Using Python/Anaconda in Fire Research

I. Introduction

   A. Type of work done in Fire Research Division at NIST [kickass fire picture]

   B. Areas in which Python/Anaconda is used

      i. Realtime plotting helmet data

      ii. FF LODI/LODD interactive map

      iii. Realtime plotting of data from FDS model rendering

II. Portable Measurement and Data Acquisition System

   A. Overview of system [pic of entire system together]

      i. Helmet portion [pic of helmet]

         a. Thermocouple

         b. Heat flux gauge

         c. Cooling water lines

      ii. Pack portion [pic of pack]

         a. Miniature pump

         b. Water reservoir

         c. Arduino Yun as data logger

   B. Setting up Arduino Yun and host computer

      i. Arduino Yun

         a. *Details about all the packages and other shit to set up Yun?*

         b. SD Card

      ii. Host Computer

         a. RabbitMQ message broker server

         b. Run receive_helmet_data

         c. Deploy Bokeh server

         d. Run plot_helmet_data.py

   C. Plotting heat flux and temperature data in real time [fig of previous workflow and new work flow using arduino/bokeh]

      i. Arduino Yun

         a. Adafruit + arduino code to receive voltages from sensors

         b. send_helmet_data.py executed using Yun's Linux distribution (OpenWrt-Yun) and following tasks are performed:

            - Sensor voltages converted to significant measurement (temperature or heat flux value)

- Arduino Yun connects to message broker on host computer using Yun's built-in WiFi support, IP address specified by user, and Pika package
- Message containing data at current time-step is constructed and published to message broker on host computer and locally to Yun's SD card

ii. Host Computer

   a. receive_helmet_data.py connects to the message broker, receives message sent to the broker from the Yun, prints message in terminal, and writes data to .csv file on host computer
   b. plot_helmet_data.py reads .csv file and plots corresponding data every second; new line of data added to .csv file every second