Lab 7: Noise Canceling Application, Heart Rate Analysis, and Red Alert Game

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Part 1: Noise Canceling Application

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The code below shows three different frequencies.

Text

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The code below shows how to generate and plot the sum of three different frequencies.

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The code below shows how compute and plot the power of the FFT of a signal.

Text

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The code below shows how to find the peak frequency

Graphical user interface, text

Description automatically generated

The code below shows how to remove all the high frequencies and transfer the rest frequencies back to signal.

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The code below shows the plot the signal after filtering out the high frequencies.

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Part 2: Heart Rate Analysis

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Before doing this program, you will need to download a WAV file from a set\_a from the heartbeat sound bank website: <https://www.kaggle.com/datasets/kinguistics/heartbeat-sounds> by selecting a wave file that shows at least 30 beats in the preview waveform.

After downloading the WAV file, you will need to run the program (Filter\_background.py) below to filter out the background noise of the soundtrack.

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Then you need to use the conversion tool to convert WAV file into CSV file by using this program (wav2csv.py) from Github (Author: lukious).

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Description automatically generated

A screenshot of a computer

Description automatically generated with medium confidence

Reminder: Remember including “.wav” at end of the wav file when inputting in the console section!!!

After finishing two steps above, you will be able to run the program.

If you would like to change the sample rate number, you can change in the code below.



The code below shows how to get data from the csv file and plot the graph based on the data.

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The code below shows how to use heartpy to run the analysis and visualize the graph.

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The code below shows how to display computed measurements in the console section.

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Part 3: Game development – Red Alert

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The code below is to declare constant such as font colors, width and height of the figure, final level of the game, color of snowflakes besides red.

A screenshot of a computer

Description automatically generated with medium confidence

For example, I change the code to make the game has 8 levels, and I also increase the start speed to 15. (Source code has 6 levels and 10 at start speed.)

The code below shows how to add background music for the game as well as declare global variables.

Text

Description automatically generated

The code below is to keep tracks the snowflakes on the screen.



The code below is to draw the snowflake.

A screenshot of a computer

Description automatically generated with medium confidence

If you would like to change the background image of the game, you can change it in line 44 above.

The code below is to update the number of snowflakes corresponded to each level and draw the update snowflake.

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The code below is to layout the snowflake and animate them on the game screen.

Text

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The code below is to check if you click on the red snowflake or not. If you click on the red snowflake on all levels, the “YOU WON” screen will show up. Otherwise, you will see the “GAME OVER” screen show up.

Text

Description automatically generated

The code below is to display the message on the game screen.

Text

Description automatically generated

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