

Enabling Wireless Digital Audio Streaming to an Implantable Hearing Aid



Introduction

S3 Connected Health worked with Cochlear to enable their True Wireless® range of accessories to wirelessly stream digital audio directly to Cochlear's implantable hearing aids to deliver clear sound in a range of challenging situations and over distance.

The range of accessories, which includes a mini microphone, phone clip and TV streamer, gives a clear and secure connection without the interference and signal drops associated with acoustic or traditional FM systems, or the need for bulky neck-worn components. This enables people with hearing loss to hear problem-free in a range of different environments. The freedom offered by the True Wireless® devices not only means a significantly easier and more enjoyable hearing experience and helps recipients use modern multi-media technology like anyone else, so they don't have to miss out on important conversations or entertainment.

Challenge

Enable wireless audio streaming from the True Wireless® devices directly to the sound processor on the Nucleus 6, without impacting the functioning or existing wireless communications of the implantable hearing aid.

Solution

To prototype and implement the wireless streaming on Nucleus 6® Sound Processor, to integrate/test the solution with existing devices and the wider eco-system associated with Cochlear's Nucleus 6® hearing system.

Impact

The service has enriched Cochlear's offering and transformed the lives of people with hearing difficulties.

Background

To facilitate True Wireless® devices to stream directly to the Cochlear Nucleus® 6 hearing solution, the True Wireless® streaming protocol had to be prototyped on Cochlear sound processors and then taken through the entire medical product development cycle. The process also had to address the constraints of porting the protocol onto a small and very constrained device that has to operate in congested wireless environments.



The Project

S3 Connected Health leveraged its capabilities in wireless communications, RF and antenna design. Our embedded firmware engineers, with expertise in firmware development for ultra-constrained hardware platforms and digital signal processing (DSP), enabled efficient and timely implementation of the digital audio streaming functionality.

One of the main challenges addressed was ensuring the functionality met the limited memory, processing capacity and power constraints associated with a hearing implant sound processor.

Cochlear True Wireless Family



Nucleus Profile Implant

The Project Contd...

Operating at the 2.4 GHz frequency, extensive testing had to be done to ensure reliable connection and streaming of audio to the sound processor in congested wireless environments, particularly with Bluetooth® hubs and Wi-Fi routers.

S3 Connected Health worked in partnership with Cochlear to ensure integration with the existing devices and the wider eco-system associated with the Nucleus® 6 hearing solution (including backward compatibility with existing remote controls and accessories).

Operating on the same frequency, S3 Connected Health enabled the sound processor to quickly and seamlessly switch between the audio streaming from the True Wireless® range of devices, and the Nucleus® 6 remote assistant and remote control devices, to ensure a secure connection without signal drops or interruptions of service. Enabling implant recipients to have all the traditional benefits of their Cochlear implantable hearing aid, along with the added benefit of wireless digital audio streaming.

Patient Stories

Tobin Fonseca, who suffered single sided deafness in 2011, speaking on a launch video for the True Wireless® devices said "I never thought Cochlear would change what I thought was a horrible situation into something I do not even think about today. With the implant and the accessories, I don't think of myself as having any type of hearing impairment, it's amazing"

Hearing difficulties impact people at all stages of life in a variety of ways. One area that is particularly challenging for children is progressing in sports where there is a shared coaching environment. Cochlear's True Wireless range has improved the lives of many children in this area, as highlighted by the parents of Hamish Terris. Cochlear allowed him to "hear the swim teacher via the mini mic the whole length of the pool. What he is achieving in all areas is amazing really".

Adults also struggle with the impacts of deafness and hearing loss but Cochlear's True Wireless range has given many adults like Faye Yarroll their social life back. Faye thought the service "was great before, but it's even better now."

Further Rollout

S3 Group has been awarded design credit as part of the Medical Design Excellence Award (Readers' Choice) in June 2015 for its contribution to the design and development of this service. The digital program was also honoured as a finalist in the Rehabilitation and Assistive Technology Products category for its compelling and innovative design.



**Nucleus 7
Sound Processor**



**Baha 4
Sound**



**Baha 5
Sound**

Contact Us

S3 Connected Health provide digital patient support programs that address the issues of therapy engagement, adherence and persistence. We personalize patient interactions, generate real-world evidence and provide actionable insight for improved healthcare outcomes.

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