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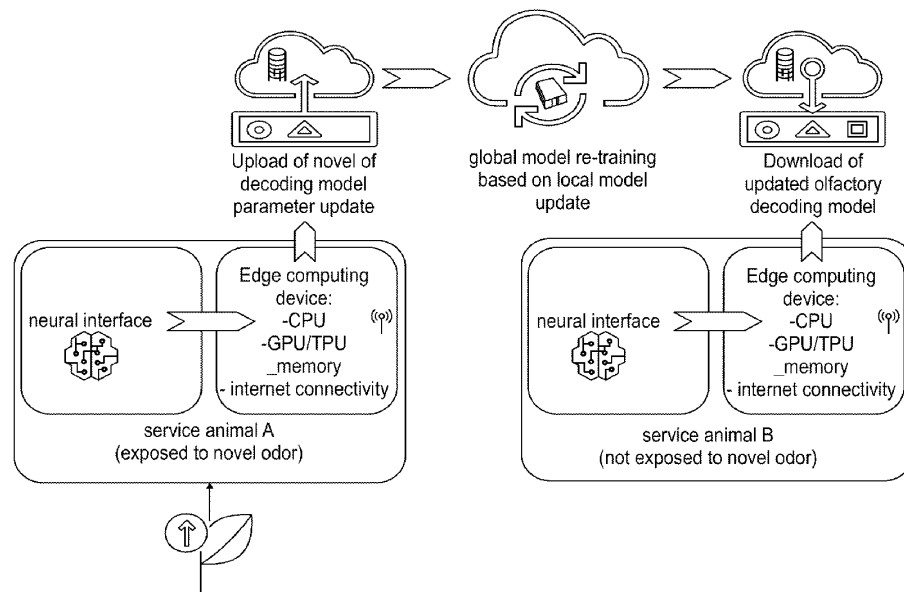


FIG. 1

(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).

[Continued on next page]

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