A System for Infrasound Pollutions Detection and Mapping

PARK Sangha[1], LEE Seokki[1], WONG Stanley[1], Asith[2], Amaya[2]

[1] Ritsumeikan University, Japan [2] Lanka Nippon BizTech Institute, Sri Lanka

I. Introduction

Background: Infrasound refers to the sound with its frequency below 20Hz and it is not audible through human ears. That is likely a reason why it was ignored by environmental organizations and the individuals.

Problem: The absence of system that detects infrasound data despite it has found to cause damage to human body. Sources of infrasound could be as follows: generators, ventilators, dehydration machine, etc.

II. Study Goal

Objectives:

Construct system that processes analog signal to gather infrasound data(pollution) of the local area and data transmission with GPS.

i. Sound processing includes Fast Fourier Transform (FFT) and Low-pass-Filter to get frequency domain data and trimmed data.
ii. Data transmission process includes updating sound data with location onto the dashboard where users can access and check it.

III. Proposed System

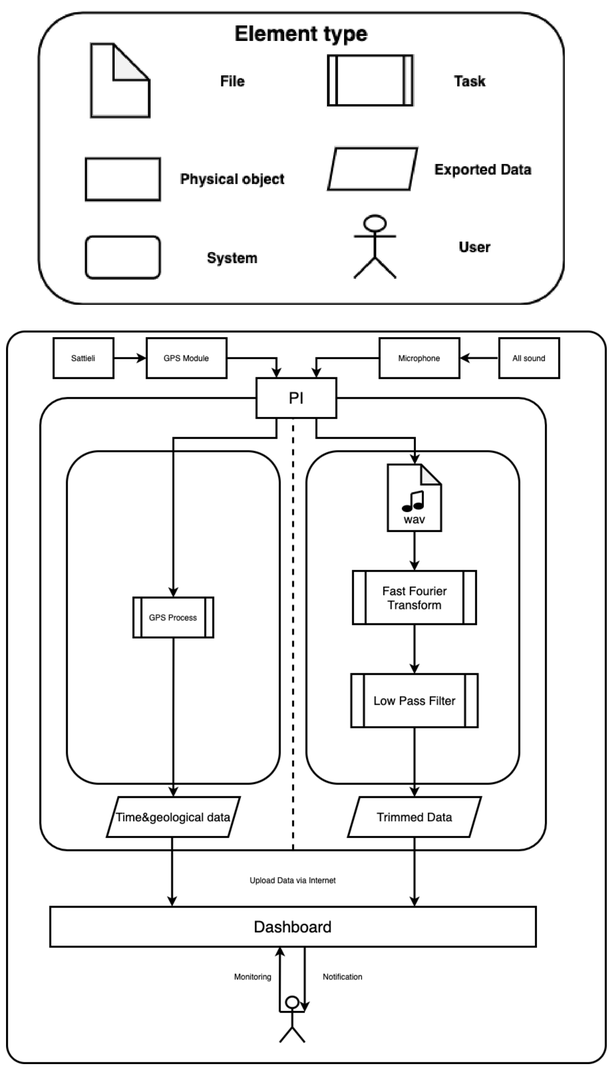

Figure 1. System Design

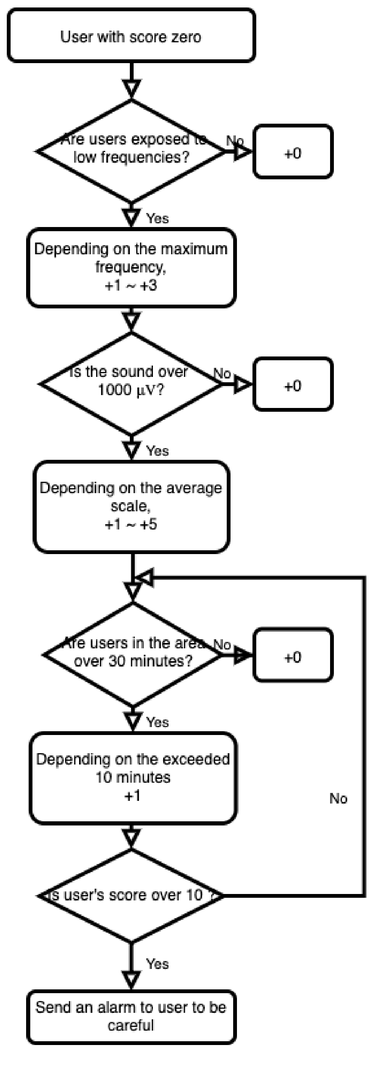

Figure 2. Warning Process Flow

IV. Developed Prototype

Figure 3. Raspberry Pi

Figure 4. Microphone

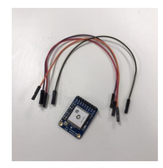

Figure 5. GPS Module

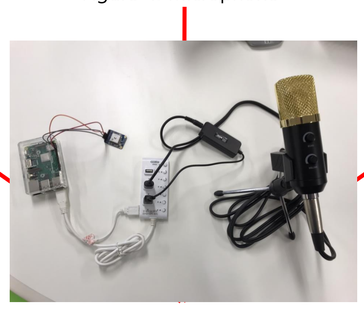

Figure 6. Prototype developed for experiment

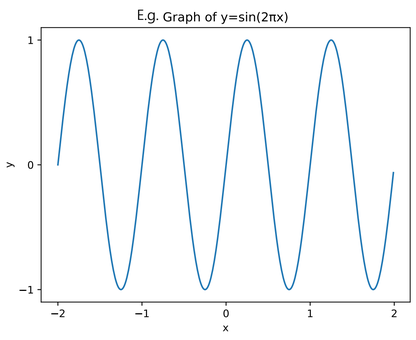

Figure7. Before FFT applied

Sine wave undergoes FFT

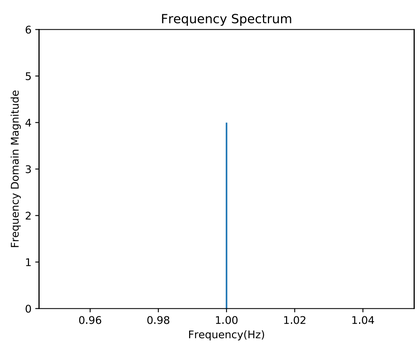

Figure8. After FFT applied

FFT decomposes a function that is respect to time into its constituent frequencies.

V. Experiments

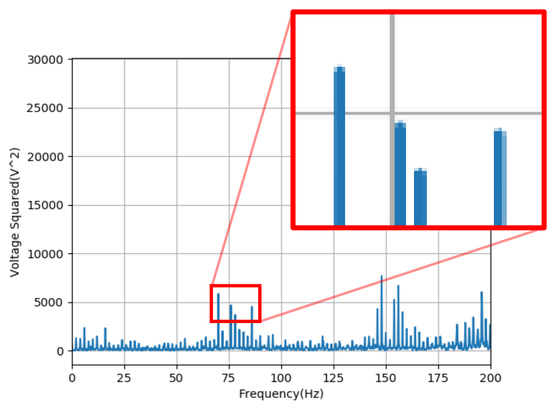

Figure 9. Frequency domain data graph when low frequency sound (70~80Hz) was generated

Figure 9 shows the frequency domain data for the respective setting.

Figure 10 shows the frequency domain data for the respective setting.

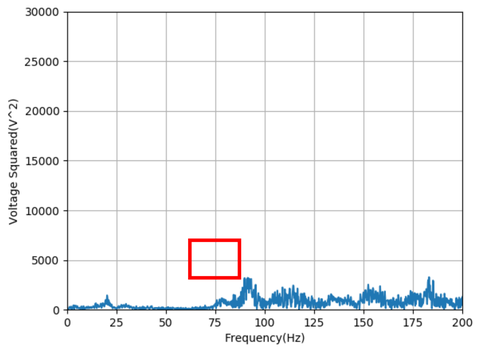

Figure 10. Frequency domain data graph when low frequency sound was not generated

Difference in constituent frequencies was observed respective to the changes of settings.

VI. Discussion Conclusions

Despite infrasound being hazardous to human being, it has not been regarded as pollution, resulting in absence of system or application for users to monitor. In this project, sensor that can detect sound below 20Hz (infrasound) was not used to develop prototype. Still, this design provide general structure of how infrasound would be monitored and notified for users.