



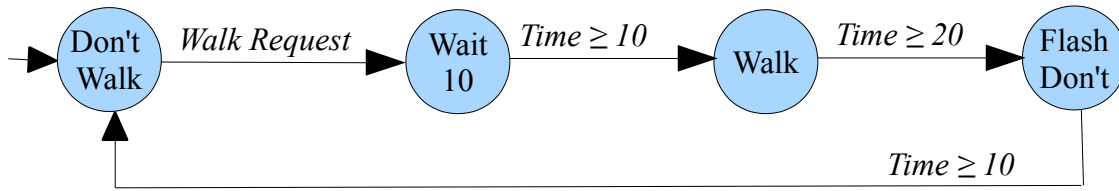
FRC1640 Programming Certification Pre-Test for the 2014 Season

Answers / Resources

1. State Machines

The problem: After “Walk” has been on for 20 seconds, “Don't Walk” flashes for 10 seconds and then “Walk” comes back on. After starting with “Don't Walk” on, once there is a walk request, the signal never goes back to “Don't Walk” even if there never a walk request again.

One possible solution: Stay in the “Flash Don't” state until 10 seconds has passed and then proceed to the “Don't Walk” state.



2. FRC Robot Framework

LabView specific: <http://decibel.ni.com/content/docs/DOC-26299>

General resources: <http://www.usfirst.org/roboticsprograms/frc/2013-Technical-Resources>

- At the beginning of build season, what is the first thing that needs to happen to the cRIO for the robot?
 - **It needs to be imaged with the current season's image, which is distributed at kickoff.**
- Why do FRC teams need to use the given framework, whether in LabVIEW, C++, or Java, for programming their competition robot?
 - **The FRC robot framework provides the necessary communications with the Field Control System, which relays driver control signals during matches.**
- Where do you need to put code to open motors and sensors so that they can be used throughout the robot project?
 - **Motors and sensors should be opened in Begin, which is run before any of the other code is started.**
- What is the “Periodic Tasks” code for?
 - **It is for tasks that happen throughout the robot program, regardless of what competition mode (Autonomous or Teleop) the robot is in. Examples of code to be put in Periodic Tasks are the drive train (used for controlling motion in Teleop and also Autonomous) and the air compressor (used for providing pressure for pneumatics).**
- Why should you never put a loop structure in the “Teleop” code?
 - **If you look at Robot Main in a robot project, you will see that the “Teleop” code is already run in a loop. Therefore, putting a loop in the “Teleop” code will mean that a loop is running inside a loop, which will slow down the rate at which control signals from the driver station are processed and cause control problems.**

3. Radio (Router) Configuration and Connecting to the Robot (cRIO)

Look at “*2013 FRC Bridge Configuration Utility*” on

<http://www.usfirst.org/roboticsprograms/frc/2013-Technical-Resources>

Driver Station tutorial: <http://decibel.ni.com/content/docs/DOC-14705>

- It is the first team meeting after the competition and the drive team cannot connect to the robot from the driver station computer. What is the first thing that should be done?
The router needs to be re-configured. The first step will be to reset it using the reset button, since the router is configured with encryption at a competition.
- If you want to connect to an FRC robot from your computer (either to run the driver station or to deploy code), what do you have to change in your computer's settings?
Your network adapter's IP address needs to be configured to be 10.xx.yy.5 or 10.xx.yy.6 where xxyy is the team number of robot you are connecting to (the competition bot is 1640, while the practice bot and others have other team numbers such as 1639, 1641, etc.). The driver station program is supposed to configure the IP address automatically when you change the team number in the driver station; you may have to re-enter the team number to have the automatic configuration occur.

4. Motors and Speed Controllers

Control system info: <http://www.usfirst.org/roboticsprograms/frc/2013-Control-System>

- Why are speed controllers used?
 - **Speed controllers such jaguars, victors, and talons, allow a percentage of power to be sent to motors. They can be configured to ramp the power up and down gradually so that the stress on the motor is less.**
- What is used if a motor just needs to be on or off?
 - **A motor that doesn't need variable power, like the one in an air compressor, can be run on a spike which provides on/off signals.**
- What do you need to know in order to send a motor a signal from a robot project?
 - **You need to know which PWM channel the motor is connected to so that you can open it in Begin.**
- What can happen if a motor isn't given a signal for over 50ms?
 - **The Safety Configuration system will detect and report a Watchdog Expiration and will disable the motor.**

5. Sensors

Sensor basics tutorial: <https://decibel.ni.com/content/docs/DOC-26312>

- What do you need to know in order to use data from a sensor in a robot project?
 - **Where the sensor is wired: the cRIO module (analog or digital, 1 or 2) and the channel on the module**
- What programming structure(s) do you need to read sensor data at certain intervals?
 - **A while loop with the code to read from the sensor *inside* the loop**
- What are the two types of sensor input?
 - **Analog (real numbers) and digital (boolean, true/false)**