



**SONOVA  
COMMUNICATIONS**

Roger Pen and Roger  
Clip-On Mic

# MEDICAL TECHNO- LOGY

**Hearing aid accessories – so you can remain connected and focused.**

Phonak – a Sonova Group brand – has a versatile communication for people with hearing loss in its portfolio in the form of its Roger™ product line.

- Two key markets are covered by Roger™: Support at school for children with hearing loss
- Solutions for adult hearing aid users who want to improve their understanding in noisy environments and over distance

The elegantly designed units also offer exceptional performance features such as optimal audio processing in any everyday environment, the opportunity to operate several microphones in a network and – last but not least – connectivity with smartphones via Bluetooth.

CSA Engineering AG has supported Phonak in setting up the software framework and has been supporting the software development for the entire product line for more than 4 years now.

**Our commitment to the medical sector makes daily life easier for people.**

**CSA Engineering AG**  
Hans Huber-Strasse 38  
CH-4500 Solothurn

Tel.: +41 32 626 35 55  
info@csa.ch  
www.csa.ch

## Services provided by CSA as part of the project

### Definition

Feasibility study  
Implementation concept



### Specification

Software specification



### Realisation

Embedded software development  
Documentation verification and validation



### Transfer

Development products

## Project

The Roger™ products consist of several processors.

- The main processor – an ARM from the SMT32 family – implements the application logic. Depending on the unit, the interface consists of buttons only or has the additional feature of a graphic display with touch screen. The device can also be configured via USB and brought right up to date.
- The dedicated DSP is responsible for processing the audio signal. The audio source is either a microphone array or an external source connected via line-in.
- The digital communication protocol is implemented in an ASIC which provides an audio network on the free 2.4GHz band.
- On some devices, a Bluetooth chip is also used to provide connectivity to mobile phones.

CSA employees supported the Phonak team to implement the software in the main processor and in the communication ASIC.

## Technology

A simple STM32 derivative was used for the Roger Pen. A more powerful derivative was needed to drive the graphics display for the Roger Touchscreen Mic product. The software architecture is based on the building block framework, which CSA has already been able to transfer to several customers (see "C++ Framework" CSA Tech flyer ). Rhapsody was used to implement the application logic. The opportunity to insert functionality directly in the graphical representation of the software increases clarity and enhances the agility of the development.

## Methodology

The use of the building block framework has shown many benefits:

- Encapsulation of tasks
- Methodology to address RTOS aspects (concurrency) in a safe way
- Reusability
- Each product is structured in the same way (recognition/maintainability)
- Drivers are abstracted and different hardware platforms are supported by the same software platform.

Over time, several products have been created on the same code basis thanks to the clear structures and the high reusability of entire components.

A large part of the work for CSA employees involved implementing the hardware drivers in such a way that the application could use the components safely. Complete USB communication as well as the control and configuration of the Bluetooth chip was implemented alongside some smaller drivers. It became apparent that the code supplied by the manufacturer often does not meet the quality requirements for an embedded product and thus had to be partially rewritten.

Another aspect of the collaboration was maintaining the build environment, which covered everything from the source code projects to testing and deployment. To this end, a reproducible environment had to be created that would allow the project employees to handle the individual steps with ease.

In their capacity as experienced developers of hardware-related software, CSA employees are able to grasp subtle and hard-to-reproduce problems in their entirety and search for a solution in a targeted and efficient manner.

## Summary

CSA's work with the Roger™ product line goes beyond simply aiding software development. Good integration into the team, the opportunity to contribute in-house skills and take responsibility made cooperation with Sonova Communications AG a success story on both sides.

