Bishop Blanchet 2022 FRC Rapid React Coding – Getting Started Guide

Follow the steps below to onboard the software development aspects for the 2022 Rapid React challenge. The topics generally include becoming familiar with the resources necessary to being your software development journey. The information included will help in learning more about the expected program flow that the Blanchet 2022 Rapid React robot will use during competition, practicing and some testing.

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# Prerequisites

The expected prerequisites for this area of the robot build are described below.

1. Extended access PC or Mac
   1. Requires USB
   2. If you don’t have one, Kyle may be able to loan one out
   3. PC likely a plus as Mac may have some quirks not outlined in this document
2. Internet connection
3. Basic working knowledge of Java a plus
4. Be ready to help correct this document where flaws are found, please keep this updated!

# Computer Software Setup

The steps below generally outline the requirements for your development computer. Follow the directions to install and properly configure your computer. Because some of the subsystems and control code will be developed throughout the FRC season, check back with this guide to get the latest instructions on how to setup your computer.

1. NI Components - <https://www.ni.com/en-us/support/downloads/drivers/download/packaged.frc-game-tools.369633.html>
2. Java - <https://java.com/en/download/>
3. WPILib / VS Code – this one takes a while
   1. <https://docs.wpilib.org/en/latest/docs/zero-to-robot/step-2/wpilib-setup.html>
   2. <https://github.com/wpilibsuite/allwpilib/releases/tag/v2021.3.1>
4. Phoenix / CTRE (Cross The Road Electronics)
   1. Library / Tool Install
      1. <https://github.com/CrossTheRoadElec/Phoenix-Releases/releases>
   2. Documentation
      1. <https://docs.ctre-phoenix.com/en/stable/ch05a_CppJava.html>
         1. Example: <https://docs.ctre-phoenix.com/en/stable/ch23_AddResource.html#phoenix-c-java-api-documentation>
      2. <https://store.ctr-electronics.com/content/api/java/html/index.html>
5. SPARK
   1. Install instructions - <https://docs.revrobotics.com/sparkmax/software-resources/spark-max-api-information#java-api-installation-instructions>

<The steps above are expected to be mostly correct but we need help here from folks to get the steps correct>

# Source Code Access

To get access to the Java codebase that the team will be building, writing and contributing to everyone will need to learn how to use a source code control system. This system will help all team members efficiently be able to keep track of their individual changes and generally keep us all organized. Although not explicitly required to adjust source code, the steps below should generally be completed after your computer software setup from the previous section is complete.

1. Setup a GitHub account
   1. <https://github.com/join>
2. Get GitHub access for the <https://github.com/Team4682Bravebots> ‘organization’
   1. Contact Kyle or Mike McAdams and tell them your GitHub logon (likely your Blanchet email)
3. Download and install git on your computer
   1. Windows - <https://git-scm.com/download/win>
   2. Mac - <https://git-scm.com/download/mac>
4. Download and install ‘GitHub Desktop’
   1. <https://desktop.github.com/>
5. Clone the ‘RapidReact2022’ repo to your machine
   1. GitHub Desktop method
      1. File -> Clone Repository
      2. GitHub.com Tab
      3. Select Team4682Bravebots/RapidReact2022
   2. cmd line method
      1. cd to a directory where you want the files to be placed
      2. git clone <https://github.com/Team4682Bravebots/RapidReact2022.git>
6. Git documentation / commands
   1. Git book - <https://git-scm.com/book/en/v2>
   2. Videos - <https://git-scm.com/videos>

# Program Structure / Flow

The 2022 Blanchet Rapid React robot is expected to generally follow the command-based programming paradigm created by FRC contributors over the past few years. The command-based program flow will be used for competitions, robot practice and integration testing. It may or may not be used at component level testing. Any developer on the 2022 Blanchet Rapid React team effort is required to learn aspects of this programming model. Some aspects are not required but are recommended learning.

## Required Reading

All members of the ‘coding’ team are expected to be familiar with the command based programming model described in the links below.

1. Command based description
   1. <https://docs.wpilib.org/en/stable/docs/software/commandbased/what-is-command-based.html>
2. Subsystems
   1. <https://docs.wpilib.org/en/stable/docs/software/commandbased/subsystems.html>
3. Commands
   1. <https://docs.wpilib.org/en/stable/docs/software/commandbased/commands.html>

## Going Deeper

All members of the ‘coding’ team are encouraged to learn more about the command based programming model.

1. General concepts
   1. Design Pattern - <https://en.wikipedia.org/wiki/Design_pattern>
   2. Declarative - <https://en.wikipedia.org/wiki/Declarative_programming>
      1. Note: many aspects of the code that team members will write will tend to be imperative, so folks should not expect this to be a purist exercise
      2. Imperative - <https://en.wikipedia.org/wiki/Imperative_programming>
2. FRC details on command system
   1. Index - <https://docs.wpilib.org/en/stable/docs/software/commandbased/index.html>
   2. Command Groups - <https://docs.wpilib.org/en/stable/docs/software/commandbased/command-groups.html>
   3. Command Scheduler - <https://docs.wpilib.org/en/stable/docs/software/commandbased/command-scheduler.html>

# Terminology / Glossary

Terminology and acronyms are described in the following table.

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| **Term / Acronym** | **Description** |
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