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63/220,361 09 July 2021 (09.07.2021) US(71) Applicants: **NEW YORK UNIVERSITY** [US/US]; 70 Washington Square South, New York, New York 10012 (US). **COMMON SCENTS INC.** [US/US]; 497 Meetinghouse Lane, Media, Pennsylvania 19063 (US).(72) Inventors: **RINBERG, Dmitry**; 70 Washington Square South, New York, New York 10012 (US). **LAVELLA, Gabriel**; 497 Meetinghouse Lane, Media, Pennsylvania 19063 (US). **LEDOCHOWITSCH, Peter**; 497 Meetinghouse Lane, Media, Pennsylvania 19063 (US). **HARVEY, Joshua**; 70 Washington Square South, New York, New York 10012 (US).(74) Agent: **MARTIN, Matthew E.** et al.; Foley & Lardner LLP, 3000 K Street, N.W., Suite 600, Washington, District of Columbia 20007 (US).

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(54) Title: SYSTEMS AND METHODS FOR BRAIN-MACHINE-INTERFACE-AIDED FEDERATED TRAINING OF SCENT DETECTION ANIMALS

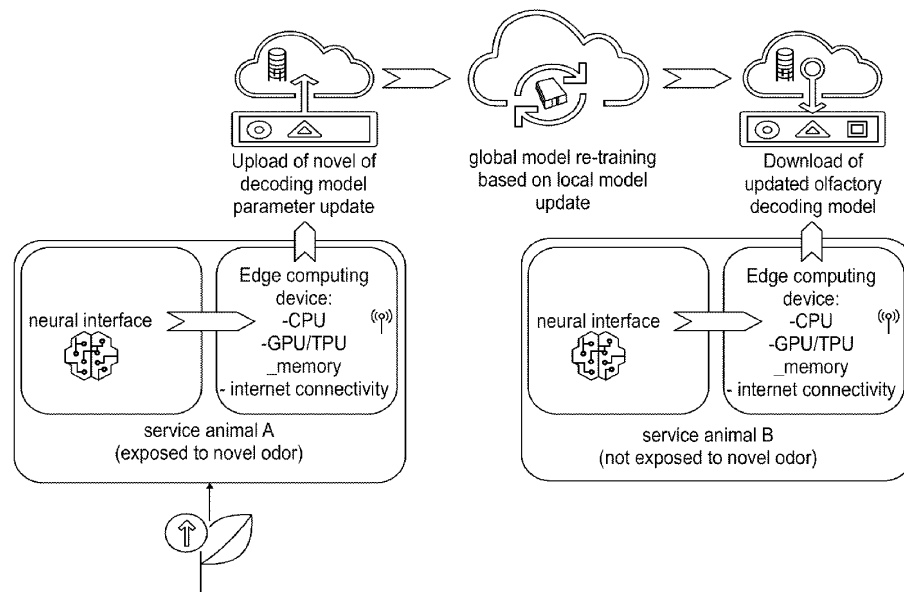


FIG. 1

(57) **Abstract:** An odor training and detection system can include multiple service animals. Each service animal can be provided with a means by which neural activity can be read from the olfactory system. Each service animal can be associated with an edge computing device containing an updateable local database and enabled with wireless communication. Each service animal can be equipped with one or multiple cloud-based servers and databases. A family of anchor odor sets and computational methods can enable the alignment of olfactory maps across individual animals into a common coordinate framework. Further disclosed is a means of computing and communicating (in a privacy-preserving manner if desirable) federated updates to olfactory decoding models between the local databases on the edge and the cloud database(s).

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