

Installation guide

Versions

Installation guide for software version V1 (V1.0, V1.1 and V1.2)

System requirements

Pick^[+] software version is currently compatible with the following hardware components:

- **Robots**
 - Universal Robots: models UR3e, UR5e, UR10e and UR16e
- **Camera**
 - Intel RealSense D435i
- **Client PC / operating system**
 - Ubuntu 20.04, Windows 10
 - Minimum screen resolution: 1920x1080



Besides the screen resolution it is important to set the display scale to 100%. By default, Windows sets the scale to 125%. It should be changed to 100% for a proper visualization of the client.

Pick^[+] components

Pick^[+] is served in two boxes: the **PC** box (box A) and the **camera** box (box B).

Box A

Box A contains the following elements:

1. PC with Pick^[+] server and client installed.
2. Ethernet cable for connection between PC and robot.



Ethernet cable for connection between PC and external client is not included. Likewise, peripherals such as keyboard, mouse and screen for PC are not included.

Box B

Box B contains the following elements (see image below):

1. Camera Intel RealSense D435i mounted on LED case.
2. Camera adapter for eye-in-hand mode (camera in robot).
3. Camera adapter for hand-eye mode (external camera).
4. Calibration plate.

5. Scanning mat.
6. LED cable.
7. Camera-PC cable.
8. Tool adapter.
9. USB with *Pick[+]* clients, URcap and user manuals.
10. Mounting screws.



Camera mounting (eye-in-hand)

Camera in robot (eye-in-hand)

2 Steps

1. Mount camera case with robot adapter with the provided mounting screws (see images below).



It is advisable to mount camera case facing the UR tool connector above tool flange (see figure on the right).



2. Mount tool adapter on top of robot adapter with the provided mounting screws.



Make sure centering slot in tool adapter matches that of the robot—i.e., aligned with the UR tool connector (see figure below).



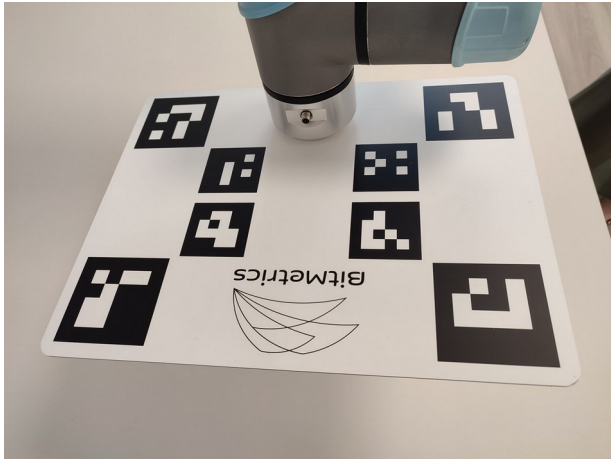
Calibration plate mounting (hand-eye)

Camera external (i.e., away from robot).

In such cases the camera and robot are calibrated by mounting the calibration plate on the robot tool flange.

1 Step

1. Mount calibration plate using centering pin and provided mounting screws (see images below).



LED lights connection

2 Steps

1. Connect non-pinned end of the cable to the desired Digital Output connections rack: red cable in DO slot and white cable in corresponding 0V slot (see left image).
2. Connect the pinned end of the cable in the connection slot in the camera case (see right image).



Camera connection

The camera needs to be connected to a USB port of type **3.1Gen2** (i.e.**10GBps**).



The camera will not connect through a USB of type 2.0. In USB 3.0 or USB 3.1Gen1 connectivity will be shown but only the RGB sensor will work. Depth requires a USB of type 3.1Gen2 or higher.

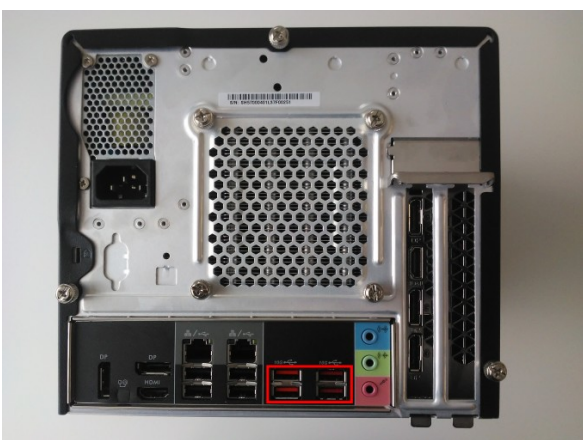
2 Steps

1. Connect USB C end of cable to the camera (see image below).

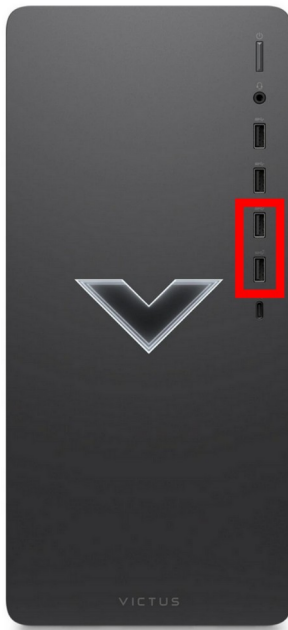


2. Connect USB A3 end of the cable to one of the 3.1Gen2 or 3.2 USB ports in the PC.

- For model Shuttle



- For model HP Victus



URcap installation

Pick[+] comes with a URcap with program nodes that help in the preparation of the robot routine.



The URcap has been tested for Polyscope software versions ranging from 5.8 to 5.11.

4 Steps

Proceed as it is usual to install URcaps in UR PolyScope:

1. Mount pen drive in UR PolyScope with a copy of the URcap (named *PickPlus-1.0.SNAPSHOT.urcap*). A copy of this file can be found in the provided pendrive or else it can be downloaded from the *Pick[+]* repository in cloud (see **Downloads** section).
2. Move to **Settings > System > URcaps** on the hamburger menu in UR polyscope.
3. Click on the **add** button ('+' sign) and select the URcap from the pen drive.
4. Restart PolyScope to complete installation.

Client installation / upgrade

Two possible *Pick[+]* client installations: *standalone* (i.e., in server PC) or *external*.

Requirements (see **System requirements** above):

- Operating system: **Windows 10** or **Ubuntu 20.04**.
- Minimum screen resolution: **1920x1080**.

2 Steps

1. Move/download file *pickplus.zip* to your PC, either from the installation USB or from the *Pick[+]* repository in cloud (see **Downloads** section).
2. Uncompress file and save in corresponding folder.

Standalone

- For model Shuttle
Save the *pickplus* folder with the new client application in directory */home/pickplus/pickplus_client*

Server installation / upgrade

6 Steps + environment update

1. Download server file (named *pickplus.zip*) from the *Pick[+]* repository in cloud (see **Downloads** section).
2. Save file in pendrive.
3. In server PC navigate to the application directory: */home/pickplus/pickplus*.
4. Remove application folder and files *credentials.txt*, *pickplus.py*, *execution_server.py* and, if it exists, *upgrade.sh*.
5. Save file *pickplus.zip* in this directory (*/home/pickplus/pickplus*) and uncompress with the following command from terminal:

```
pickplus@pickplus-BM:~/pickplus$ unzip pickplus.zip
```

6. Make sure that the application directory and files *credentials.txt*, *pickplus.py* and *execution_server.py* are all in the current directory. If an environment update is required there will also be a file named *upgrade.sh*.
7. * If *upgrade.sh* is in the downloaded folder an upgrade of the Python environment will be required. To proceed first make sure that you are **connected to the internet**.



You may use any of the network cards available in the PC to connect to the internet (ethernet or wireless). Just make sure that, after finishing the upgrade, the two ethernet connections are properly set to communicate to robot and external client (as described in this guide) and that there are no network conflicts between connections (to play safe, disable wireless connectivity when finishing upgrade).

We first make sure that the file is executable:

```
pickplus@pickplus-BM:~/pickplus$ chmod +x upgrade.sh
```

We execute:

```
pickplus@pickplus-BM:~/pickplus$ ./upgrade.sh
```



You may need `sudo` privileges to execute and/or make the file executable. Ask your administrator about the system's password. To make the file executable with `sudo`, enter `sudo chmod +x upgrade.sh`

Client connectivity and execution

Two ways to execute the *Pick[+]* client: *standalone* (i.e., from server PC) and *external*.

Standalone

Client installed and executed from server PC.

2 Steps

1. Move to the *Pick[+]* client directory in terminal
2. Execute client: in terminal execute the command `./pickplus.sh`

- **For model Shuttle**

Open terminal and move to `/home/pickplus/pickplus_client/pickplus:`

```
pickplus@pickplus-BM:~$ cd pickplus_client/pickplus
```

Execute client:

```
pickplus@pickplus-BM:~/pickplus_client/pickplus$ ./pickplus.sh
```

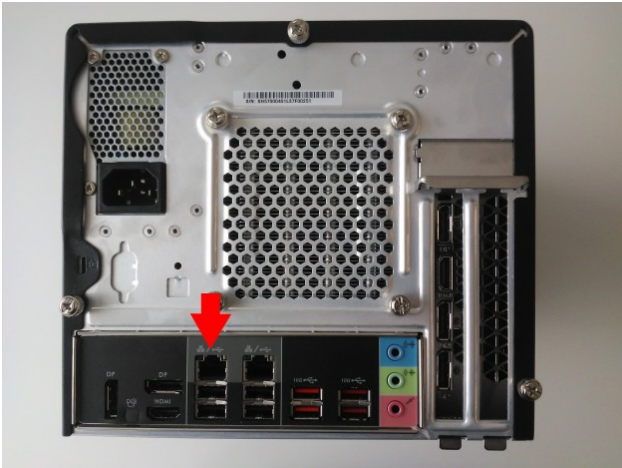
External

Client installed on independent PC.

4 Steps

1. Connect ethernet cable to the corresponding port in *Pick[+]* server. Make sure server is ON before attempting to connect client.

- For model Shuttle



- For model HP Victus



2. Configure ethernet connection manually as follows on external PC:
 - IP: **200.200.1.1**
 - Network mask: **255.255.255.0**
 - Gateway: **200.200.1.100** (Pick[+] server listens on this IP)



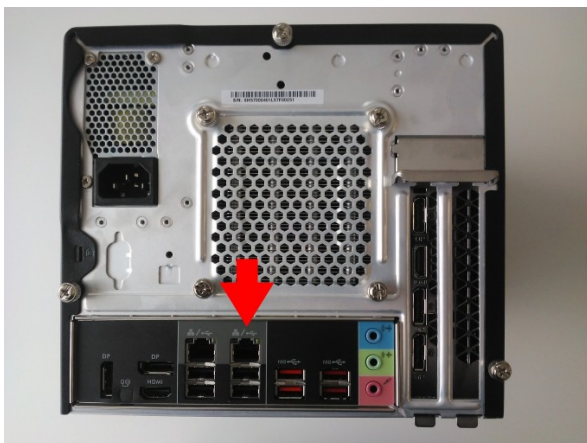
In older settings of the *Pick[+]* server the IP set to communicate with the client may be set to 192.168.1.100. If so, change the server IP to 200.200.1.100.

3. In the systems terminal, move to the pickplus directory: the directory where you saved the client folder *pickplus* (once unzipped) that contains the client executable.
4. Once in the client folder execute:
 - *pickplus.sh* in Ubuntu (by writing in terminal `./pickplus.sh`)
 - *pickplus.exe* in Windows (by writing in terminal `pickplus.exe`)

Robot connection

2 Steps

1. Connect ethernet cable to the corresponding port in *Pick[+]* server/PC (see images below for the models *Shuttle* and *HP Victus*).
- For model Shuttle



- For model HP Victus



2. Configure network connection in UR Polyscope as follows:
 - IP: **200.200.2.2**
 - Network mask: **255.255.255.0**
 - Gateway: **200.200.2.1** (*Pick[+]* server listens to robot on this IP)

Downloads



In older settings of the *Pick[+]* server the IP set to communicate with the robot may be set to 200.200.2.1. If so, change the server IP to 200.200.2.1.

All *Pick[+]* code can be downloaded from the *Pick[+]* repository:

<http://www.bitmetrics-downloads.es>



When downloading code, make sure about the compatibility of all the code components. To play safe, stay on the same version for all components.