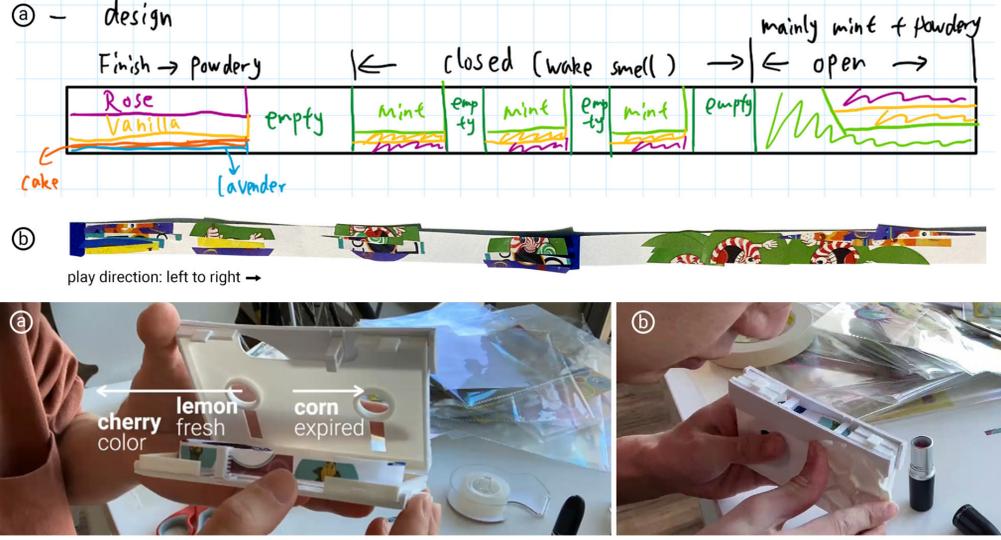
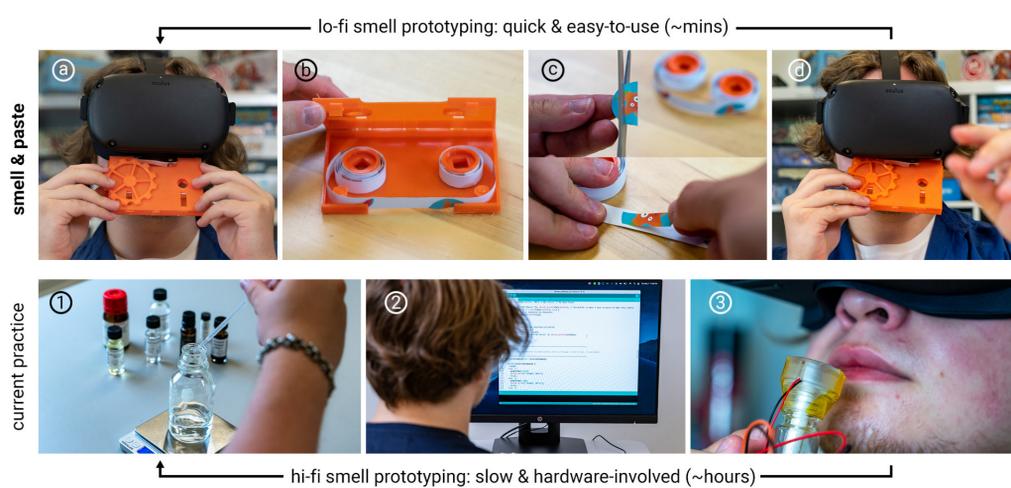


# smell & paste: low-fidelity prototyping of olfactory experiences

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## goal: enable lo-fi smell prototyping

Low-fidelity prototyping is so foundational to HCI that it appears in all early design cycles. So, how do olfactory experts prototype? To answer this, we interviewed experts and found that they do not because no process supports this. Thus, we engineered Smell & Paste, a lo-fi toolkit for olfactory experiences. To prototype with our toolkit, designers assemble olfactory experiences by pasting scratch-and-sniff stickers onto a paper-tape, taking <1min. While advancing, the cassette scratches the stickers, releasing their odors. We liken our toolkit to paper prototyping because it uses commodity materials, enabling low iteration cost and fast production, and circumvents tinkering with electronics, programming, or chemicals.

## study 1: do smell experts prototype?

We conducted semi-structured interviews with 8 smell experience experts.

**Key results:** Methods for rapid olfactory prototyping are rare. This scarcity is best illustrated by how only two participants produced low-tech olfactory prototypes using scratch-and-sniff. In contrast, the other participants iterated over complex hi-fi prototypes or final versions of their experiences.

Experts emphasized the overhead associated with acquiring domain expertise and tacit knowledge early in prototyping. Experts stated difficulties or time spent learning how to program or engineer, produce their fragrances or encapsulations, and use existing delivery methods.

## study 2: classroom deployment

We deployed the toolkit for a university-level Human-Computer Interaction course's assignment. Seven participants received a toolkit with two cassettes, 41 scratch-and-sniff odors, a tutorial, and a design prompt.

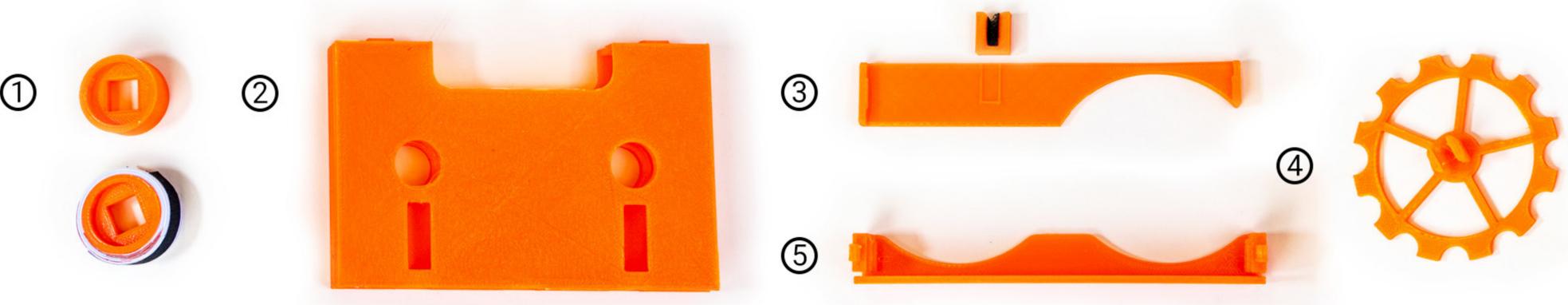
**Key results:** Our toolkit's form factor encouraged linear experiences. However, participants found creative ways to support non-linear experiences (e.g., encoding choices). Participants directly embedded notes onto the tapes. They experimented with scent intensity by cutting the stickers. They extended this to compose new fragrances by combining available odors.

Most importantly, participants were able to iterate rapidly over olfactory sequences and combined Smell & Paste with established prototyping strategies like Wizard-of-Oz, video prototypes, and paper prototypes (without prompting). Finally, the toolkit proved to be customizable.

## study 3: expert deployment

We recruited two expert participants from Study 1 and sent them the toolkit.

**Key results:** Experts highlighted Smell & Paste's rapid ability to produce odor sequences. E1 emphasized that they found the cassette's ability to "surprise" was incredibly advantageous (compared to a scratch-and-sniff card that people can sample ahead). Experts found the physical affordance of the mechanical design to be intuitive. Participants were excited that prototyping resulted in a storable and shareable artifact.



## smell & paste toolkit

Inspired by this, we built our toolkit leveraging scratch-and-sniff stickers. Our "Smell & Paste" toolkit relies on a 3D-printed cassette (no electronics, all mechanics) to which the user can load "smell tapes." We implemented our cassette to let designers "play the odor sequence" and address some scratch-and-sniff limitations.

Users select scented sticker, cut them, and apply them to a paper tape. Primary modes of operation include: cut and paste, fade, cross-fade, multi-track, and splice.

