Lab 2: Sapphire Sound Monitoring

Software Requirements

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1 Introduction

This chapter provides an overview of the entire Software Requirements Specification (SRS) document. It defines the purpose and scope of this document, identifies the software product, and lists the sources and terms used in interpretation. It consists of the following subtopics: Purpose, Scope, Definitions, Acronyms and Abbreviations, References, and Overview.

1.1 Purpose

The goal of this Software Requirements Specification (SRS) is to precisely and completely define all the external requirements for the Sapphire Sound Monitor software product so that both the supplier and the customer can agree on its capability and functionality. It is intended for the project team, customers (property managers), and quality assurance personnel as a design, validation, and verification reference.

1.2 Scope

The SRS specifies the requirements for Sapphire Sound Monitor software, such as mobile and web applications for tenants and property managers. The main application feature is to provide objective, automated measurement and reporting of decibel levels in shared housing situations without recording audio, thus allowing privacy to the tenants. The end goal is to transform the resolution of subjective noise complaints into a data-driven conflict resolution process, ultimately reducing contention, improving tenant satisfaction, and maintaining peace across properties.

1.3 Definitions, Acronyms, and Abbreviations

- 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.

1.4 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

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1.5 Overview

The remaining parts of this SRS have two principal sections: Overall Description (Section 2) and Specific Requirements (Section 3). Section 2 provides overall background and context, such as the perspective of the product, its functions, user types, and overall constraints. Section 3 outlines specific, testable requirements, and these will be organized according to User Role.

2 Overall Description

This section of the SRS describes the broad factors and background information that bear on the Sapphire Sound Monitor product and its requirements. It is meant to provide context for the detailed requirements in Section 3 by detailing the product's role within its setting, capturing its most important functions, defining its intended users, and outlining its principal constraints and assumptions.

2.1 Product Perspective

The Sapphire Sound Monitor is a standalone solution for noise monitoring, but an intrinsic component in an extended property management system. It communicates with dedicated hardware (Raspberry Pi Zero 2 W and I2C Decibel Sound Level Meter) and provides user interaction in terms of software interfaces (Web/Mobile UI). It is an external system to the core property management tools, acting as a provider of data for conflict resolution.

2.2 Product Functions

The listed primary functions are: Privacy-First Decibel Monitoring (decibel monitoring and filtering, no audio recording), Automated Noise Event Reporting (audio recording events over pre-set thresholds for generating timestamped reports), Real-Time Smart Alerts (alerting the residents upon exceeding a threshold to facilitate self-correction), Data-Driven Report Generation (providing objective evidence in the event of disputes), and an Optional Positive Reinforcement/Rewards System (rewards quiet behavior).

2.3 User Characteristics

The two major user classes are Property Managers (principal customers needing objective evidence, reporting, and property-level summaries) and Tenants (beneficiaries needing a personal approach to monitor their own noise, receive live notice, and inspect their own individual noise history for defense against unfounded complaints). For instance, the Tenant interface must be

simple and intuitive (so a web/mobile application), while the Property Manager interface must support robust report generation and noise threshold setting.

2.4 Constraints

- Hardware Limitation: The software must interface exclusively with the specified Raspberry Pi/Infineon/I2C hardware stack.
- Privacy Constraint: The system must strictly adhere to a no-audio-recording policy.

2.5 Assumptions and Dependencies

Network Availability: Reliable Wi-Fi connectivity is assumed to be available in each installation unit for the sensor's communication with the backend.