

QBii Plus ROS2 Setup Guide

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QBii Plus ROS2 Setup Guide

1. Hardware Setup (see Figure 1)

- Make sure the power switch is in off position (switch LED should be in raised position).
- Connect a USB keyboard to the Raspberry Pi (located at the back of the Sensor Deck). If the Short USB Cable connecting the Pi and the robot's ESP32 is in place, unplug temporarily.
- Connect HDMI cable to the Raspberry Pi (located on the left side of the Sensor Deck). Attach to a monitor of choice.
- Turn on QBii Plus



Figure 1: Ports and Cables

2. Network Setup

- After turning on the robot, wait for the Raspberry Pi to load.
- Login to Pi with the following credentials:
 - User: qrs
 - Password: qrs
- Change the wireless configuration by modifying the configuration in '50-cloud-init.yaml' file (location: /etc/netplan/50-cloud-init.yaml)

3. Accessing QBii Plus over Wi-Fi

- After disconnecting HDMI and USB keyboard from the Raspberry Pi, connect (or re-connect) the included USB cable to QBii Plus as shown in Figure 1.
- After a reboot the Raspberry will connect to the local wireless network and the ROS2 nodes will launch automatically
- To verify the wireless connection use a IP scanner to see the IP address of the Pi
 - Suggested IP scanner app: <u>Angry IP Scanner</u>
 - Select IP Range and scan the IP on the office subnet 192.168.0.0 to 192.168.0.255.



 Then, click on the bar icon next to the Start button to open the Fetchers panel

Start	
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• In the Fetchers panel, you can enable MAC Vendor which will help you discover which IP is the Pi.

Fetchers × Here you can select fetchers for scanning. Fetchers are represented by columns. Selected fetchers Available fetchers Ping 1 TL Hostname 1 MAC Address Ports 1 Comments MAC Vendor ← HTTP Sender Image: Hostname Image: HTTP Sender NetBIOS Info Packet Loss HTTP Proxy	<u></u>				
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4. Configuring Foxglove Studio

- This section assumes you are accessing QBii Plus from Foxglove Studio.
- Go to Foxglove studio
 - Log in with preferred credentials
 - Add new local connection by inserting the previously found Raspberry Pi IP in the connection input field
 - Only replace localhost with the Raspberry Pi IP



or ^o Foxglove WebSocket	Connect to a ROS 1, ROS 2, or custom system using the Foxglove WebSocket protoco For ROS systems, be sure to first install the foxglove_bridge ROS package.
o ^{ro} Rosbridge	WebSocket URL
ROS 1	ws://localhost:8765
[III] Velodyne Lidar	
Remote file	
ROS 2	
	Manu daga far DOO 1 Manu daga far DOO 0 Manu daga far sustan data

- Select layout and Open from file (sample layout json file is provided in zip folder)
- Change the topic of each panel to the available topic running on the QBii Plus

∵ ~ G	ws://192.168.0.14:8765 foxglove_bridge / 2024-01-13 5:08:51.827 PM EST	ROSA ~	
/rosa/camera/frameLabeled 🌣 :	3D ::	Q Search layouts	¢ :
	7722 MS (1772)	Create new layout Import from file	Ø



• List of topics should look something like the following:

👬 ~ 🕞			
Panel Topics Problems		×	/
Q Filter by topic or schema name			
/qbii0/cmd_vel geometry_msgs/msg/Twist			
/qbii0/odom/pose geometry_msgs/msg/PoseWithCovarianceStamped	ΞÐ		
/rosa/battery sensor_msgs/msg/BatteryState	ŒÐ		
/rosa/camera/frame sensor_msgs/msg/Image	eÐ		
/rosa/camera/frame/compressed sensor_msgs/msg/CompressedImage	ΞÐ		
/rosa/camera/frameLabeled 1.75 Hz	1,354		1
/rosa/camera/frameLabeled/compressed sensor_msgs/msg/CompressedImage	ΞÐ		
/rosa/cmd_vel geometry_msgs/msg/Twist	ΞÐ		
/rosa/imu sensor_msgs/msg/Imu	ΞÐ		
/rosa/joints sensor_msgs/msg/JointState	ΕÐ		
/rosa/odom nav_msgs/msg/Odometry	ΞÐ		
/rosa/odom/pose geometry_msgs/msg/PoseWithCovarianc	7,859		
/rosa/odometry/filtered nav_msgs/msg/Odometry	ŒÐ		
/rosa/odometry/filtered/pose geometry_msgs/msg/PoseWithCovarianceStamped	ΞÐ		
/rosa/tof/front_left sensor_msgs/msg/Range	EÐ		
/rosa/tof/front_right sensor_msgs/msg/Range 17.11 Hz	7,861		

- Teleop panel configuration should look similar to the following:
- Clicking the arrows on the Teleop panel should drive the QBii Plus robot over Wi-Fi

Panel Topics Problems	×	/rosa/camera/frameLabeled	🌣 i 3D	¢ :
Teleop panel Title ▼ General	Teleop		88 MS (1-49	
Publish rate	10		\sim	1
Topic	/qbii0/cmd_vel			
✓ Up Button				$\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{\mathbf{$
Field	linear-x 👻		/	
Value	0.3			rosa/camera_optical
				×14
Field	linear-x 💌			
Value	-0.3			
✓ Left Button			15	
Field	angular-z 💌		-	
Value	1			
✓ Right Button				
Field	angular-z 💌			
Value	-1			\mathbf{X}
			Teleop	¢ :
				4
				-
		Re	set view	

5. Configuring with Custom ROS2 Nodes

- QBii Plus ROS2 nodes are exposed over local wireless network using <u>foxglove bridge</u>
- All QBii Plus topics can be accessed by integrating foxglove bridge to your custom ros nodes and through ws://[qbii-ip-address]:8765 websocket