1. Computer Programming for Engineers

Computer programming may seem like a daunting field for beginner programmers. It does not need to be. At its core, computer programming is providing a set of instructions to a computer. Each line of code contains one or more instructions. Sometimes instructions interfere with each other and cause errors. Imagine telling someone who has never seen a sandwich before how to make a peanut butter and jelly sandwich. The steps may be:

1. Get Bread, Peanut Butter, Jelly, Knife, and Plate.

2. Place plate.

3. Place two pieces of bread side by side on plate. Call them Slice A and Slice B.

4. Put peanut butter on knife.

5. Use knife to spread peanut butter on Slice A.

6. Clean knife.

7. Put jelly on knife.

8. Use knife to spread jelly on Slice B.

9. Combine Slice A with Slice B by placing Slice B on Slice A.

10. Eat Sandwich.

11. Clean Knife

12. Clean Plate

Provided no external changes, this set of instructions will always lead to a proper peanut butter and jelly sandwich. However, some people may argue about if you should use grape jelly or strawberry jelly, chunky or smooth peanut butter. Some people are adamant that you must put Jelly on Slice A, never peanut butter. Some argue that if one starts with a loaf of bread instead of slices then it produces a better sandwich. These options represent the different ways that people program. There are many different sets of instructions that produce peanut butter and jelly sandwiches. Programming is very smiliar. There are many different ways to code a program that will lead to the same result.

However, there are ways which are more efficient than others, and there are ways to make code easier to understand. When writing code, it is important to write with a consistent programming style that allows others to understand your code. Code must be maintained over time, and may transition between programmers.

This chapter should serve to introduce the basics of computer programming as a platform for the Cyber Truck Experience program.

1.1. Introduction to Practical Computer Programming

Python is a commonly used <u>programming language</u>. Programming languages are the dialects of computer instructions that are written. While many concepts carry over between languages, differences in syntax, or how you write and format the instructions, mean that functionally equivalent instructions may look different.

For example, to get the program to "say" something or show a string of text in:

- Python version 3: print(Hello World)

- Python version 2: print "Hello World"

- Java: println(Hello World)

- Arduino: Serial.print("Hello World")

Pay attention to the spacing, punctuation, and print commands. This is a basic example, but the syntax differences between languages

1.2. Programming with Python

A. Data Sheet Snippets