Total Marks: / 45 (5%)

Instructions:

- This assignment is to be done individually.

Submissions:

- Create a Python program named as Firstname_Lastname_A2.py which will perform the task specified below.
- Once you are done, upload the completed program in Assignment-2 SLATE drop box.

Problem: Suppose you are a network engineer. You have been asked to design a Wireless Sensor Network as an Internet of Things (*IoT*) solution that measures the Carbon dioxide (CO_2) levels [1]. The goal of this design is to measure the CO_2 levels in several buildings across Sheridan campus. As a result, the efficiency of the ventilation system will be improved. To conduct a feasibility study for this project, you decided to develop a simulation using Python that models the network.

Write a Python program that places senor nodes at fixed two-dimensional positions (i.e., this position should be randomly assigned in an area of 100 m * 100 m). Afterword, every day you will collect one reading measured in Part Per Million (PPM). Assume the range for readings is between 20 PPM and 50 PPM (i.e., all those readings are assumed to be whole integers). You want to take measurements for several days. The program should compute the averaged reading(s) for each sensor based on one or more days. You must follow the output below exactly as this is the user requirements:

```
*******************************************

Enter the number of sensors deployed across Sheridan Campus: 1


This is for Sensor 1 at position (43.99, 42.19)

Enter the number of days for the readings: 2

Enter the CO2 for Day 1: 20

Enter the CO2 for Day 2: 10

Rounded Average Readings 15.00  PPM

Do you want to continue: (Y)es or (N)o: N

Existing the Program.....
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Enter the number of sensors deployed across Sheridan Campus: 2

This is for Sensor 1 at position (56.44, 87.31)

Enter the number of days for the readings: 3

Enter the CO2 for Day 1: 10

Enter the CO2 for Day 2: 20

Enter the CO2 for Day 3: 10

Rounded Average Readings 13.33 PPM

This is for Sensor 2 at position (92.69, 30.93)

Enter the number of days for the readings: 2

Enter the CO2 for Day 1: 10

Enter the CO2 for Day 2: 20

Rounded Average Readings 15.00 PPM

Do you want to contine: (Y)es or (N)o: e

Incorrect Entry! Please Try again

Do you want to continue: (Y)es or (N)o: 32

Incorrect Entry! Please Try again

Do you want to continue: (Y)es or (N)o: y

****

Enter the number of sensors deployed across Sheridan Campus: 2

This is for Sensor 1 at position (66.91, 48.71)

Enter the number of days for the readings: 4

Enter the CO2 for Day 1: 10

Enter the CO2 for Day 2: 10

Enter the CO2 for Day 3: 20

Enter the CO2 for Day 4: 50

Rounded Average Readings 22.50 PPM

This is for Sensor 2 at position (64.03, 85.19)

Enter the number of days for the readings: 1

Enter the CO2 for Day 1: 10

Rounded Average Readings 10.00 PPM

Do you want to contine: (Y)es or (N)o: n

Existing the Program.....

EVALUATION

Your submission will be evaluated based on the following criteria:

Efficient Code: Program uses variables where and only when necessary; program doesn't define variables that are never used, nor does it use too many variables for unnecessary tasks; program logic is written concisely and is not cluttered with unnecessary tasks. **(2 marks)**

Program Components and Functionality: program functions according to specifications - input and output is done in the console based on the procedural programming **(not the Object-Oriented Programming)**: **(40 marks)**

- Lists should be used especially for the sensors' positions and the computation of the averaged readings. **(5 marks)**
- The number of sensors cannot be less than one sensor and cannot accept alphabets as values. The same applies to the number of days. **(5 marks)**

- The program always run as long as the user does not enter "No" or "N". **(5 marks)**
- If the user enters a letter or word that is neither "yes", "y", "no", "n", then the program will re-ask the user to reenter the input. **(5 marks)**
- The program should accept "YES", "NO", "Yes", "n" …. etc. Do not include all possibilities. **(5 marks)**
- The output should match the provided output in this assignment. **(5 marks)**
- Declare and define several functions especially for the creation of the simulated sensors, the collected readings, the assignment of sensors' positions, and the average of readings.

(10 marks)

Programming Style: proper indentation and spacing, use of comments/documentation; all identifiers are descriptive and valid; variables are defined with appropriate types and converted when required. **(3 marks)**

Notes:

1. If the program does not run, a grade zero will be given.
2. **All assignment shall be submitted by the deadline.** Late submissions will be penalized with 10% per day for up to 3 calendar days after which the assignment cannot be submitted anymore.

3. This assignment shall be **completed individually**. Remember that completing the assignment by yourself will ensure your success on the midterm and final exam. See the Academic Honesty at Sheridan.

4. If you want to use any entitled **accommodation** for the assignment, you MUST inform the professor at least **2 working days in advance of the due date**.
5. It is mandatory to meet the naming conventions specified for all the files to be submitted.

References

[1] Mumtaz, R.; Zaidi, S.M.H.; Shakir, M.Z.; Shafi, U.; Malik, M.M.; Haque, A.; Mumtaz, S.; Zaidi, S.A.R. Internet of Things (IoT) Based Indoor Air Quality Sensing and Predictive Analytic: A COVID-19 Perspective. Electronics 2021, 10, 184. https://doi.org/10.3390/electronics10020184