US 20220352860A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2022/0352860 A1**

Darr et al. (43) **Pub. Date: Nov. 3, 2022**

(54) **PASSIVE SUB-AUDIBLE ROOM PATH LEARNING WITH NOISE MODELING**

(71) Applicant: **THAT Corporation**, MIlford, MA (US)

(72) Inventors: **Roger R. Darr**, Tumwater, WA (US); **Matthew Easley**, Woodstock, GA (US)

(73) Assignee: **THAT Corporation**, Milford, MA (US)

(21) Appl. No.: **17/661,582**

(22) Filed: **May 2, 2022**

Related U.S. Application Data

(60) Provisional application No. 63/182,413, filed on Apr. 30, 2021.

Publication Classification

(51) **Int. Cl.**

H03G 3/24	(2006.01)
H03G 3/30	(2006.01)
H03G 5/16	(2006.01)

(52) **U.S. Cl.**

CPC ***H03G 3/24*** (2013.01); ***H03G 3/3089*** (2013.01); ***H03G 5/165*** (2013.01)

(57) **ABSTRACT**

Frequency domain compensation is provided for spectral impairment resulting from the audio path characteristics for a given audio device in a given listening space. Selected segments of an audio stream are recorded at a listener position to measure degradation in the audio path and to update compensation filter characteristics of the audio device. Recorded transmitted and received audio sequences are aligned based and compared in the frequency domain. The difference between the aligned transmitted and received sequences represents the frequency domain degradation along the acoustic path due to the speaker, the physical attributes of the room, and noise. A dynamically updated noise model is determined for adjusting compensation filter characteristics of the audio device, which can be updated during use of the audio device. A compensation curve is derived which can adapt the equalization of the audio device passively during normal usage.