
Voltec Docs

Release 1.0

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VOLTEC Robotics is a team from Monterrey, Nuevo León México

This documentation has the following purposes:

1. Maintain and keep a record of Team 6647 VOLTEC Robotics's robot progress throughout its generations
2. Be a simple, quick and effective way for new team members to understand the engineering process behind our robots
3. Provide other teams with first-hand insight into Team 6647's robots and internal logistics

PROGRAMMING BASICS

Here are some useful resources:

1.1 AndromedaLib

1.1.1 What is AndromedaLib?

Cheatsheet

<https://sphinx-tutorial.readthedocs.io/cheatsheet/>

AndromedaLib is a library designed for making FRC programming far easier than before. Why? Because it includes many wrappers around many of WPILIB's classes to manage hardware.

For example, lets revisit how a CANSparkMax object is created using WPILIB's standard library:

```
public class Robot extends TimedRobot {
    CANSparkMax spark1 = new CANSparkMax(2, MotorType.kBrushless);

    @Override
    public void robotInit(){
        spark1.setInverted(true);
        spark1.setSmartCurrentLimit(40);
        spark1.burnFlash();
    }
}
```

As you can see, there are several steps involved in creating and modifying how a specific motor works and interacts with the rest of the robot. Now, imagine having more than 10 motors being used, each would need to be defined and initialized in several lines, leading to bulky, unnecessary code.

This is where AndromedaLib functions best. It includes many wrappers that allow multi-modifications via a single initialization in the following manner:

```
public class Robot extends TimedRobot {
    SuperSparkMax superSpark1 = new SuperSparkMax(3, GlobalIdleMode.Coast, true, 40);

    @Override
    public void robotInit(){
    }
}
```

Therefore, we use instantiate a SuperSparkMax object with an id of 3, a coast idle mode, inverted, and with 40 amps of current limit. All of this through a single line.

1.2 Programming and setup

1.2.1 Overview

What is programming?

Programming is the process of designing and writing a program that, after the compilation process, can be read and executed by a computer in order to obtain some specific result or perform some specialized task.

What is java?

Java is an object-oriented programming language that produces software for multiple platforms.

How do to begin?

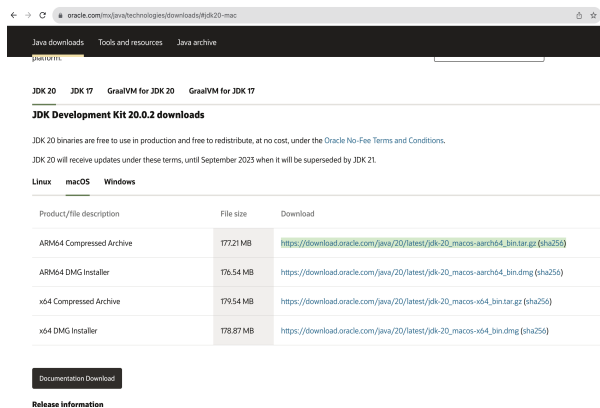
To begin programming, we first need a tool to write our code. There are several IDE (Integrated Development Environment) that we can use to write our code. However, we will be using a code editor named Visual Studio Code, which is used widely by many programmers. Additionally, we will need to instal the Java Development Kit (JDK) in order to develop, test and run java programs.

1.2.2 Installation

JDK

Go to: <https://www.oracle.com/mx/java/technologies/downloads/#jdk20>

Select your operating system and download the JDK.



To verify that the JDK was installed correctly, open a terminal(Mac)/command prompt(Windows) and type the following command:

```
java -version
```

If the JDK was installed correctly, you will see a similar message:

```
java version "18.0.2" 2022-07-19
```



```

alecoeto@MacBook-Air-de-Alejandra-7 ~ % java -version
java version "18.0.2" 2022-07-19
Java(TM) SE Runtime Environment (build 18.0.2+9-61)
Java HotSpot(TM) 64-Bit Server VM (build 18.0.2+9-61, mixed mode, sharing)
alecoeto@MacBook-Air-de-Alejandra-7 ~ %

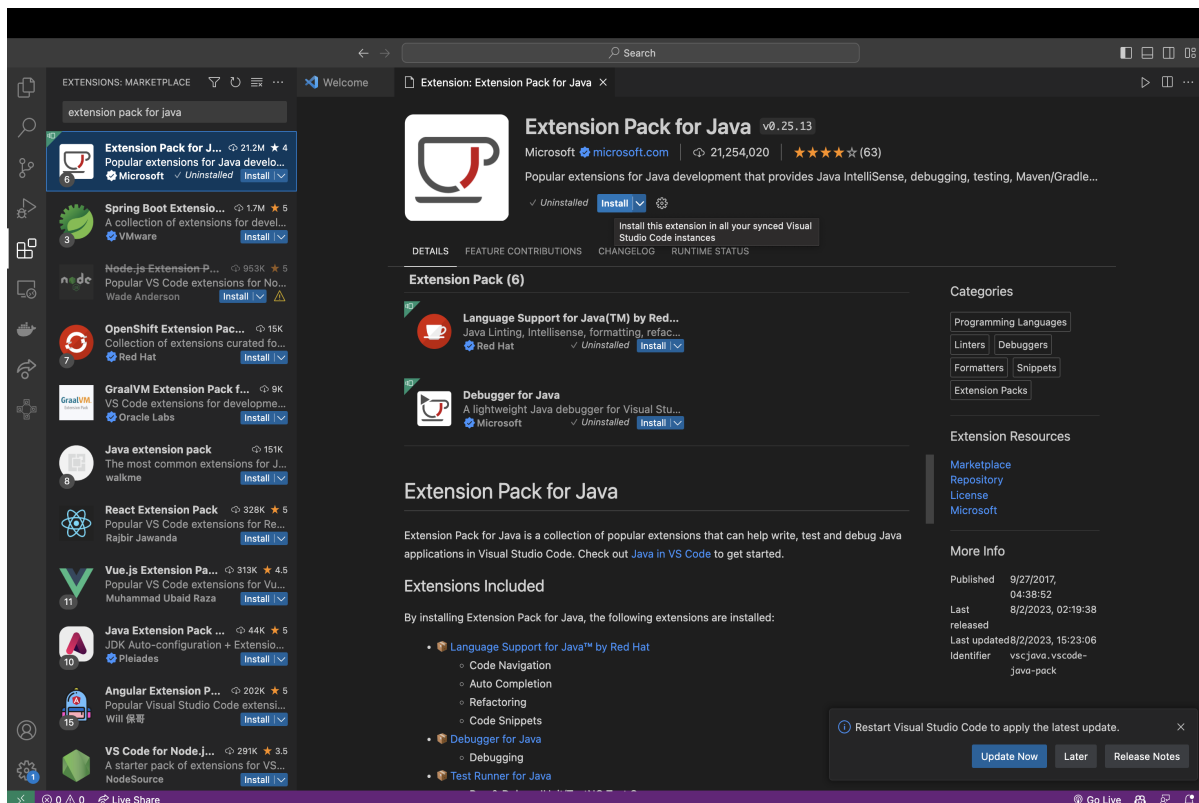
```

VSCode Go to: <https://code.visualstudio.com/download>

Download the version that corresponds to your operating system.

Once it is downloaded, go to the extensions section to install the following tools:

- Extension Pack for java
- Debugger for java
- Test runner for java



1.3 Intro to Java

1.4 Loops and Flow Control

1.4.1 Flow Control

If Statements

An if statement is used to check if a condition is true. If it is true, the code inside the if statement will be executed. If it is not true, the code will be skipped, but we can use an else if statement to check another condition that could execute different code. If none of the conditions are true, we can use an else statement.

Operators

In order to check if a condition is true, we can use any of the following operators:

Operator Meaning Example		
==	Equal to	1 == 2 (False)
!=	Not equal to	1 != 2 (True)
>	Greater than	1 > 2 (False)
<	Less than	1 < 2 (True)
>=	Greater than or equal to	1 >= 2 (False)
<=	Less than or equal to	1 <= 2 (True)

Example

```
if (x > 0) {
    System.out.println("x is positive");
} else if (x < 0) {
    System.out.println("x is negative");
} else {
    System.out.println("x is zero");
}
```

AND, OR, NOT

- AND && is used to check if two conditions are true
- OR || is used to check if one of two conditions are true
- NOT ! is used to check if a condition is false

```
//Any number between 0 AND 10 will enter the condition
if (x > 0 && x < 10) {
    System.out.println("x is between 0 and 10");
}

//If the number is 0 OR 10, it will enter the condition
if (x == 0 || x == 10) {
    System.out.println("x is either 0 or 10");
}
```

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```
//If the number is NOT 0, it will enter the condition  
if (!(x == 0)) {  
    System.out.println("x is not 0");  
}
```

Switch

1.4.2 Loops

While

Do-While

For

1.5 Functions

1.6 Object Oriented Programming

1.7 Arrays

CHAPTER
TWO

ONSHAPE

VOLTEC DESIGN PROCESS

3.1 6647 Impala Design process

Welcome to the design walkthrough for Team 6647's 2023 season robot: Impala