

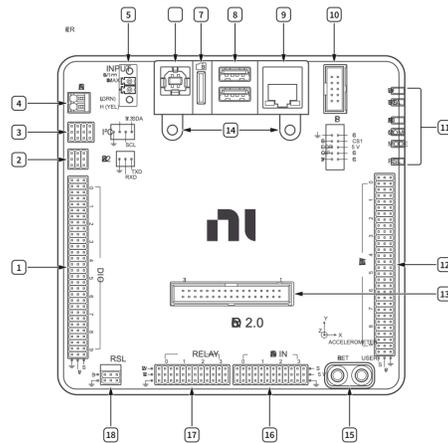
A Guide For Roborio 2.0

A Quick Guide For RoboRIO 2.0

RoboRIO 2.0 is a portable configurable device that is used to design and control the robotics and mechatronics systems used in the FRC[10]. The RoboRIO is like the brain of a FRC robot. The roboRIO has a basic architecture of a real-time processor and field-programmable gate array but it is powerful, smaller, and lighter than the previous system FRC has developed[6]. In the past, through the 2009 to 2014 CompactRIO (cRIO) was used in the FRC tournaments, and in the 2015 it was replaced with NI RoboRIO[3]. In this guide; the features of roboRIO 2.0 will be covered.

In the image below a roboRIO 2.0 is represented, and each feature is labeled with a number. Each of them will be covered in order:

Figure 1. Features of Roborio[5]



1. Digital input and output (DIO) port	2. RS-232 port	3. I2C port
4. CAN port	5. Power connector	6. USB Device port
7. microSD card slot	8. USB Host ports	9. Ethernet port
10. Serial peripheral interface bus (SPI) port	11. LEDs	12. Pulse-width modulation (PWM) port
13. myRIO Expansion Port (MXP)	14. MXP retention mount	15. User and Reset buttons
16. Analog input (AI) port	17. Relay port	18. Robot signal light (RSL) port

1. Digital input and output (DIO) port: It is used for digital sensors such as switches or encoders. Three cables are connected to this port, which are the ground, voltage and signal for each sensor.[2][6]
2. RS-232 port: It is used for communicating with peripheral devices. TXD is the output signal, it allows serial transmit output with ± 5 V to ± 15 V signal levels, and RXD is the input signal, it allows serial receive input with ± 15 V input voltage range.[5][8]

3. I2C port: It is used to communicate with the sensors. It can communicate with sensors like LCD/LED drivers, capacitive sensors, real time clocks and Arduino.[2]
4. CAN port: Controller Area Network units (nodes) are connected by a bus. Each node requires a microprocessor to receive and transmit messages. It is used to power/signal TalsonSRX's, Falcons, the pneumatics control module, and the power distribution panel.[2][6]
5. Power connector: The place where the roboRIO gets wired to the power distribution hub.
6. USB Device port: Provides a way to connect roboRIO to the devices for loading code and driving robots.[6]
7. MicroSD card slot: This slot is for the microSD card which holds the LabVIEW RT operating system for the roboRIO 2.0.[5]
8. USB Host ports: It is used for interfacing the robotRIO with USB devices.[6]
9. Ethernet port: It is used for communication with wireless devices.[6]
10. Serial peripheral interface bus (SPI) port: It is used for interfacing with specific sensors like gyro.[6]
11. LEDs: It used to check the status of the systems.[6]
12. Pulse-width modulation (PWM) port: The roboRIO uses PWM to approximate an analog signal.[2]
13. myRIO Expansion Port (MXP):It is a multi-purpose extension for DIO, I2C and PWM. It includes analog input and analog output. MXP device that can be connected through this port can break out all usable signal pins on the roboRIO.[2][4]
14. MXP retention mount: It is used to secure the connection of the MXP with two screws.[7]
15. User and Reset buttons: Pressing and releasing the Reset button restarts the processor and the FPGA. The User Button produces a logic TRUE when depressed and a logic FALSE when not depressed. The User Button is not debounced in hardware.[5]

16. Analog input (AI) port: Analog inputs are connected to here and analog inputs are typically used for sensors whose measurements vary continuously over a range. They can communicate by outputting a voltage proportional to their measurements.[\[1\]](#)
17. Relay port: 5V controllable outputs on both FWD and REV pins. It is used for certain devices such as Spike H-Bridge Relay for motor control.[\[2\]](#)
18. Robot signal light (RSL) port: RSL is connected to here and it can be used to quickly diagnose problems with the robot.[\[9\]](#)

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