

Fig. 23. Dragon vessel timepiece.

Olfactory Output

Taste Output

Learning Goals

- Understand ...
 - The challenges of olfactory output devices
 - What parameters are used to create an artificial taste
- Know
 - Historic an example of using smell as information display
 - The basic components and functions of an olfactory output devices

Aromatic Output for Interaction

- Humans use their sense of smell
 - Is food safe to eat?
 - Is there danger due to a fire?
 - Relationships



- Unexplored medium in human computer interaction
 - technical difficulties in emitting scent on demand
 - chemical difficulties in creating accurate and pleasant scents

Joseph "Jofish" Kaye, Making scents: aromatic output for HCI, Interactions, Volume 10, Number 1 (2004), Pages 48-61

Incense Clocks

Historic smell output devices: Dragon vessel timepiece

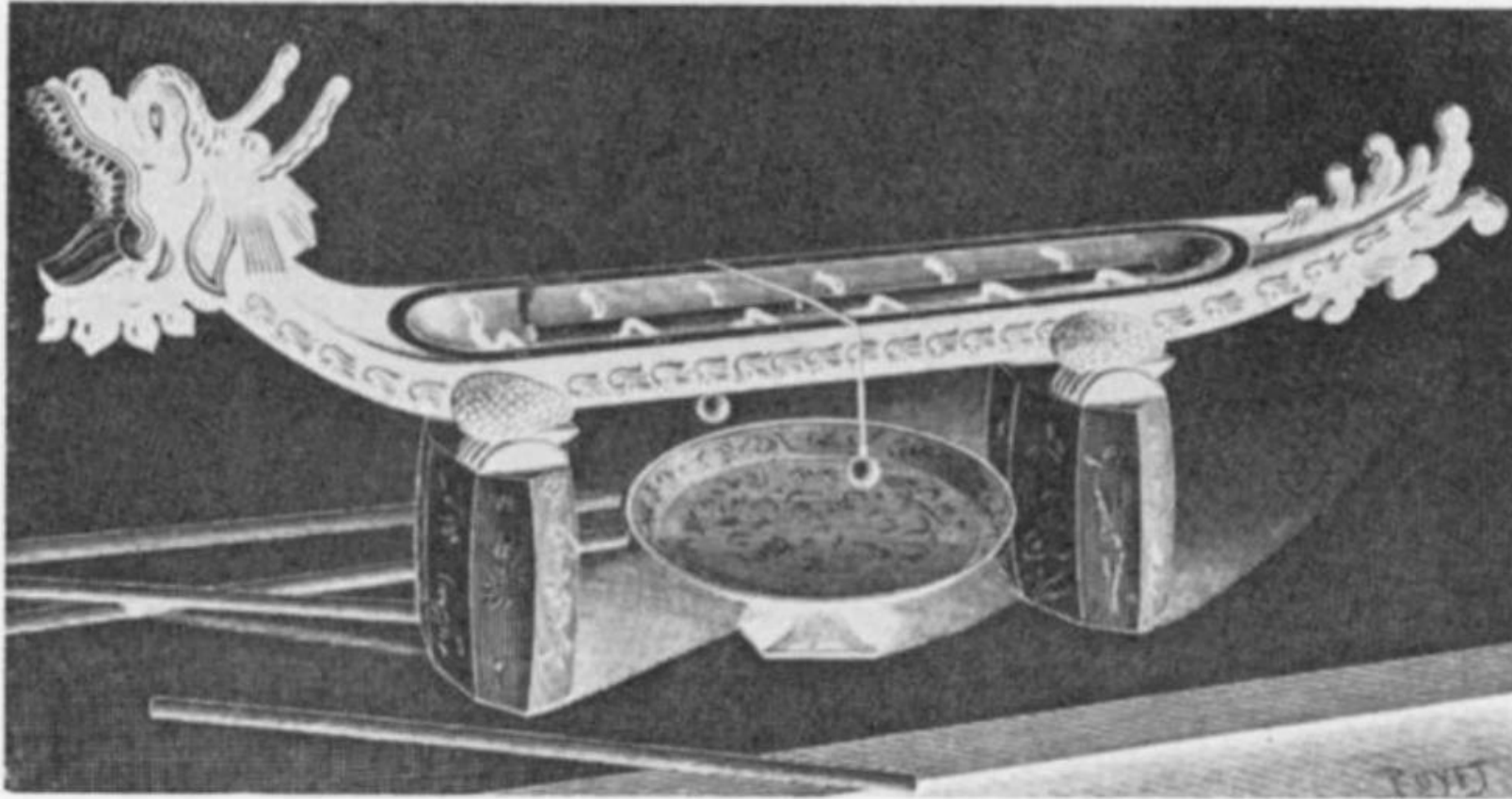


Fig. 23. Dragon vessel timepiece. Bedini, S. A. (1963). The scent of time. A study of the use of fire and incense for time measurement in oriental countries. Transactions of the American Philosophical Society, 53(5), 1-51.

Incense Clocks

Historic smell output devices

- timekeeping device (China, East Asia)
- Clock body holds incense sticks or powdered incense
- Different incenses along the body
- Calibrated burning rate to measure time
- Can include bells (auditory signal)
- Used in homes and temples
- New smell / other incense signals passage of time
- ...you can smell the time

Bedini, S. A. (1963). The scent of time. A study of the use of fire and incense for time measurement in oriental countries. Transactions of the American Philosophical Society, 53(5), 1-51.

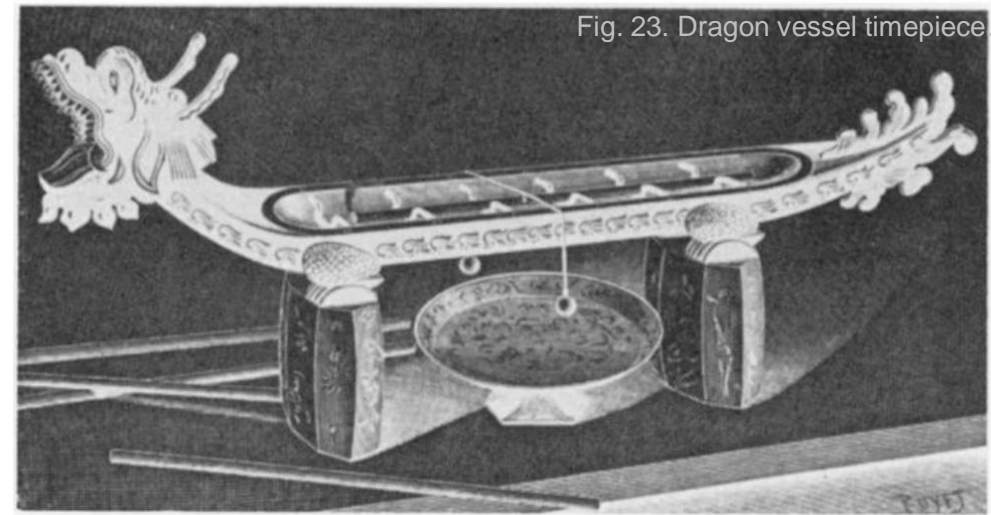


Fig. 23. Dragon vessel timepiece

Physiology and Chemistry of Smell

- A thousand different kinds of olfactory receptors in our nose,
- each can sense a single kind of chemical bond in a molecule
- No abstract classification of smell
 - Examples: how does mint taste? It tastes like ...mint
 - Compared to colors: green vs. spinach colored
- Rapidly acclimatized - Less than 1 minute
- Human Olfactory Bandwidth... ... hard to tell
 - Perfumers and florist can distinguish many different smells - potentially thousands

Joseph "Jofish" Kaye, Making scents: aromatic output for HCl, Interactions, Volume 10, Number 1 (2004), Pages 48-61

Smell output

- Explored in movie theaters and VR... but so far not really successful
- Olfactory Icons
 - Smell a “shot” fired each time you press the trigger in your game
 - Ambient Notification, e.g. Smell of rose to notify you of a date or an incoming message
- What information should be displayed?
- **An Olfactory display is useful for slowly-moving, medium-duration information or information for which an aggregate representation is slowly changing.**









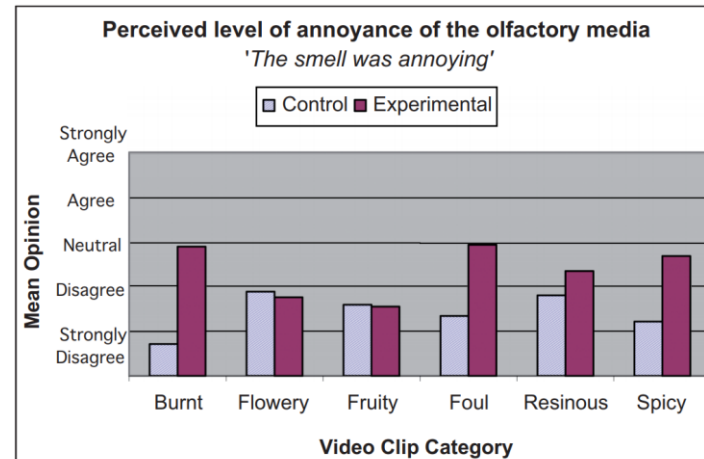
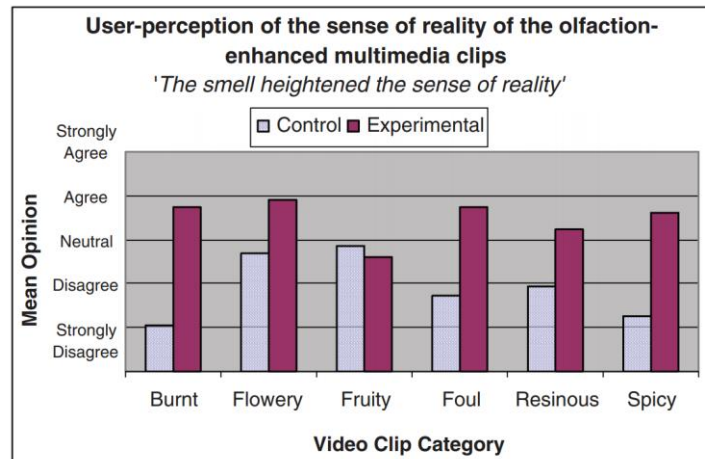
<http://www.microfab.com/vapor-generation/aromajet>

Joseph "Jofish" Kaye, Making scents: aromatic output for HCI, Interactions, Volume 10, Number 1 (2004), Pages 48-61

Multimedia Applications with Olfaction

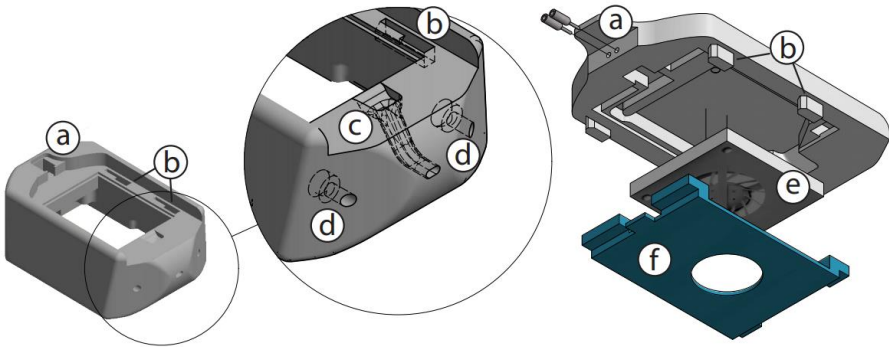
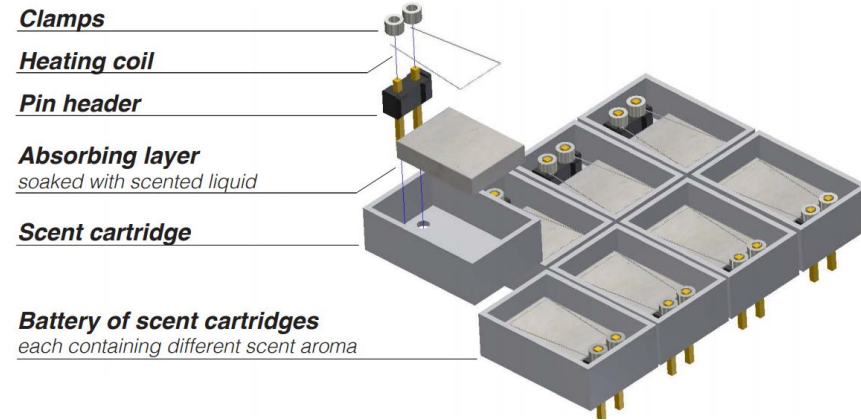
Table I. Video Categories and the Smells Used

Video Name	Burnt	Flowery	Foul	Fruity	Resinous	Spicy
Video Description	Documentary on bush fires in Oklahoma	News broadcast featuring perfume launch	Documentary about rotting fruits	Cookery show on how to make a fruit cocktail	Documentary on Spring allergies & cedar wood	Cookery show on how to make chicken curry
Smell Used	Burning Wood	Wallflower	Rubbish Acrid	Strawberry	Cedar Wood	Curry
						



Gheorghita Ghinea and Oluwakemi Ademoye. 2012. The sweet smell of success: Enhancing multimedia applications with olfaction. ACM Trans. Multimedia Comput. Commun. Appl. 8, 1, Article 2 (January 2012), 17 pages. DOI:<https://doi.org/10.1145/2071396.2071398>

Wearable Olfactory Output Device (Research)

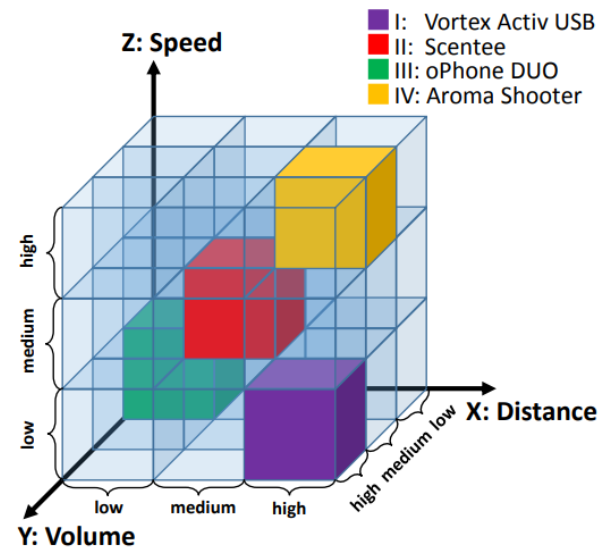


Dobbelstein, D., Herrdum, S., & Rukzio, E. (2017, September). inScent: A wearable olfactory display as an amplification for mobile notifications. In Proceedings of the 2017 ACM International Symposium on Wearable Computers (pp. 130-137).



Olfactory Output Device

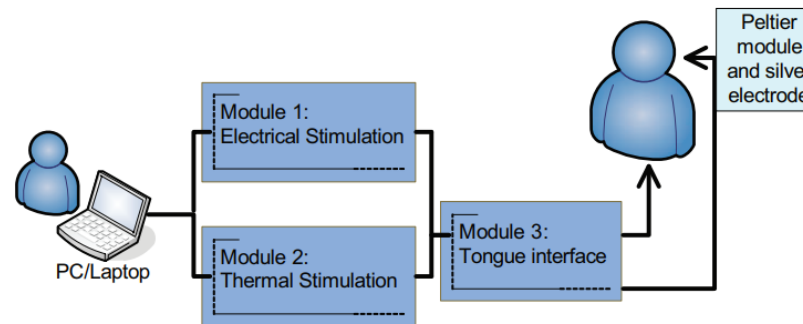
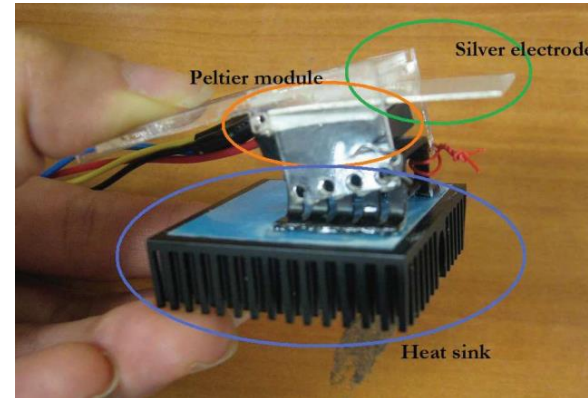
- Key challenges
 - Creating a certain smell
 - Storing and providing the smell
 - Timed delivery of the smell to the user
 - Neutralizing / replacing the smell
- Parameters of scent delivery
 - Distance
 - Volume
 - Speed



Dmitrenko, D., Vi, C. T., & Obrist, M. (2016, October). A comparison of scent-delivery devices and their meaningful use for in-car olfactory interaction. In Proceedings of the 8th International Conference on Automotive User Interfaces and Interactive Vehicular Applications (pp. 23-26).

Taste Output Device (Research)

- Tongue interface
 - Peltier Element
 - Silver electrode
- Output Parameters
 - Electro stimulation (polarity, frequency, $0\mu\text{A}$ to $200\mu\text{A}$, 50Hz to 1000Hz.)
 - Temperature (cooling/heating, 20°C to 35°)



Ranasinghe, N., Karunanayaka, K., Cheok, A. D., Fernando, O. N. N., Nii, H., & Gopalakrishnakone, P. (2011, November). Digital taste and smell communication. In Proceedings of the 6th international conference on body area networks (pp. 78-84).



Did you understand this block?

Can you answer these questions?

- What are the key challenges when creating an olfactory display?
- What components do you need for outputting smell?
- What parameters are relevant for olfactory output devices?
- How is artificial taste created?
- Give a historical example of a smell output device and explain its basic function-

References

- Joseph "Jofish" Kaye, Making scents: aromatic output for HCI, Interactions, Volume 10, Number 1 (2004), Pages 48-61
- Bedini, S. A. (1963). The scent of time. A study of the use of fire and incense for time measurement in oriental countries. Transactions of the American Philosophical Society, 53(5), 1-51.
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- Ranasinghe, N., Karunanayaka, K., Cheok, A. D., Fernando, O. N. N., Nii, H., & Gopalakrishnakone, P. (2011, November). Digital taste and smell communication. In Proceedings of the 6th international conference on body area networks (pp. 78-84).

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