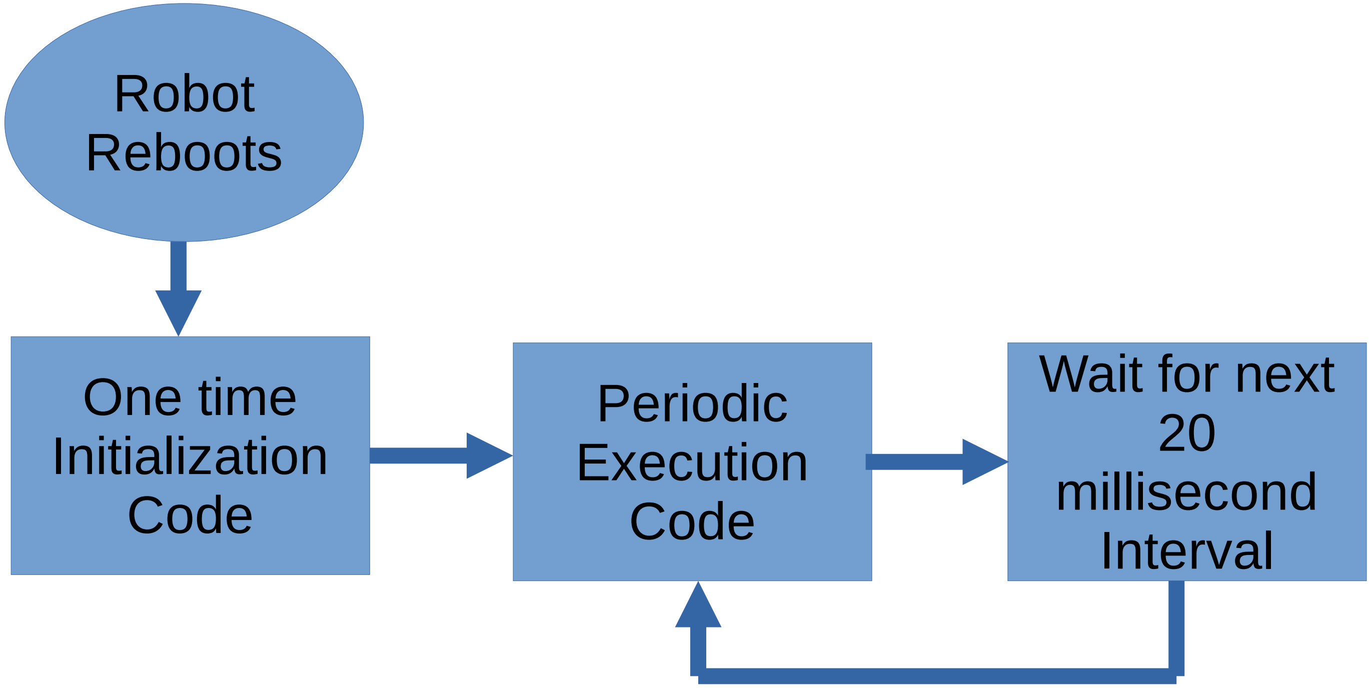
FRC Robot Programming

MODULE 1 – Basics / Boolean In / Out

FRC Robot Programming 10/31/2023

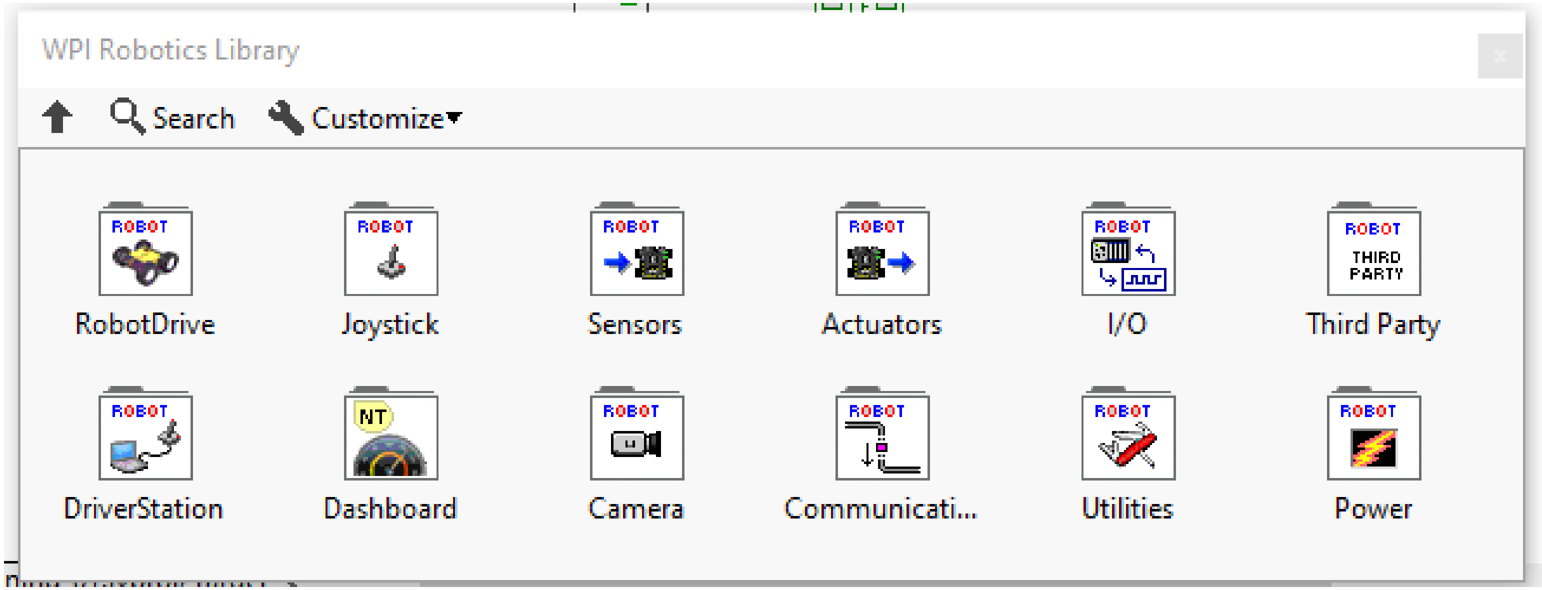
Basic Robot Program

- **One time initialization actions**
- **Continuous execution code cycles every 20 milliseconds.**
  - Faster or slower loops can be added if needed
- **Much more about this subject later**


Robot Reboots
One time Initialization Code
Periodic Execution Code
Wait for next 20 millisecond Interval

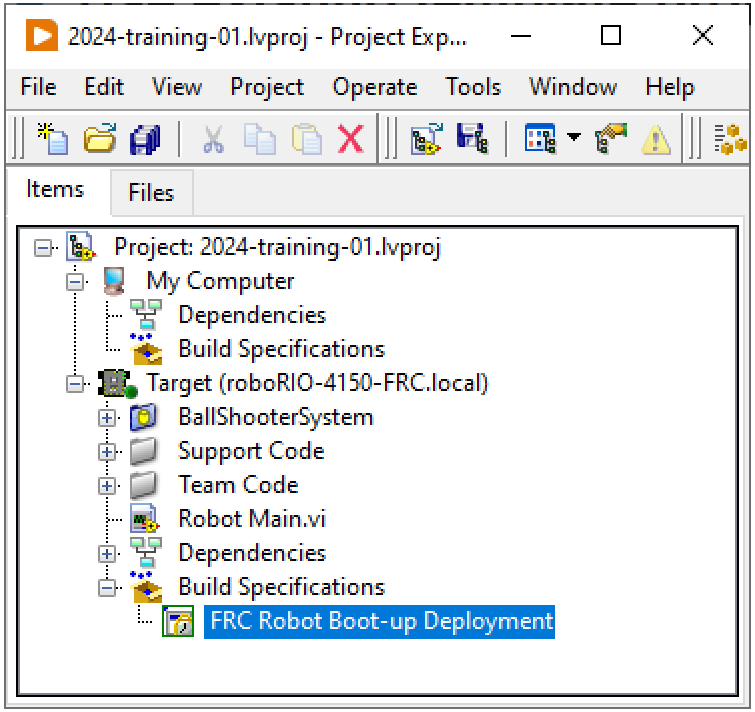
WPILIB Robot Programming Palette

- **Function palette for all robot functions.**



Template Robot Project

- **Use existing template projects as the starting point for all robot code. (More about projects later.)**
- **For the exercises there is already a project created ready for use.**

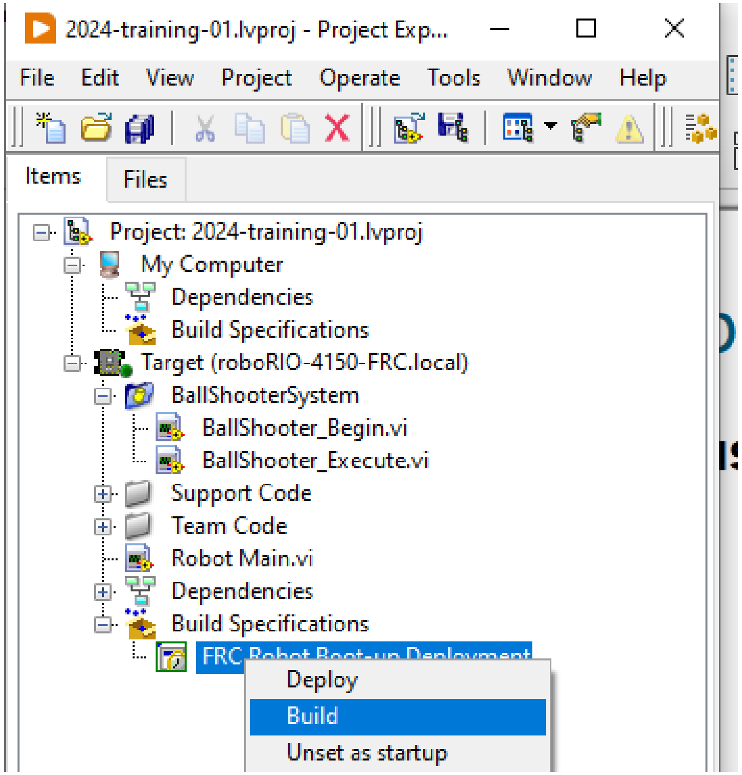


2024-training-01.lvproj - Project Exp...

Project: 2024-training-01.lvproj
- My Computer
  - Dependencies
  - Build Specifications
- Target (roboRIO-4150-FRC.local)
  - BallShooterSystem
  - Support Code
  - Team Code
  - Robot Main.vi
  - Dependencies
  - Build Specifications
    - FRC Robot Boot-up Deployment

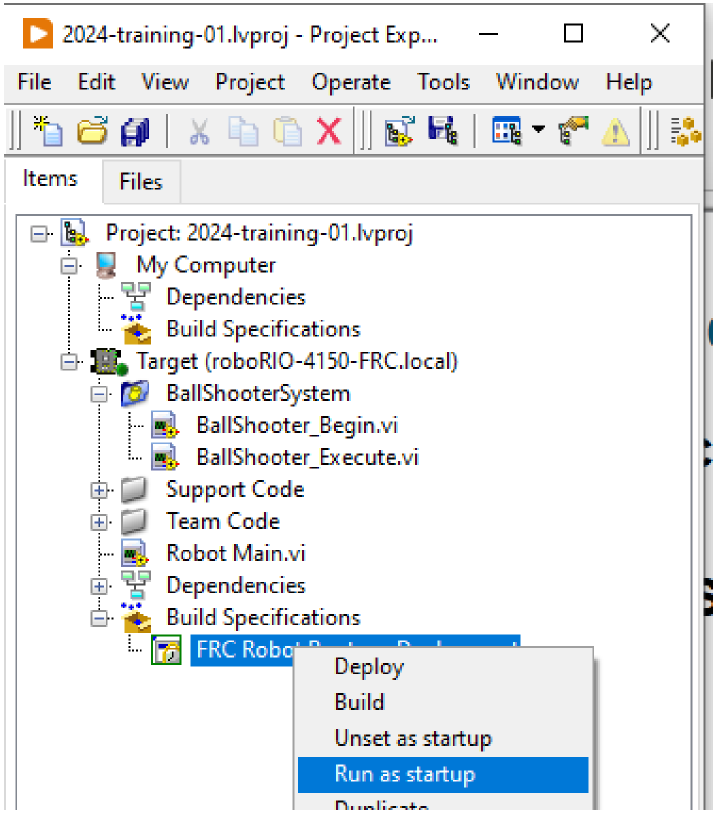
Compiling Robot Project

- **Robot Project must be compiled, “built”, before deploying to robot. Ensure code builds without errors!**



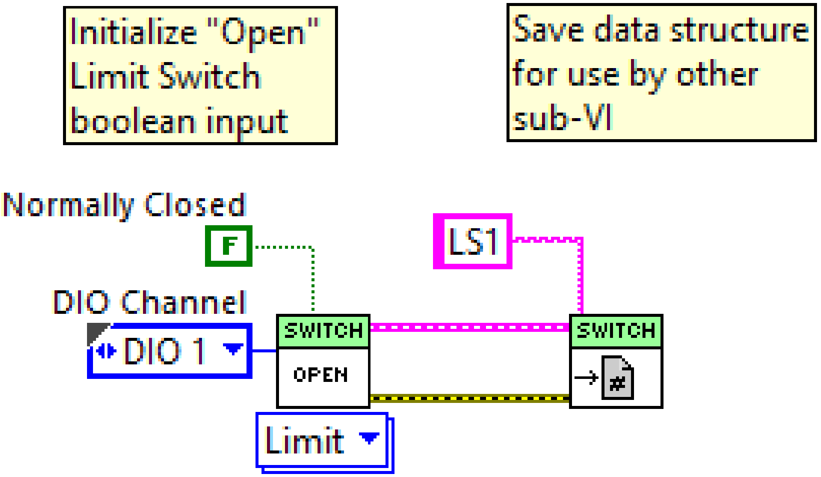
Deploying code to robot

- **Built robot project must be deployed to robot by selecting “run as startup”. Ensure this completes!**
- **Then use Driver Station software to enable and test.**



Boolean Input – Limit Switch - Initialization

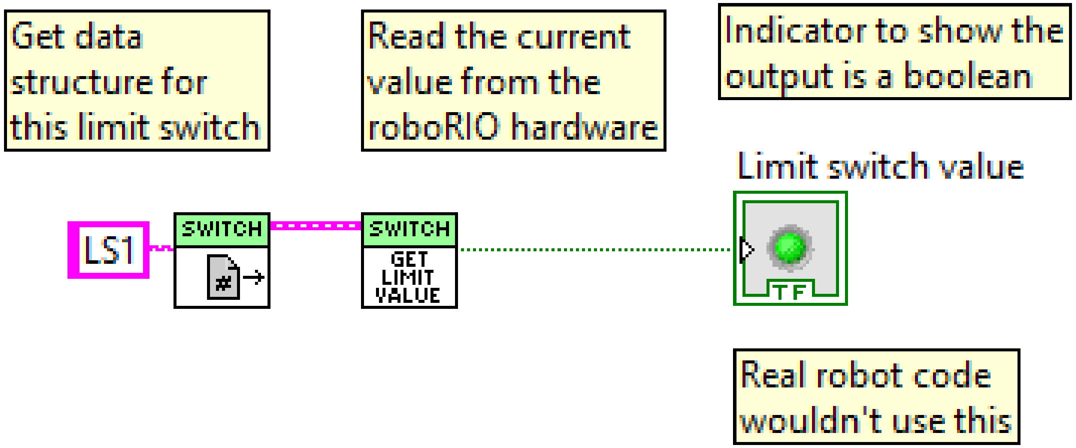
- **Initialization code**
  - **Initialize hardware I/O**
  - **Assign created data structure to “registry” for use by continuous execution routine.**
  - **Note that this will be similar for ALL Input/Output (I/O) performed by the robot.**
- **Limit Switch found under “sensors” sub palette**


Initialize "Open" Limit Switch boolean input

Save data structure for use by other sub-VI

Boolean Input – Limit Switch - Execution

- **Execution code**
  - **Get “registry” entry for desired input**
  - **Read current value from hardware.**
  - **This code needs to be used every 20 milliseconds**



Get data structure for this limit switch

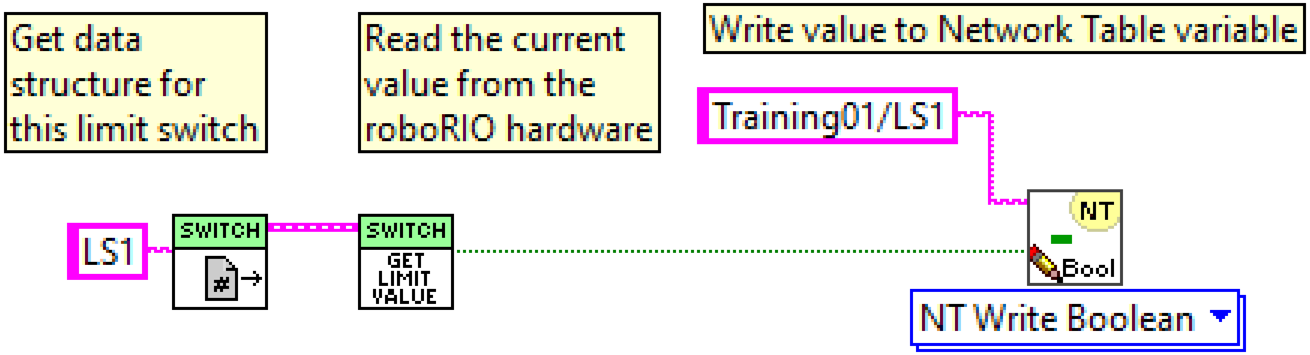
Read the current value from the roboRIO hardware

Indicator to show the output is a boolean

Real robot code wouldn't use this

Network Table Variables

- **Network Table Variables**
  - **Write values for use by:**
    - Display to drivers
    - Trending operational performance and tuning
    - Debugging
  - **Can both read and write values**
- **Sample write**

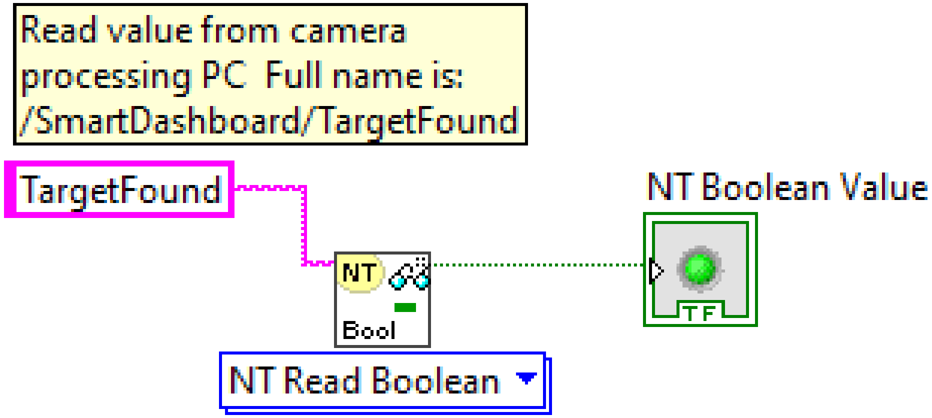

Get data structure for this limit switch

Read the current value from the roboRIO hardware

Write value to Network Table variable

Network Table Variables

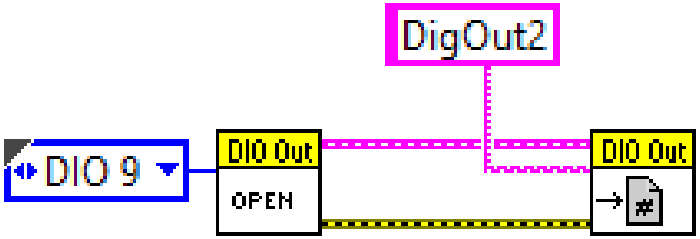
- **Network tables uses “outline” style for naming variables.**
  - **Variable names that start with “/” start at the top level.**
  - **Variable names that start without a “/” start under “/SmartDashboard”**
- **Names must be exact – Case is different, spaces are different**
  - **This includes trailing spaces !!**
- **Sample read**



Read value from camera processing PC Full name is: /SmartDashboard/TargetFound

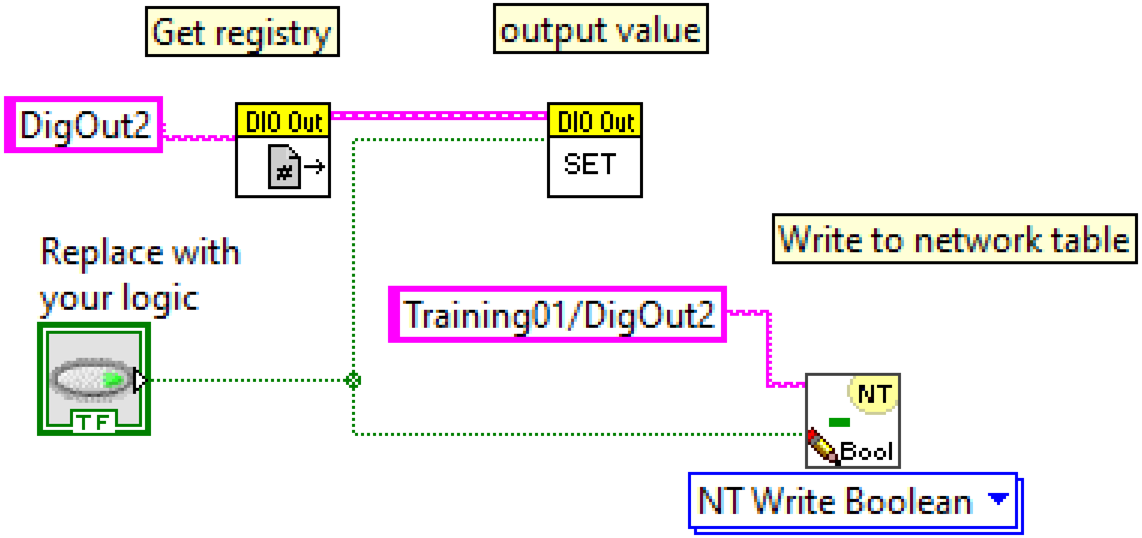
Boolean Output – Digital Out - Initialization

- **Initialization code**
  - **Initialize hardware I/O**
  - **Assign created data structure to “registry” for use by continuous execution routine.**
- **Digital Output found under I/O sub-palette**



Boolean Output – Digital Out - Execution

- **Execution code**
  - **Get “registry” entry for desired output**
  - **Write desired value to hardware.**
- **This code needs to be used every 20 milliseconds**



Exercise

- **Do Exercise 4.2 from Control Logic Training Module 4**