Bachelor Project Proposal Overview

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Abstract

The project aims to re-implement the remote control (RC) functionality for GN Hearing aids using Bluetooth Low Energy (BLE) protocols. The current RC relies on a proprietary protocol, which may not be supported by future radios. The goal is to develop a prototype on a Nordic Semiconductor development kit (nRF 52 DK) and eventually run it on the actual RC hardware.

Problem Statement

- Current Issue: The existing RC for GN Hearing aids uses a proprietary protocol that may become obsolete with future radio technologies.
- Proposed Solution: Implement the RC functionality using BLE protocols compatible with the latest hearing aids featuring LE Audio (LEA).
- Development Tools: The project will utilize the Nordic Semiconductor nRF 52 DK for prototyping, with a potential transition to the nRF54Lxx family for enhanced capabilities.

Background Information

- Historical Context: GN Hearing Aids were pioneers in wireless communication in the 2.4 GHz ISM band, enabling audio streaming and remote control functionalities back in 2010.
- Proprietary Protocol: Initially, a proprietary protocol was developed using Nordic Semiconductor's Enhanced ShockBurst protocol.
- LE Audio Announcement: In 2020, the Bluetooth SIG introduced LE Audio features, which include specific support for hearing aids.

Specific BLE Features Required

1. Coordinated Sets: For bonding the RC with the hearing aids.
2. Volume Control Profile: For adjusting volume levels.
3. Hearing Access Profile: For changing presets.

Project Goals

1. Embedded Systems Understanding: Demonstrate knowledge of embedded systems.
2. BLE Application: Show how to apply BLE in simple embedded systems.
3. Framework Utilization: Highlight the benefits of using established development frameworks.

4. Code Transition Skills: Exhibit skills in moving code from a development kit to custom hardware.
5. Battery Lifetime Evaluation: Assess the expected battery life of the new implementation.

Analysis

- Relevance: The project addresses a significant need for modernizing the control interface of hearing aids, ensuring compatibility with future technologies.
- Technical Feasibility: Utilizing Nordic Semiconductor's development kits and the Zephyr Project framework is a solid approach, given their support for BLE and embedded systems.
- Impact: Successful implementation could enhance user experience by providing a more reliable and user-friendly remote control solution for hearing aids.
- Learning Outcomes: The project is well-structured to provide valuable learning experiences in embedded systems, BLE technology, and practical software development.