



(12) **United States Patent**
Lee

(10) **Patent No.:** **US 11,792,595 B2**
(45) **Date of Patent:** **Oct. 17, 2023**

(54) **SPEAKER TO ADJUST ITS SPEAKER SETTINGS**

(71) Applicant: **Microchip Technology Incorporated**, Chandler, AZ (US)

(72) Inventor: **Tik Man Lee**, Chandler, AZ (US)

(73) Assignee: **Microchip Technology Incorporated**, Chandler, AZ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1 day.

(21) Appl. No.: **17/647,202**

(22) Filed: **Jan. 6, 2022**

(65) **Prior Publication Data**

US 2022/0369060 A1 Nov. 17, 2022

Related U.S. Application Data

(60) Provisional application No. 63/186,938, filed on May 11, 2021.

(51) **Int. Cl.**
H04S 7/00 (2006.01)

(52) **U.S. Cl.**
CPC **H04S 7/301** (2013.01); **H04S 7/307** (2013.01)

(58) **Field of Classification Search**
CPC H04S 7/301; H04S 7/307
USPC 381/303
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,676,044 B2 3/2010 Sasaki et al.
9,426,598 B2 8/2016 Walsh et al.

10,861,465 B1 12/2020 Vines et al.
2005/0152557 A1 7/2005 Sasaki et al.
2014/0369505 A1* 12/2014 Lee H04R 3/12 381/17
2016/0309258 A1 10/2016 Hiscock et al.
2018/0242095 A1 8/2018 Patil et al.
2019/0215634 A1* 7/2019 Doolittle H04S 7/30
2020/0366994 A1 11/2020 Arteaga et al.

OTHER PUBLICATIONS

International Search Report from International Application No. PCT/US2022/070061, dated Apr. 29, 2022, 5 pages.
International Written Opinion from International Application No. PCT/US2022/070061, dated Apr. 29, 2022, 6 pages.

* cited by examiner

Primary Examiner — Vivian C Chin

Assistant Examiner — Douglas J Suthers

(74) *Attorney, Agent, or Firm* — TraskBritt

(57) **ABSTRACT**

Examples disclosed herein include a speaker. The speaker may include a group of microphones and a processor. The processor may determine a first speaker-channel identifier for a multi-speaker system at least partially responsive to a first tone captured at the group of microphones. The processor may also determine a position of a source of the captured first tone relative to the speaker at least partially responsive to position information derived from the captured first tone. The processor may also determine a second speaker-channel identifier at least partially responsive to the first speaker-channel identifier and the position of the source of the captured first tone. The processor may also determine speaker settings at least partially responsive to the second speaker-channel identifier. Related devices, systems and methods are also disclosed.

26 Claims, 9 Drawing Sheets

