

Robotics, Integration, and Automation

CREATING THE ROBOT HARDWARE MODULE

| Name | Class/Period | Date |
|------|--------------|------|
| | | |

1. Overview

In this lab activity, you will create and add a hardware module to your PLC programming project. The hardware (IO) module, which represents the robot controller's EtherNet/IP board, will allow the PLC to communicate with the robot.

- Note:** In order to differentiate between the programmable logic controller and the robot controller, the two devices are referred to as the PLC and the robot, respectively.

2. Performance Objectives

After completing this lab activity, you will be able to:

- Add the robot hardware module to the project.
- Configure the hardware module.
- Enable communication between the PLC and the robot.

3. Required Materials

You need the following materials to complete the lab activity:

- SmartCart 4.0
- Computer
- Ethernet cables

4. Required Software

Logix Designer is required for this lab activity. It is included in the Studio 5000 suite. Ensure that the software is installed on your PC and has a valid license. If you are having problems installing or licensing the software, contact your instructor or IT manager.

5. Inventory and Safety

Before beginning the lab activity, review this checklist and mark off each item as you complete it.

- All hardware components are available for this lab activity.
- Hands, hair, and clothing are securely away from the work area.
- The work area is clean and devoid of food or drink.
- Review the SmartCart safety guidelines.
- Read through the entirety of this lab activity to familiarize yourself with the requirements.

6. Lab Activity

6.1. Preliminary Steps

In this task, you will return the states of your workstation (computer), PLC, and robot to the states that they were at the end of the previous lab activity.

Confirm that:

- The workstation has a static IP address of 192.168.0.1.
- The PLC’s A1 port has a static IP address of 192.168.0.2. This can be seen on the controller’s scrolling screen.
- The PLC’s firmware revision matches the revision of the Logix Designer programming software.
- The robot has a static IP address of 192.168.0.3.
- The robot has been configured for EtherNet/IP communication with the PLC.

For instructions on how to modify the workstation, the PLC, and the robot to match the above configurations, refer to the previous lab activities of this section.

6.2. Creating the Robot Hardware Module

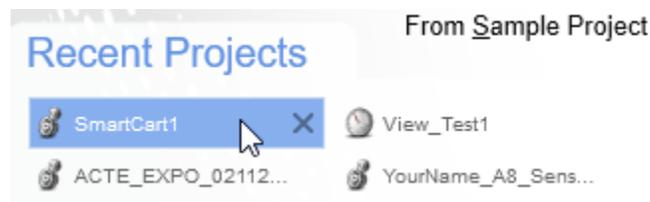
In this section, you will open your Studio 5000 Logix Designer project and add the hardware module.

Perform these steps.

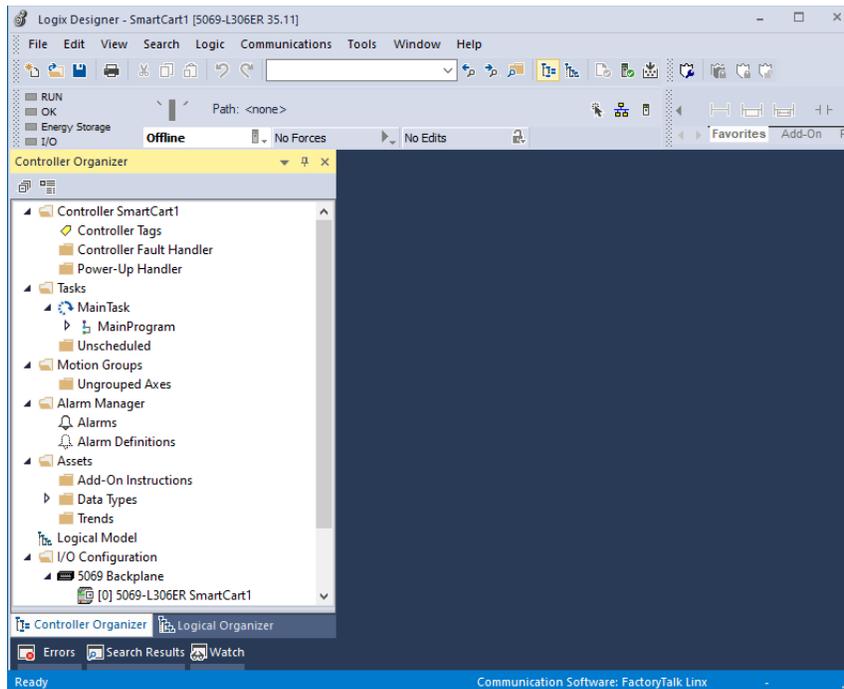
1. Run Studio 5000.
2. Open the project you created previously.



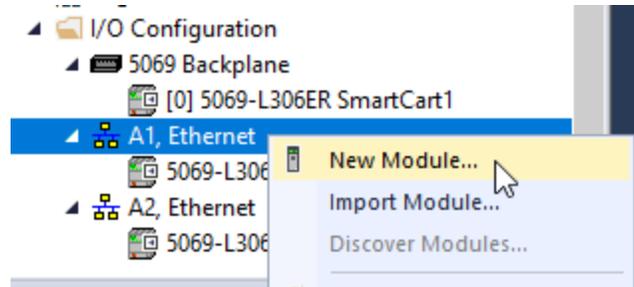
The project is probably found in the Recent Projects area.



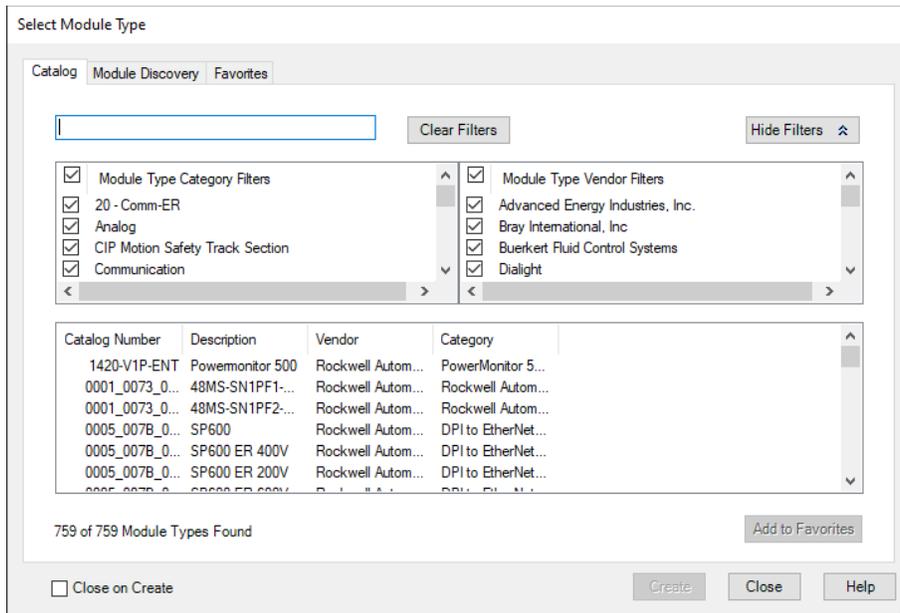
The project opens. The only hardware that is currently in the I/O Configuration folder is the PLC.



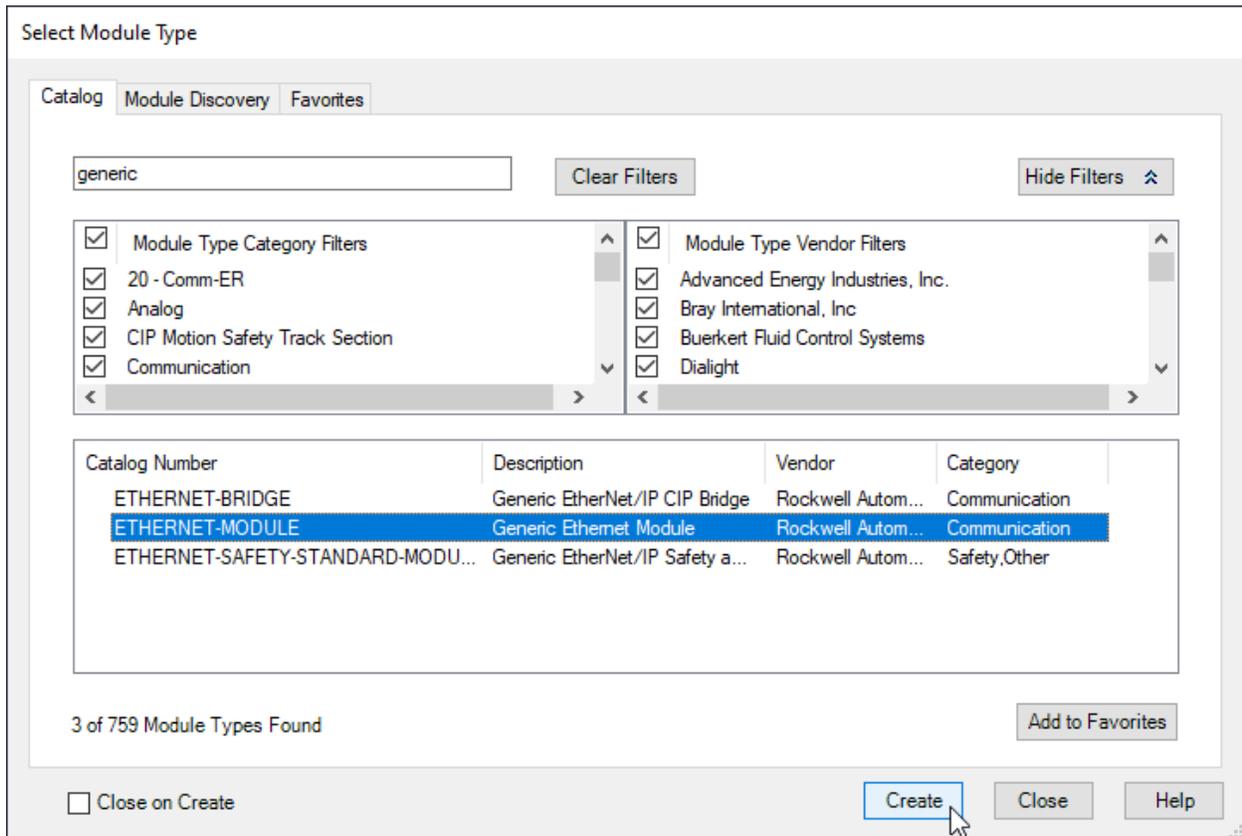
3. In the I/O Configuration folder, right-click **A1, Ethernet** and in the popup menu, select **New Module**.



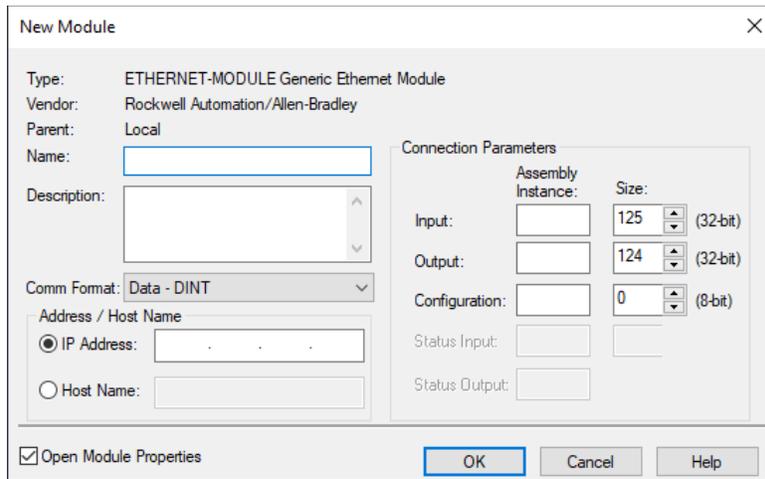
4. The hardware catalog is displayed.



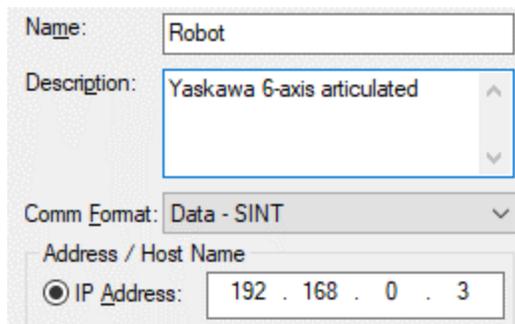
5. Use the search field to find the ETHERNET-MODULE as shown. Select the module, and then click **Create**.



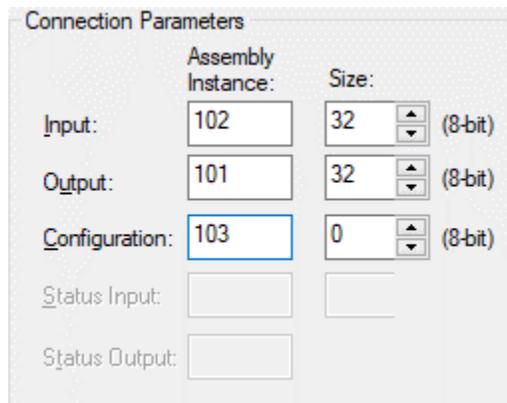
The New Module window opens.



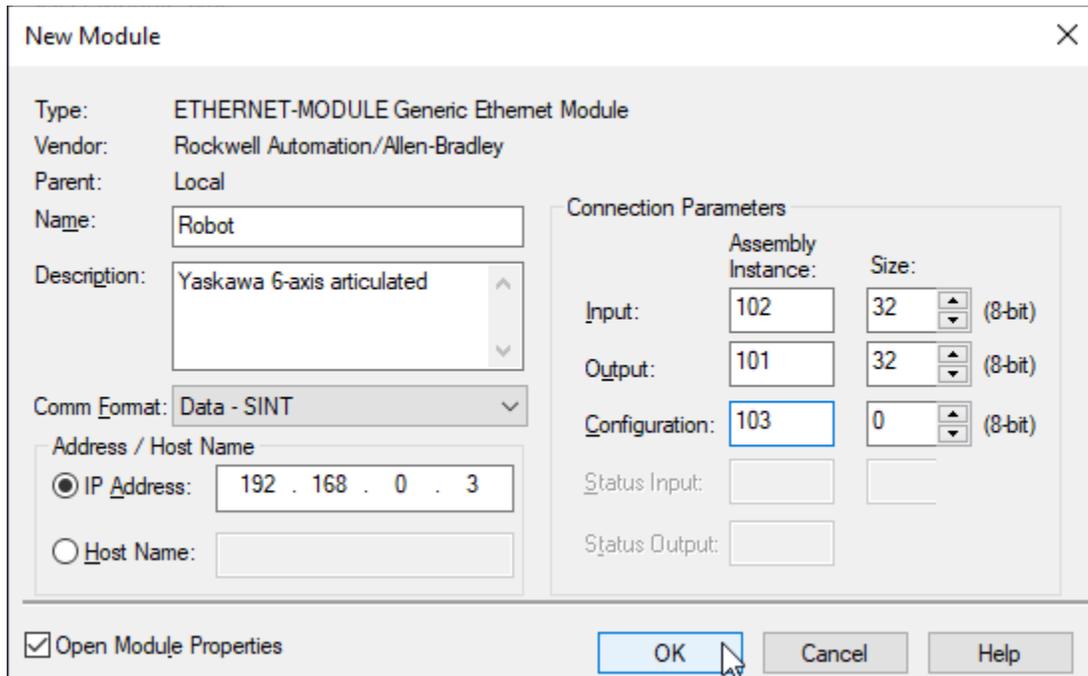
- On the left side, enter a name and description for the module. Change the Comm Format to **Data – SINT** and enter the robot’s IP address.



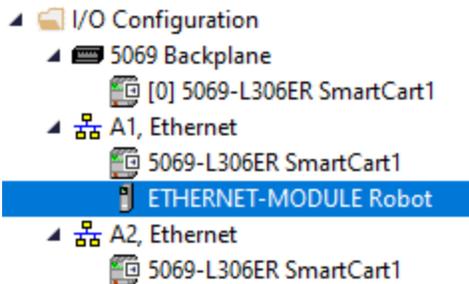
- Enter the connection parameters as shown. Note that these correspond to the parameters you entered when registering the PLC device during configuration on the robot (see the end of the EtherNet/IP board configuration section of the previous lab activity). However, the input and output assembly instances are now switched, because the PLC’s input is the robot’s output, and the PLC’s output is the robot’s input.



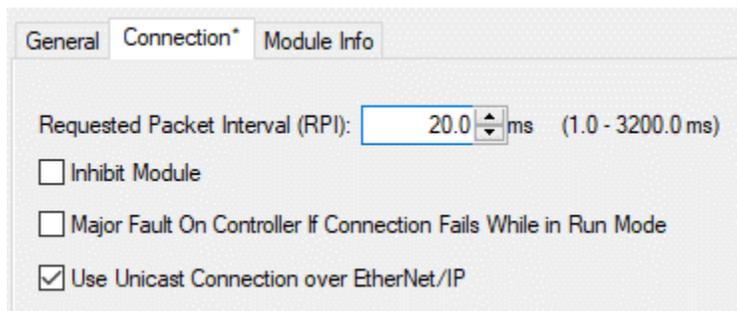
- Click **OK** to create the hardware module.



The module is added to the Controller Organizer. At any time, you can double-click the module to open its properties window.

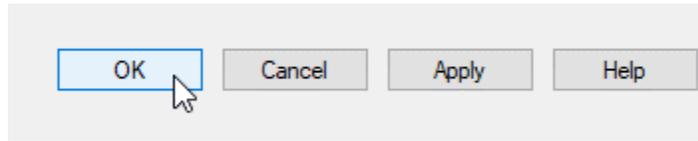


- Open the module’s properties window if it is not already open. In the Connection tab, change the Requested Packet Interval (RPI) to **20** ms. Recall that you entered an RPI of 20 ms when registering the PLC on the robot in the previous lab activity.

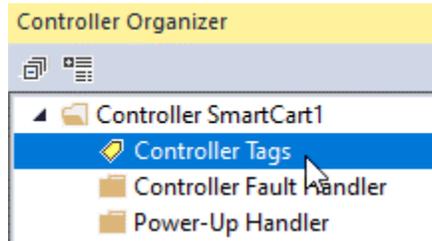


Did You Know? RPI specifies the period at which data updates over a connection.

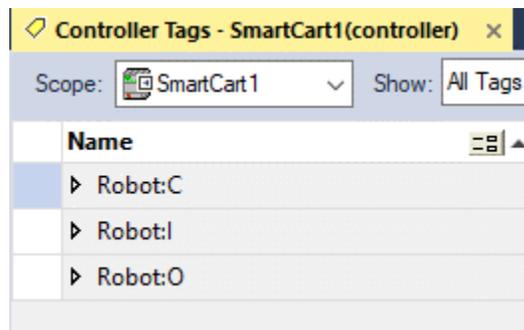
10. Click **OK** to confirm the change. The module’s property window closes.



11. In the Controller Organizer, double-click **Controller Tags**.



The Data Monitor (the Monitor Tags tab) opens. Note that three groups of module tags have been added. In the next lab activity, you will use these module tags to exchange data between the PLC and the robot.



6.3. Downloading and Confirming the Connection

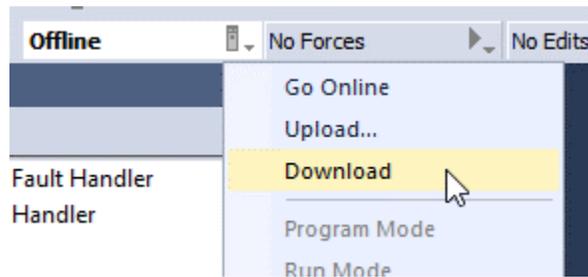
In this task, you will download the project to the PLC and ensure that the I/O configuration has been successful.

Perform these steps:

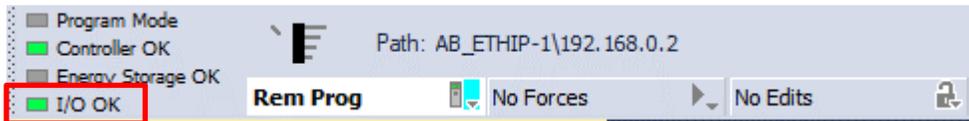
1. Power up the I/O box. Wait for the PLC to power on.
2. Power up the robot. Ensure that the mode key on the pendant is set to Teach mode.

① **Troubleshooting tip:** Ping the PLC and the robot to confirm network connectivity.

3. Download the project to the PLC.



4. In the PLC status area, ensure that the **I/O OK** LED is on.



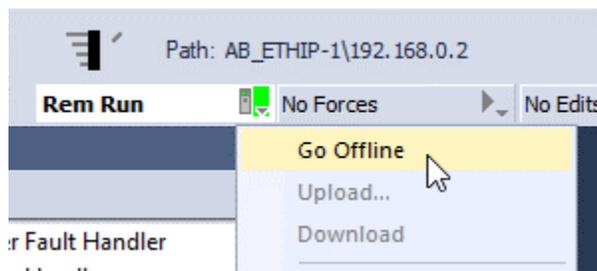
① **Note:** If the PLC status area shows an **I/O Not Responding** message, troubleshoot the project's module configuration, the network connection to the robot, and the robot's EtherNet/IP board configuration.



5. Switch to Rem Run mode (Communications > Run Mode) and confirm that the I/O is still OK.



6. Go offline.



7. Save the project. You will use it in the next lab activity.



7. Authentic Skill Assessment

Have your instructor verify that your work meets the requirements in the performance objectives and sign below. Keep this lab activity sheet for future reference.

| Instructor Signature | Date |
|----------------------|------|
| | |

8. Reset Steps

This lab activity does not have any reset steps.

9. Shutdown

Unless instructed otherwise by your instructor, review and complete each of the items on the checklist below.

- Power down the robot.
- Power down the I/O box.