ROBOTICS FROM SCRATCH

Intro

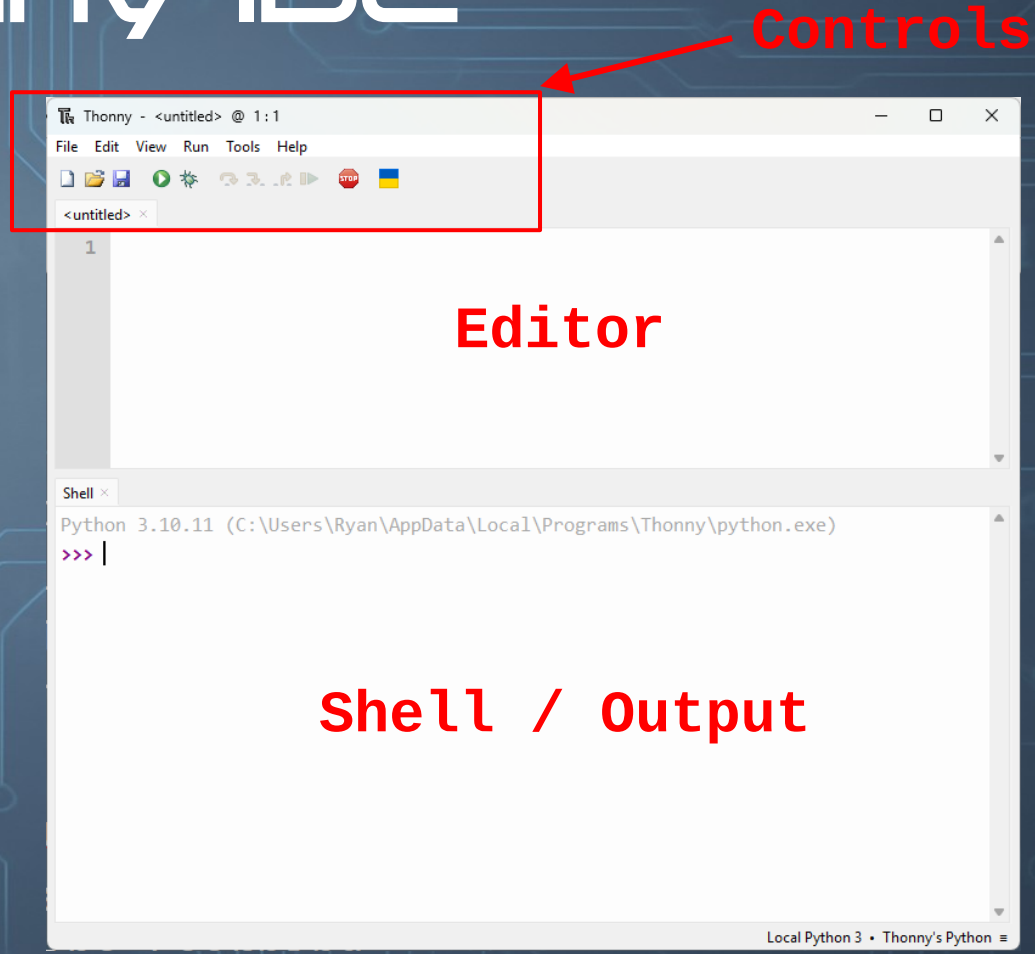
- About me, Ryan Absher
- About you
  - Name, robotics/programming experience
- About the class
  1. Python / Programming
  2. Electricity Basics
  3. Robotics / Design Concepts

Why Python?

- Easy to learn, closer to English
- Easy but still powerful
- Used all over:
  - Google
  - NASA
  - YouTube
  - Instagram
  - Machine Learning
  - Engineering
  - Science

Thonny IDE

- IDE – Integrated Development Environment
- Write, Save, Load, Run, Debug Code
- Installed?



Basics

- **Statements - Instructions**
  - Each statement (line) is an instruction
  - Go to the store
- **Syntax - Rules / Grammar**
  - Not went to the store
- **Case Sensitive**
  - `print` not Print or PRINT or pRiNt
- **Comments**
  - `# This is a comment, it is ignored`

First Program - Print

- print() is used when you want to write something out on the screen
- What you want to write is placed inside the parentheses and quotes
- Try printing your name:
  - print(“Your Name”)

Data Types

- 4 Major ones to worry about now
- **Integer** – Whole numbers
  - -1, 5, 1024, etc…
- **Float** – Decimal numbers
  - 3.14159, 1.618, etc…
- **String**
  - “Hello” or ‘Hello’
- **Boolean**
  - True (1) or False (0)

Integers

- Whole Numbers +/-
- Try:
  - print(5+5)
- Basic operators:
  - Add +
  - Subtract -
  - Multiply *
  - Divide /

- Try printing:
  - 10 + 3
  - 10 - 3
  - 10 * 3
  - 10 / 3

Floats

- Decimal Numbers
- Try:
  - Print(5.0 + 2.3)
- Same operators:
  - Add +
  - Subtract -
  - Multiply *
  - Divide /

Strings

- Words, Letters, Sentences,etc…
- Strings must be enclosed in quotes
  - “Double Quotes” or ‘Single Quotes’
  - print(Hello, World)

Booleans

- Either:
  - True or False
  - 1 or 0
  - HIGH or LOW
  - ON or OFF
- These will be very important with digital electronics later.

Variables

- A “box” to put things in
- Create a variable
  - `name = “Your Name”`
- Print it out
  - `print(“My name is”, name)`
- What variable types are these?
  - `number_of_dogs = 2`
  - `new_number = “Seven”`
  - `pi = 3.14159`
  - `is_running = True`

Variables - Input

- `input()` is used to get information from the user
- `color = input("Please enter your favorite color")`
- `color` is now a variable that holds the name of the color entered.
- `print("You entered: ", color)`

2nd Program - Calculator

- Create 3 variables (num1, num2, and answer) and set them to 0
- Ask the user to input() a number twice
- Add the two numbers together and print the result

2nd Program - Calculator

- num1 = 0
- num2 = 0
- answer = 0
- num1 = input(“Please enter the first number”)
- num2 = input(“Please enter the second number”
- answer = num1 + num2
- print(“The answer is: ”, answer)
- Notice anything weird?
- Input gives us a string, we need an integer
- Convert the string to an integer using:
  - int(variable)
  - float(variable)
  - str(variable)
  - bool(variable)

2nd Program – Calculator (Corrected Shorter)

- num1 = int(input(“Please enter the first number”))
- num2 = int(input(“Please enter the second number”))
- print(“The answer is: ”, num1 + num2)

Summary

- Class Layout
- Thonny IDE
- print()
- Data Types and Variables
- Math Operators
- input()
- Simple Calculator

Questions?