US 20230231635A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2023/0231635 A1

OKAMOTO et al. (43) Pub. Date: Jul. 20, 2023

(54) **POSITION ESTIMATION SYSTEM, FIXED RADIO APPARATUS, AND MOBILE RADIO APPARATUS**

(71) Applicant: **Panasonic Intellectual Property Management Co., Ltd.**, Osaka (JP)

(72) Inventors: **Mei OKAMOTO**, Kanagawa (JP); **Naganori SHIRAKATA**, Kanagawa (JP); **Tomohiro MURATA**, Kanagawa (JP); **Hiroshi TAKAHASHI**, Kanagawa (JP); **Yohei MORISHITA**, Kanagawa (JP)

(21) Appl. No.: **18/189,535**

(22) Filed: **Mar. 24, 2023**

Related U.S. Application Data

(63) Continuation of application No. PCT/JP2021/026007, filed on Jul. 9, 2021.

(30) **Foreign Application Priority Data**

Sep. 29, 2020 (JP) 2020-163244

Publication Classification

(51) **Int. Cl.**

H04B 17/27	(2006.01)
H04B 17/318	(2006.01)
G01S 5/02	(2006.01)

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

CPC ***H04B 17/27*** (2015.01); ***H04B 17/318*** (2015.01); ***G01S 5/02525*** (2020.05)

(57) **ABSTRACT**

A mobile radio apparatus transmits to a plurality of fixed radio apparatuses, a fingerprint that indicates a reception strength distribution of radio signals from the plurality of fixed radio apparatuses. Each of the plurality of fixed radio apparatuses in which a learning model is installed inputs the fingerprint to the learning model and transmits a degree of proximity of the mobile radio apparatus output from the learning model to another one or more of the plurality of fixed radio apparatuses, and determines a position of the mobile radio apparatus, based on a first degree of proximity output from the learning model and a second degree of proximity received from the other one or more of the plurality of fixed radio apparatuses.