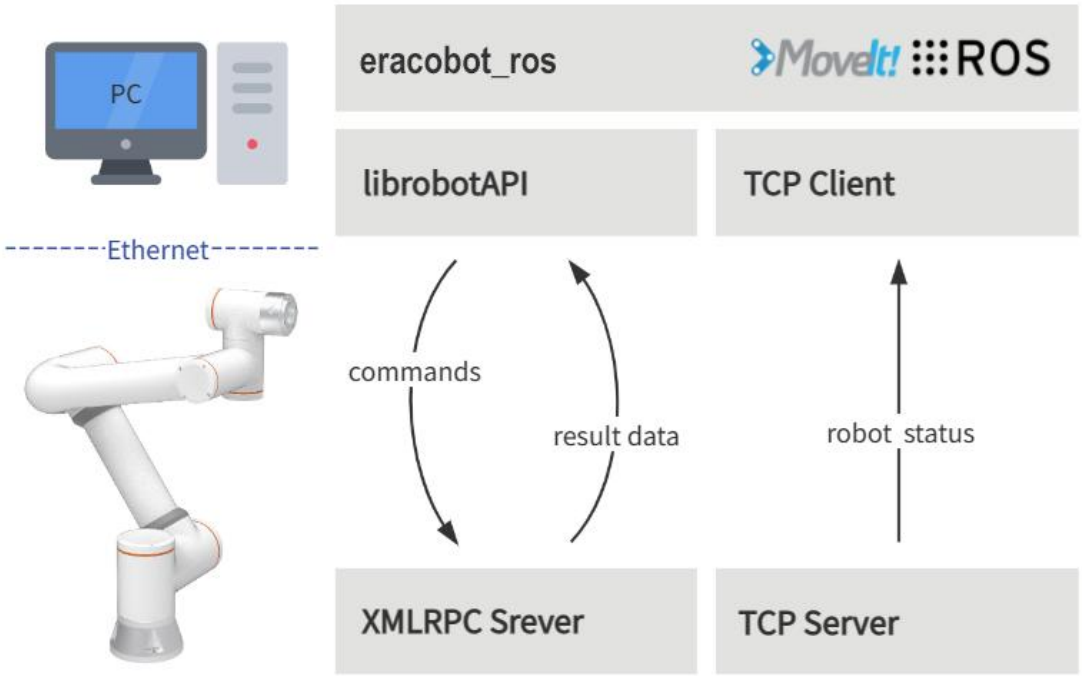
1 Overview

The brief architecture of eracobot_ros is shown in the figure below. The collaborative robot side provides an XMLRPC server and a TCP server.
The XMLRPC server mainly provides robot instruction API to complete robot movement and status value acquisition functions.
The status feedback TCP server provides real-time feedback of the robot status with a feedback period of 8ms.
ROS and Moveit! have been installed on the user's PC, and eracobot_ros has been compiled. Each function package in eracobot_ros includes the lib library of the robot API, and in eracobot_hw, a TCP client is established to communicate with the robot status feedback server to obtain robot status feedback data.



2 Installation

This chapter introduces how to build eracobot_ros and the required installation environment.

2.1 Installation Environment

Recommend Installation environment as follow:

- Ubuntu 18.04 LTS Bionic Beaver & ROS Melodic Morenia
- Ubuntu 20.04 LTS Focal Fossa & ROS Noetic Ninjemys

The following instructions are for Ubuntu 20.04 LTS systems and ROS Noetic Ninjemys. If you are using Melodic, replace noetic with melodic in the command line.

2.2 ROS Installation

After finishing installation of Ubuntu operate system on PC,it needs to install and configure environment of ROS Noetic , link of https://wiki.ros.org/noetic/Installation/Ubuntu is for showing Ubuntu install of ROS Noetic.
After configure ROS Noetic well,it needs to install environment as following:

```
echo "source /opt/ros/noetic/setup.bash" >> ~/.bashrc
source ~/.bashrc
sudo apt-get install -y \
    ros-noetic-rosparam-shortcuts \
    ros-noetic-ros-control \
    ros-noetic-ros-controllers \
    ros-noetic-moveit
```

2.3 Compile Package of ROS

After ROS Noetic is properly installed and configured, create a Catkin workspace in a directory of your choice.

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

And then clone library of eracobot_ros from Gitee

```
cd ~/catkin_ws/src
git clone https://gitee.com/fair-innovation/frcobot_ros.git
```

Build package of eracobot_ros

```
cd ~/catkin_ws
catkin_make
echo "source ~/catkin_ws/devel/setup.bash" >> ~/.bashrc
source ~/.bashrc
```

If an error occurs, please check whether the packages in the ROS installation requirements have been installed successfully. After the compilation is completed, copy the lib library to the ROS lib environment (the path is: /opt/ros/noetic/lib) so that

the program can run normally.

```
# 此处catkin_ws默认路径为"~"，如有不同，将"~"改为实际路径即可
sudo cp ~/catkin_ws/src/frcobot_ros/frcobot_hw/lib/* /opt/ros/noetic/lib
```

The default path of catkin_ws here is "~". If it is different, change "~" to the actual path.

3 Quick Start

3.1 eracobot_hw

Eracobot_hw mainly supply basic functions of communicate with cobot,which includes

- Status feedback msg of Cobot
- Demo Command of control cobot
- Status feedback nodes and topics of cobot
- Quick start status nodes and demo command via launch file

Contents of eracobot_hw.launch are as following:

```
<launch>

    <!-- params -->
    <param name="robot_ip" type="string" value="192.168.58.2"/>
    <param name="robot_port" type="int" value="8083"/>

    <!-- frcobot status node -->
    <node pkg="frcobot_hw" type="frcobot_status_node" name="frcobot_status_node" output="screen" />

    <!-- frcobot control demo -->
    <node pkg="frcobot_hw" type="frcobot_cmd_demo" name="frcobot_cmd_demo" output="screen" />

</launch>
```

Important:

- **robot_ip and robot_port need to be set same with the IP and port of the controlled cobot**
- **Default IP of ex-factory robot is 192.168.58.2, and the user status feedback port is 8083.**

The following commands can be used to quickly start the robot status feedback node and command demo function.

```
roslaunch frcobot_hw frcobot_hw.launch
```

Open a new terminal and use the following commands to print and view real-time status feedback data.

```
rostopic ehco /frcobot_status
```