



US009409015B2

(12) **United States Patent**
Harczos

(10) **Patent No.:** **US 9,409,015 B2**

(45) **Date of Patent:** ***Aug. 9, 2016**

(54) **METHOD AND APPARATUS FOR GENERATING AN ELECTRODE STIMULATION SIGNAL IN A NEURAL AUDITORY PROSTHESIS**

(75) Inventor: **Tamas Harczos**, Wümbach (DE)

(73) Assignee: **Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V.**, Munich (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 133 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/601,012**

(22) Filed: **Aug. 31, 2012**

(65) **Prior Publication Data**

US 2013/0238054 A1 Sep. 12, 2013

Related U.S. Application Data

(63) Continuation of application No. PCT/EP2010/069522, filed on Dec. 13, 2010.

(60) Provisional application No. 61/310,425, filed on Mar. 4, 2010.

(51) **Int. Cl.**
A61N 1/05 (2006.01)
A61N 1/36 (2006.01)

(52) **U.S. Cl.**
CPC **A61N 1/36032** (2013.01); **A61N 1/0541** (2013.01)

(58) **Field of Classification Search**
CPC A61N 1/0541; A61N 1/36032; A61N 1/36178; A61B 5/6817
USPC 607/55-57, 136
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,905,285 A 2/1990 Allen et al.
6,064,913 A 5/2000 Irlicht et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN 101160151 A 4/2008
CN 101347367 A 1/2009

(Continued)

OTHER PUBLICATIONS

Official Communication issued in International Patent Application No. PCT/EP2010/066522, mailed on Jan. 20, 2012.

(Continued)

Primary Examiner — Eugene Wu

(74) *Attorney, Agent, or Firm* — Keating & Bennett, LLP

(57) **ABSTRACT**

An auditory stimulation signal processing has a plurality of signal inputs adapted to receive a plurality of frequency bin signals, a selection probability value assigner, a random selector, and an electrode stimulation signal generator. The selection probability assigner is adapted to assign a selection probability value to at least one frequency bin signal of the plurality of frequency bin signals. The random selector is adapted to select one frequency bin signal from the plurality of frequency bin signals by means of a random process taking into account the selection probability value assigned to the at least one frequency bin signal. The electrode stimulation generator is adapted to generate an electrode stimulation signal for application to an electrode of a neural auditory prosthesis, the electrode corresponding to a frequency of the selected frequency bin signal. A corresponding method and a computer readable digital storage medium are also disclosed.

10 Claims, 11 Drawing Sheets

