ROB-GY 6103 Advanced Mechatronics: HW 7

Problem 1: Write and execute a Python script on a Raspberry Pi that (i) asks for an accepts an integer input (*n* denoting the number of entries to be provided in step (ii)) from the user and (ii) receives *n* pairs of user inputs as entries of name (string) and age (string). After receiving all the user inputs, the program must print the names of people between 20 and 25 years of age.

Problem 2: Write and execute a Python script on a Raspberry Pi that simulates readings from two sensors at a sampling interval of one second. Specifically, your program should generate random numbers for each sensor every second. While the first sensor reading must be an integer value between 0 to 25, the second sensor reading must be between 0.00 to 5.00. The script should log these values along with a timestamp in a .txt file for a total program runtime of 60 seconds.

Problem 3: Simulate a traffic light sequence using a Raspberry PI and three LEDs (one Red, one Yellow, and one Green) interfaced to the R-PI GPIO pins with appropriate current limiting resistors. Write a Python script that continually cycles through the LED ON sequence of RED (5 seconds), Yellow (2 seconds), and Green (5 seconds).

Problem 4: Interface an LED with an appropriate current limiting resistor to a Raspberry Pi PWM pin. Interface two push buttons (B1 and B2) in active low configuration with the Raspberry Pi GPIO pins wherein the internal pull-up resistors are to be used (with appropriate Python instructions). Write a Python script that increases (alternatively, decreases) the LED brightness when button B1 (alternatively, button B2) is pressed (i.e., B1 increases and B2 decreases led brightness).

Problem 5: Interface a PING)) sensor and an LED appropriately to a Raspberry Pi. Write a Python script that logs in a .txt file the distance measured by the PING)) sensor every two seconds. Moreover, the Python script employs a conditional logic to rapidly blink the LED when the measured distance falls below a specified threshold (e.g., 20 cm) and turns the LED OFF when the distance is reported to be above the threshold.