

## LABVIEW

### BACKGROUND AND COMMON USES FOR THE LANGUAGE

LabVIEW is an acronym for Laboratory Virtual Instrument Engineering Workbench. LabVIEW is a product of National Instruments. It is a data-flow visual programming language. Most widely, this language is used in conjunction with National Instruments hardware to enable computers to operate as laboratory electronic instruments, such as oscilloscopes, signal generators and timers.

Currently, FIRST Robotics has adopted the National Instruments roboRIO Advanced Robotics Controller to control the robots that teams build to compete in the FIRST Robotics competitions, annually. The roboRIO may be programmed using the LabVIEW language, among others. The discussion here will focus on this application of LabVIEW and the associated tools provided for use in the FIRST competitions.

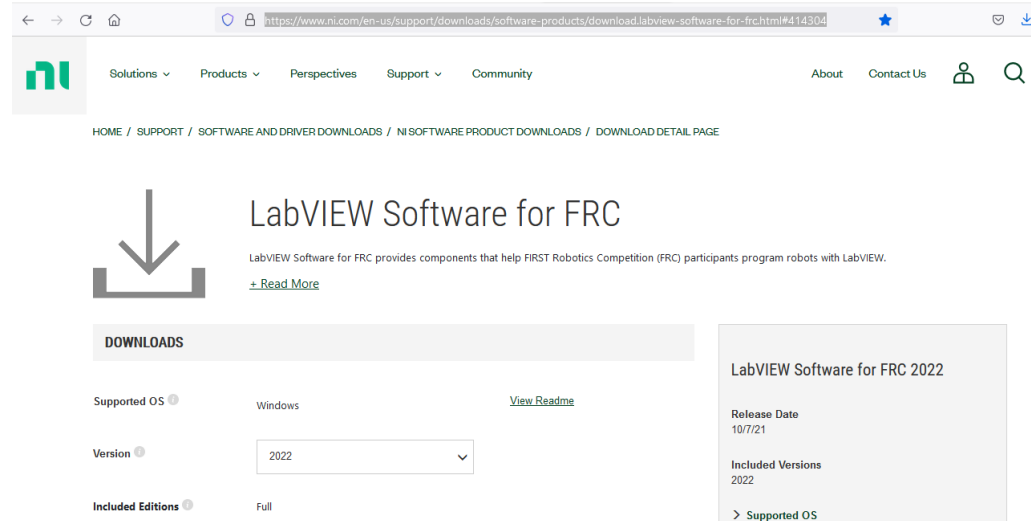
### DEVELOPMENT TOOLS

Starting with the 2019 season, the LabVIEW software for use in the FIRST competition has been distributed online from a webserver, rather than through an optical disc.

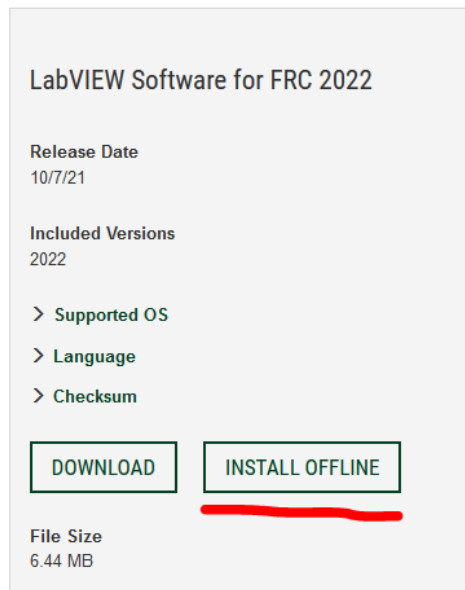
### INSTALLATION OF THE DEVELOPMENT TOOLS

The following procedure is for installing the NI software for FRC 2022. This is based on information from this site: <https://docs.wpilib.org/en/stable/docs/zero-to-robot/introduction.html>.

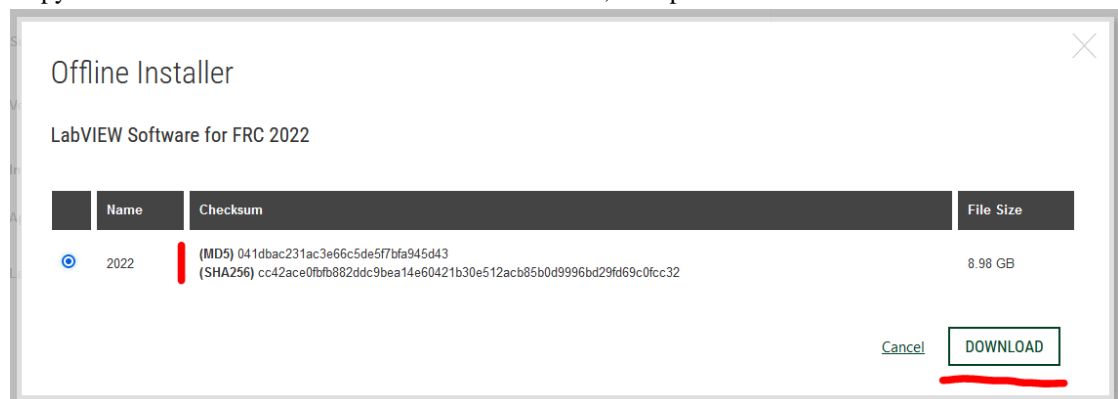
1. Download the LabView for FRC 2020 installer.
  - a. Navigate to <https://www.ni.com/en-us/support/downloads/software-products/download.labview-software-for-frc.html#414304>.



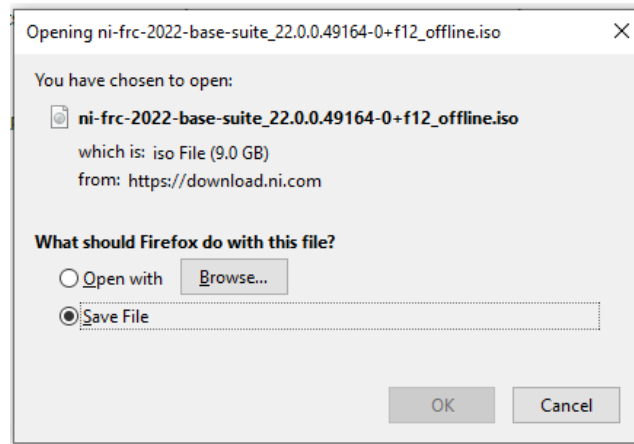
- b. Press the Install Offline button.




- c. Copy the hash code for later validation of the download, then press the Download button.

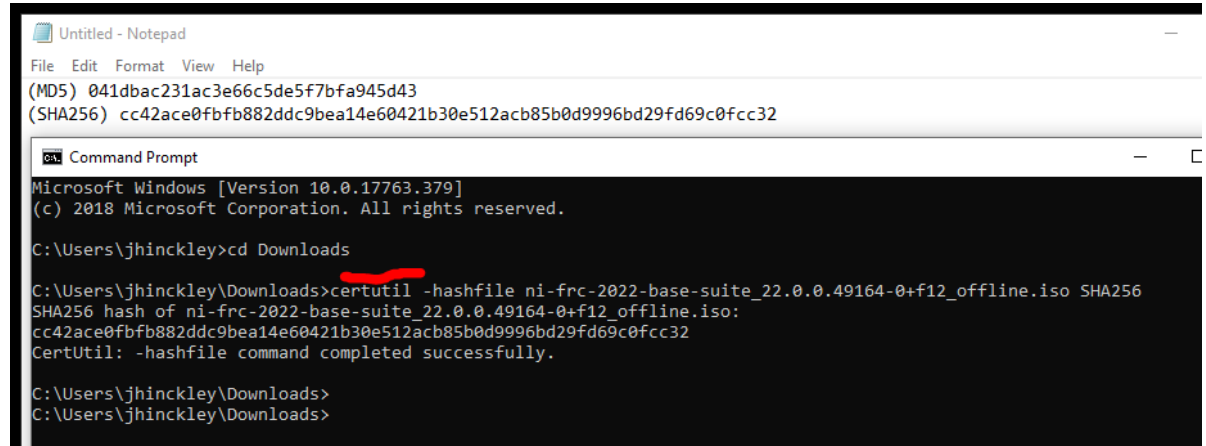


- d. Save the file to your Downloads folder. This download will take a considerable length of time.



Name	Date modified	Type	Size
 ni-frc-2022-base-suite_22.0.0.49164-0+f12_offline.iso	2/10/2022 9:59 AM	Disc Image File	9,416,076 KB

- e. Check the integrity of the download. Use the certutil function as follows and compare the SHA256 hash with the value provided by NI. They should be the same.



Untitled - Notepad

File Edit Format View Help

(MD5) 041dbac231ac3e66c5de5f7bfa945d43  
 (SHA256) cc42ace0fbfb882ddc9bea14e60421b30e512acb85b0d9996bd29fd69c0fcc32

---

Command Prompt

Microsoft Windows [Version 10.0.17763.379]  
 (c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\jhinckley>cd Downloads

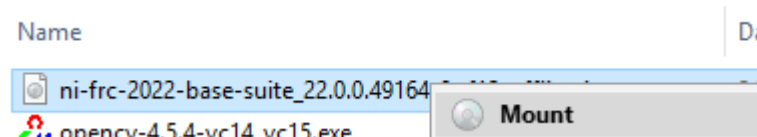
C:\Users\jhinckley\Downloads>certutil -hashfile ni-frc-2022-base-suite\_22.0.0.49164-0+f12\_offline.iso SHA256  
 SHA256 hash of ni-frc-2022-base-suite\_22.0.0.49164-0+f12\_offline.iso:  
 cc42ace0fbfb882ddc9bea14e60421b30e512acb85b0d9996bd29fd69c0fcc32  
 CertUtil: -hashfile command completed successfully.

C:\Users\jhinckley\Downloads>

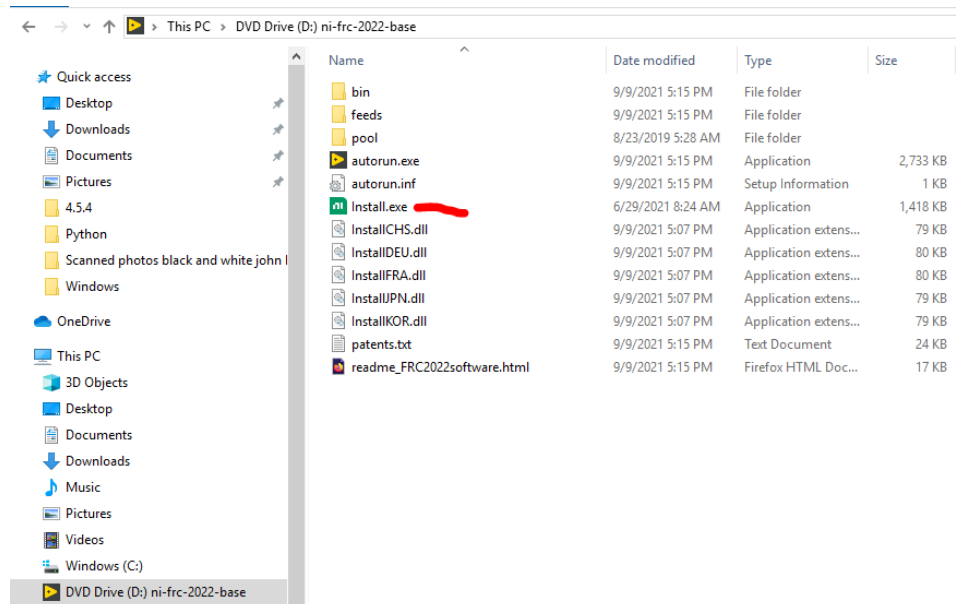
C:\Users\jhinckley\Downloads>

## 2. Install LabView.

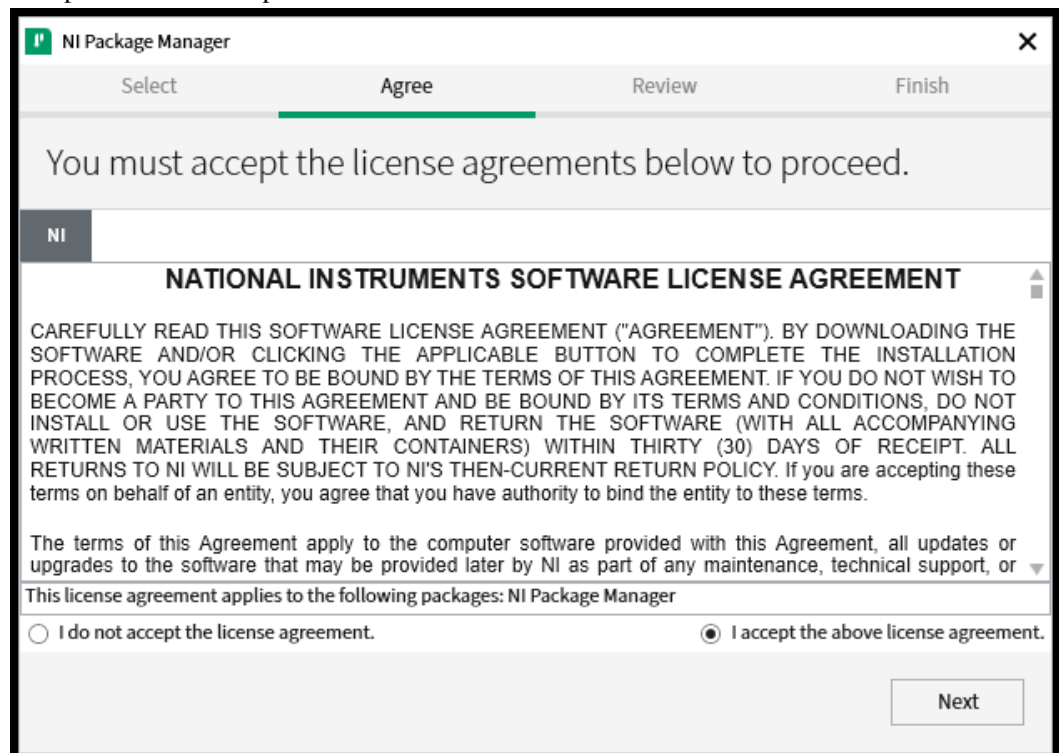
- a. Right-click on the downloaded iso file and select Mount.



- b. Run install.exe as an administrator from the mounted iso.

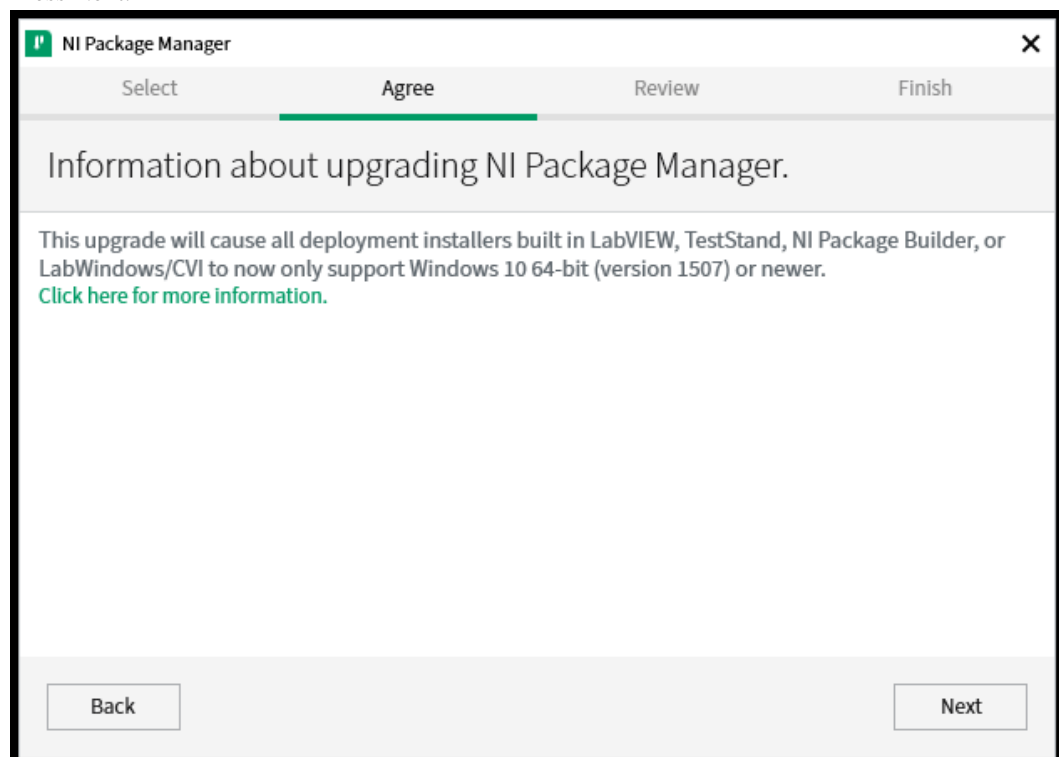


- c. Accept this license and press the Next button.



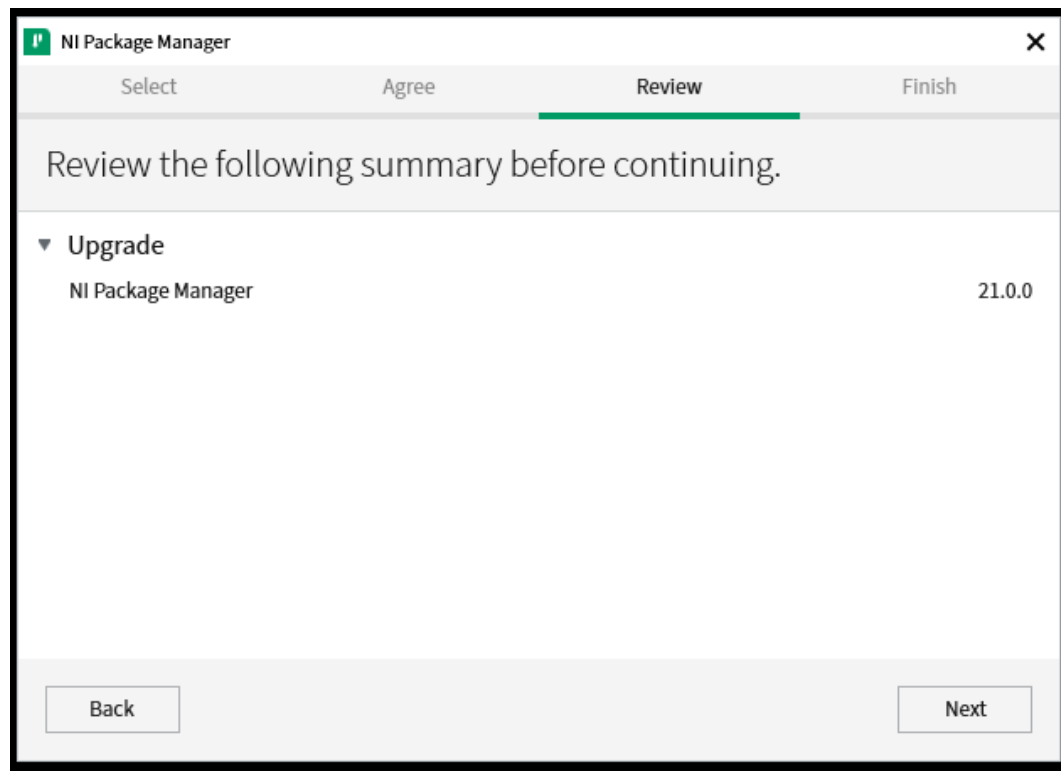
The screenshot shows the NI Package Manager window with the 'Agree' tab selected. The window title is 'NI Package Manager'. The progress bar shows 'Select', 'Agree' (active), 'Review', and 'Finish'. The main text reads: 'You must accept the license agreements below to proceed.' Below this is a section for 'NI' with the title 'NATIONAL INSTRUMENTS SOFTWARE LICENSE AGREEMENT'. The agreement text states: 'CAREFULLY READ THIS SOFTWARE LICENSE AGREEMENT ("AGREEMENT"). BY DOWNLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BUTTON TO COMPLETE THE INSTALLATION PROCESS, YOU AGREE TO BE BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT WISH TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ITS TERMS AND CONDITIONS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SOFTWARE (WITH ALL ACCOMPANYING WRITTEN MATERIALS AND THEIR CONTAINERS) WITHIN THIRTY (30) DAYS OF RECEIPT. ALL RETURNS TO NI WILL BE SUBJECT TO NI'S THEN-CURRENT RETURN POLICY. If you are accepting these terms on behalf of an entity, you agree that you have authority to bind the entity to these terms.' Below the agreement text, it says: 'The terms of this Agreement apply to the computer software provided with this Agreement, all updates or upgrades to the software that may be provided later by NI as part of any maintenance, technical support, or'. Then it says: 'This license agreement applies to the following packages: NI Package Manager'. At the bottom, there are two radio buttons: 'I do not accept the license agreement.' and 'I accept the above license agreement.' (which is selected). A 'Next' button is located at the bottom right.

- d. Press Next.

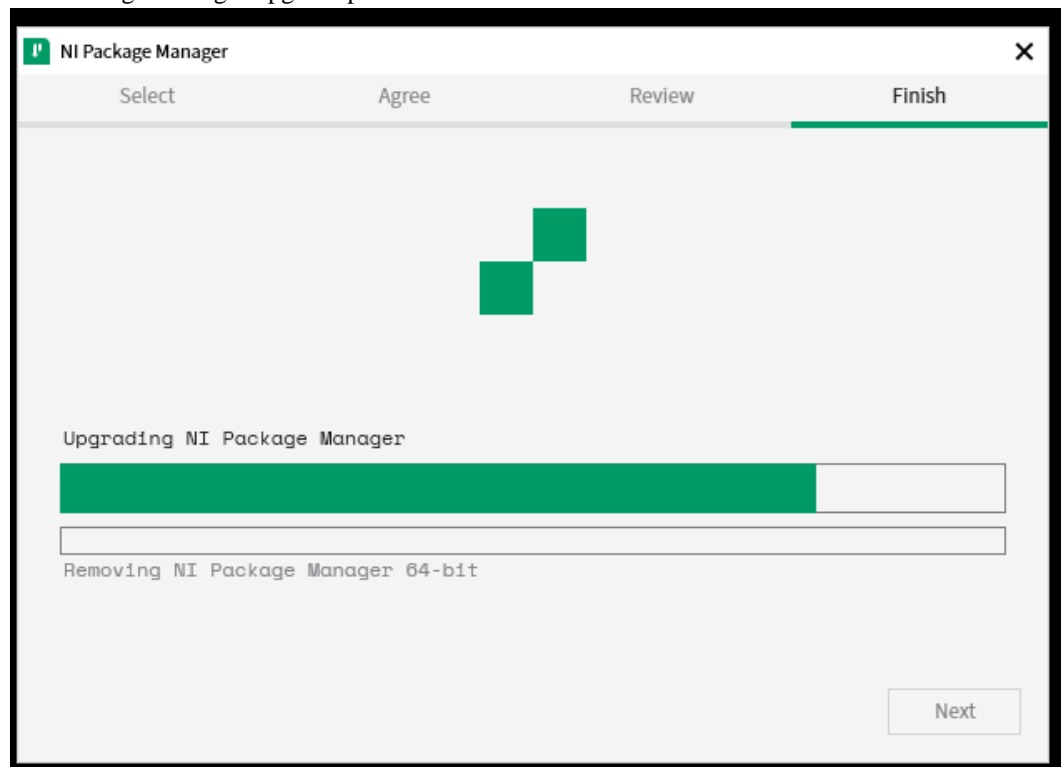


The screenshot shows the NI Package Manager window with the 'Agree' tab selected. The window title is 'NI Package Manager'. The progress bar shows 'Select', 'Agree' (active), 'Review', and 'Finish'. The main text reads: 'Information about upgrading NI Package Manager.' Below this, it says: 'This upgrade will cause all deployment installers built in LabVIEW, TestStand, NI Package Builder, or LabWindows/CVI to now only support Windows 10 64-bit (version 1507) or newer.' There is a link: 'Click here for more information.' At the bottom, there are two buttons: 'Back' and 'Next'.

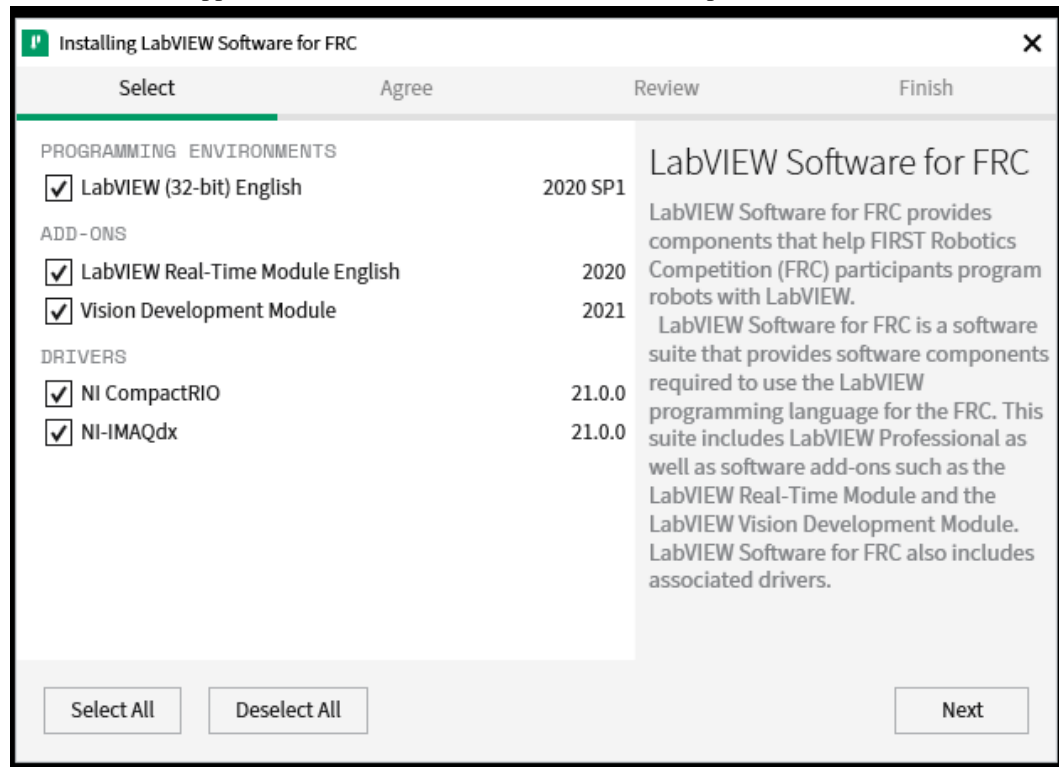
- e. Press Next.



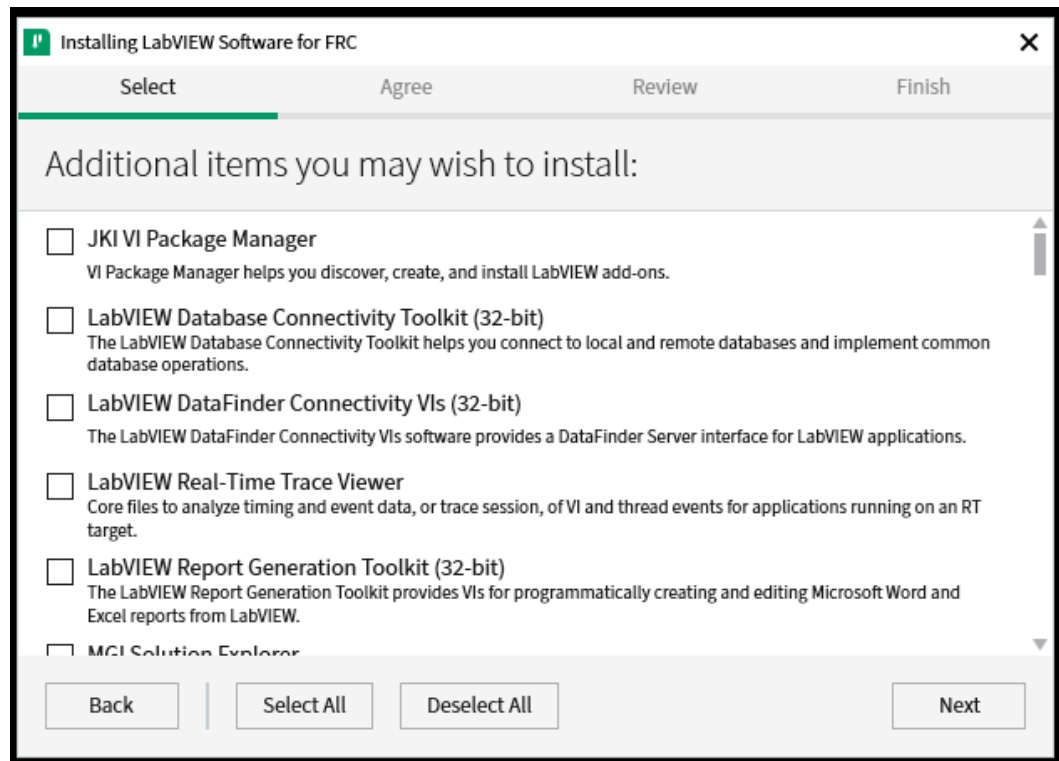
- f. The Package Manager upgrade proceeds.



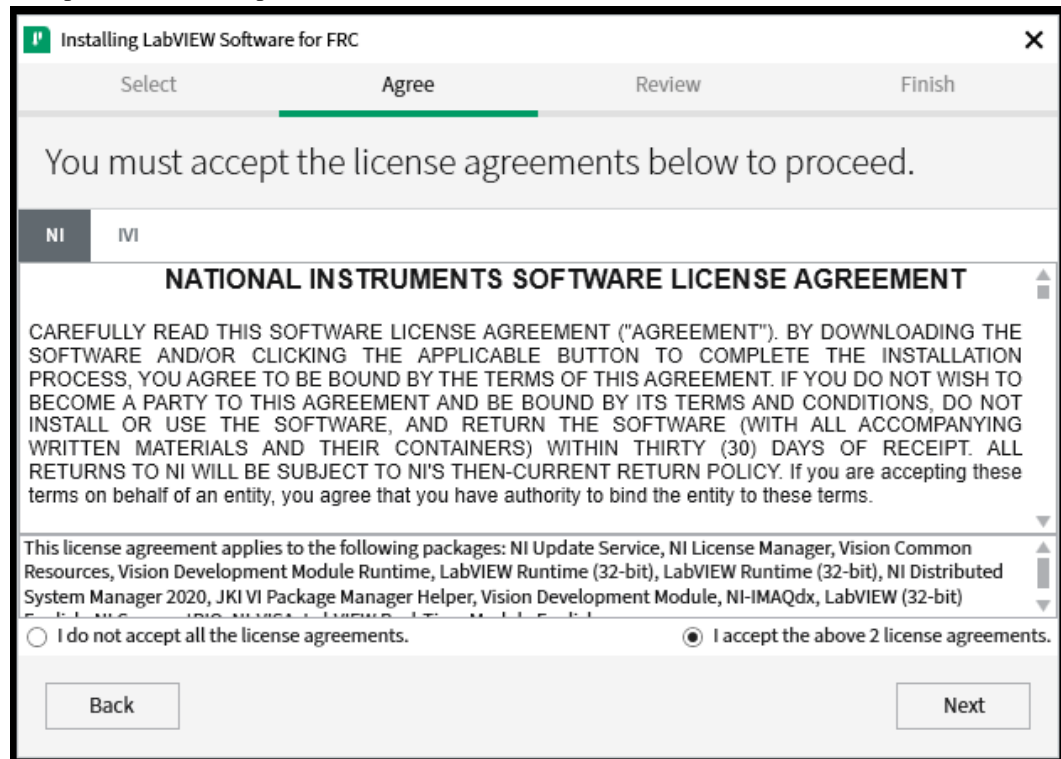
- g. When done, this appears. Ensure that all items are selected, then press Next.



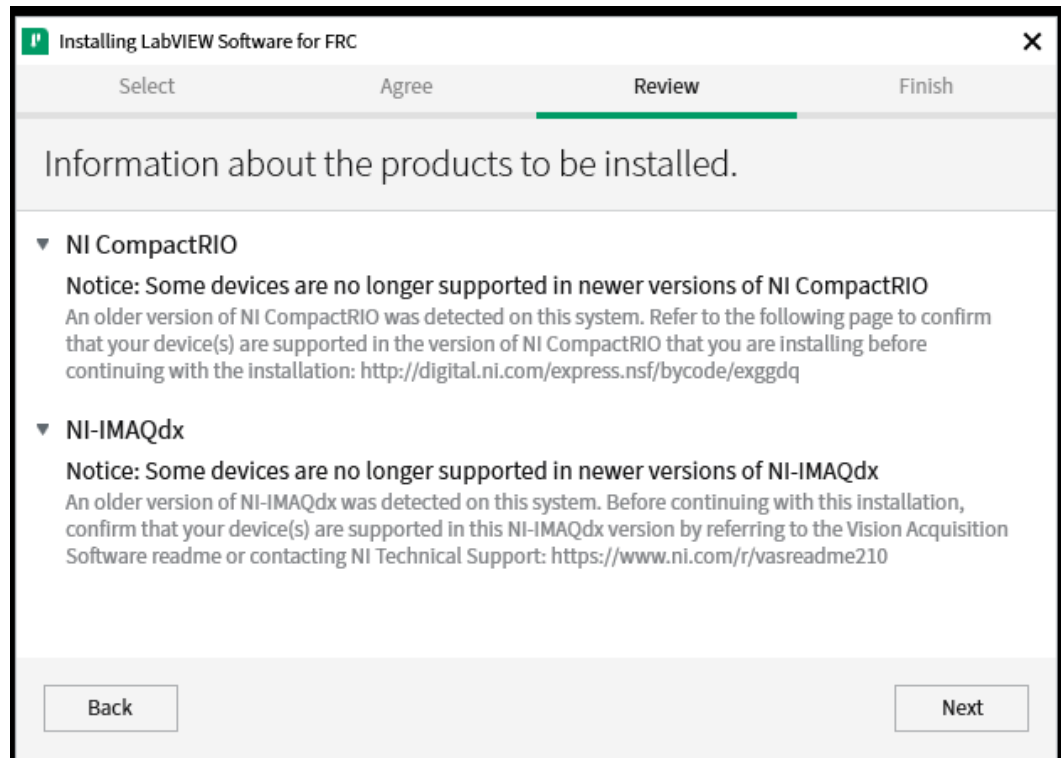
- h. On the next screen, press the Deselect All button, then press Next. Any such add-ins can be added later as the need arises.



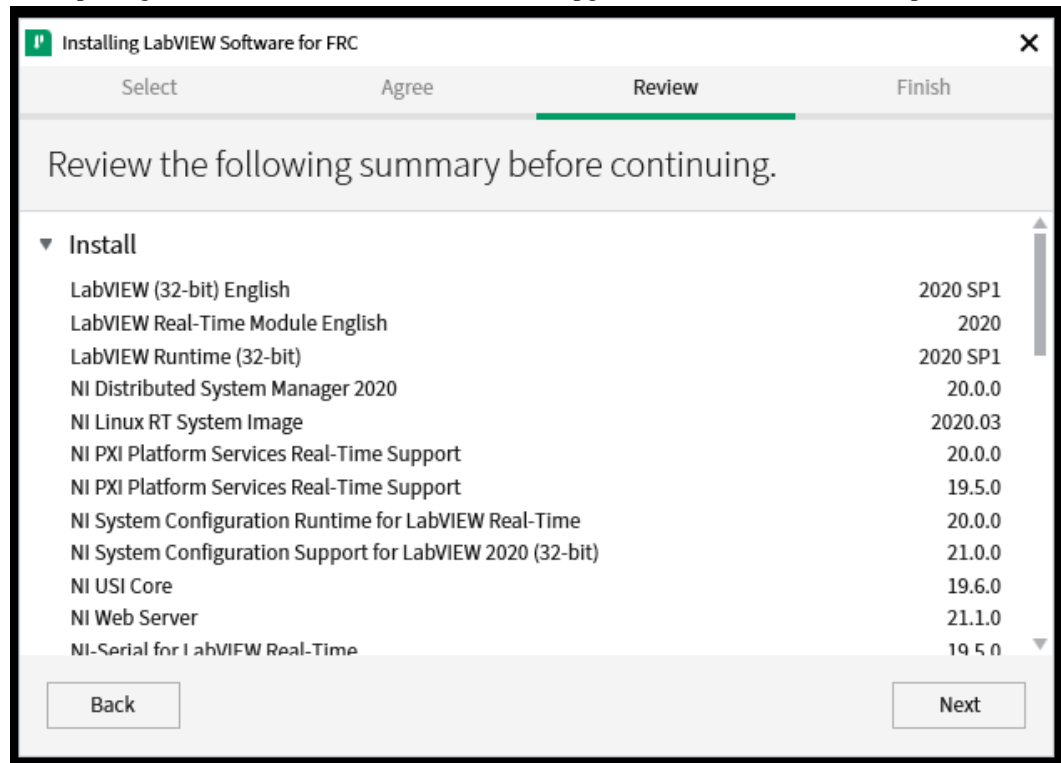
- i. Accept the license and press Next.



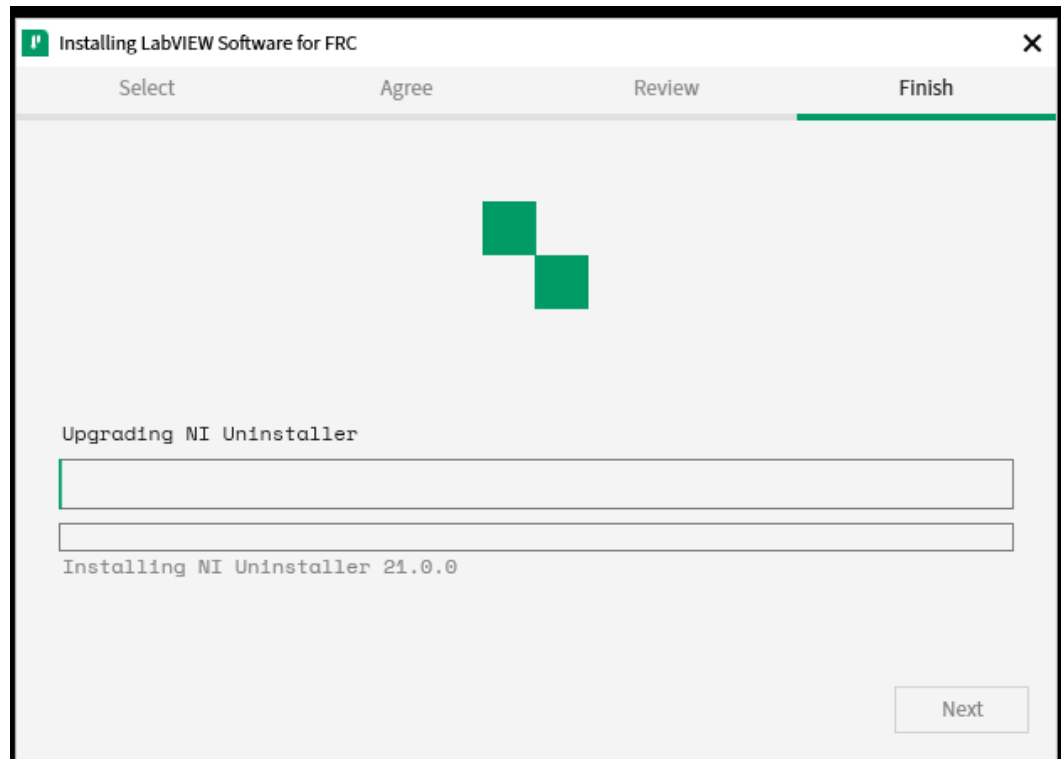
- j. Press Next.



- k. Some packages will be installed, then some will be upgraded. Review this list, then press Next.

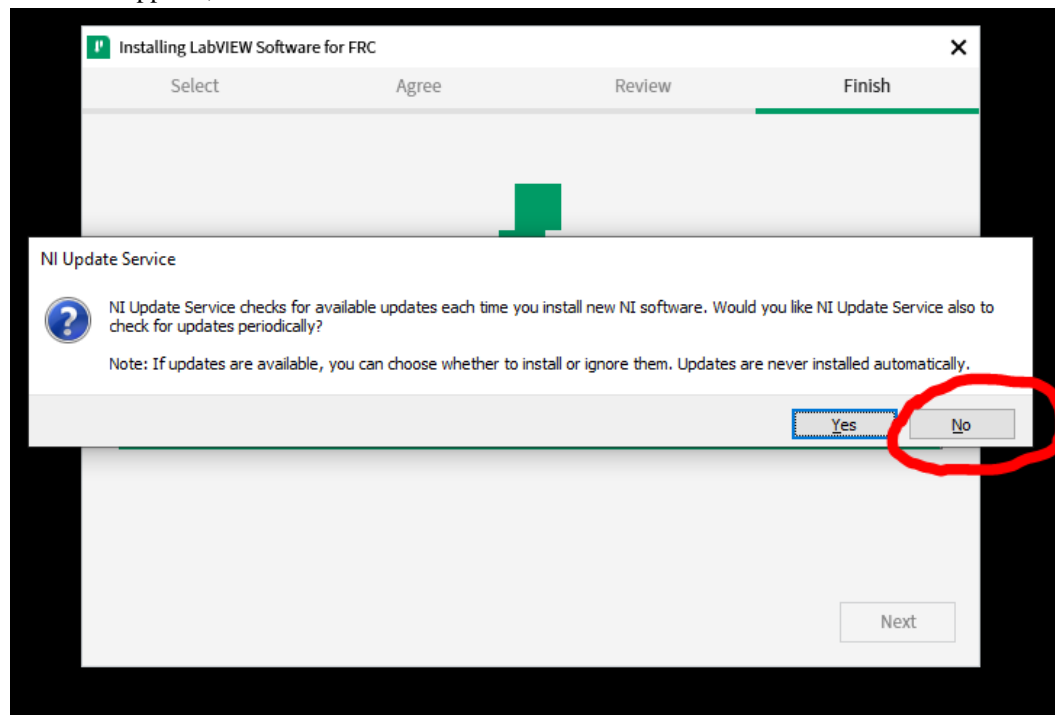


- l. The installation commences. This will take at least an hour.

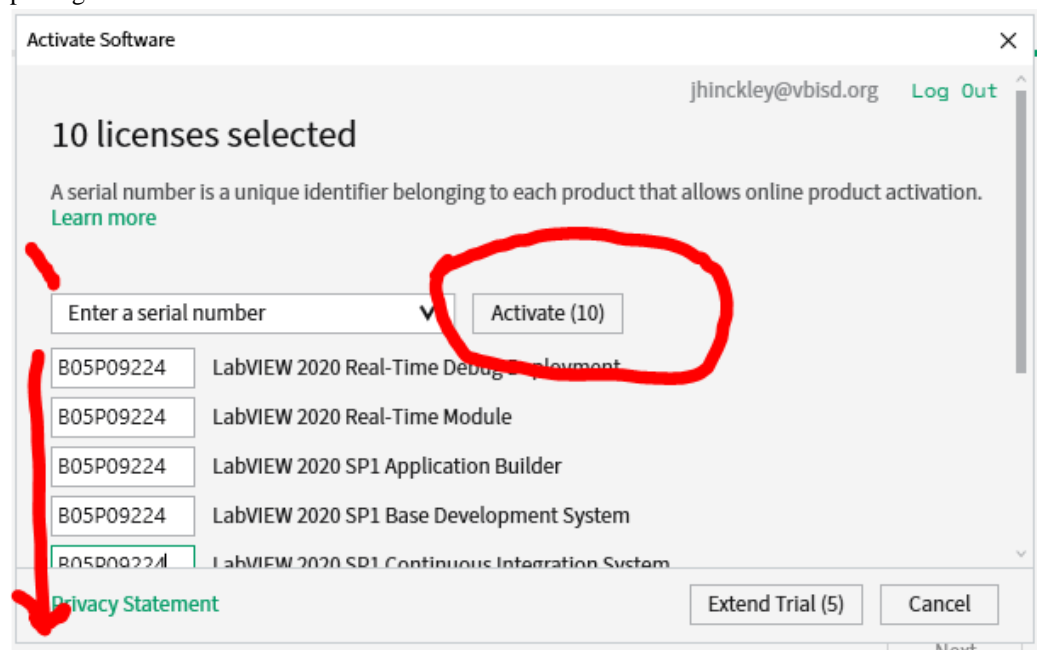




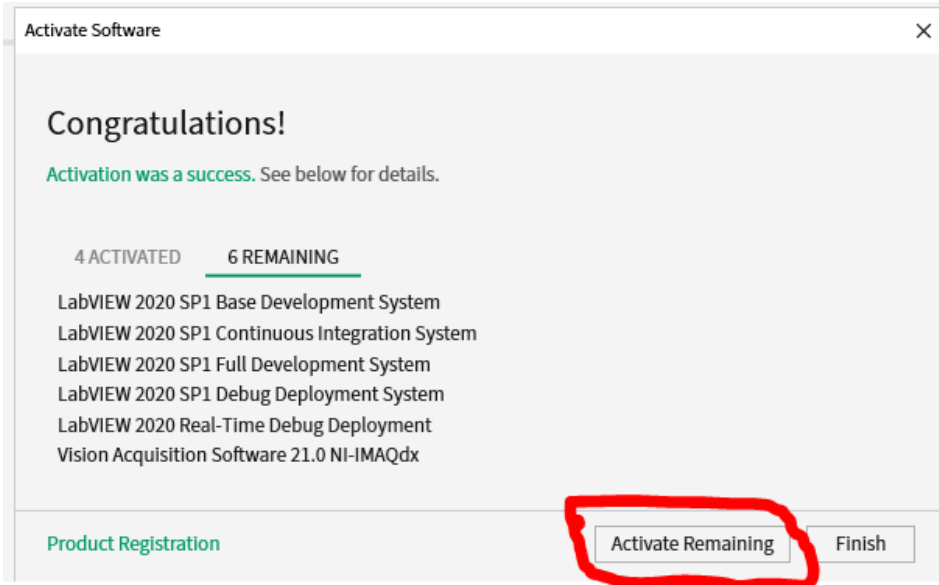
- m. When this appears, select No.



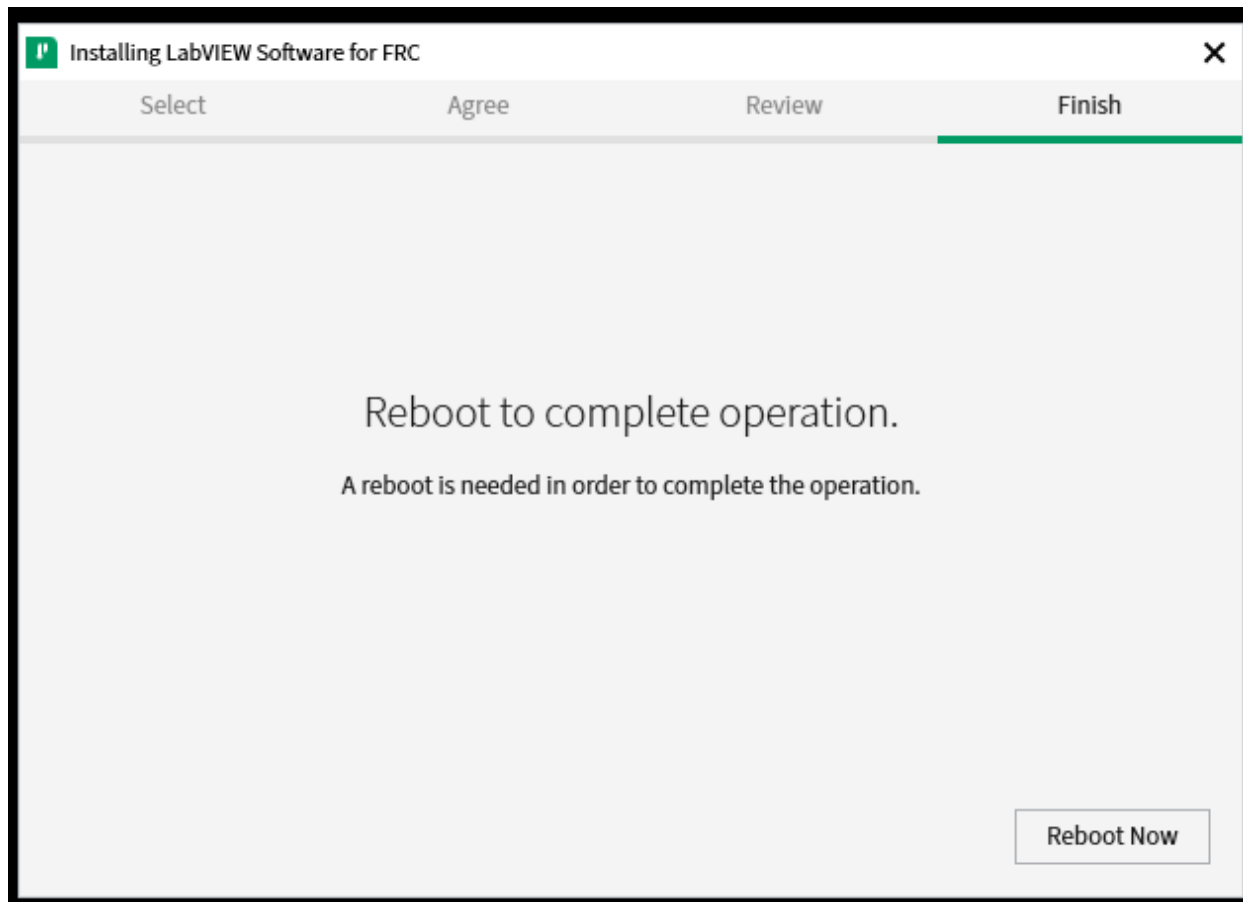
- n. Activate the software. Select “Enter a serial number”. Enter this year’s serial number for each package. Press the Activate button.



- o. According to <https://docs.wpiilib.org/en/stable/docs/zero-to-robot/step-2/labview-setup.html> the following are not expected to activate. Press the Finish button



- p. Press the Reboot Now button.



3. Install the FRC Game Tools (LabView update, FRC driver station, FRC robotRIO Imaging tool).

- a. Navigate to <https://www.ni.com/en-us/support/downloads/drivers/download.frc-game-tools.html#440024> .

The screenshot shows the NI website's download page for FRC Game Tools. The browser address bar displays the URL: <https://www.ni.com/en-us/support/downloads/drivers/download.frc-game-tools.html#440024>. The NI logo is in the top left, and navigation links for Solutions, Products, Perspectives, Support, and Community are in the top center. Links for About and Contact Us are in the top right. A breadcrumb trail reads: HOME / SUPPORT / SOFTWARE AND DRIVER DOWNLOADS / NI DRIVER DOWNLOADS / DOWNLOAD DETAIL PAGE. The main heading is 'FRC Game Tools', accompanied by a large download icon. A description states: 'FRC Game Tools provides components that help FIRST Robotics Competition (FRC) participants manage and communicate with robots.' A link to '+ Read More' is provided. A note with an information icon says: 'Note: Install programming environments such as NI LabVIEW or Microsoft Visual Studio® before installing this product.' Below this is a 'DOWNLOADS' section with filters for 'Supported OS' (set to Windows) and 'Version' (set to 2022). On the right, a box titled 'FRC Game Tools 2022' lists the 'Release Date' as 1/7/22 and 'Included Versions' as 2022 f1, 2022.

ni Solutions Products Perspectives Support Community About Contact Us

HOME / SUPPORT / SOFTWARE AND DRIVER DOWNLOADS / NI DRIVER DOWNLOADS / DOWNLOAD DETAIL PAGE

## FRC Game Tools

FRC Game Tools provides components that help FIRST Robotics Competition (FRC) participants manage and communicate with robots.

[+ Read More](#)

Note: Install programming environments such as NI LabVIEW or Microsoft Visual Studio® before installing this product.

### DOWNLOADS

Supported OS Windows

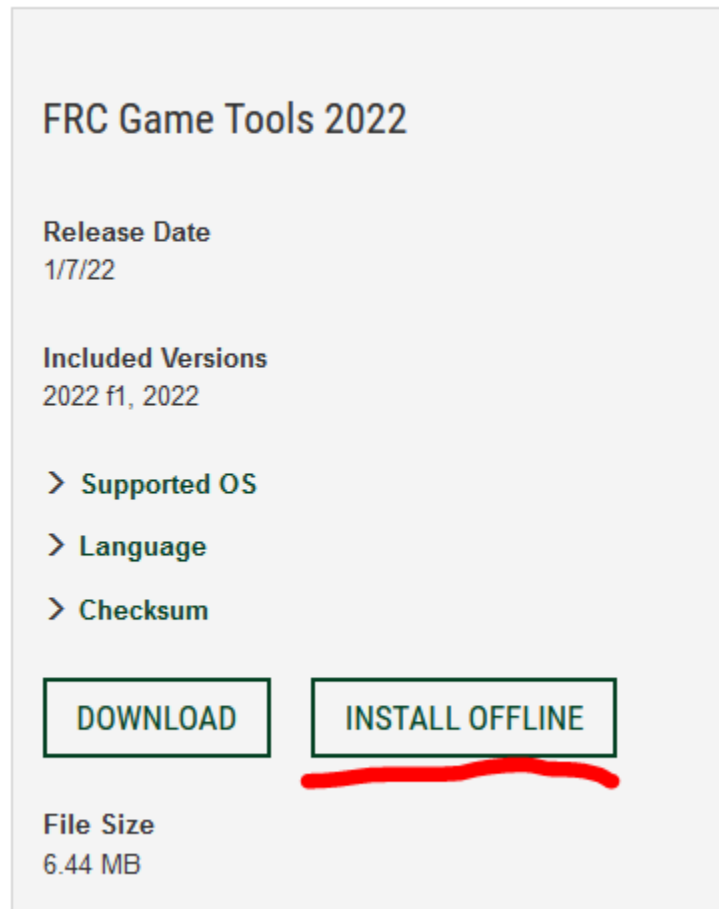
Version 2022

#### FRC Game Tools 2022

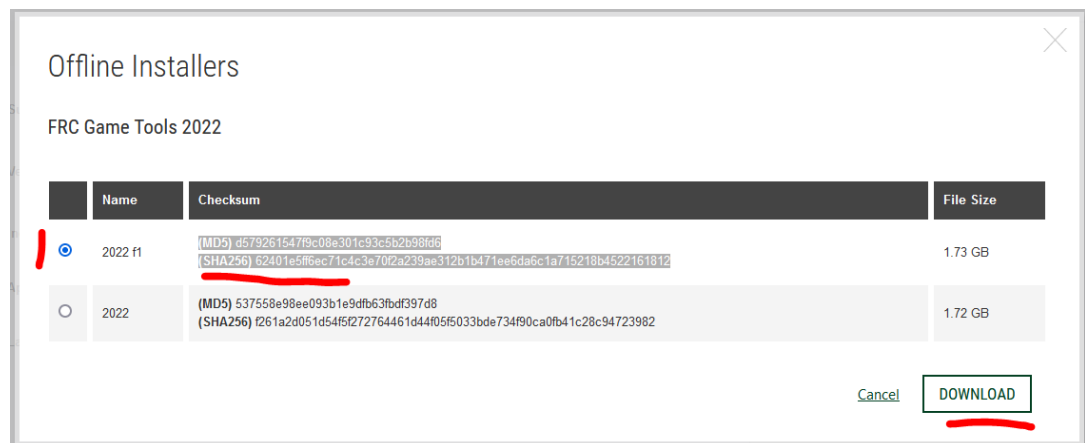
Release Date  
1/7/22

Included Versions  
2022 f1, 2022

- b. Press INSTALL OFFLINE.

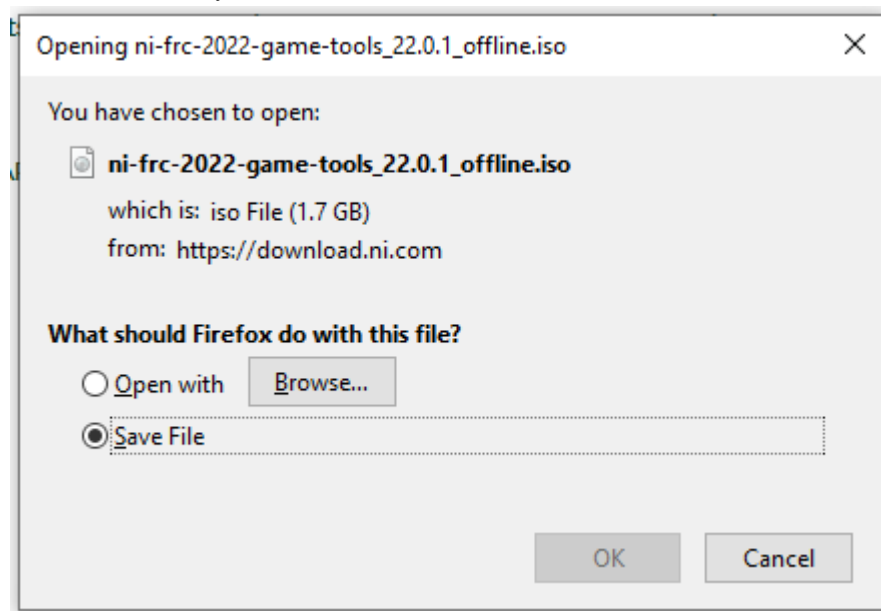


- c. Save the hash codes for later validation of the download. Select the 2022f1 package and press the download button.



- d.

- e. Save the iso file to your Downloads folder.



Name	Date modified	Type	Size
 ni-frc-2022-game-tools_22.0.1_offline.iso	2/10/2022 12:09 PM	Disc Image File	1,814,466 KB

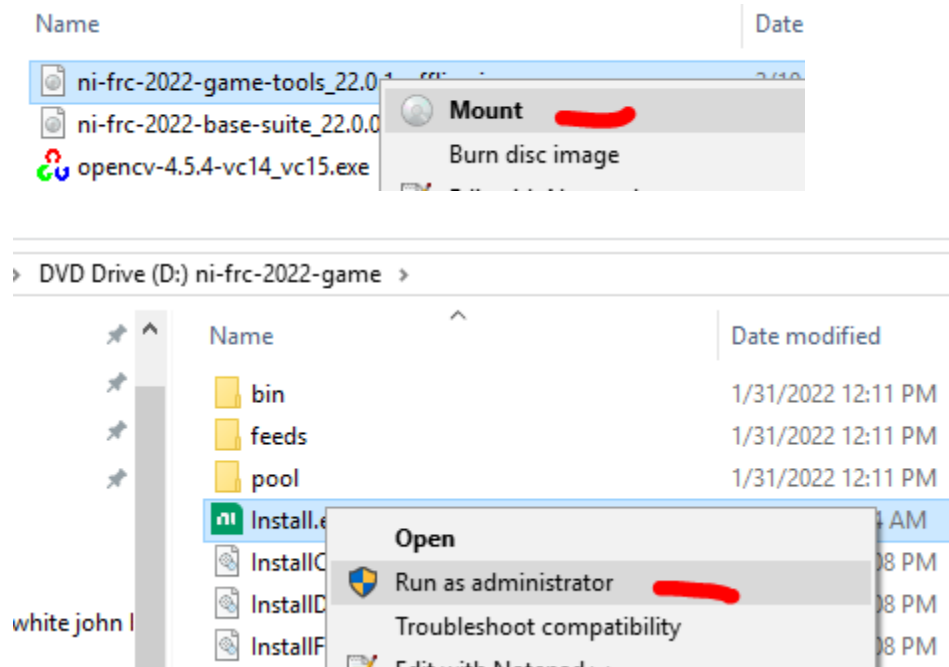
- f. Check the integrity of the download using the certutil function.

```
Untitled - Notepad
File Edit Format View Help
(MD5) d579261547f9c08e301c93c5b2b98fd6
(SHA256) 62401e5ff6ec71c4c3e70f2a239ae312b1b471ee6da6c1a715218b4522161812

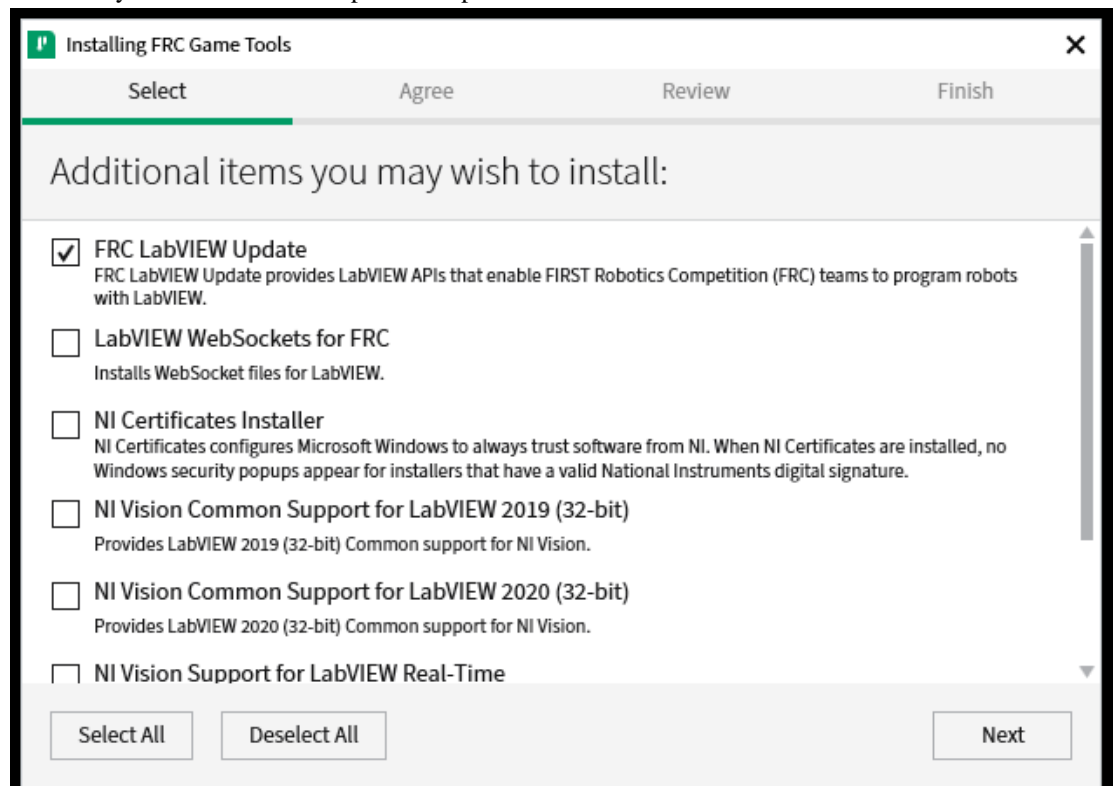
C:\Users\jhinckley\Downloads>certutil -hashfile ni-frc-2022-game-tools_22.0.1_offline.iso SHA256
SHA256 hash of ni-frc-2022-game-tools_22.0.1_offline.iso:
62401e5ff6ec71c4c3e70f2a239ae312b1b471ee6da6c1a715218b4522161812
CertUtil: -hashfile command completed successfully.

C:\Users\jhinckley\Downloads>
```

- g. As before, mount the iso file and run the installer as an administrator.



- h. Select only the FRC Labview Update and press the Next button.



- i. Accept the licenses. Press Next.

Installing FRC Game Tools

Select Agree Review Finish

You must accept the license agreements below to proceed.

NI FIRST Competition

**NATIONAL INSTRUMENTS SOFTWARE LICENSE AGREEMENT**

CAREFULLY READ THIS SOFTWARE LICENSE AGREEMENT ("AGREEMENT"). BY DOWNLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BUTTON TO COMPLETE THE INSTALLATION PROCESS, YOU AGREE TO BE BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT WISH TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ITS TERMS AND CONDITIONS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SOFTWARE (WITH ALL ACCOMPANYING WRITTEN MATERIALS AND THEIR CONTAINERS) WITHIN THIRTY (30) DAYS OF RECEIPT. ALL RETURNS TO NI WILL BE SUBJECT TO NI'S THEN-CURRENT RETURN POLICY. If you are accepting these terms on behalf of an entity, you agree that you have authority to bind the entity to these terms.

The terms of this Agreement apply to the computer software provided with this Agreement, all updates or upgrades to the software that may be provided later by NI as part of any maintenance, technical support, or

This license agreement applies to the following packages: FRC Game Tools

☐ I do not accept all the license agreements. ☒ I accept the above 2 license agreements.

Back Next

- j. Press Next.

Installing FRC Game Tools

Select Agree Review Finish

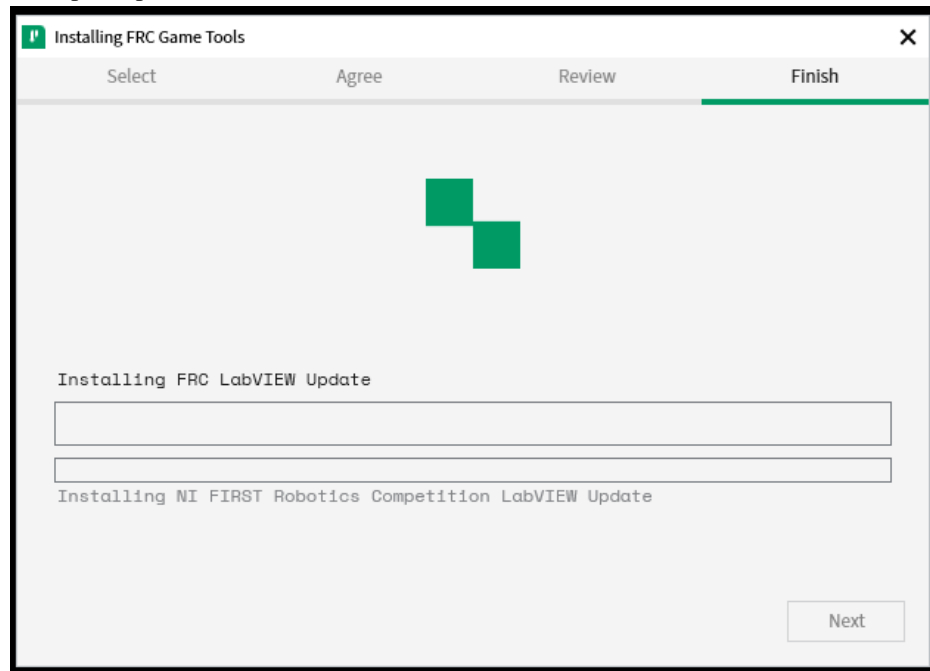
Review the following summary before continuing.

▼ Install

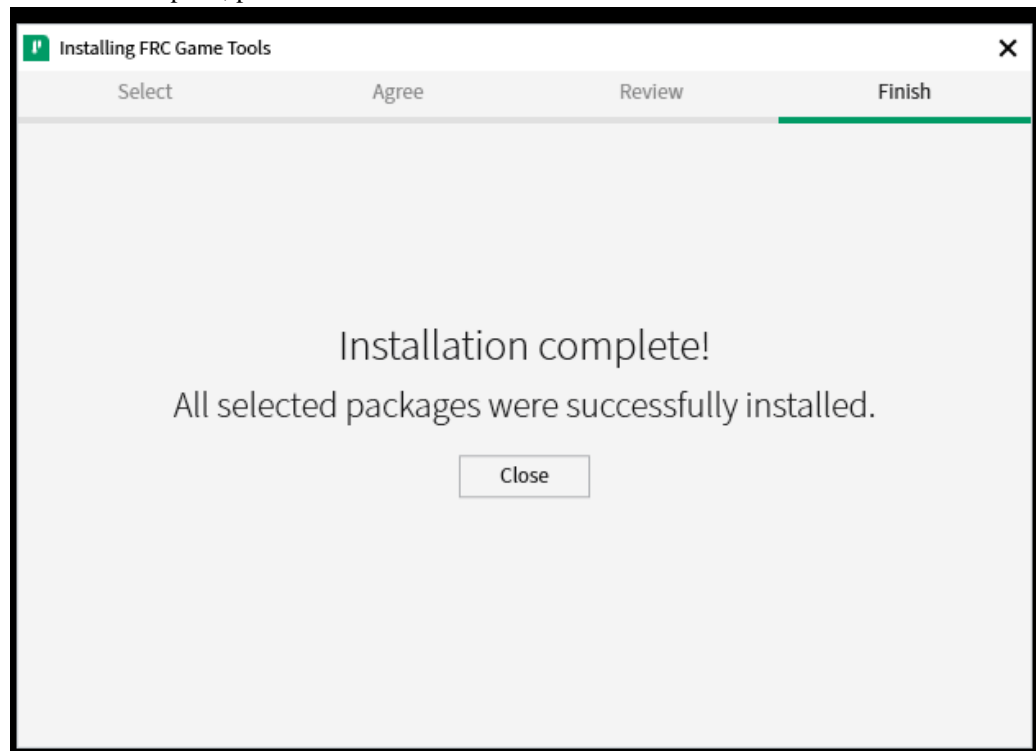
FRC Game Tools	2022 f1
FRC LabVIEW Update	2022 f1

Back Next

- k. The update proceeds.

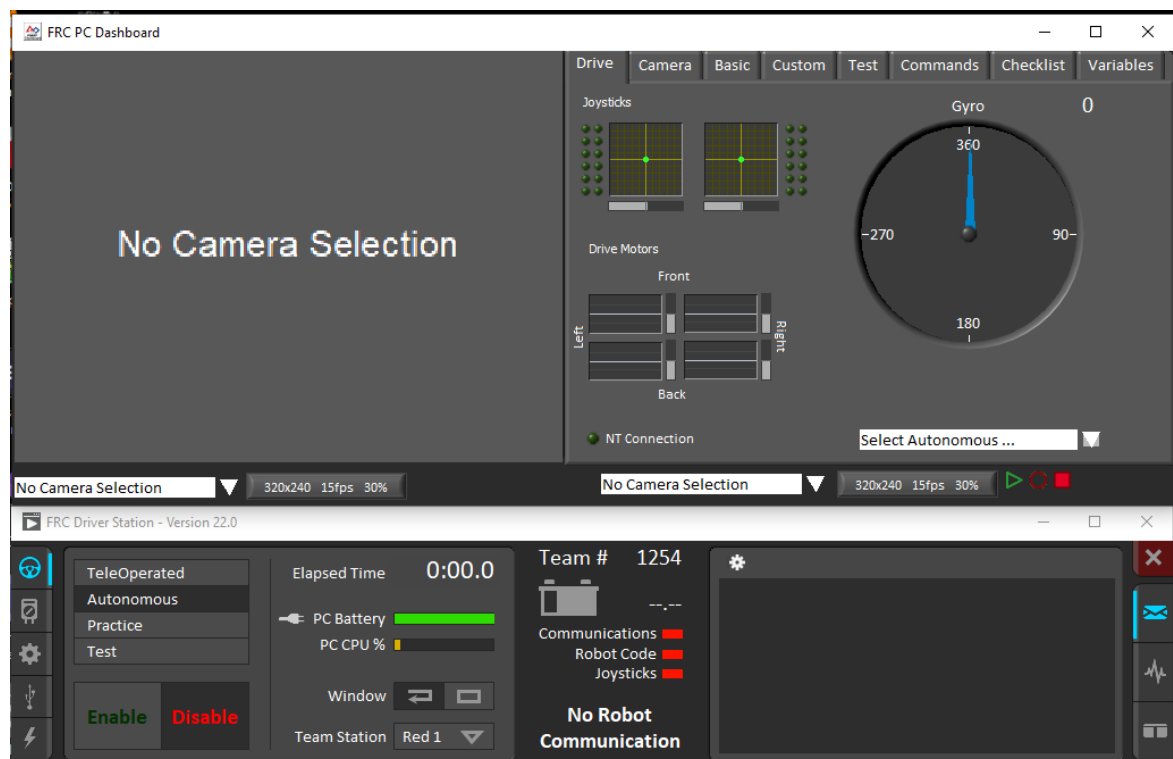
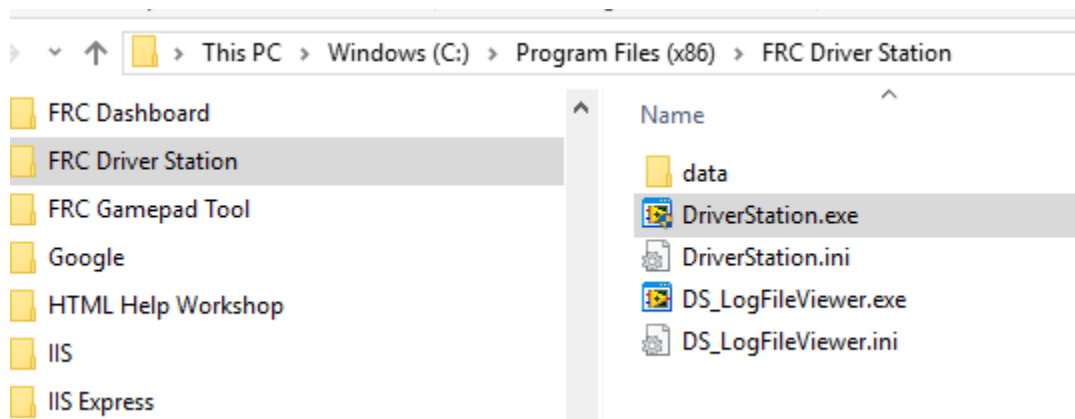


- l. When this complete, press the Close button.

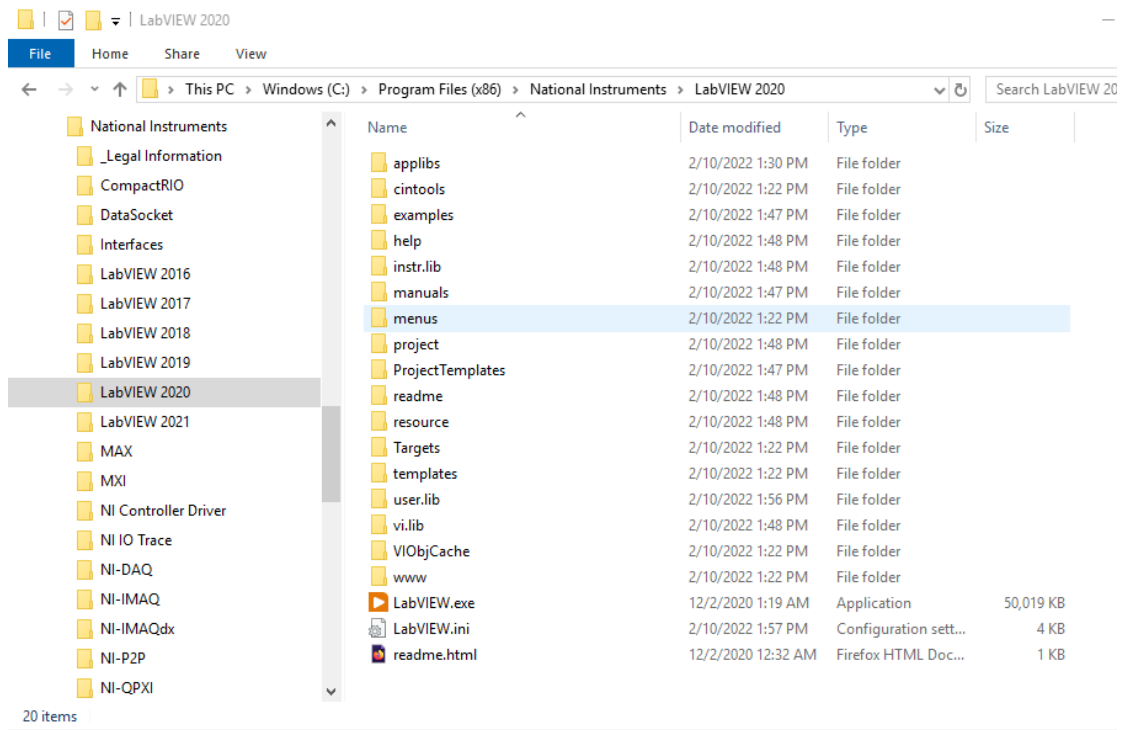


4. This appears to be the end of the installation process.
5. The Driver Station is located in C:\Program Files (x86)\FRC Driver Station. Running the Driver Station will automatically start the Dashboard, too.





1. The LabVIEW program is located in C:\Program Files (x86)\National Instruments\LabVIEW 2020.



2. Running this brings up the LabVIEW development environment.

