Lab 1: Sapphire Sounds

Zachery Hendrickson

CS 411W

Thomas J. Kennedy

06 October 2025

Version 1

Lab 1 Version 1

Table of Contents

Listing of Figures

No table of figures entries found**.**

Listing of Tables

No table of figures entries found.

Lab 1 Version 1

1 Introduction

Noise disputes in shared living environments are often difficult to resolve due to reliance on subjective complaints. This can result in false accusations, unresolved tensions, and overall tenant dissatisfaction. Currently, there is no widely adopted method for monitoring and verifying noise disturbances that is both objective and privacy conscious. Sapphire Sounds addresses this problem through a mobile and web application that works with a non-invasive noise sensor. The sensor measures sound levels without recording audio. When high noise levels persist, the system generates time-stamped reports to help property managers resolve disputes fairly. Tenants can also monitor their own noise history, receive real-time alerts, and earn rewards for maintaining a quiet environment. By providing clear and unbiased data, Sapphire Sounds supports more peaceful and cooperative shared living spaces.

2 Sapphire Sounds Product Description

Sapphire Sounds is a smart noise-monitoring system built to ease conflicts in shared living spaces. It combines a small sensor with mobile and web applications to measure decibel levels without recording conversations, protecting tenant privacy. When noise levels stay above a threshold for too long, the system generates time-stamped reports that can be shared with property managers. The goal is to provide clear, unbiased data that helps tenants avoid false accusations, supports property managers in resolving complaints fairly, and ultimately fosters a more peaceful and respectful community.

2.1 Key Product Features and Capabilities

Sapphire Sounds objectively monitors noise by capturing sound intensity in decibels without recording or analyzing conversations. It provides real-time alerts to tenants, generates historical noise logs, and produces automated reports for property managers. The system is unique in its privacy-first design and its reward system, which incentivizes tenants to maintain quiet

environments. By replacing subjective claims with measurable evidence, it de-escalates conflicts, promotes accountability, and encourages healthier tenant–landlord relationships.

2.2 Major Components (Hardware/Software)

The solution combines low-cost hardware with custom software to deliver reliable noise monitoring. A Raspberry Pi Zero 2 W with a decibel sensor and Wi-Fi captures sound levels and securely sends the data to the cloud. The software stack uses Node.js, React.js, and PostgreSQL, with Docker and Firebase handling deployment and hosting. Key features include engines for monitoring decibel levels, sending alerts, and analyzing trends. Together, these parts create a scalable system that protects tenant privacy while providing clear, data-driven noise management.

3 Identification of Case Study

The primary audience for Sapphire Sounds is both tenants and property managers. Tenants can monitor their own noise activity, prevent conflicts before they escalate, and even earn recognition or rewards for maintaining respectful sound levels. Property managers, gain a reliable way to validate complaints, identify recurring disturbances, and address issues without always needing to be on-site. The need is clear noise complaints are among the most common challenges in multi-unit housing. When decisions rely only on personal accounts, disputes can escalate, blame may be misplaced, and trust between tenants and managers often breaks down. By providing objective, privacy-focused data, Sapphire Sounds establishes a shared standard that both sides can depend on, making it easier to resolve conflicts fairly and promote a more peaceful living environment.

4 Conclusion

Placeholder.

3 Glossary

- dB (Decibel): A unit to measure the intensity of sounds.
- Noise Event: An occurrence when decibel thresholds are reached for a specific duration. Used for reporting.
- Noise Sensor: A physical device that monitors sound levels without recording audio.
- Report: A structured report generated by the system, detailing the noise event.
- Threshold: A predefined decibel level, which if exceeded, will trigger a noise event
- Tenant: A resident or occupant of a shared or multi-unit housing space using the system to manage and monitor noise activity.

4 **References**American Public Health Association. (2021, October 25). *Noise as a public health hazard*. https://www.apha.org/policy-and-advocacy/public-health-policy-briefs/policy-database/2022/01/07/noise-as-a-public-health-hazard

Minut. (n.d.). *Minut*. http://www.minut.com/

RentEye. (n.d.). *RentEye*. http://www.renteye.com/