Project Kratos

Electronics QSTP

Week 1 : Introduction to Arduino and Programming

Python

- Basic python knowledge is a prerequisite for the ROS parts of this QSTP. So, along with arduino you will also be learning python this week.
- Learn about variables, operators and expressions, control flow, functions, data structures , OOP, input-output, exceptions in python from the given tutorial : A Byte of Python. Make sure you know enough by the end of the week to complete the python part of the weekly assignment.

Arduino

- What is an Arduino? Watch these videos:
    - https://www.youtube.com/watch?v=_h1m6R9YW8c
    - https://www.youtube.com/watch?v=9KAdz3M0uKs&t=1s
    - https://www.youtube.com/watch?v=scySICLIhsk
    - https://www.youtube.com/watch?v=mNrZMsJm-e0
- Make an account on TinkerCad. Go to the dashboard. Click on Circuits > Make a new circuit.
- Simulate the circuit shown in the last video. Make the circuit by dragging and dropping the necessary components. Connect the components by clicking on their end points. Then write the code in the ‘code’ section. Finally click ‘start simulation’. You can change the blinking rate by turning the knob on the potentiometer.

Programming

- Go through the given tutorial : tutorialspoint, from ‘Program Structure’ to ‘Arrays’.
- You can just skim through the parts before ‘Program Structure’.

Serial Communication

- Learn about Serial communication from this video : Serial Communication. It also contains a small bit about ‘processing’ which you can skip.

Weekly assignment (Submit before 11.59pm 17th May 2020)

- Python :
    - Create a function that takes a list as a parameter and returns another list, containing all prime numbers in the original list. Ask the user to input a list of 10 elements. Use the function to find the prime numbers in the inputted list and display it.
    - Create a simple calculator, that asks the user for two numbers and an operation. Use exception handling to prevent divide by zero error, during division.
    - So, you are a coder. Create a Coder class to describe people like you. Each coder has a name, age, list of languages he knows, list of projects he has done, and an experience score. Create methods by which you can add more languages and projects. With each language added the score increments by 10. With each project added the score becomes 1.5x. Also create a method called info, which when called gives a brief description of the coder, in a few sentences.
- Arduino :
    - You can change the volume of a device by turning a knob. Now we are not using any audio device. Consider an array of 5 LEDs as a Volume bar. The volume level is indicated by the number of LEDs glowing adjacently. Create a circuit such that, turning the knob in one direction increases the volume, and turning it in the other direction decreases the volume. Use a potentiometer as the knob.
    - There is an array of 10 LEDs. The user is going to input a positive integer less than 1024 on the serial monitor. If he inputs a larger number, then you have to show an error message. If the number is right, then convert it into binary and display the binary form on the LED array, with 1 as ON, and 0 as OFF. Now use a potentiometer to control the brightness of the ON LEDs.

Note 1: Submit the assignments before the due date. Any delay has to be notified with reasons. Punctuality is an essential part of the Kratos Team.

Note 2: Most of you would be doing these things for the first time, so you are bound to get struck at some point and may get overwhelmed by the course content. We don't expect you to solve everything in the first try. You have a week. We highly encourage you to ask any doubt, however small or dumb you think it is. That is the only way by which you grow. Your job here is to learn and our job is to help you.

Note 3: Any feedback regarding the course structure or the assignments, is very valuable. We are also students, just like you and we have a lot of scope for improvement.