EduServeSG

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Are schools noisy?

Yes!

In fact, noise levels in school can reach up to 60 - 85 decibels!

Fun fact!

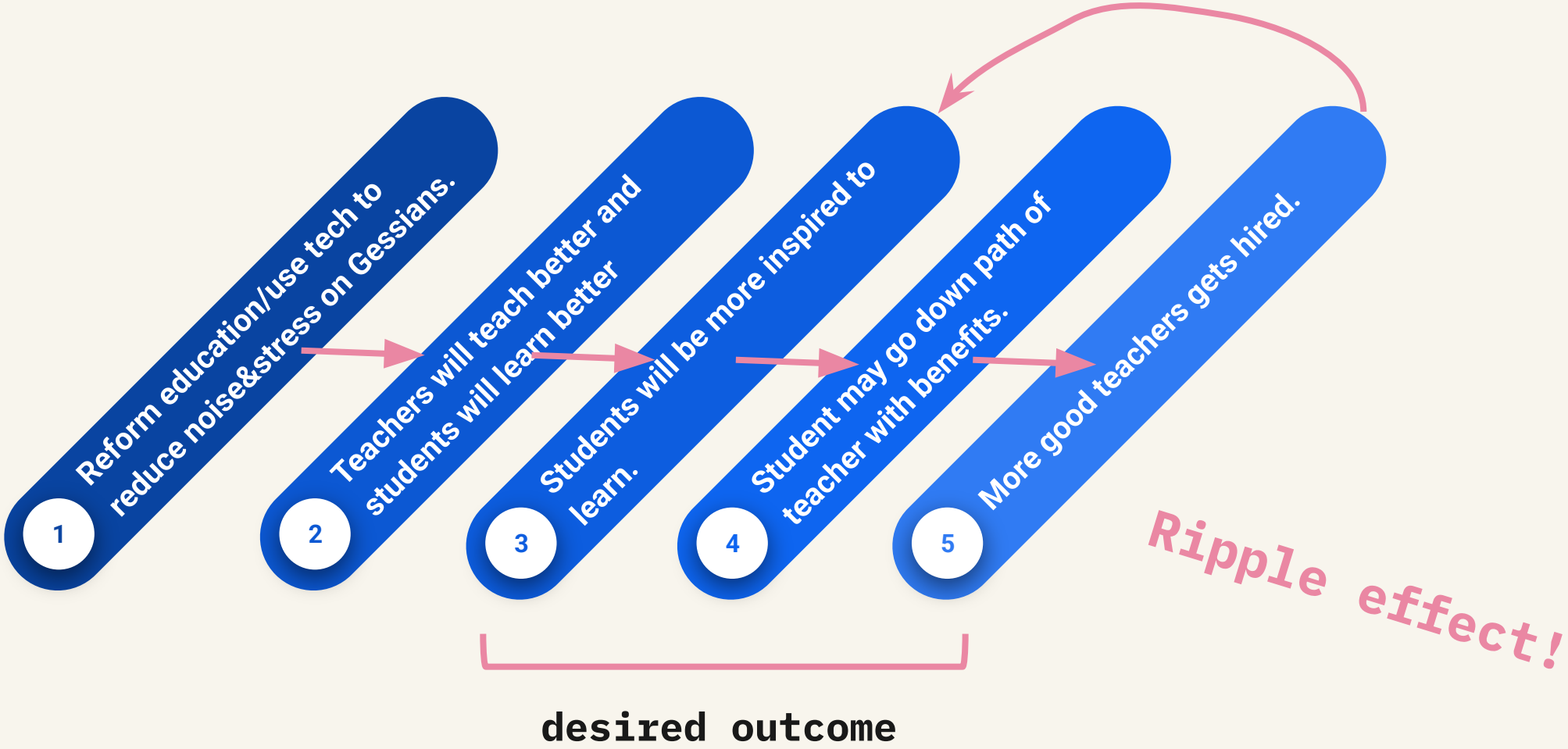
35 Db is actually the optimum noise level :D

Did you know?

Noise is a factor that induces stress!
Causing feelings of Rage!
Irritation!
Annoyance!
Making you into an :<
A grumpy old man!

We believe that ***stress*** is the number one cause of bad teaching and unmotivated students.

And we believe that relieving that stress will make the issue better.

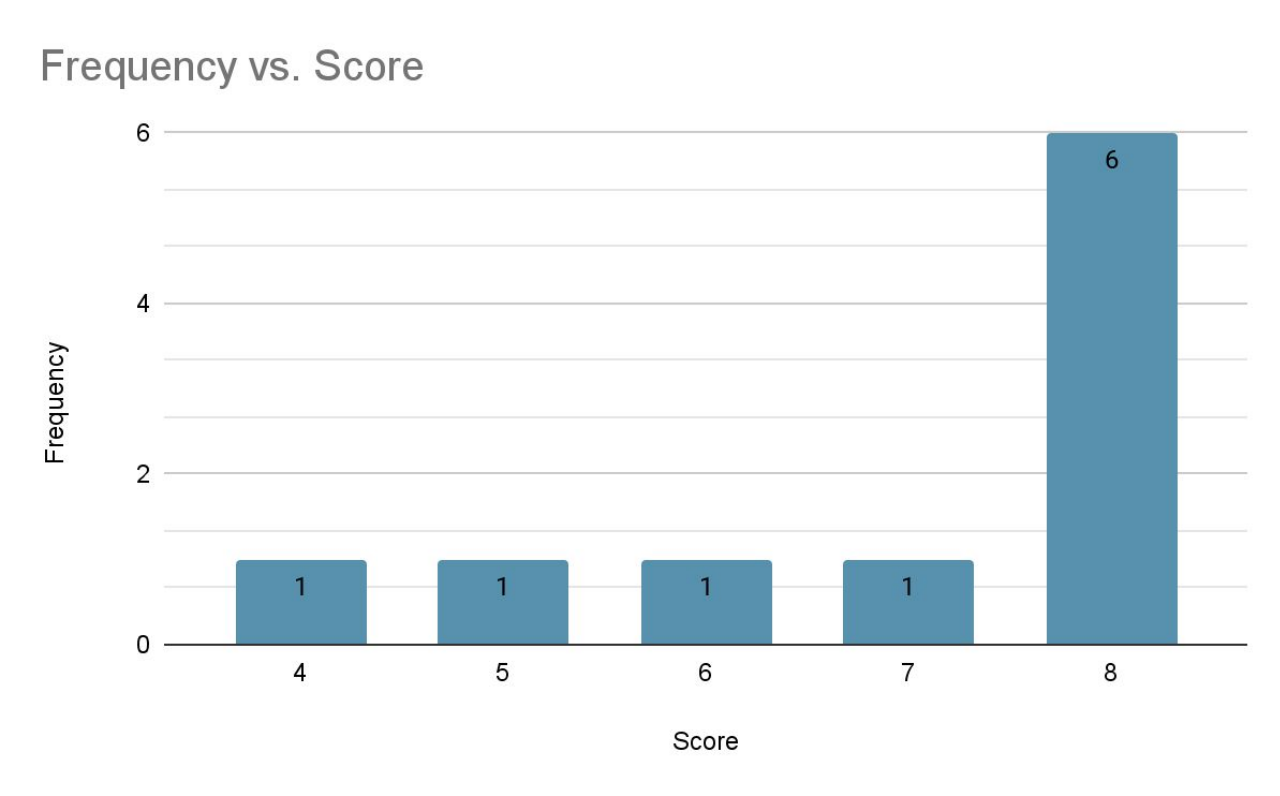


This is the belief of **eduServeSG**

We believe that teachers are getting more burned-out due to them having to do too much work. Work may include marking test papers, pressure from parents/guardians or authorities, as well as doing too much administrative work and trying to maintain classroom discipline. Burnout may lead to a lack of motivation to continue teaching, decreasing the quality of education, making students feel less inspired to learn.

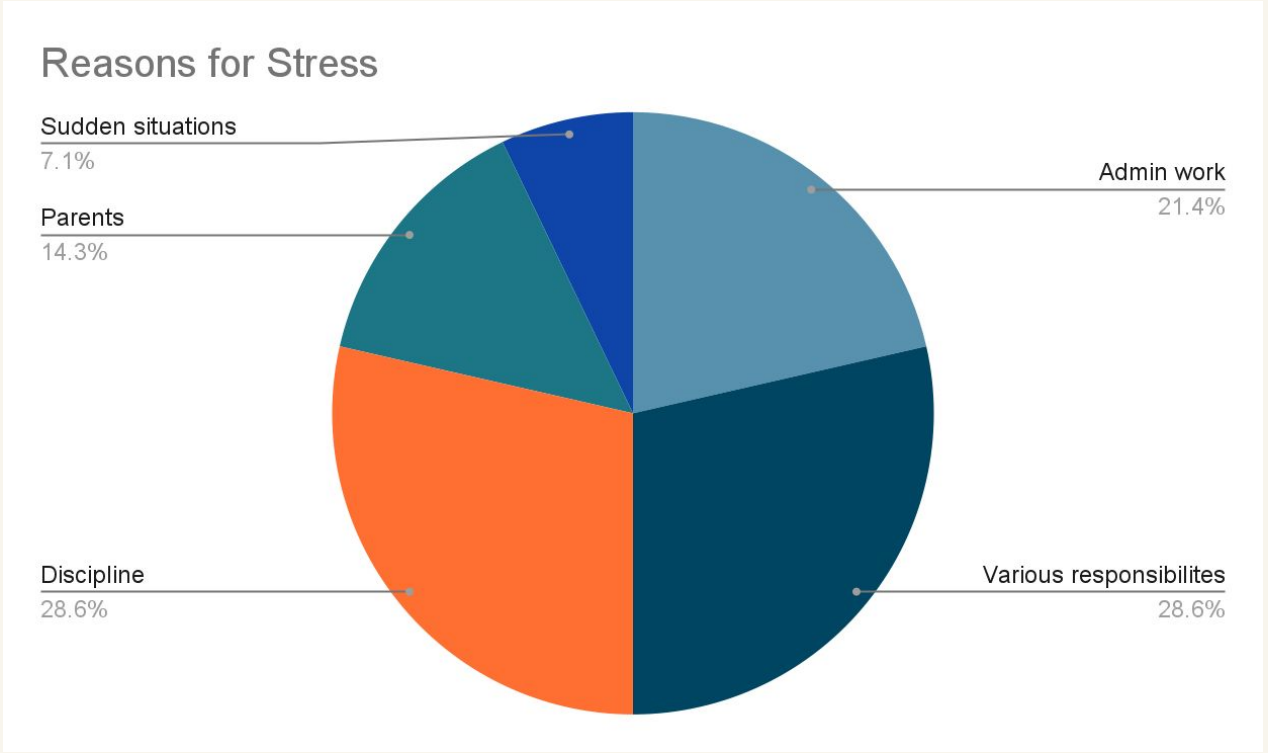
What is the scale of this problem?

- A survey was conducted to measure teachers' stress.
- 6 teachers came from Gan Eng Seng School, while 4 teachers came from Farrer Park Primary School.
- Teachers had to answer the question "On a scale of 1 to 10, rate your stress level."
- The highest score, 8, appeared **6 times** in the data.



Evidence that this links back to noise?

- In that same survey, teachers were asked, “What would you find most stressful about your job as a teacher?”
- **28.6%** of teachers found **managing discipline** and **various responsibilities** to contribute to their stress levels.
- In another study, the top 4 stressors of a teacher are
  - **administrative work (49%)**
  - **being held accountable for students’ success (44%)**
  - **marking/grading assignments (41%)**
  - **managing discipline (38%)**



Wait a minute…

..Undisciplined students

> they make a lot of **noise**

> they are also **hard to manage**

> this makes teachers **stressed**!

Further evidence that noise is bad :<

How noise affects students

My fellow students, is there ever a time where…

1. **Noise is disrupting your studies?**
2. **Noise is disrupting your lesson?**
3. **Noise is disrupting that Korean drama you're secretly watching in class?**
4. **Noise is making the teacher you dislike the most grumpier than usual, and he gave you extra homework?**

If you're a student, at least one of the above would have happened to you at least once, but most of the time, these occurrences are quite common!(except 3 for those Korean drama haters)

We can see here that… Noise Is Disruptive, and could even cause stress! (reasons mentioned earlier)

So how do we solve this???

Let's ***define.***

- From the data we collected, we can say that **noise** is effectively an incredibly hazardous and annoying issue, and stopping its endless massacre on our mental stability is not an easy task!
- An effective solution must…
  - Minimise, or even eliminate the harmful noise in schools
  - Effectively reduce the issue of discipline in classrooms, by making sure teachers don't have to disrupt the class to reprimand one student, not being very labourous
  - Cost-effective and simple to use, yet lasts at least a few years

Our amazing solution……(drumroll*)

Idea: EduServeSG!

- monitors students' noise and sees noise level
- if noise level reaches a certain level, make a sound so all students or teachers(if one is there) in the classroom of the noise level
- After 1 minute, if noise in classroom is still high, sends another sound
- Every sound sent, one point is added to class
- Class above a certain number of points get punishment, classes below a certain number of points get rewards, if all classes have points below a certain number of points, pizza party for whole level!(or any other suitable reward)(enables interclass cooperation and peer pressure to reduce noise level)

Checklist to see if idea is suitable:

Does idea relieve the teacher off the duty (discipline) to allow them to focus more on teaching?(so they don't have to exert their voice)	✔
Does idea effectively reduce the severity of noise in the whole school?	✔
Is idea cost-effective and simple to use, yet lasts at least a few years?	✔

Development of idea:

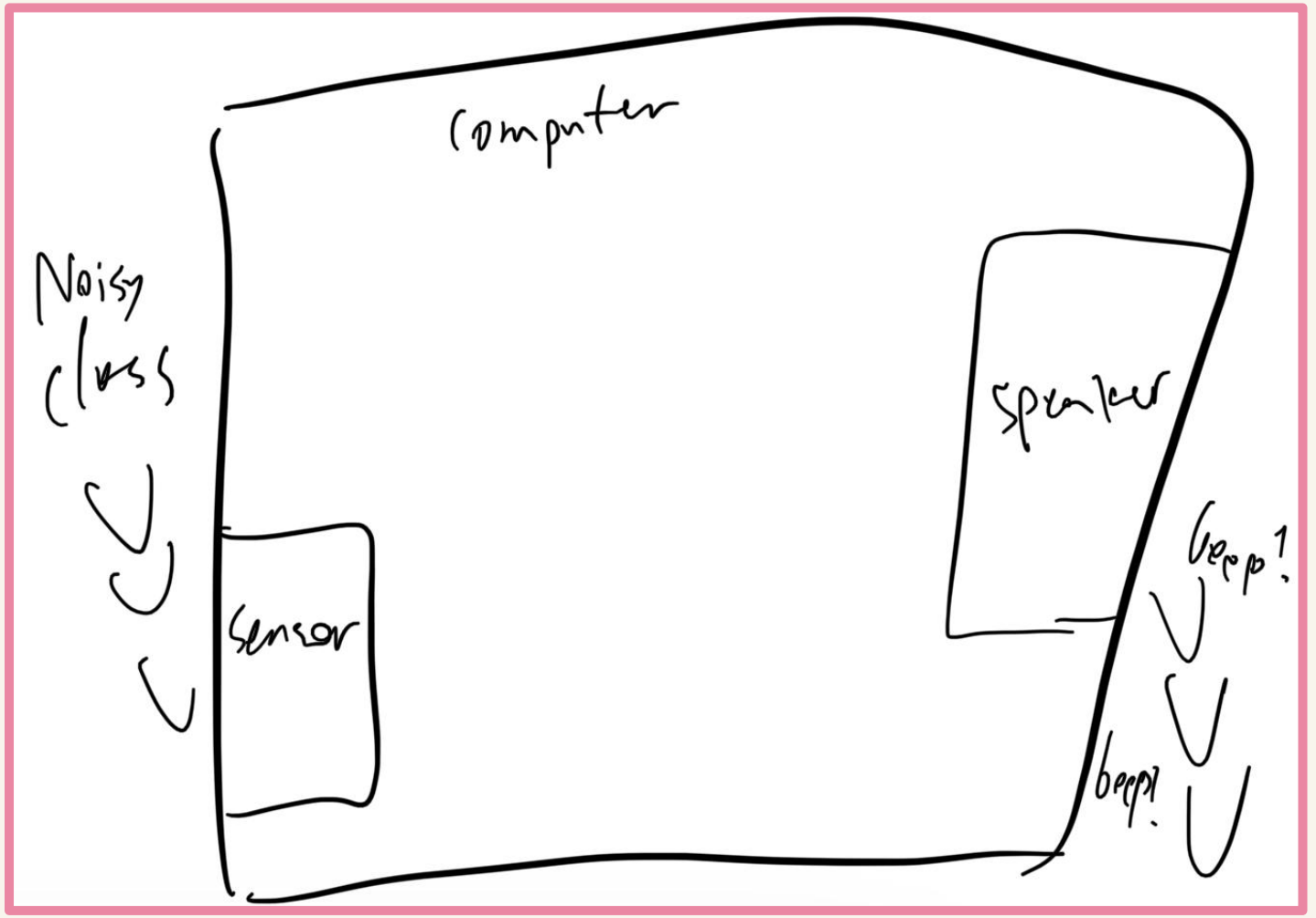
hardware used: built-in laptop microphone, built-in laptop speaker, a teacher's laptop

- Teacher decides what the period of monitoring should be
- 2 states of noise
    1. acceptable noise level (decided by teacher)
    2. unacceptable noise level (decided by teacher, they input data)
- At first state, nothing will happen.
- At second state, 1 point will be added if it stays so for a variable decided by the teacher
- At the end, the information will be placed in a text document
- Total points will be physically tallied by teachers, shouldn't take more than 10 minutes
- Current points of a class will not be known to class, causes unrest amongst students and encourages discipline

Platform to use

After some searching, we have decided to use pyaudio as a platform to act as a median between the external mic and laptop speakers, and to house the code

Rough sketch of prototype!



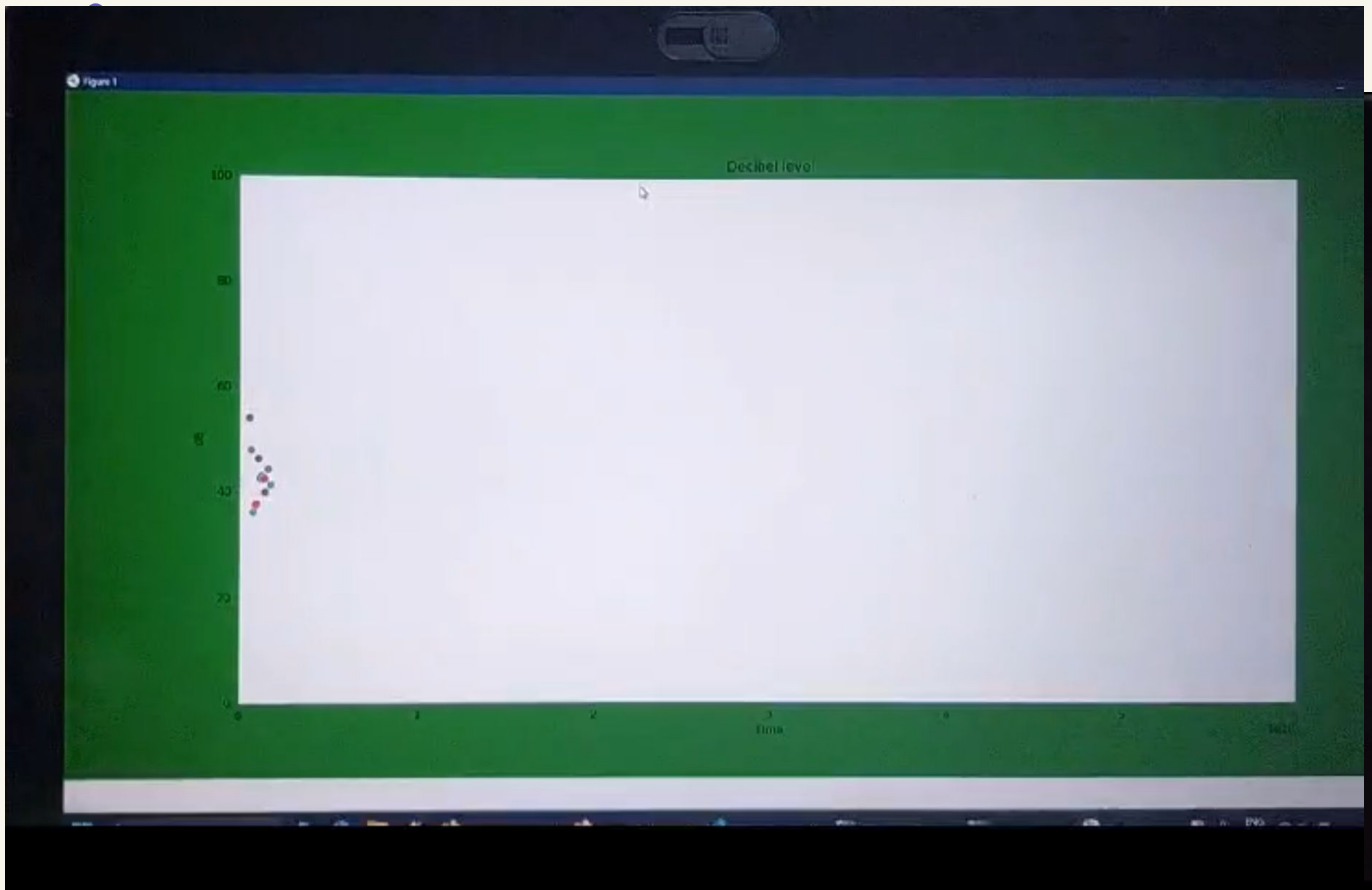
Our code!

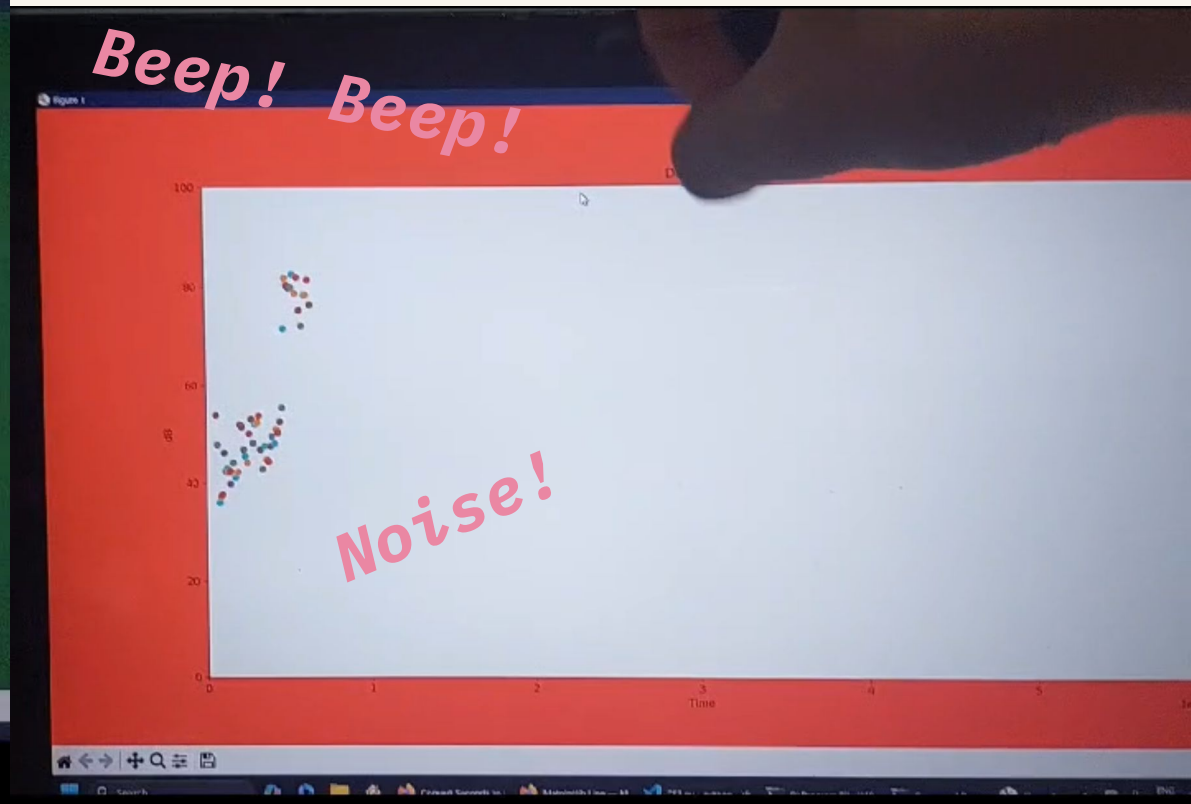
```python
# Import necessary modules
import pyaudio  # for audio input/output
import numpy as np  # for numerical operations
import matplotlib.pyplot as plt  # for plotting
import time  # for time-related functions
from IPython.display import display, clear_output  # for interactive output

# Define constants

# Prompt for classroom name, noise threshold and length of time to add points
CLASS = str(input("What classroom is this laptop in right now?"))
THRESHOLD = int(input("What should be the unacceptable noise level? Default is 70"))
countermax = int(input("What should the amount of time for counter needed to add 1 to the point be?"))

# Other constants
CHUNK = 1024  # Number of audio samples per chunk
RATE = 44100  # Sampling rate in Hz
FORMAT = pyaudio.paInt16  # Format of audio data (16-bit PCM)
CHANNELS = 1  # Number of audio channels (mono)
MAX_TIME = int(input("How long will there be no teacher for?")) * 1000000000  # Maximum recording time in nanoseconds

# Variables for tracking noise score
score = 0
counter = 0
title = "Decibel level, score:"

# Create PyAudio object
audio = pyaudio.PyAudio()

# Create audio stream object
stream = audio.open(format=FORMAT,
                    channels=CHANNELS,
                    rate=RATE,
                    input=True,
                    frames_per_buffer=CHUNK)
```

```
# Create figure and axis objects for plotting
fig = plt.figure()
plt.ion()  # Enable interactive mode
ax = fig.add_subplot(1, 1, 1)

# Initialize time-related variables
start_time = time.time_ns()
current_time = 0

# Variables for plotting
x = px = 0
recording = False

# Open an output text file
f = open('output.txt', 'wt')
output = "Class:" + CLASS + "\n"
f.write(output)

# Main loop
while current_time < MAX_TIME:
    # Read audio data from the stream
    data = stream.read(CHUNK)

    # Convert audio data to a numpy array
    data = np.frombuffer(data, np.int16)

    # Calculate decibel level from RMS value
    rms = np.linalg.norm(data) / np.sqrt(CHUNK)
    db = 20 * np.log10(rms)
    px = x
    x = current_time % (60 * 1000000000)
```

```
    # Plot decibel level on the graph
    ax.set_title(title)
    ax.set_xlabel("Time")
    ax.set_ylabel("dB")
    ax.plot(db)
    ax.set_xlim(0, 60 * 1000000000)
    ax.set_ylim(0, 100)

    if x < px:
        ax.cla()
    ax.plot(x, db, marker="o")
    clear_output(wait=True)
    plt.pause(0.01)

    # Check if the decibel level exceeds the threshold
    if db > THRESHOLD:
        fig.patch.set_facecolor('red')
        counter = counter + 1

    else:
        fig.patch.set_facecolor('green')
        recording = False
        counter = 0

    if counter == countermax:
        counter = 0
        score = score + 1
        output = time.ctime() + ": " + str(score) + "\n"
        f.write(output)
        title = "Decibel level, score: {0}".format(score)

    current_time = (time.time_ns()) - start_time

# Close audio stream and audio objects
stream.stop_stream()
stream.close()
audio.terminate()

# Close the figure
plt.close(fig)
```

A depiction of a part of the code!





Let's ***test and discuss.***

Discussion

What do you think of EduServeSG?

- It can help monitor students' activities during periods where a teacher is not around
- the current prototype is rather cost-effective due to its part list
- It reduces total noise in school, through peer pressure, social unrest, punishment, and rewards.
- Improves overall mood in school, reducing stress caused by noise
- Provides optimal learning environment, reducing noise
- Improves public image of school

What are some limitations?

- The methods used by EduserveSG may be controversial, in terms of morality. However, we have class cleanliness, which is quite a similar system, so I believe the morality of this is absolutely fine.

What could be some further expansions/improvements made?

- Have a whole separate prototype for this, instead of using laptops of teachers, to minimise disruption of classes due to the prototype. This would only be possible if the school budget would to increase, so perhaps in the future, after we get a lift :<
- We could record the noise level of individual students, but would require much expansion, over-complication, and over-development of product, won't be sustainable.

In conclusion…

eduServeSG is a promising start to reducing noise and its effects, providing a nice and quiet environment to work and study in.

In the future, we hope to improve EduserveSG further, and we hope the school can afford such a financial burden

Hopefully, our project can revolutionise schools, perhaps even acting as a gateway for other intriguing and helpful ideas to come about

May our project be worth the efforts!

Before we end:

Sources used:
Information in noise levels in school: https://svantek.com/academy/noise-in-schools/
Survey used in pg 5 and 6:
https://docs.google.com/forms/d/e/1FAIpQLSeSqUiTDiUnw4wGoXNPpuIi5KTjoHGIcUmxNeVSfejL4joPXQ/viewform?usp=sharing
Study used in pg 6:
https://medium.com/invisible-illness/the-top-ten-stressors-for-teachers-4195490f70e7 (paywall)
Slides template: Slidesgo

Credit:
Many thanks to Foong Liang Jun(2-3) from Infocomm for providing information on **pyaudio**

Many thanks to all our team members for putting their best effort!

Special thanks to Mr Chan and Titus for giving us help for our project

THANK YOU FOR LISTENING!

Have a nice day :)