

Speech-to-Scent Prototype

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Odor digitalization needs systems that can connect human odor ideas with real scents¹. In this work, we present a prototype, shown in Fig. 1, that allows a user to request an odor by speaking a natural-language sentence. The system interprets the request, generates an odor recipe, and presents the result with a 20-channel olfactory display.

A user can say, for example, “I want to experience the scent of a fresh forest in the mountains.” The spoken request is first transcribed into text. The text is then processed by a large language model (LLM) and converted into a fixed set of nine odor descriptors: floral, fresh, balsamic, green, herbal, spicy, woody, sweet, and warm. This descriptor vector is used as the input condition for OGDiffusion², a generative model that produces a target mass spectrum. This mass spectrum represents the chemical profile that the system aims to reproduce. This target spectrum is converted into a recipe using non-negative least squares, using 20 odor components as basis, obtained by non-negative matrix factorization from an essential-oil basis. The final mixture is then sent to the olfactory display and released to the user.

The prototype demonstrates a complete speech-to-scent workflow in real time. Since the system works with essential-oil-derived components, requests related to flowers, herbs, plants, woods, spices, freshness, and perfume-like smells are more suitable for the current prototype. More specific odors, such as cooked food, body odors, animals, places, or abstract concepts, are harder to reproduce. This demonstration is a practical step toward interactive odor generation and shows how spoken user intentions can be connected to algorithmic scent generation and physical odor delivery.

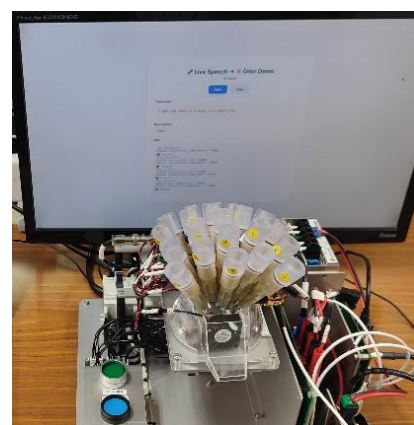


Figure 1. Olfactory display.

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References

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