



2015 FTC Kick-Off

Build the Developer Workstation

Frog Tech University, FRC Team 503
September 12, 2015

Course 101

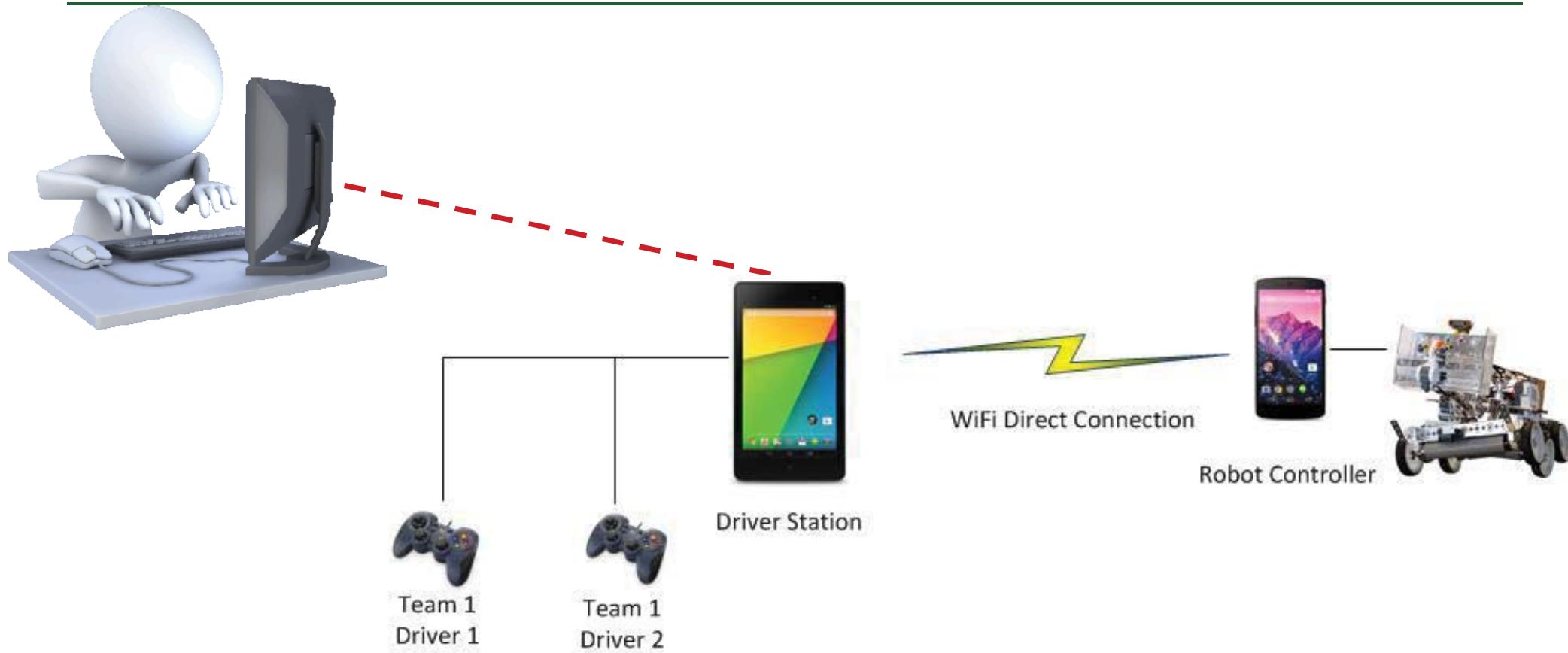
Today's Goal.....



The goal of todays session is to set up your laptop to make software changes to the robot

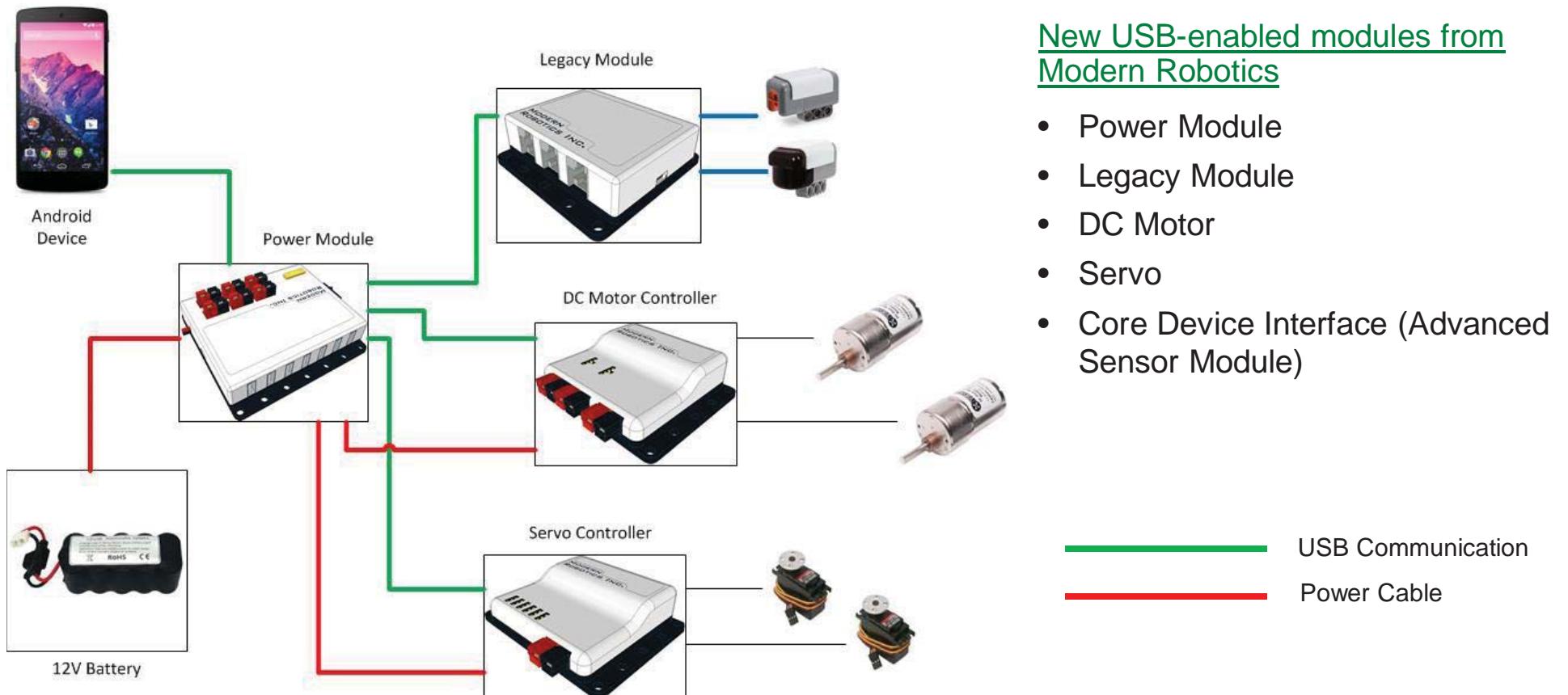
New Point to Point Communication System

Pair of Android phones provide ‘Wi-Fi Direct’ Communication



New USB Enabled Controllers

All of these fit on the robot...

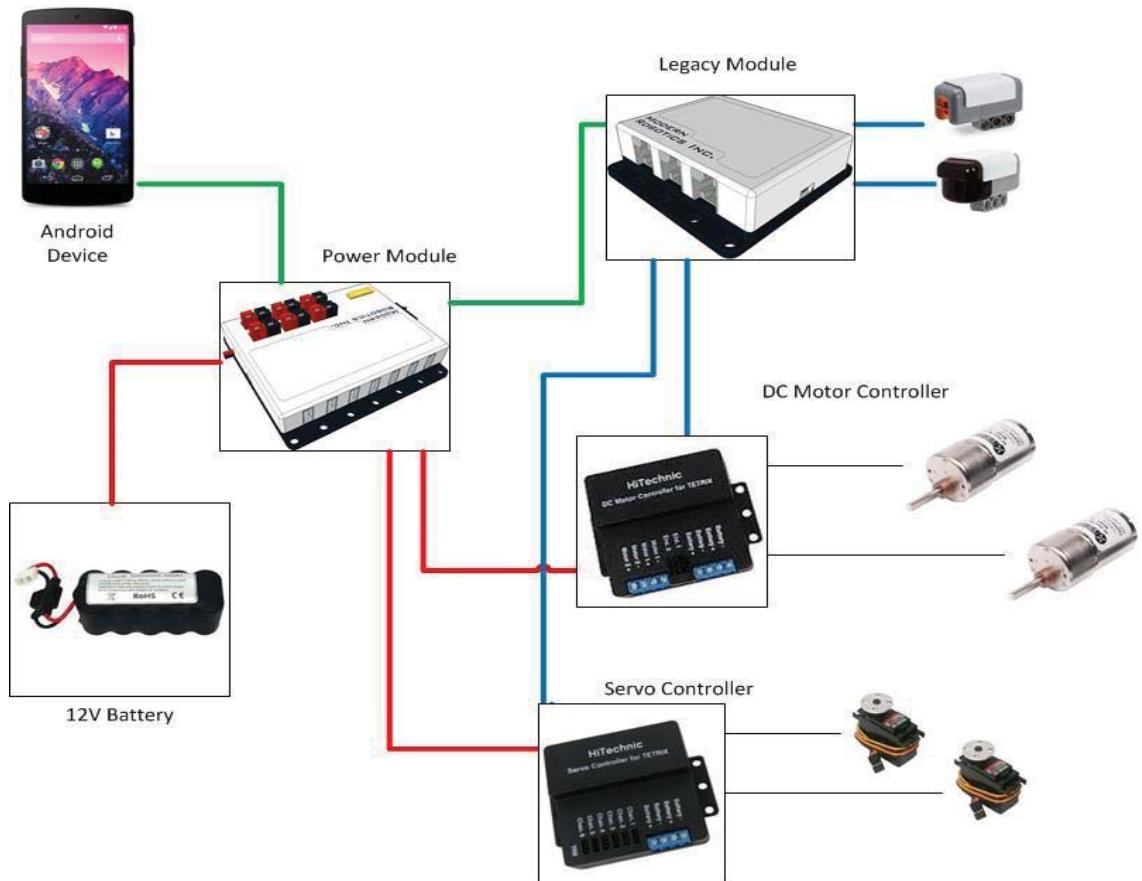


New USB-enabled modules from Modern Robotics

- Power Module
- Legacy Module
- DC Motor
- Servo
- Core Device Interface (Advanced Sensor Module)

Support for Legacy Devices

All of these fit on the robot...



Legacy Module allows use of NXT-compatible devices

- NXT Sensors
- Tetrix DC Motor and Servo Controllers
- Matrix 9V DC Motor/Servo Controller (coming soon)
- LEGO NXT motors are NOT supported

Developer Workstation Set-up

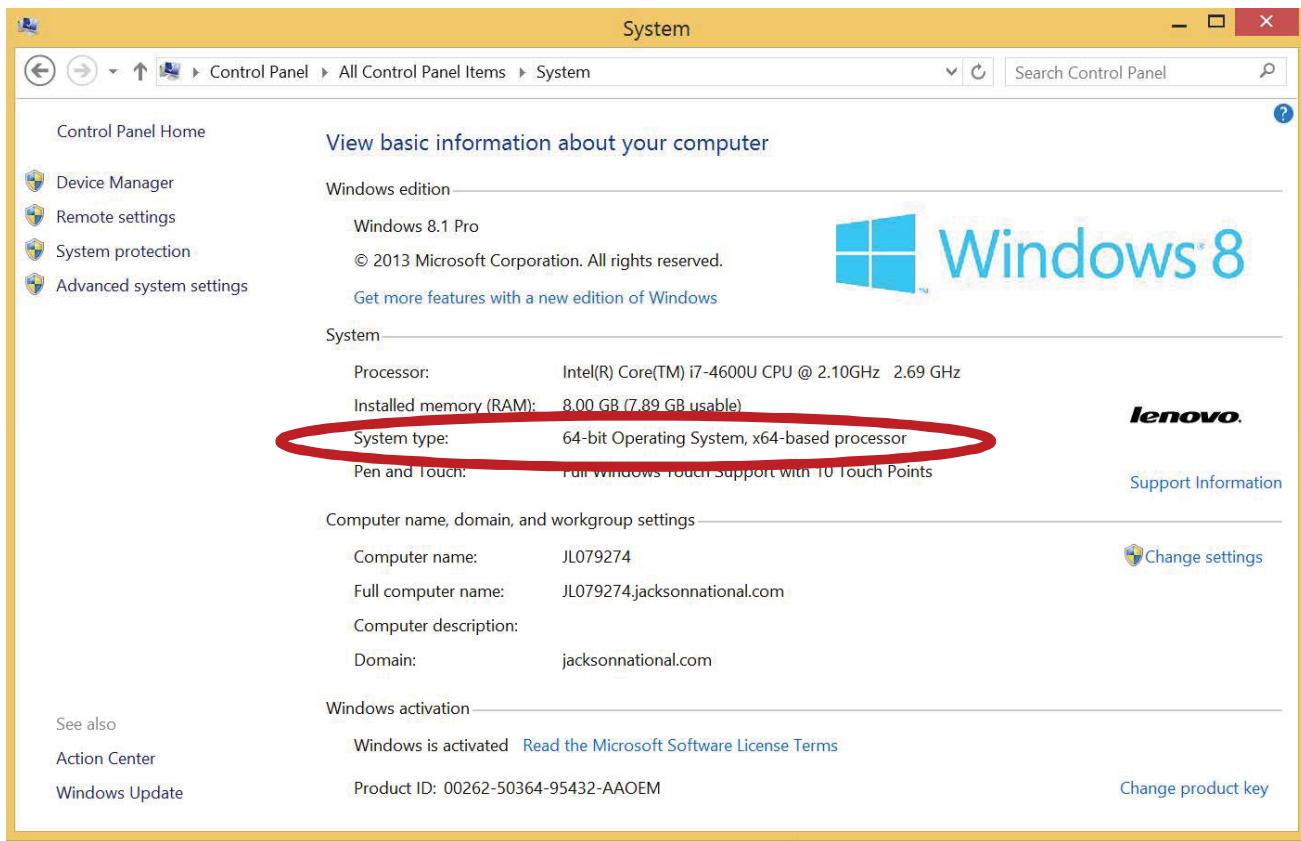
9 Easy Steps !!!!



1. Verify System Requirements
2. Install FTC Software Development Kit (SDK)
3. Install Java Developers Kit (JDK)
4. Install Android Studio Integrated Development Environment (IDE)
5. Configure Android Studio
6. Build FTC Application
7. Fix Missing API 19
8. Fix Missing Build Tools 21.1.2
9. Build the FTC Application Executable (Gradle)

Step 1 – Verify System Requirements

We need to find the System Type



Guide

- Go to Windows – System Settings
- Find the System Type
 - 32-Bit or 64-Bit

System Requirements

- Windows 8/7/Vista/2003
- 2 GB RAM, 4GB Recommended
- 1.4 GB Disk Space
- 1280x800 Minimum Screen Resolution
- JDK 7

7 Note: Android Studio does not work on Windows 10 !!!!!



Use the Frog Force 503 USB Stick

The USB Stick contains all the necessary software

Frog Force 503 USB Software Stick



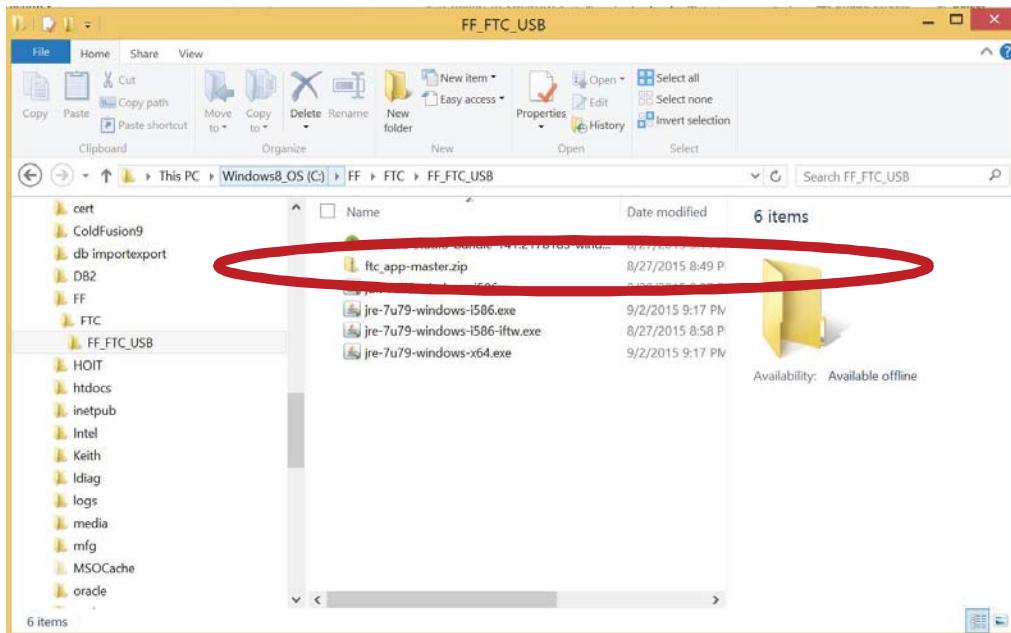
Great News - Frog Force has already downloaded the necessary software and copied it onto the USB stick

Guide

- Plug in FF memory stick into laptop USB port
- Open Windows Explorer

Step 2 – Install FTC Software Development Kit (SDK)

1 – Using the Memory Stick, Copy the FTC app onto your machine

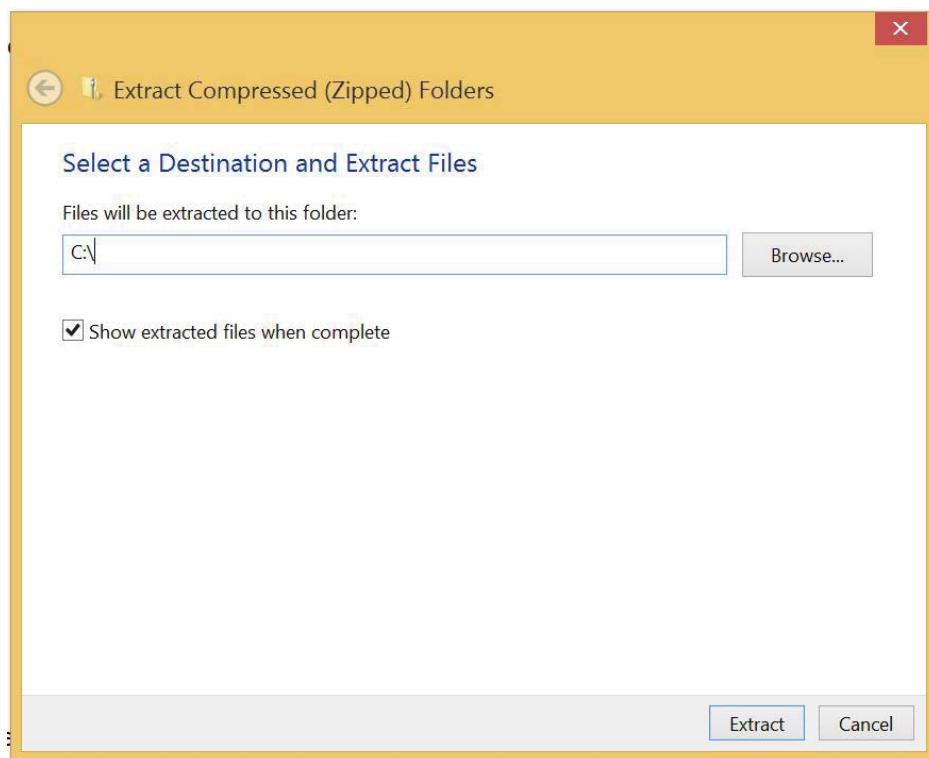


Guide

- Open Windows Explorer
- Access the FF USB Stick
- Copy the ftc_app-master.zip from the memory stick to your downloads directory
- Once the copy is complete, bring up the Download directory in Windows Explorer
- Select the ftc_app_master.zip file that you just copied
- Right click on the ftc_app-master zip file
- Select ‘Extract All’

Step 2 – Install FTC Software Development Kit (SDK)

2 – Tell the system where to put the unzipped files

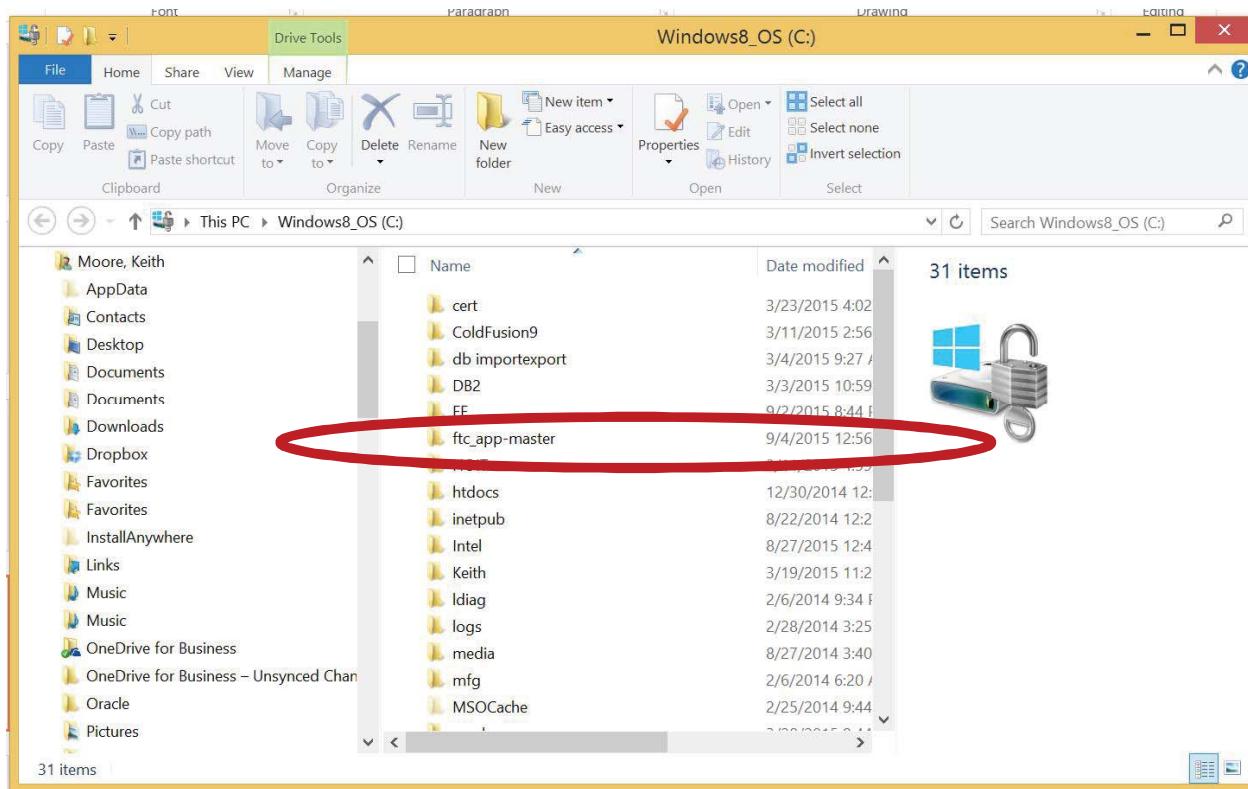


Guide

- Select destination for extracted files – c:\
- Press ‘Extract’ button

Step 2 – Install FTC Software Development Kit (SDK)

3 – Tell the system where to put the unzipped files



Guide

- Once the extract is completed, you will see a window similar to the one on the left
- This shows the new `ftc_app-master` directory installed on your c: drive

Congratulations you have installed the FTC SDK!!!

Step 3 – Install Java Development Kit (JDK)

1 – Using the Memory Stick, Run the JDK install program



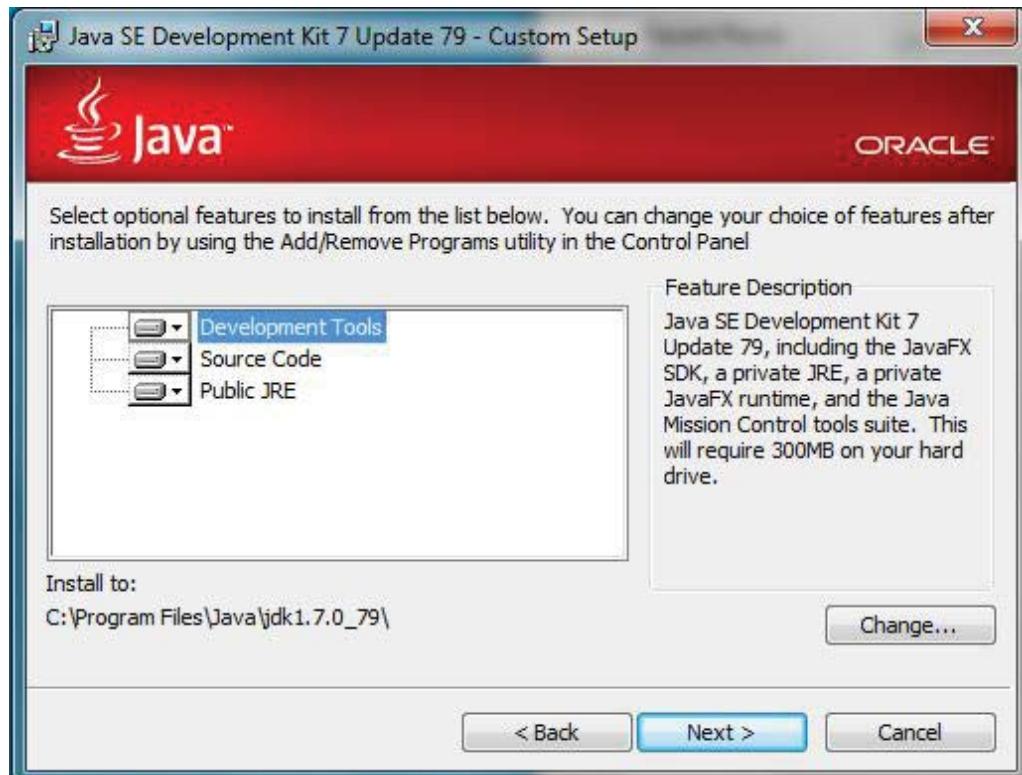
Guide

- Use Windows Explorer to access the FF Memory stick and display the file list
- Determine if your laptop is x86 or x64 then double click on the correct JDK file:
 - X86 – jdk-7u79-windows-i586.exe
 - X64 – jdk-7u79-windows-x64.exe
- If your machine asks to allow the Java SE Development Kit 7 Update 79 to make changes to your computer click 'Yes'
- The JDK Installation Wizard will execute and you will see the Welcome Screen (Displayed on the left)
- Click Next

Note: You must use version 7.79 – do not use version 8

Step 3 – Install Java Development Kit (JDK)

2 – Accept Installation Defaults



Guide

- You should see the 'Custom Setup' window at the left
- Accept the installation defaults – Click Next

Step 3 – Install Java Development Kit (JDK)

3 – Accept Destination Folder Default



Guide

- You should see the 'Destination Folder' window at the left
- Accept the installation defaults – Click Next

Step 3 – Install Java Development Kit (JDK)

4 – Installation Complete



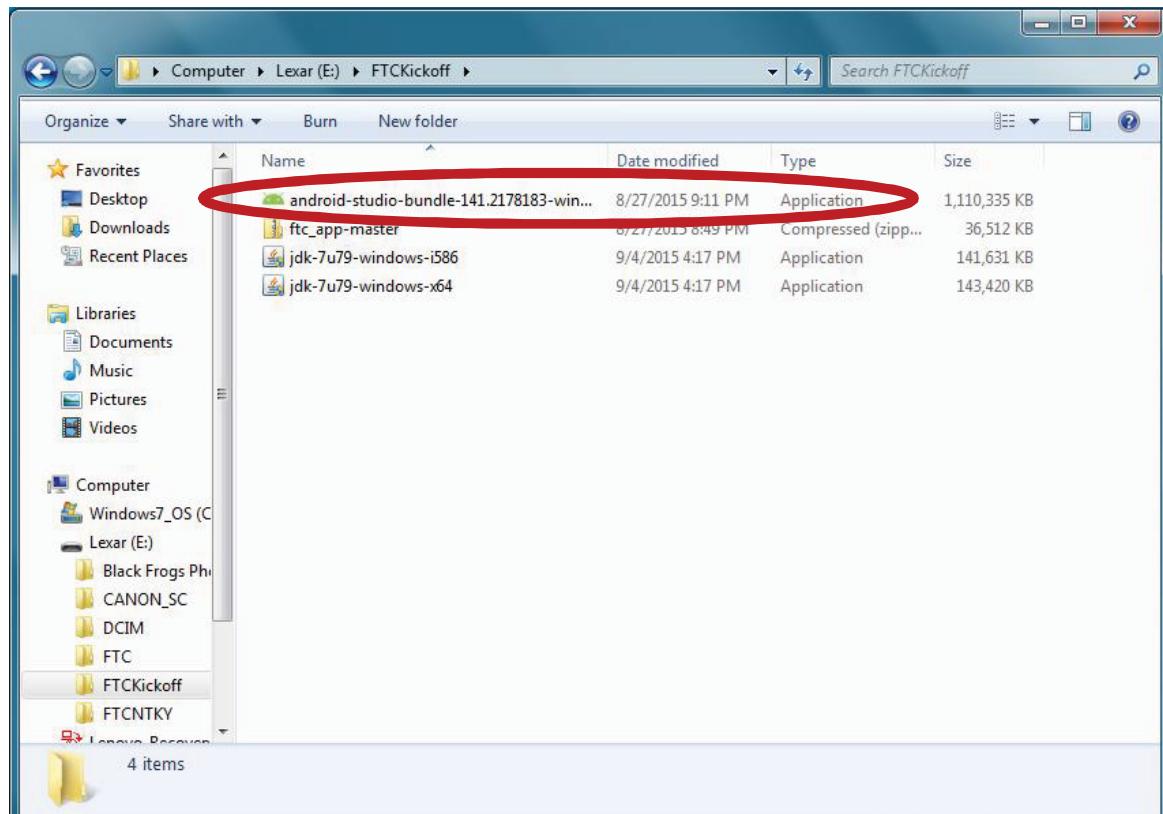
Guide

- Once the install has completed, you will see the 'Complete' window at the left
- Click Close

Congratulations you have installed the JDK!!!

Step 4 – Install Android Studio Integrated Development Environment (IDE)

1 – Use the FF USB Stick and run the Android Studio install program



Guide

- Open Windows Explorer
- Access the FF USB Stick
- Select “android-studio-bundle....” file and double click to start the install
- If your machine asks to allow the android-studio-bundle... to make changes to your computer click ‘Yes’

Step 4 – Install Android Studio Integrated Development Environment (IDE)

2 – Confirm that you want to install Android Studio

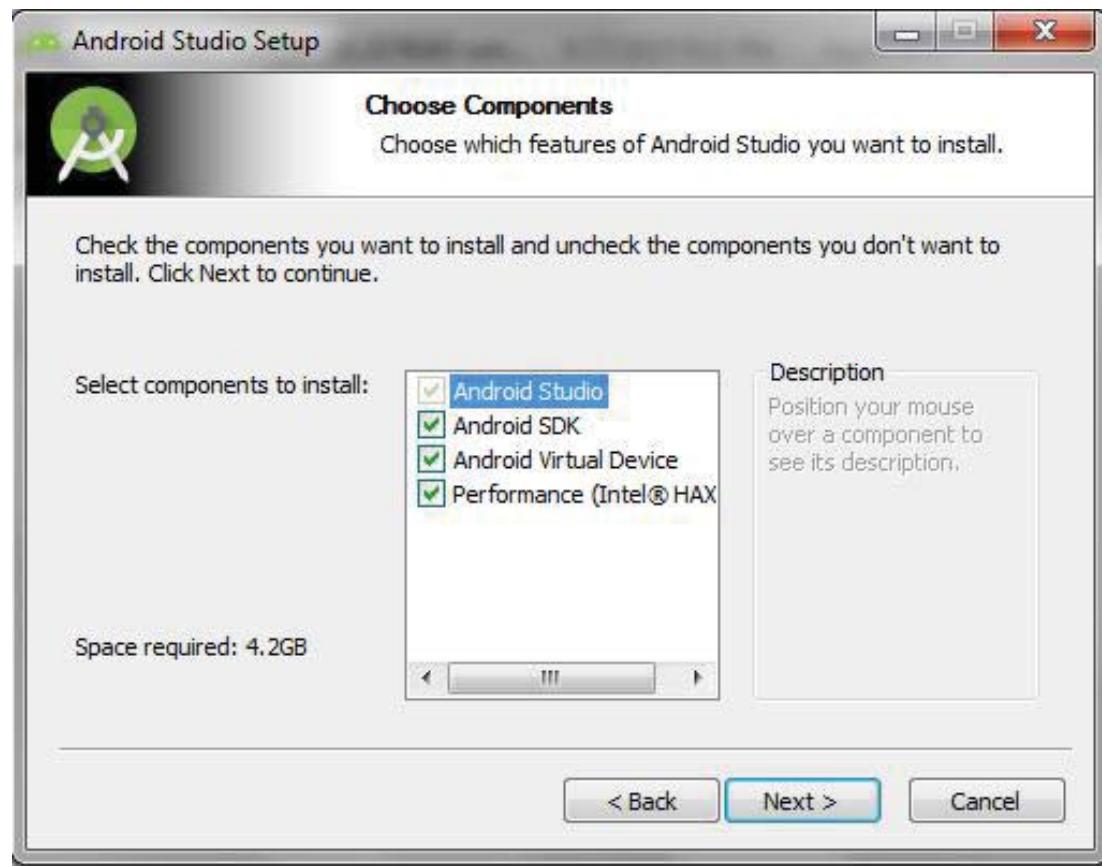


Guide

- Once the setup program loads you will see the confirmation page at the left
- Click Next to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

3 – Choose what components you want to install

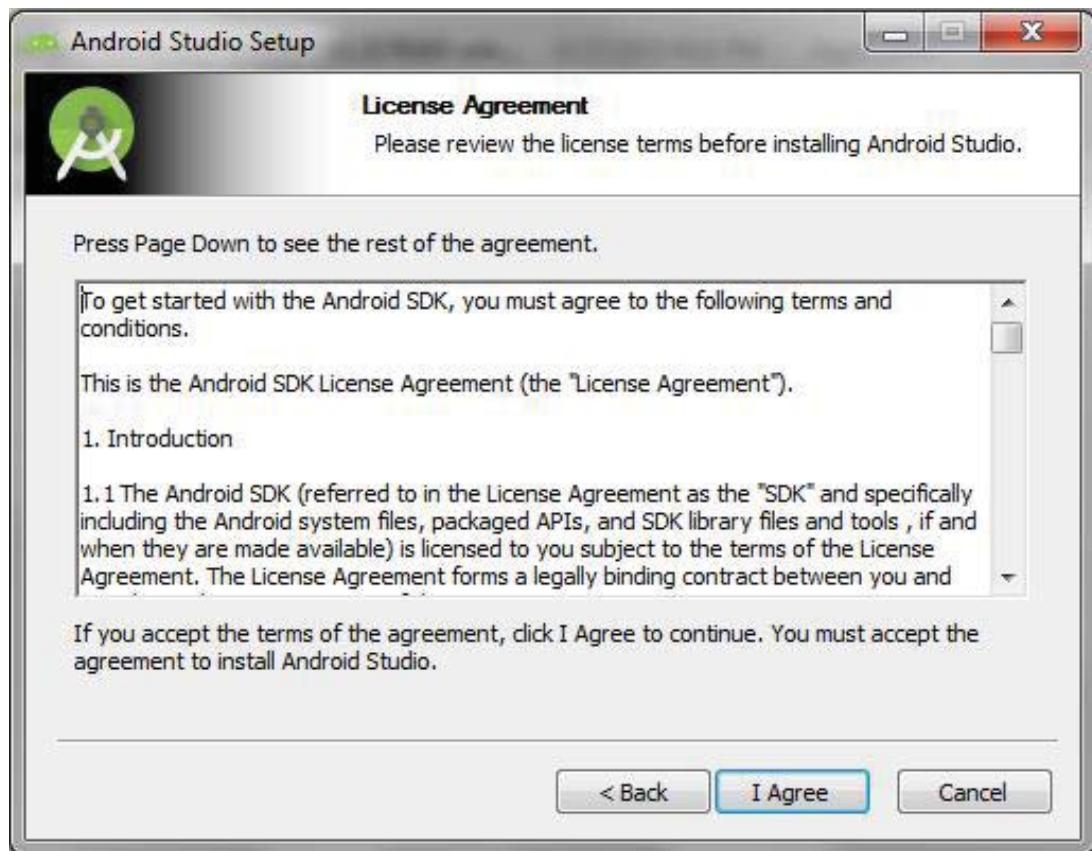


Guide

- You will see the 'Choose Components' page at the left
- Accept the default selections
- Click Next to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

4 – Accept the license Agreement



Guide

- You will see the 'License Agreement' page at the left
- After thoroughly reading the agreement...
- Click I Agree to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

5 – Set the Install Locations

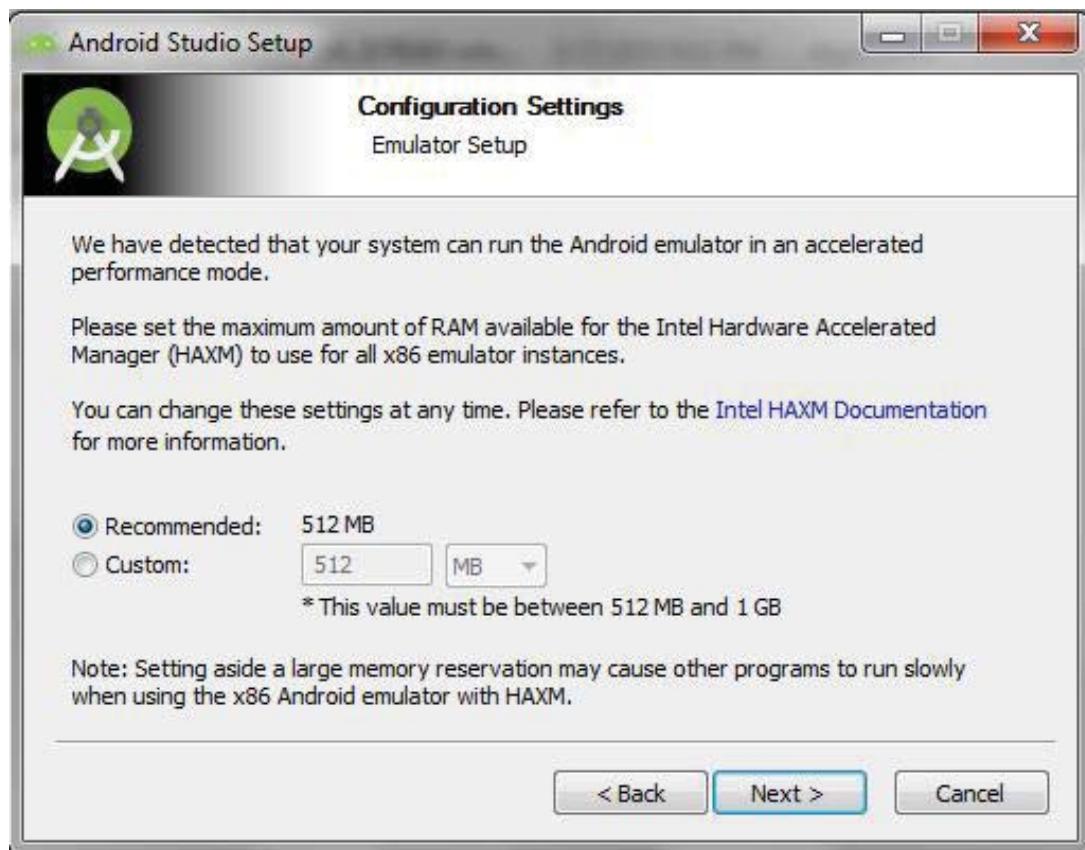


Guide

- You will see the 'Configuration Settings' page at the left
- Accept the default locations for the Android files
- Click Next to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

6 – Set Emulator Hardware Accelerator Memory Reservation



Guide

- You will see the 'Configuration Settings' page at the left
- Accept the recommended memory size
- Click Next to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

7 – Set the Folder name on the Start Menu



Guide

- You will see the 'Choose Start Menu Folder' page at the left
- Accept the default folder name
- Click Install to start the process
- Once the installation process starts you will see a progress bar showing how the installation is going. Be patient this does take a while.

Step 4 – Install Android Studio Integrated Development Environment (IDE)

8 – Set the Folder name on the Start Menu

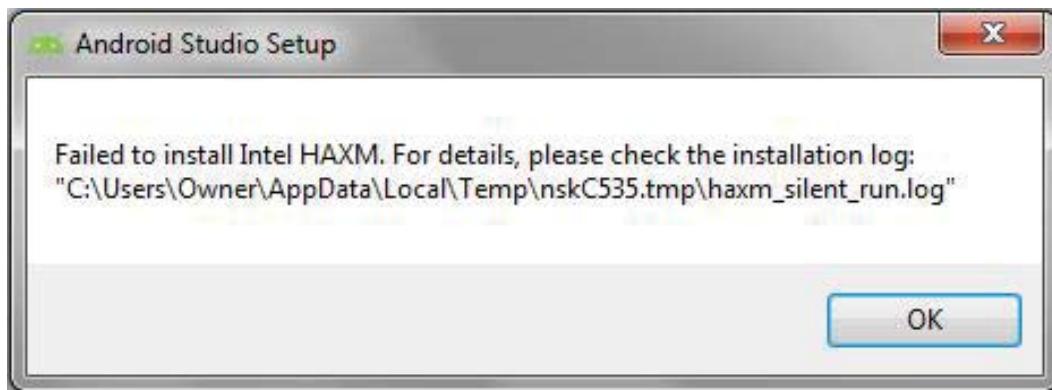


Guide

- You will see the 'Choose Start Menu Folder' page at the left
- Accept the default folder name
- Click Next to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

9 – Error Message for Hardware Accelerator Failure

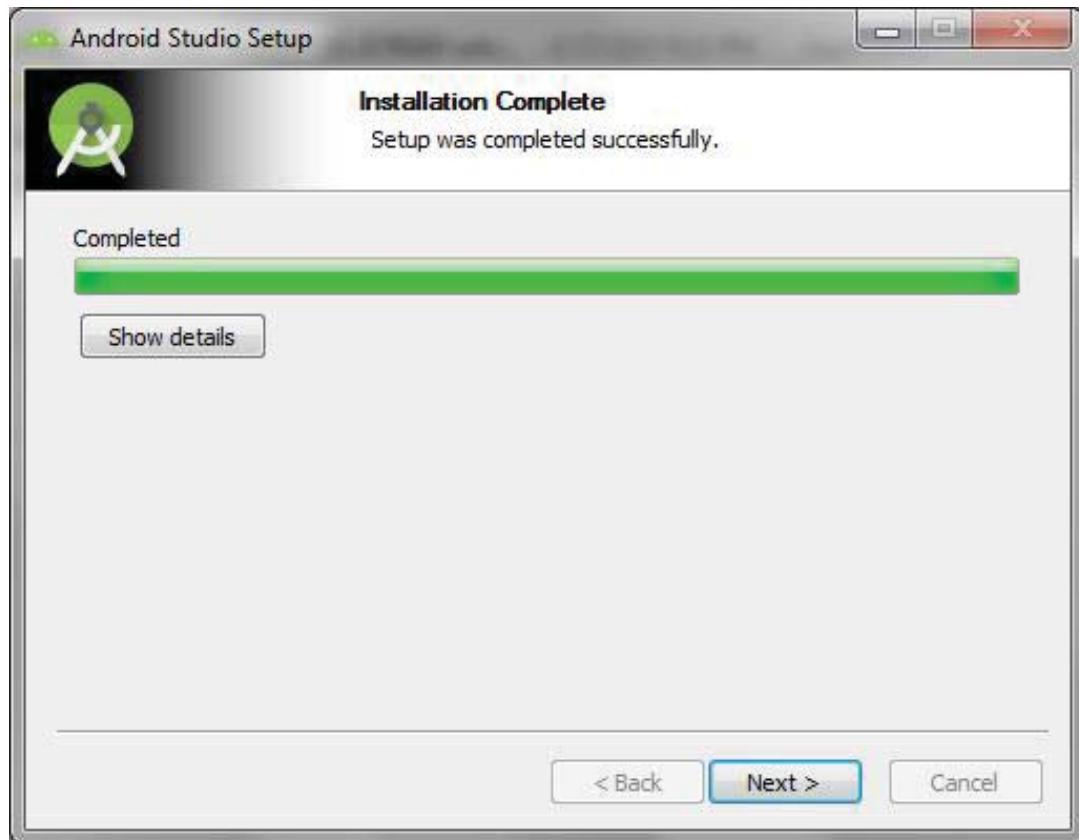


Guide

- You may see an error message for a failure of the Hardware Accelerator feature.
- The file mentioned in the error message box can not be found on the hard drive
- Searching the internet does not provide an acceptable answer.
- Click OK to continue the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

10 – Installation Completed



Guide

- You should see the 'Installation Complete' page at the left
- Click Next to complete the install

Step 4 – Install Android Studio Integrated Development Environment (IDE)

11 – Setup has completed



Guide

- You should see the 'Android Studio Setup' page at the left
- Uncheck the Start Android Studio box
- Click Finish to complete the install

Congratulations you have installed Android Studio!!!

Step 5 – Configure Android Studio

1 - Start Android Studio



Guide

- Go to the Windows Start Menu
- Click on “All Programs”
- Locate the Android Studio folder, click to open folder
- Select Android Studio application by clicking on it
- You should see the start up screen on the left

Step 5 – Configure Android Studio

2 - Select default to not import existing settings



Guide

- The first time you open Android Studio it will ask if you want to import any setting from a previous Android Studio install
- Ensure that the radio button is set to “I do not have a previous version”
- Click OK

Step 5 – Configure Android Studio

3 - Allow Android Studio to use your network connection

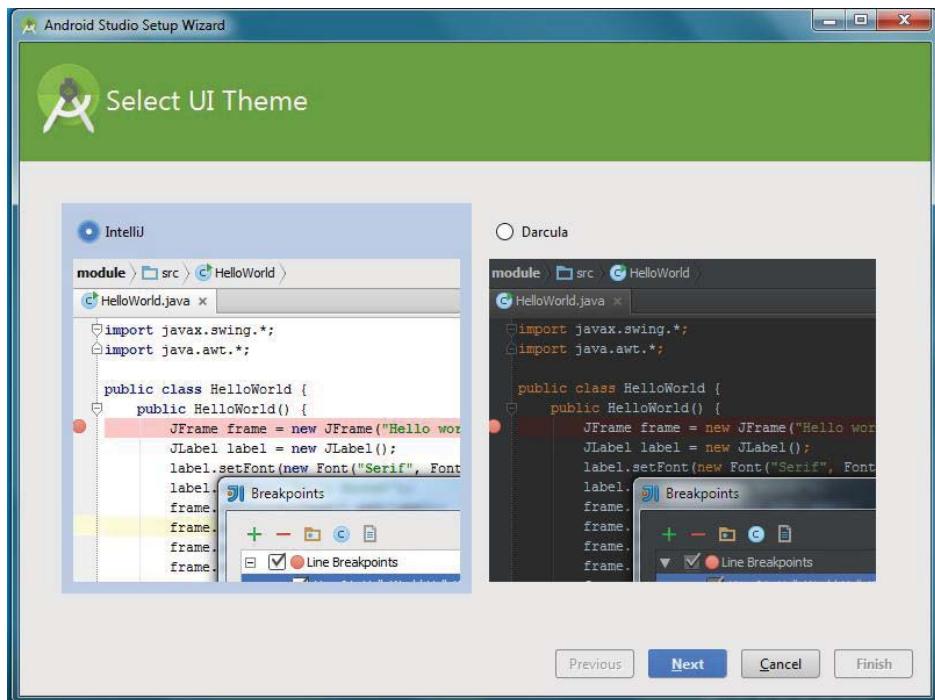


Guide

- Android Studio will always go out through the internet and contact the Google sites to check for updates.
- You may get a Windows firewall security alert to allow the network access.
- Click “Allow Access”

Step 5 – Configure Android Studio

4. Set User Interface Theme

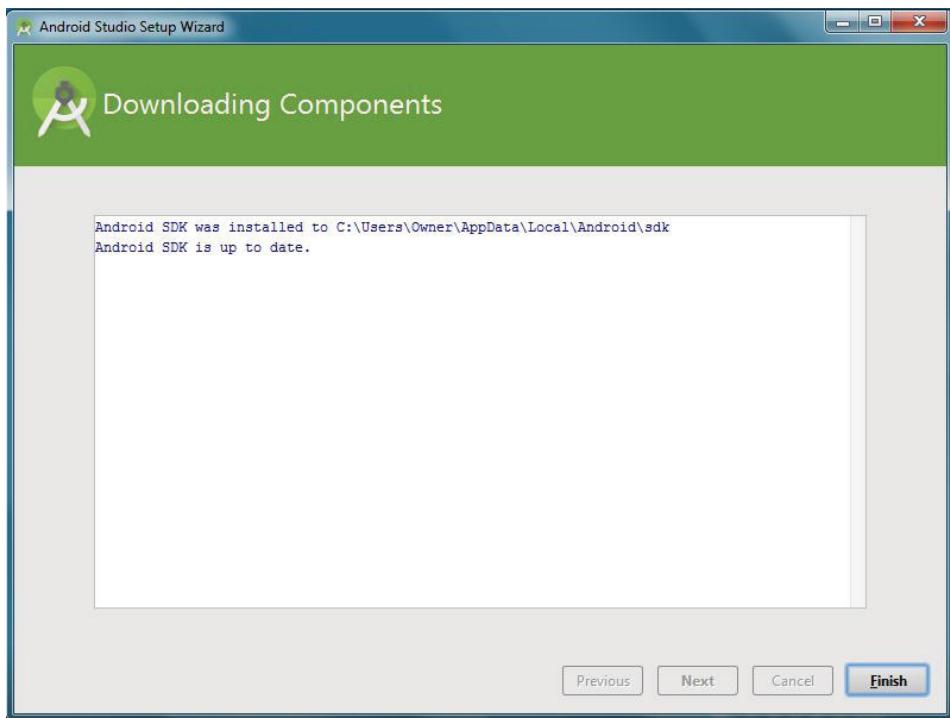


Guide

- Select the default IntelliJ theme
- Click “Next”

Step 5 – Configure Android Studio

5. Android Studio will automatically update if needed



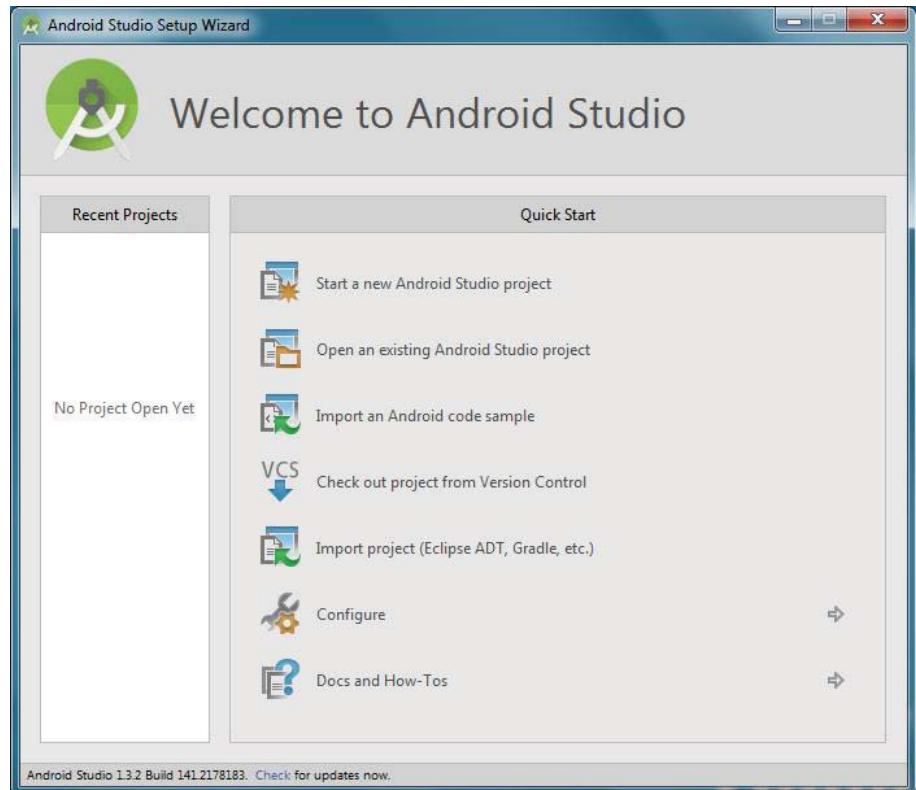
Guide

- Android Studio will display the “Setup Wizard” window similar to the one on the left.
- If there are any updates it will download and apply them.
- When it is finished the “Finish” button will be selectable
- Click “Finish”

Congratulations you have Configured Android Studio!!!

Step 6 – Build FTC Application

1. Open Existing Android Studio Project

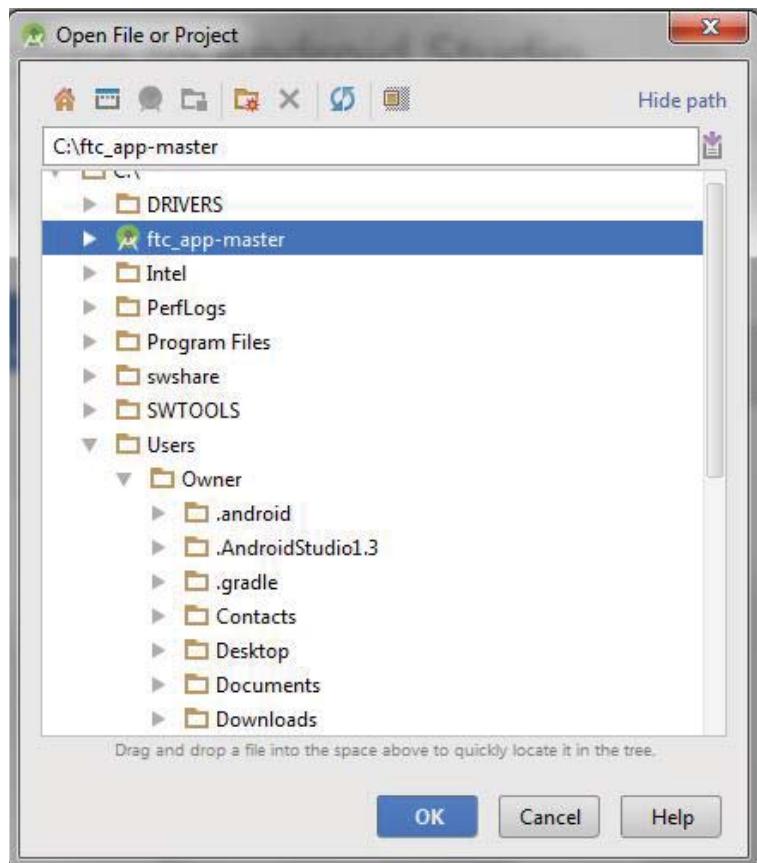


Guide

- Click on “Open an Existing Android Studio project”

Step 6 – Build FTC Application

2. Select FTC_app-master Project

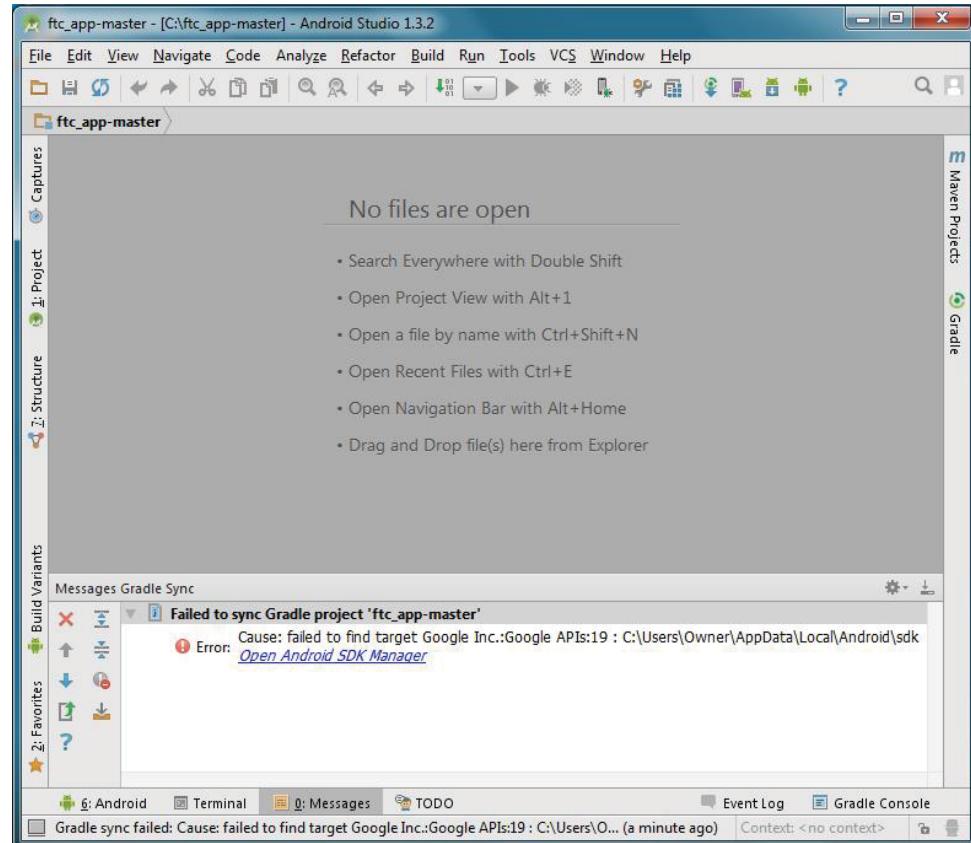


Guide

- Select “ftc_app-master”
- Click on “OK”

Step 6 – Build FTC Application

3. Select FTC_app-master Project



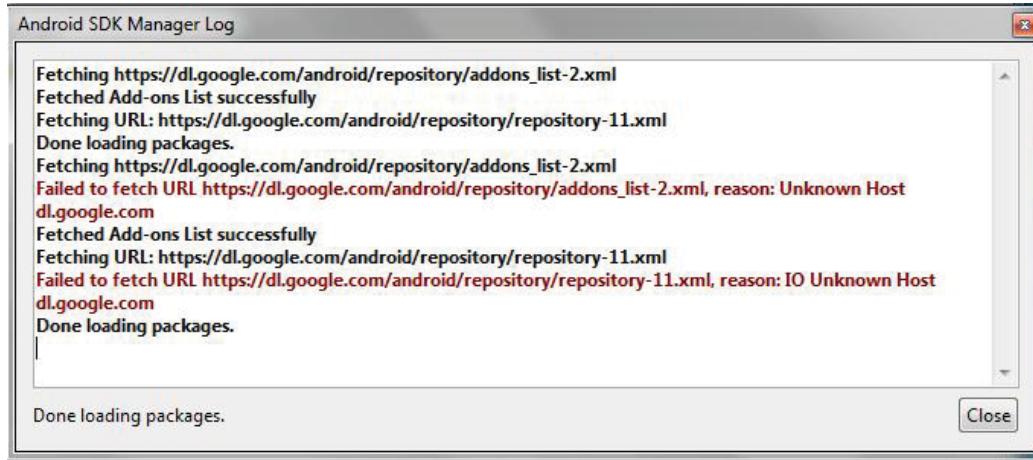
Guide

- Android Studio will try to compile the “ftc_app-master” project
- The compile will fail missing Google API 19
- To fix the missing API, click on the “Open Android SDK Manager” link”

Step 6 – Build FTC Application

4. Android SDK Manager may fail if you are not connected to the Internet

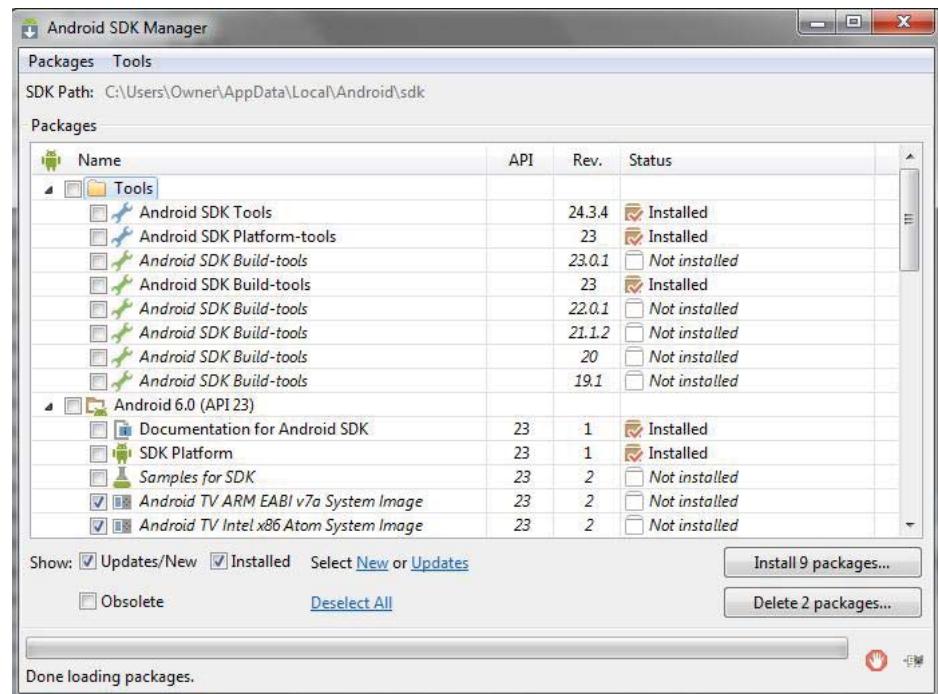
Guide



- The Android SDK Manager will look for the missing API on the Internet.
- You will receive an error message similar to the one on the left if you are not connected to the Internet.
- If you do Click ‘Close’
- Connect to the Internet
- Then click on the “Open Android SDK Manager” link to retry the process.
- If you don’t receive this error message, proceed to the next page.

Step 7 – Fix Missing API 19

1. Use SDK Manager to install API 19 (4.4.2 KitKat)

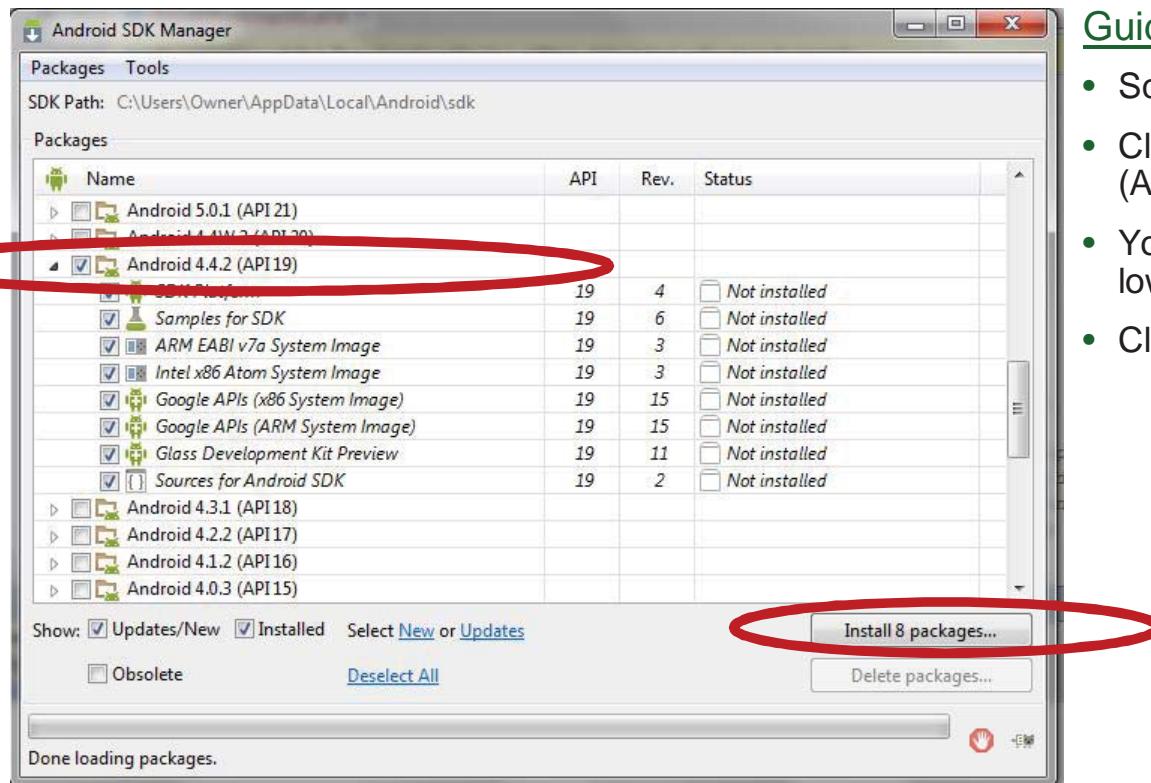


Guide

- Android Studio will try to identify what you are missing.
- It will come up with 9 packages to install-including Android TV!
- Unfortunately it does not identify the missing API 19 that we need!
- Click on the “Deselect All” link
- Scroll down until you see the Android 4.4.2 (API 19)

Step 7 – Fix Missing API 19

1. Use SDK Manager to install API 19 (4.4.2 KitKat)

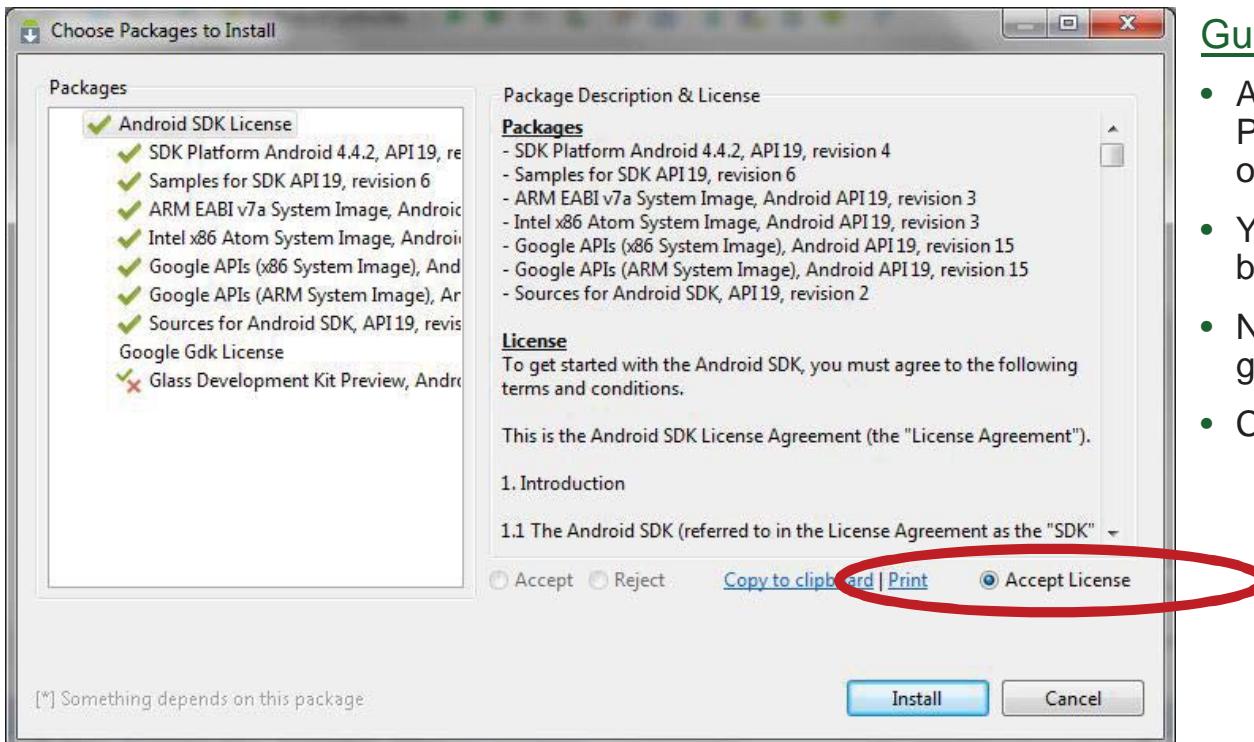


Guide

- Scroll down until you see the ‘Android 4.4.2 (API 19)’
- Click on the checkbox to the left of ‘Android 4.4.2 (API 19)’
- You will see “Install 8 packages” on the button on the lower right side of the page
- Click on the “Install 8 packages” button

Step 7 – Fix Missing API 19

2. Accept the License Terms and Conditions

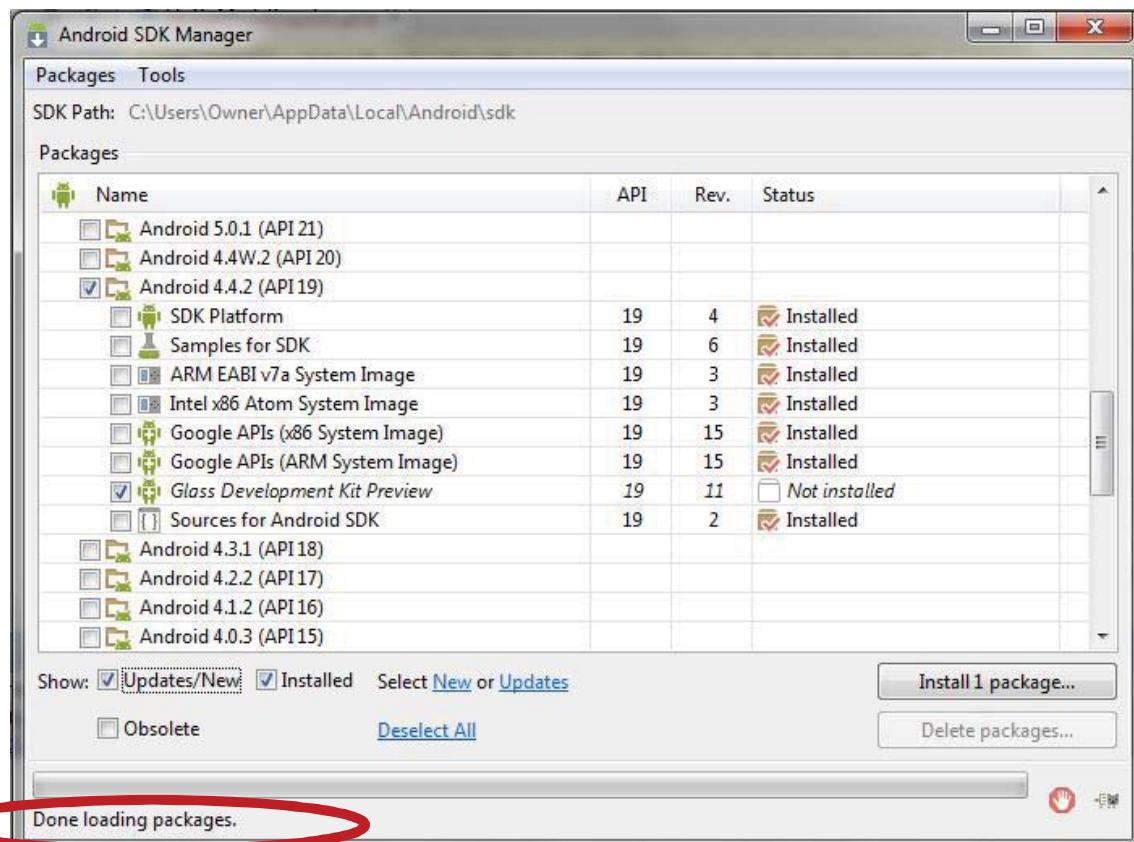


Guide

- Android Studio will display a “Choose Package to Install” window similar to the one on the left
- You must click on the “Accept License” radio button to install the software.
- Note that all the packages now turn to a green check mark
- Click the “Install” button

Step 7 – Fix Missing API 19

3. API 19 Installed – However 1 update package remains to be installed

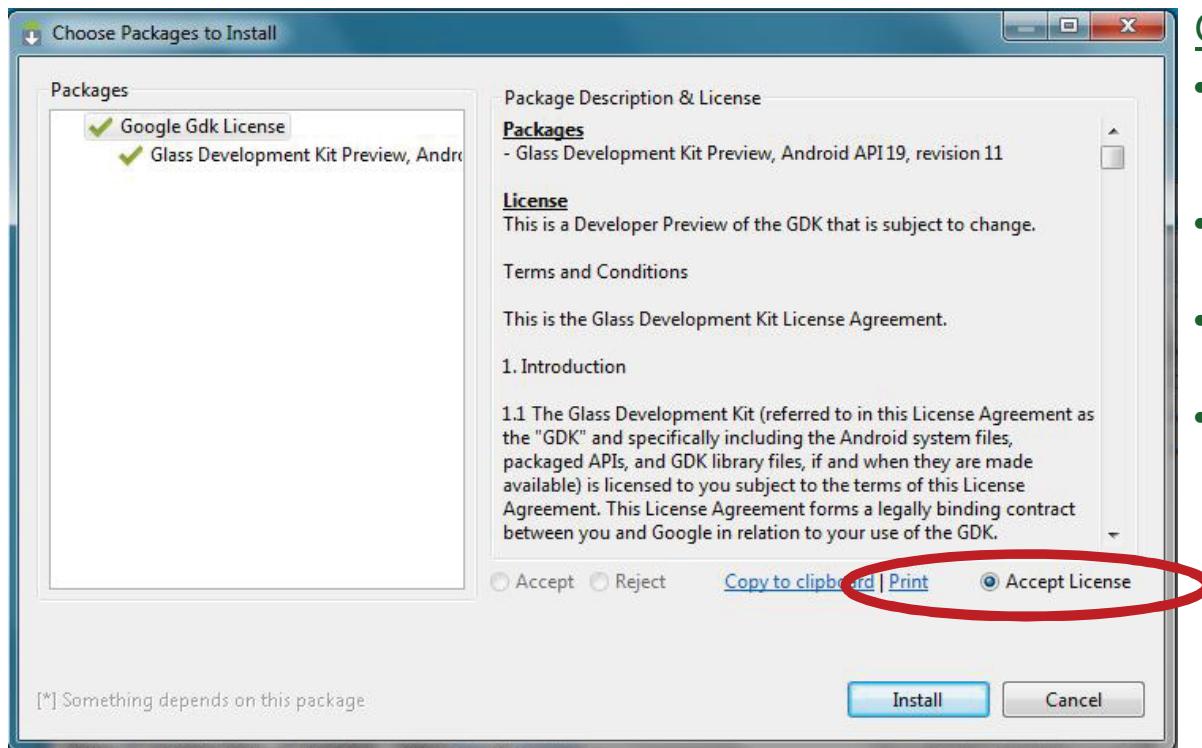


Guide

- Android Studio will display the “Android SDK Manager” page.
- Note that “Android 4.4.2 (API 19) is now checked
- The message on the lower left will say “Done loading packages”
- However, there is one additional package that must be installed.
- Click the “Install 1 package” button

Step 7 – Fix Missing API 19

4. Accept License terms for Glass Development Kit

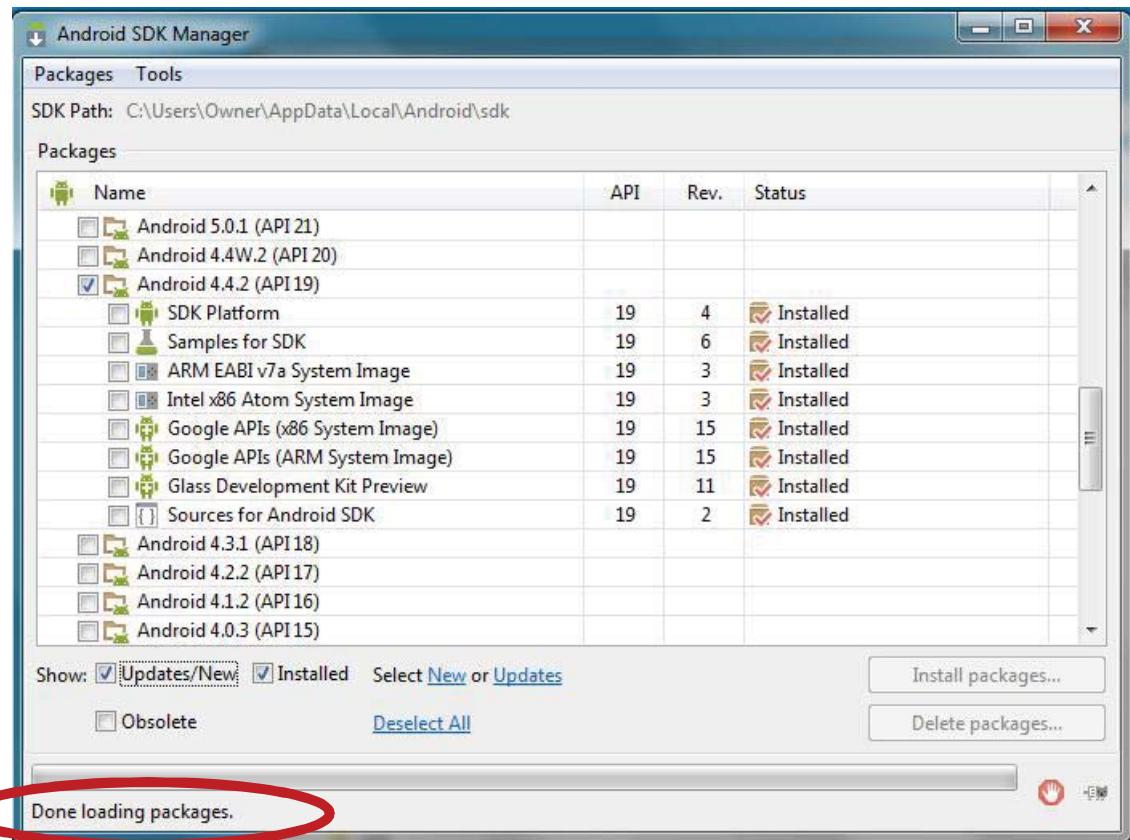


Guide

- Android Studio will display a “Choose Package to Install” window similar to the one on the left
- You must click on the “Accept License” radio button to install the software.
- Note that all the packages now turn to a green check mark
- Click the “Install” button

Step 7 – Fix Missing API 19

5. Accept License terms for Glass Development Kit

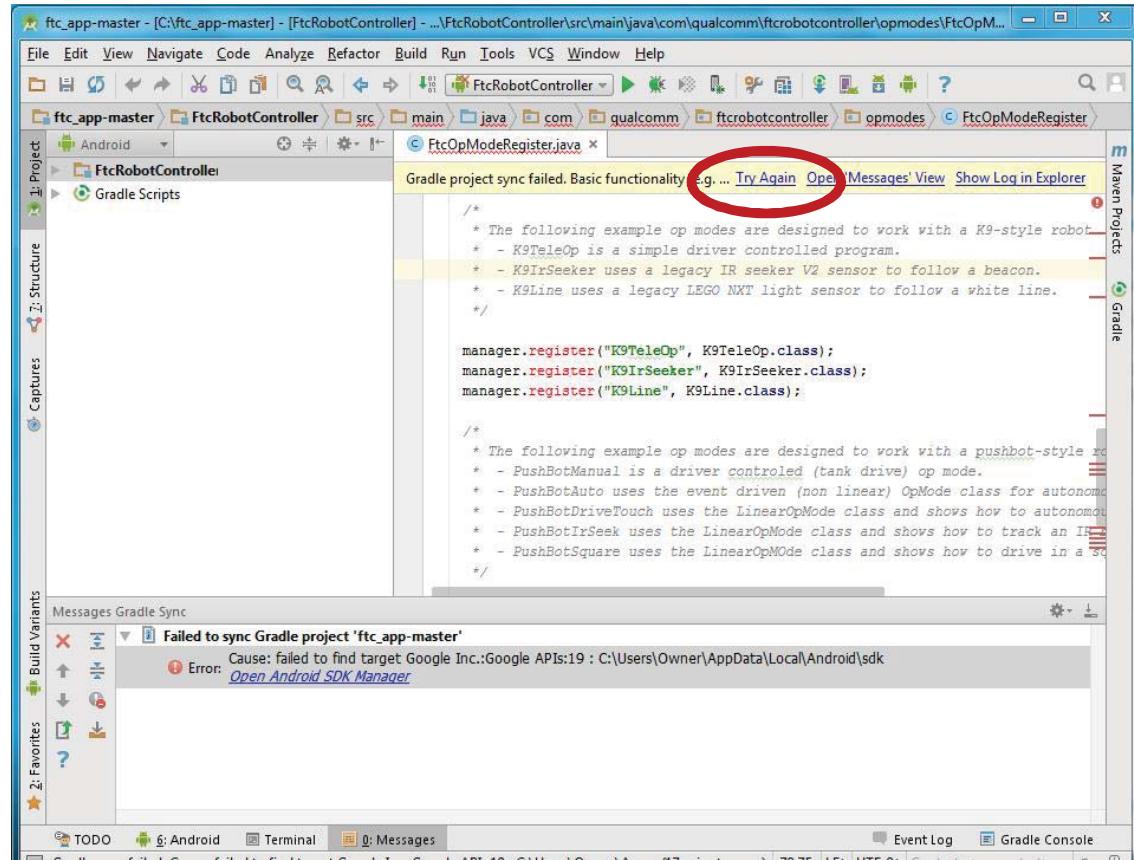


Guide

- Android Studio will display the “Android SDK Manager” page.
- Note that “Android 4.4.2 (API 19) is now checked
- The message on the lower left will say “Done loading packages”
- Click the window close button (“X” in top right corner) to return to the Android Studio IDE

Step 7 – Fix Missing API 19

6. Try Again to compile the FTC application

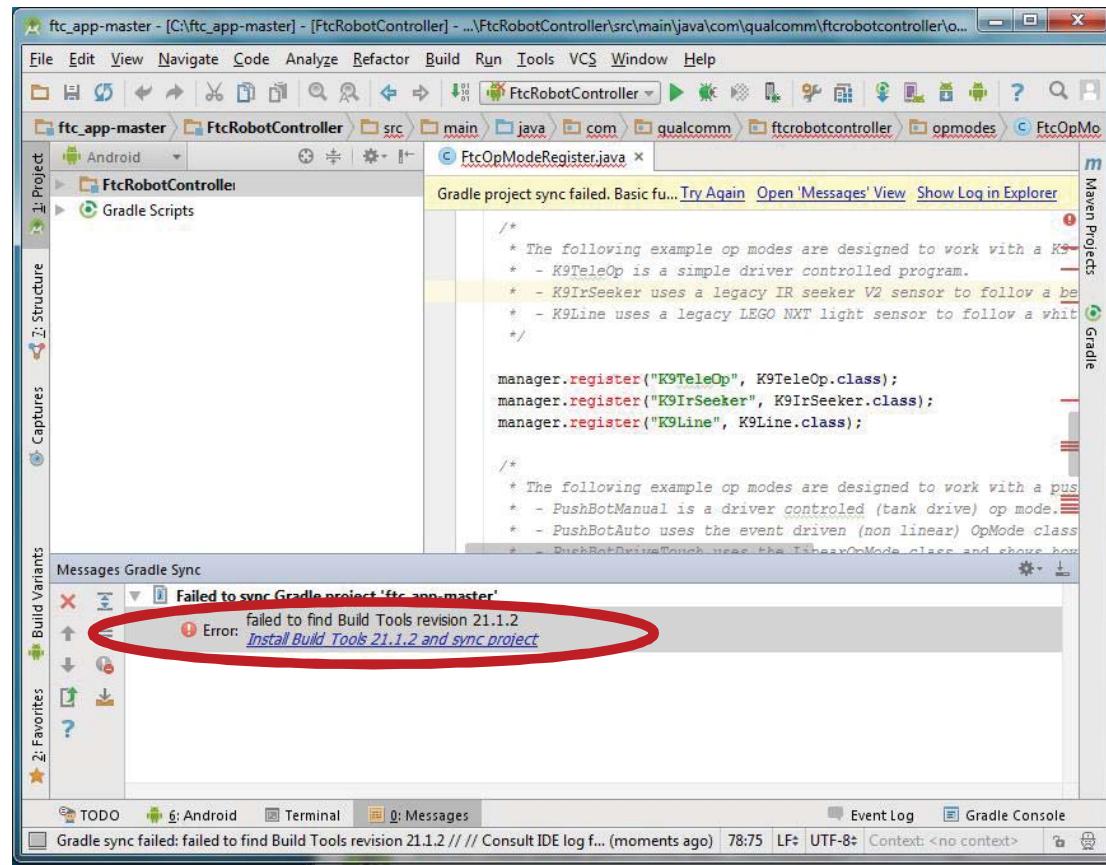


Guide

- Android Studio will display the “ftc_app-master” IDE page similar to the one on the left
- Click on the “Try Again” link to recompile the FTC application
- Note: on some machines, the try again link is disabled and will not allow you to click it. Simply exit Android Studio then restart it. This will cause Studio to try and recompile the ftc_app-master op modes.

Step 8 – Fix Missing Build Tools 21.1.2

1. Android Build Tools 21.1.2 is needed by the FTC application

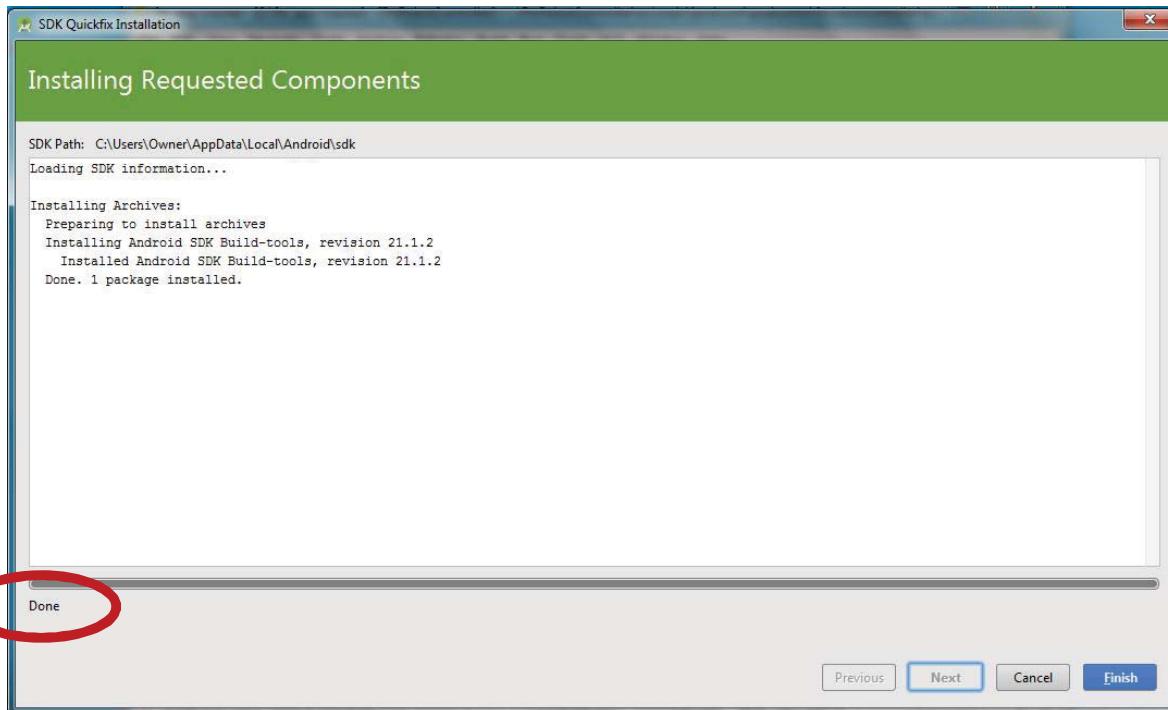


Guide

- Android Studio will display another error.
- This error refers to missing Build tools 21.1.2
- To resolve the error, click on the “Install Build Tools 21.1.2 and sync project” link

Step 8 – Fix Missing Build Tools 21.1.2

2. Android SDK will Automatically fix the problem

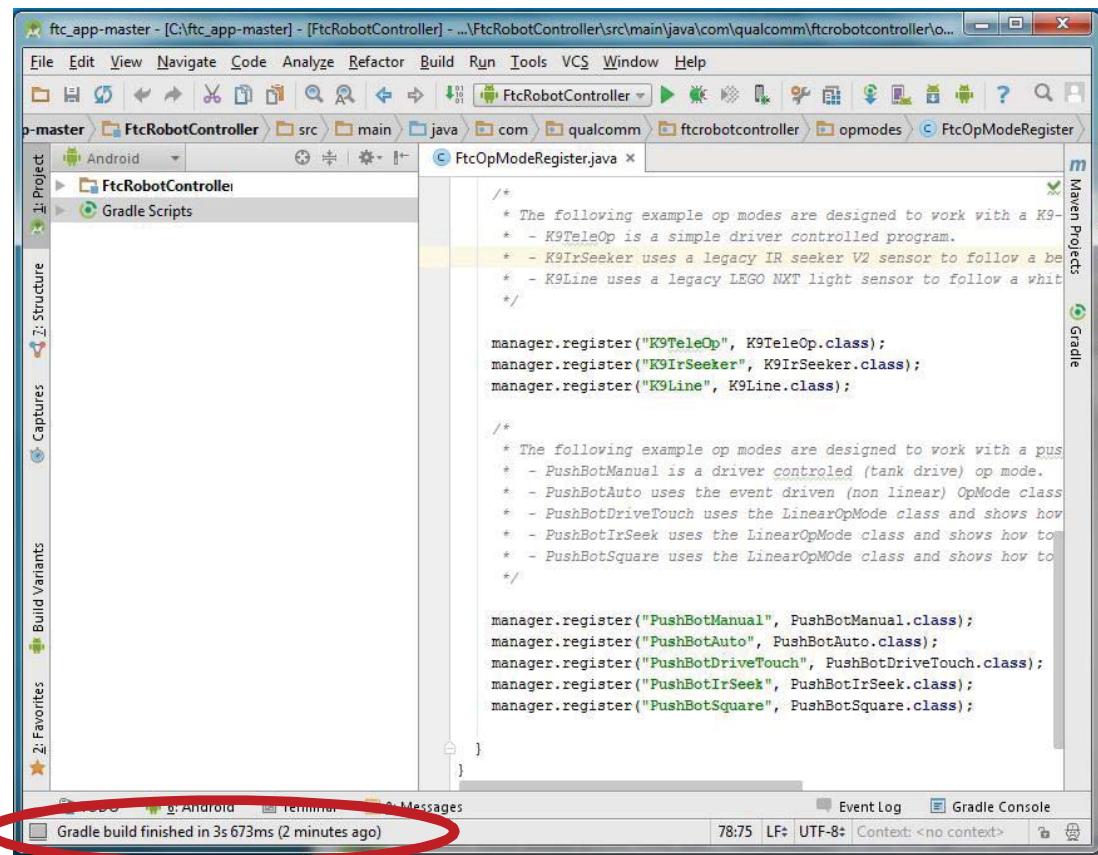


Guide

- Android Studio SDK will find and install the missing build tools automatically
- will display another error. You will see a “SDK Quickfix Installation” page similar to the one on the left
- Note that when the SDK is finished it will indicate “Done” in the lower left hand corner of the page
- Click on the “Finish” button

Step 9 – Build the FTC Application Executable (Gradle)

1. Android SDK will Automatically start compiling the application



The screenshot shows the Android Studio interface with the project 'FtcRobotController' open. The code editor displays the file 'FtcOpModeRegister.java'. In the status bar at the bottom, there is a message: 'Gradle build finished in 3s 673ms (2 minutes ago)'. This message is circled in red.

```
/*
 * The following example op modes are designed to work with a K9-
 * - K9TeleOp is a simple driver controlled program.
 * - K9IrSeeker uses a legacy IR seeker V2 sensor to follow a be
 * - K9Line uses a legacy LEGO NXT light sensor to follow a whi
 */

manager.register("K9TeleOp", K9TeleOp.class);
manager.register("K9IrSeeker", K9IrSeeker.class);
manager.register("K9Line", K9Line.class);

/*
 * The following example op modes are designed to work with a pus
 * - PushBotManual is a driver controlled (tank drive) op mode.
 * - PushBotAuto uses the event driven (non linear) OpMode class
 * - PushBotDriveTouch uses the LinearOpMode class and shows how
 * - PushBotIrSeek uses the LinearOpMode class and shows how to
 * - PushBotSquare uses the LinearOpMode class and shows how to
 */

manager.register("PushBotManual", PushBotManual.class);
manager.register("PushBotAuto", PushBotAuto.class);
manager.register("PushBotDriveTouch", PushBotDriveTouch.class);
manager.register("PushBotIrSeek", PushBotIrSeek.class);
manager.register("PushBotSquare", PushBotSquare.class);
```

Guide

- Once all the errors are resolved, the Android Studio SDK will automatically start compiling the ftc_app-master application
- Be patient, this will take a few minutes
- The status page similar to the one on the left will be displayed during the compile.
- Once the compile is complete you will see the "Gradle build finished" message in the lower left hand corner of the screen



Congratulations you have a working development environment!!!!!!



Questions?



What we are doing today will transform tomorrow's culture.