### Collected Works Related to the Development of the Modern Cochlear Implant

by

Professor Blake S. Wilson

A thesis presented to the University of Technology Sydney

In fulfillment of the

thesis requirement for the

degree

Higher Doctorate

December 2014

# CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

Production Note: Signature removed prior to publication.

#### Abstract

This thesis for a higher doctorate in engineering at the University of Technology, Sydney (UTS) presents collected works related to the development of the modern cochlear implant, a prosthesis that restores useful hearing for deaf or severely hearing impaired persons. The emphasis is on the engineering aspects of the development, and the principal work for this thesis is the book *Better Hearing with Cochlear Implants: Studies at the Research Triangle Institute*, which is a major engineering aspects of the development. This bounded thesis included that also describe engineering aspects of the development. This bounded thesis includes the ten further publications, an acknowledgments section, a published review of the book, a one-page biographical sketch for the author, and the author's full CV. The book is available separately at the UTS Library or from the publisher, Plural Publishing, Inc., of San Diego, CA, USA.

## Contents

Acknowle	edgments	6
Publications		7
1.	Wilson BS, Finley CC, Lawson DT, Wolford RD: Speech processors	
	for cochlear prostheses. Proc IEEE 76: 1143-1154, 1988	7
2.	Wilson BS, Finley CC, Lawson DT, Wolford RD, Zerbi M: Design	
	and evaluation of a continuous interleaved sampling (CIS) processing	
	strategy for multichannel cochlear implants. J Rehab Res Devel 30:	
	110-116, 1993	19
3.	Wilson BS: Thirty years of the British Journal of Audiology: Guest	
	Editorial: The future of cochlear implants. Brit J Audiol 31: 205-225,	
	1997	26
4.	Wilson BS: Engineering design of cochlear implants. In Cochlear	
	Implants: Auditory Prostheses and Electric Hearing, edited by F-G	
	Zeng, AN Popper and RR Fay, Springer-Verlag, New York, pp. 14-52,	
	2004	47
5.	Wilson BS, Schatzer R, Lopez-Poveda EA, Sun X, Lawson DT,	
	Wolford RD: Two new directions in speech processor design for	
	cochlear implants. Ear Hear 26: 73S-81S, 2005	86
6.	Wilson BS, Dorman MF: The surprising performance of present-day	
	cochlear implants. IEEE Trans Biomed Eng 54: 969-972, 2007	95
7.	An SK, Park SI, Jun SB, Byun KM, Lee CJ, Wilson BS, Rebscher SJ,	
	Kim SJ: Design for a simplified cochlear implant system. IEEE Trans	
	Biomed Eng 54: 973-982, 2007	99

109
109
126
160
164
165
166

### Acknowledgments

In looking back over my career, I have many people to thank for helping me and the teams I have directed. Most of these people are named in the Acknowledgements section of the book included as a part of this thesis. I have been blessed to have known these wonderful and talented people and to have had the grand opportunities to work with them.

I also am most grateful indeed for the expert and selfless help given to me in connection with my submission for a higher doctorate at the University of Technology, Sydney (UTS). The persons at the UTS who so generously helped me include Dean and Professor Hung Nguyen; Dean and Professor Nicky Solomon; Executive Assistant Maree Joulian; Senior Deputy Vice Chancellor and Vice President Peter Booth; and Deputy Vice Chancellor and Vice President for Research Attila Brungs, who now is the Vice Chancellor and President.

I am so very proud and happy to be associated with this magnificent university and its spectacular people and programs. Sometimes I cannot believe my great good fortune, made possible by my family and many friends and colleagues worldwide.