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Master in Media Art & Design
from Bauhaus-University Weimar

PhD in Design Research
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Post Doc & Principal Investigator
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The Inflatable Cat: Idiosyncratic Ideation
Of Smart Objects For The Home

miteinander TECHNISCHE UNIVERSITÄT CHEMNITZ SFU Bauhaus-Universität Weimar

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Participatory Design in Human-Computer Interaction

Participatory design assumes that direct collaboration between those who develop technology and those who use it leads to technical solutions that meet the needs of users.

Future users are a vital resource to technology design.

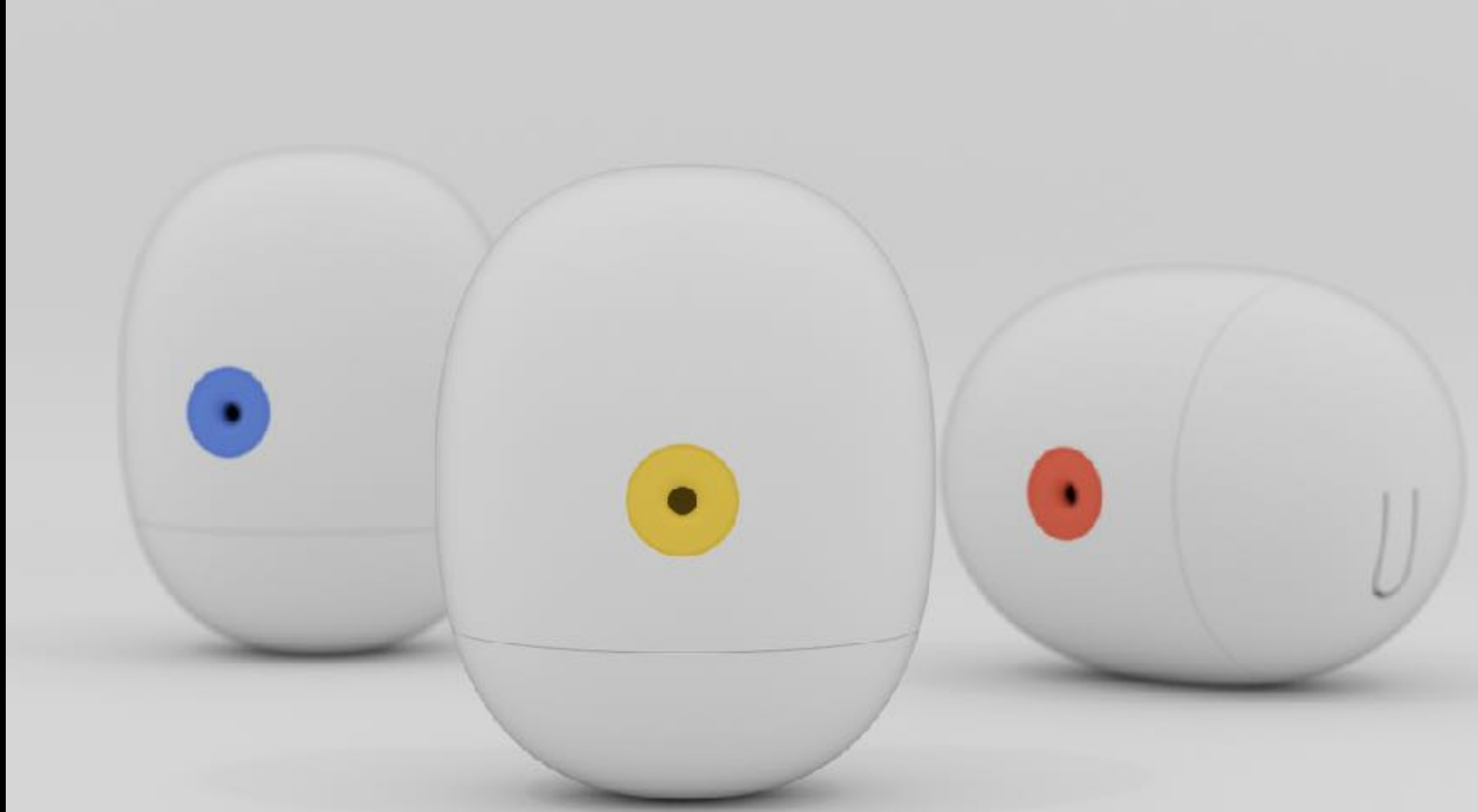
How can we involve them into technology design?

Context: Internet of Things in the Home



Involving People In Design Of Human-Computer Futures.

Co-Design Lab:
Living Lab »Miteinander«

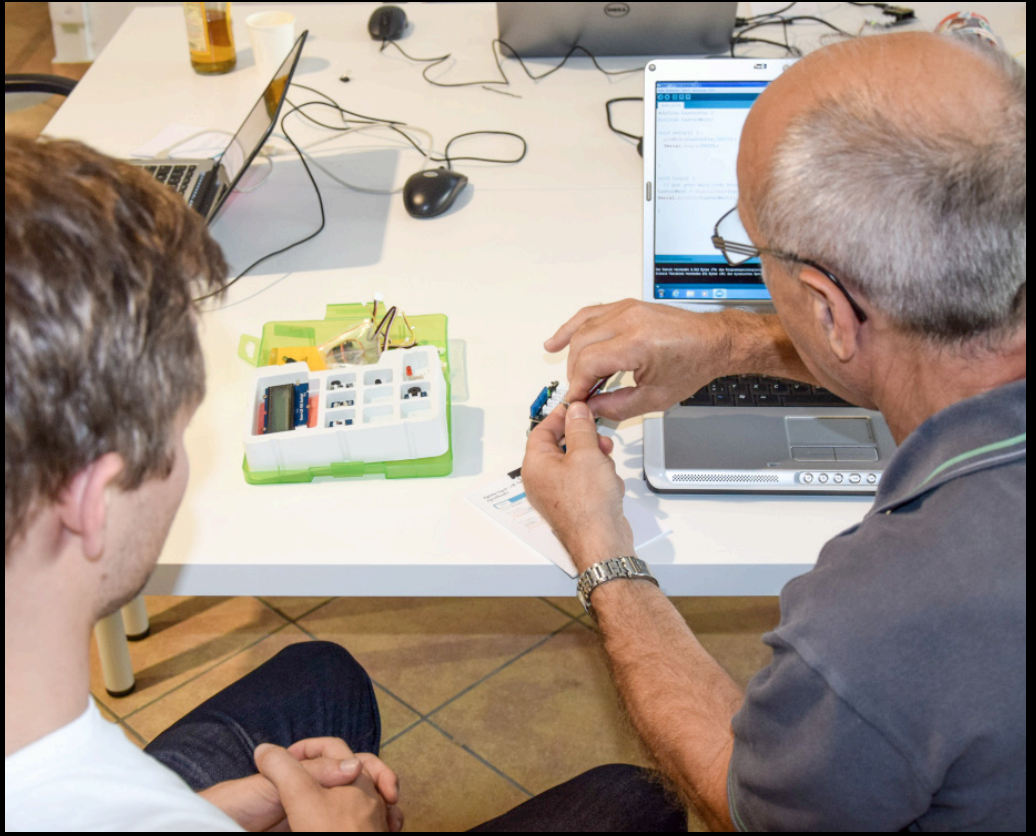


Co-Design Method: Sensing Home

Co-Design Tool: Loaded Dice



Living Lab / Places For Participation

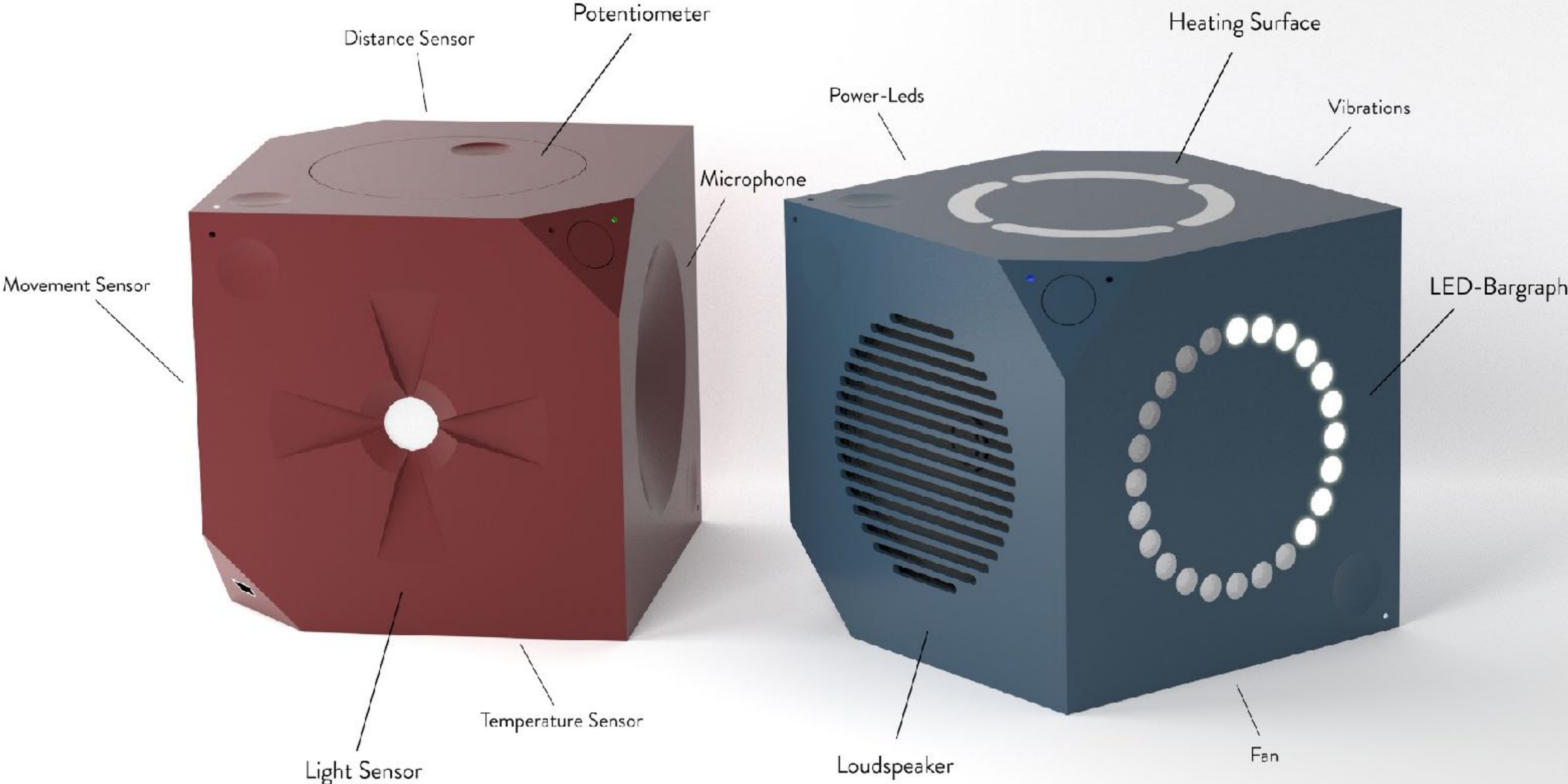


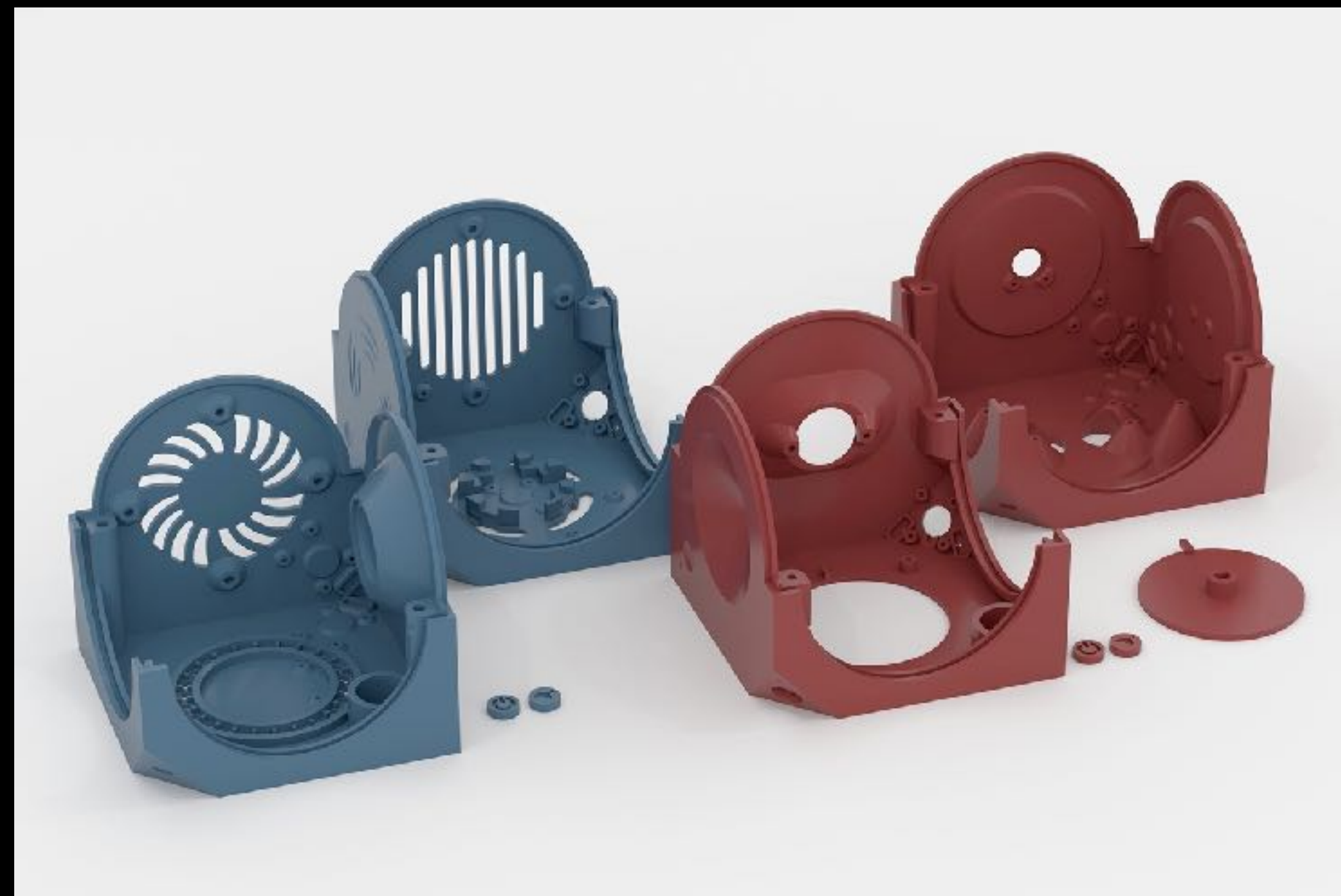
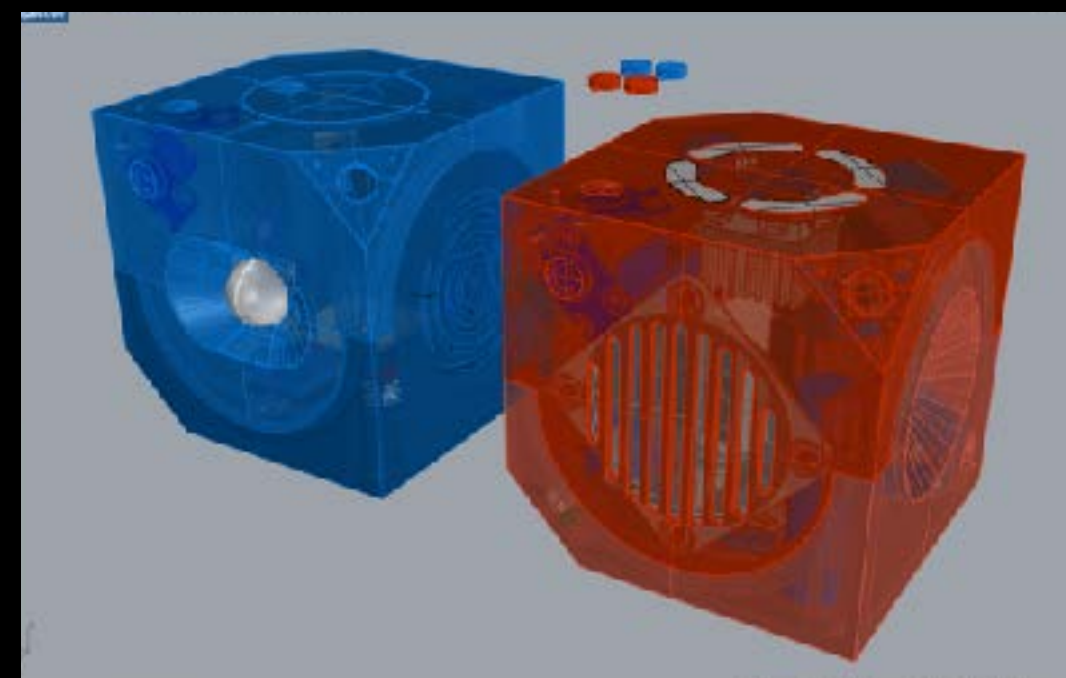
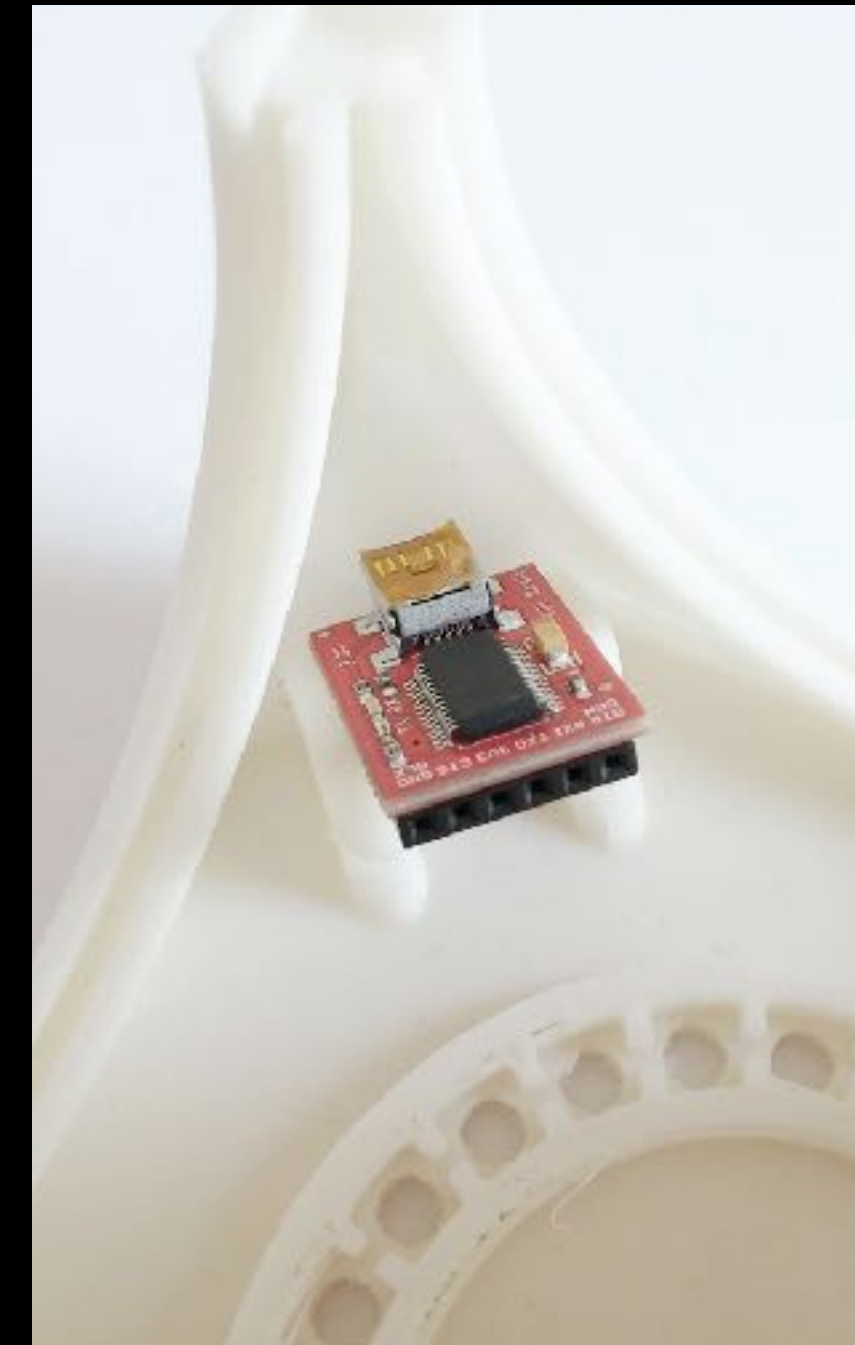
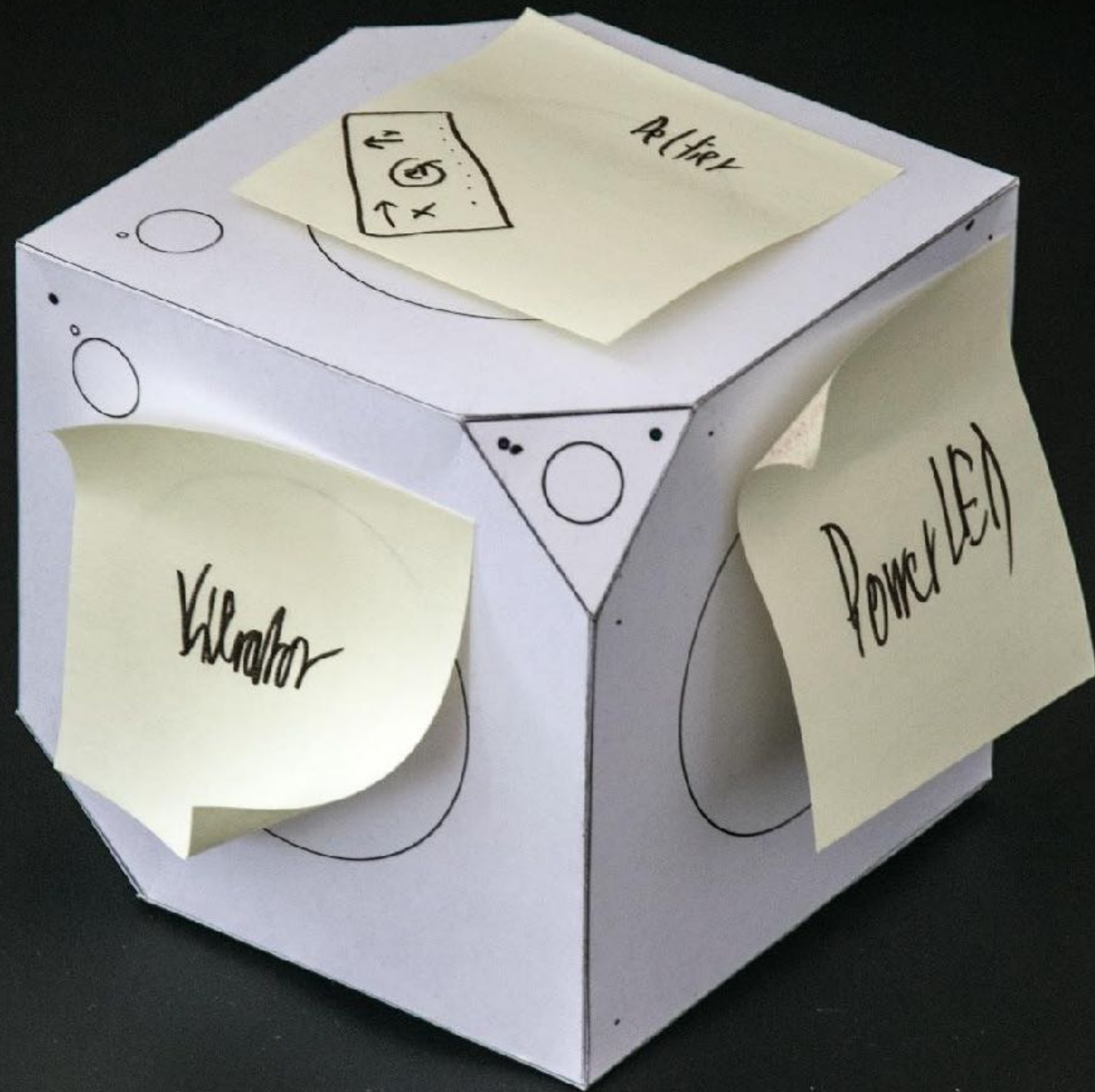
Andreas Bischof, Albrecht Kurze, Sören Totzauer, Michael Storz, Kevin Lefevre, and Arne Berger. 2018. Initiating Participation: Methodological and Practical Challenges of Living Lab Projects for Early Stages of Research and Development. In *Conference Proceedings Open Living Lab Days 2018*, 407 - 421. <https://doi.org/10.5281/zenodo.1434972>

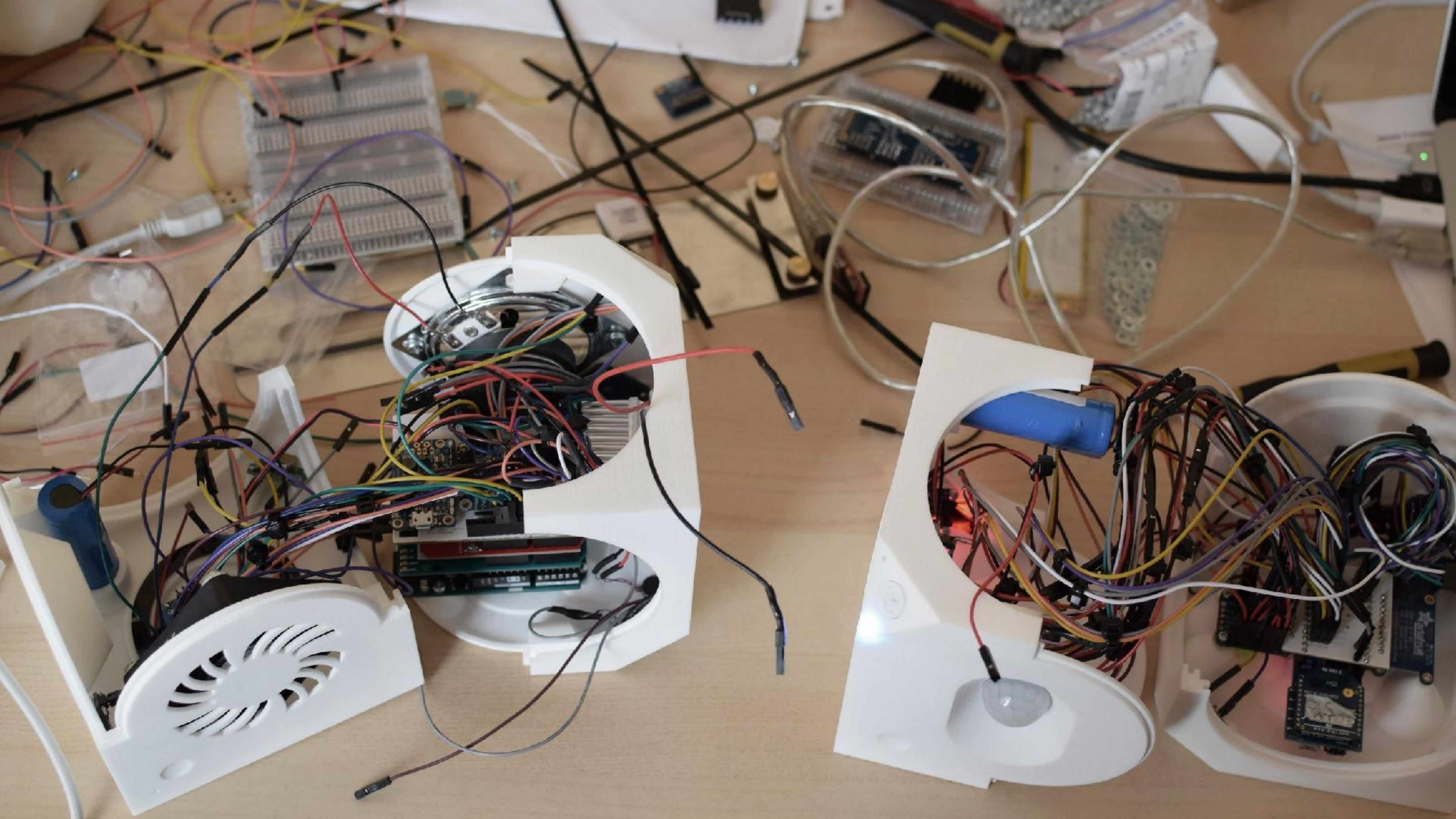
Loaded Dice / Tools For Participation



Co-Design Tools: Loaded Dice





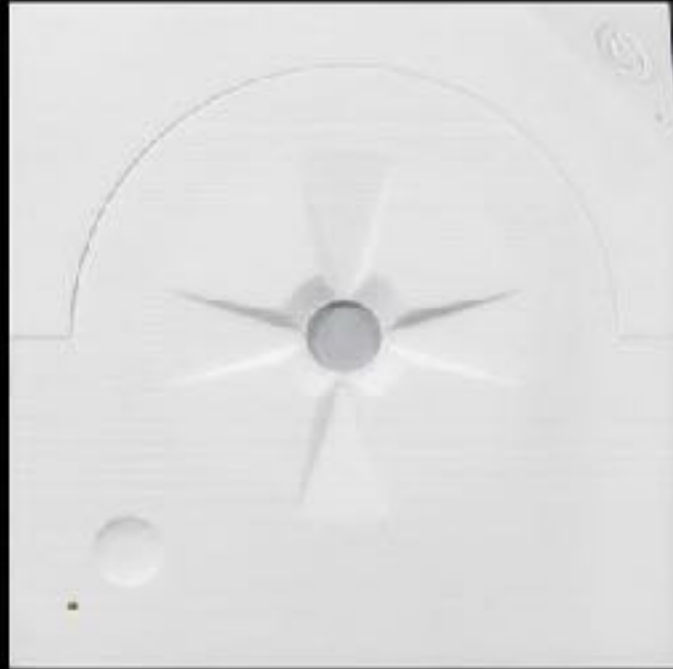


Loaded Dice / Semiotics

Sensors



microphone



light



movement
(passive infrared)



manual
(potentiometer)



temperature
(infrared)



distance
(ultrasonic)

Actuators



fan



loudspeaker



vibration



power-LED



thermo-element



bargraph

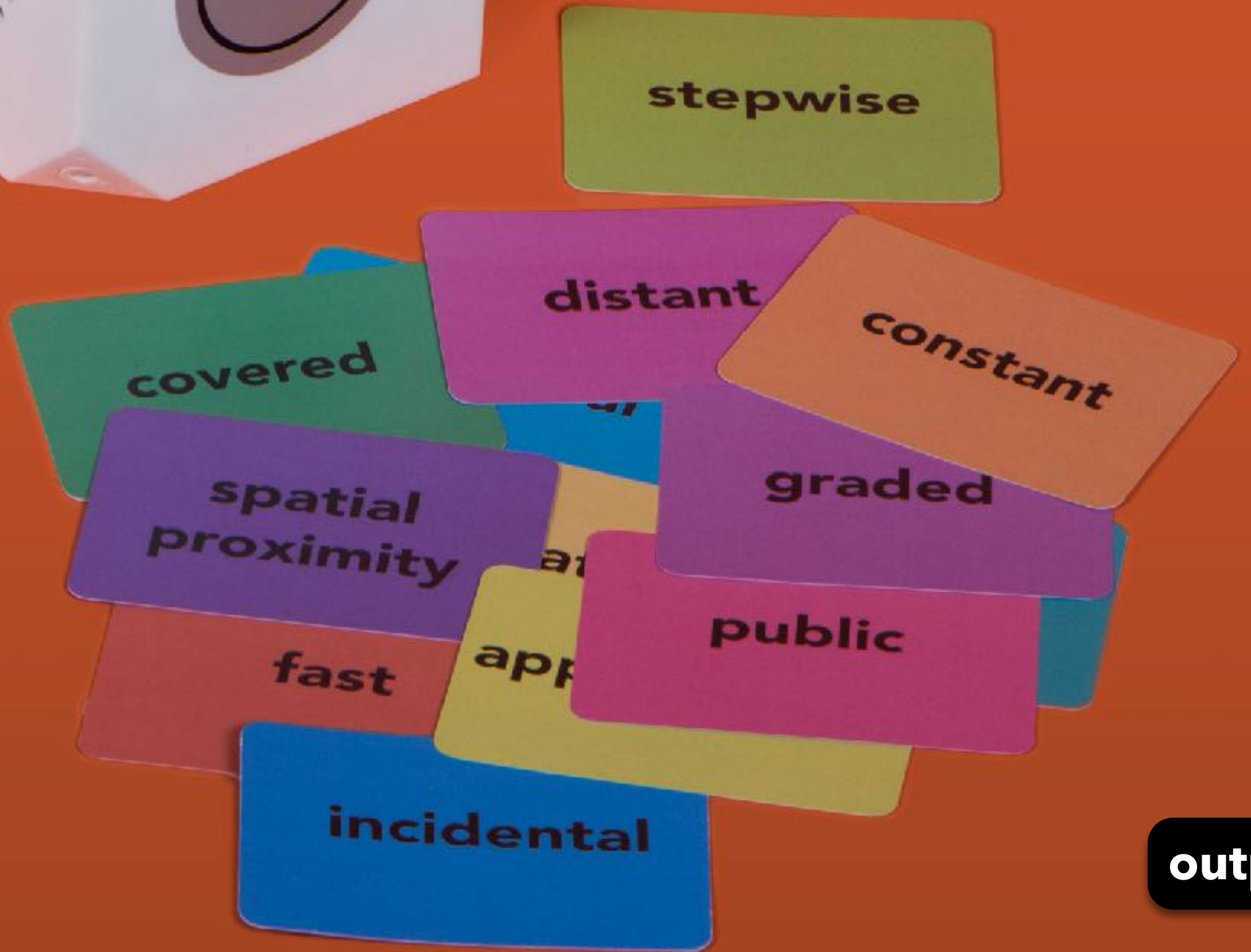
1. define goal, understand problem

3. Loaded Dice

2. vocabulary of sensory qualities

input

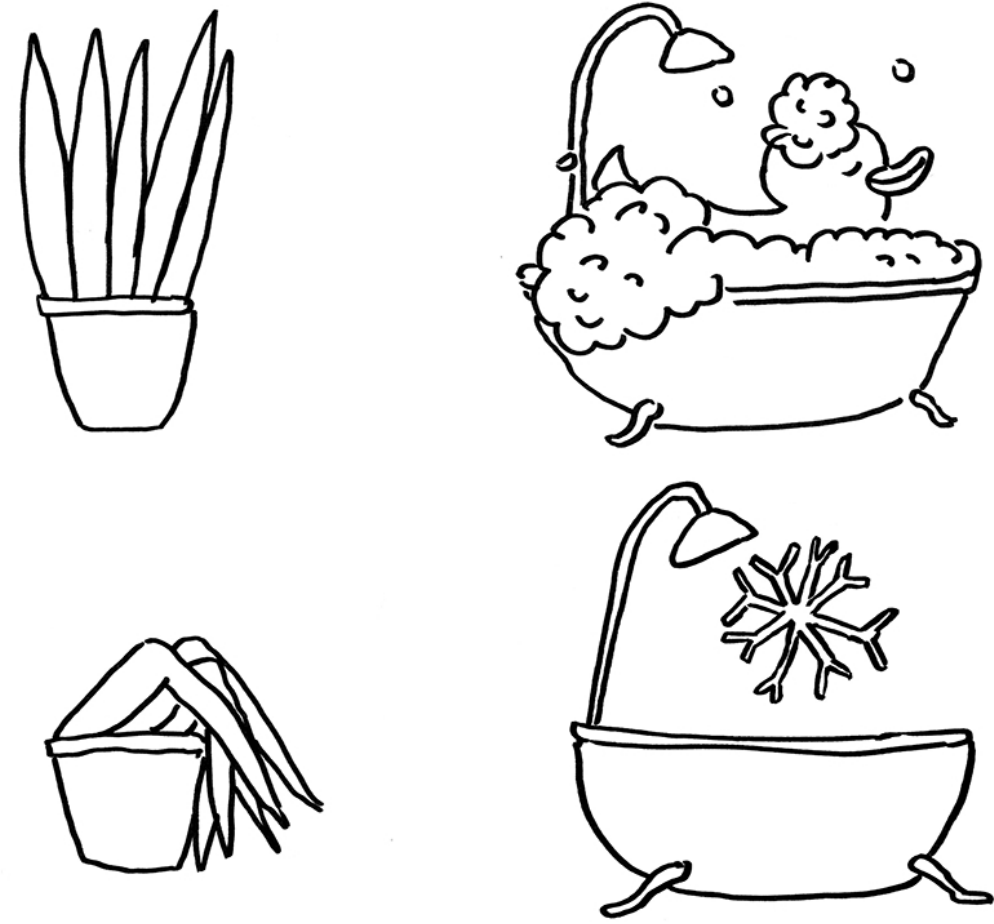
output



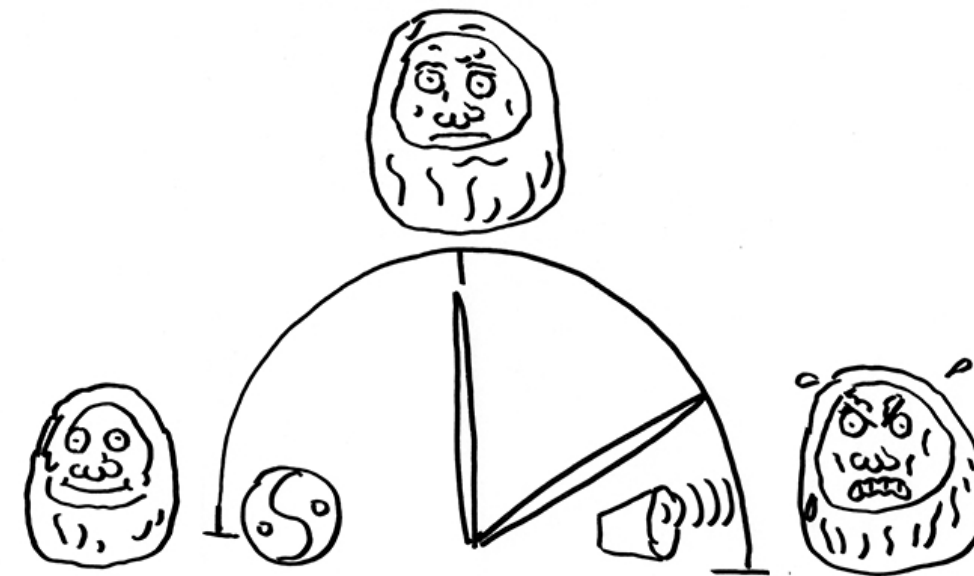
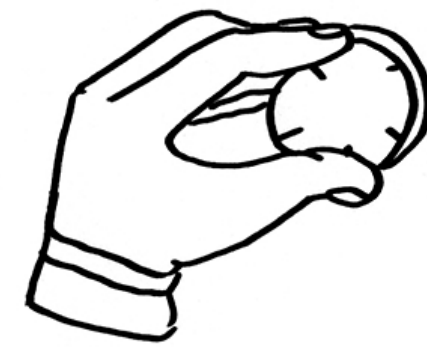
Use Case Examples: The Whether Bird



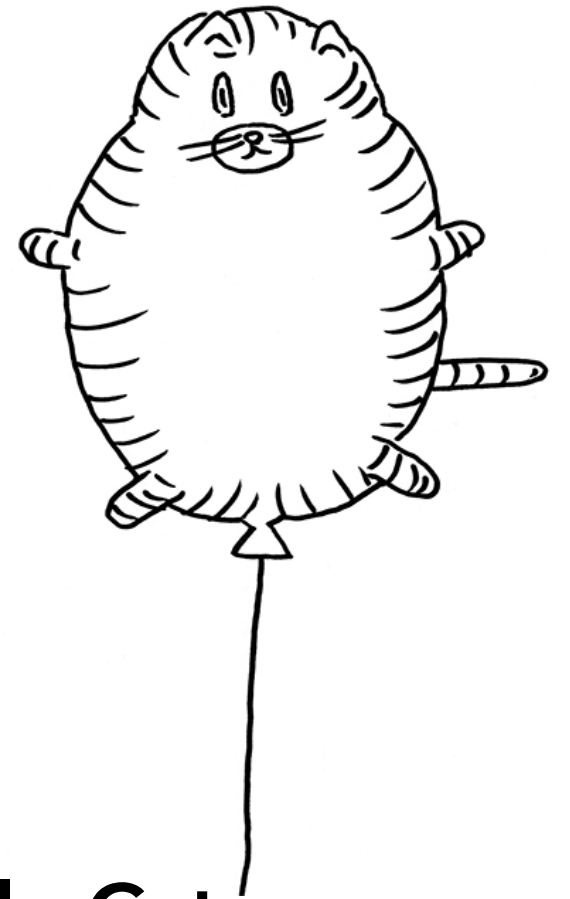
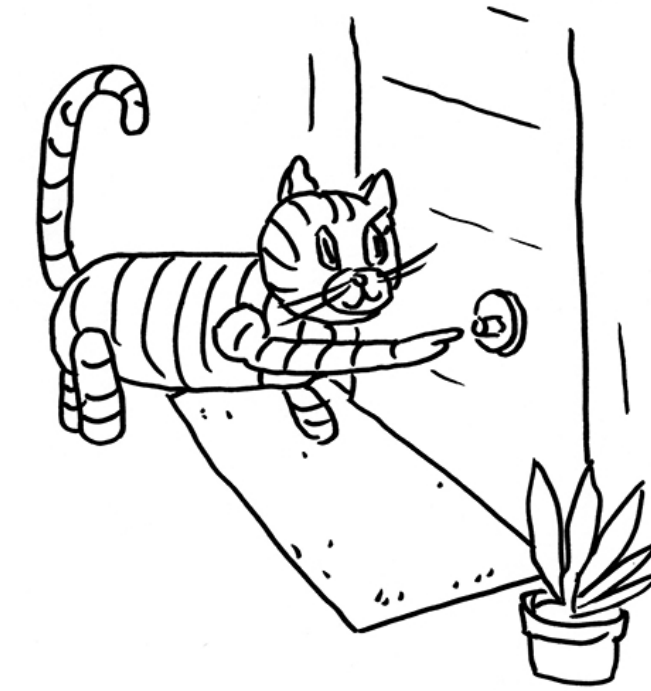
Three Case Examples: Idiosyncratic Smart Objects



The Automated Rent Debtor



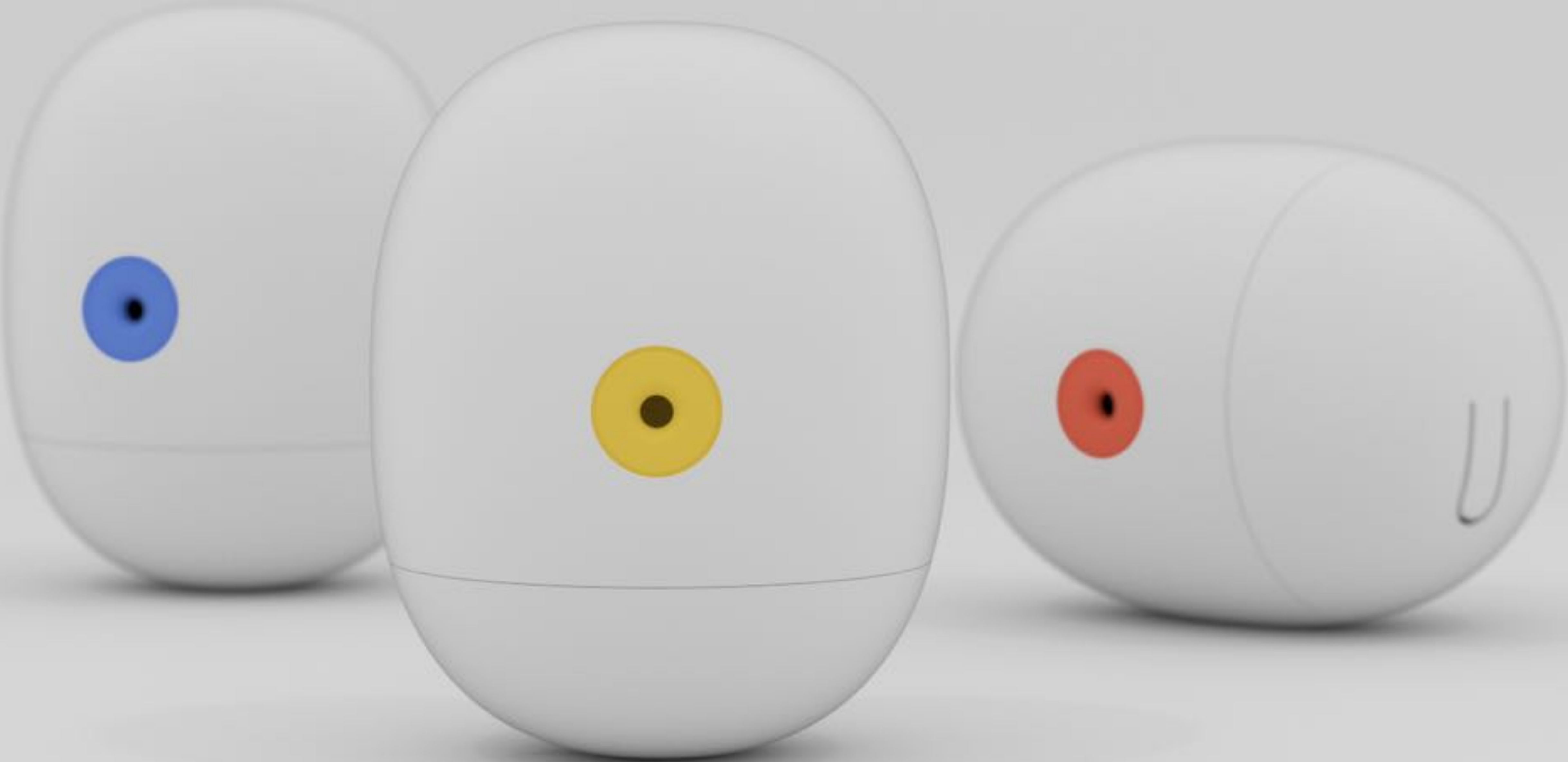
The Anger Meter



The Inflatable Cat

Arne Berger, William Odom, Michael Storz, Andreas Bischof, Albrecht Kurze, and Eva Hornecker. 2019. *The Inflatable Cat: Idiosyncratic Ideation of Smart Objects for the Home*. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems. <https://doi.org/10.1145/3290605.3300631>

Co-Design Method For Empowerment In Data Legibility: **Guess The Data**

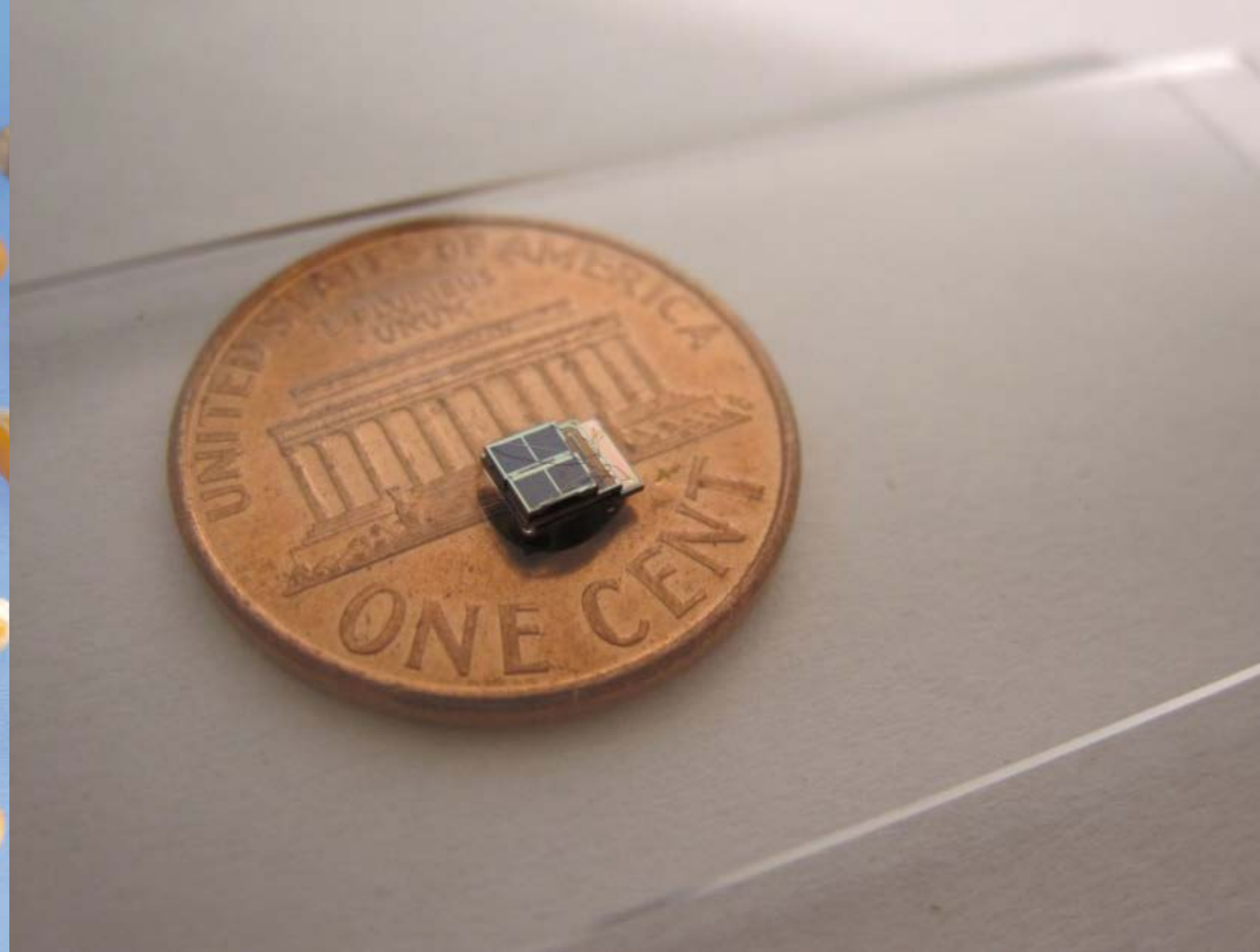
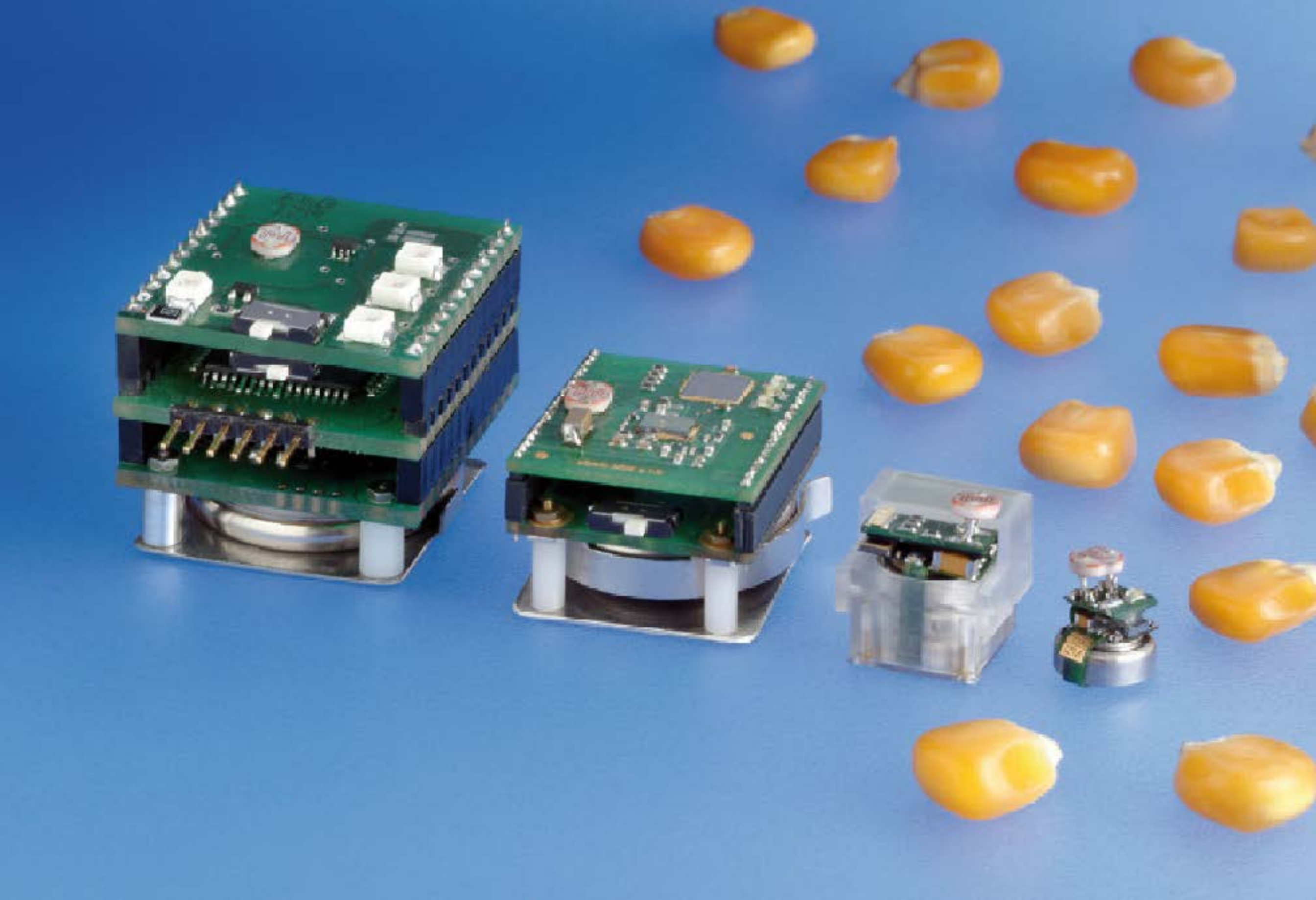


Motivation: Connected Sensors In The Smart Home



WHEN VISITING A NEW HOUSE, IT'S GOOD TO CHECK WHETHER THEY HAVE AN ALWAYS-ON DEVICE TRANSMITTING YOUR CONVERSATIONS SOMEWHERE.

Motivation: Ubiquitous Connected Sensors



More and more, smaller and smaller: possibilities / limits?
→ vision of „Smart Dust“ (few mm^3)

Research Interest

What do simple sensors reveal about users and their domestic activities?

- to algorithms vs. to humans
- to us as researchers (and experts)?
- to users as non-experts but originators of the data?

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Internet of Things Toolkit



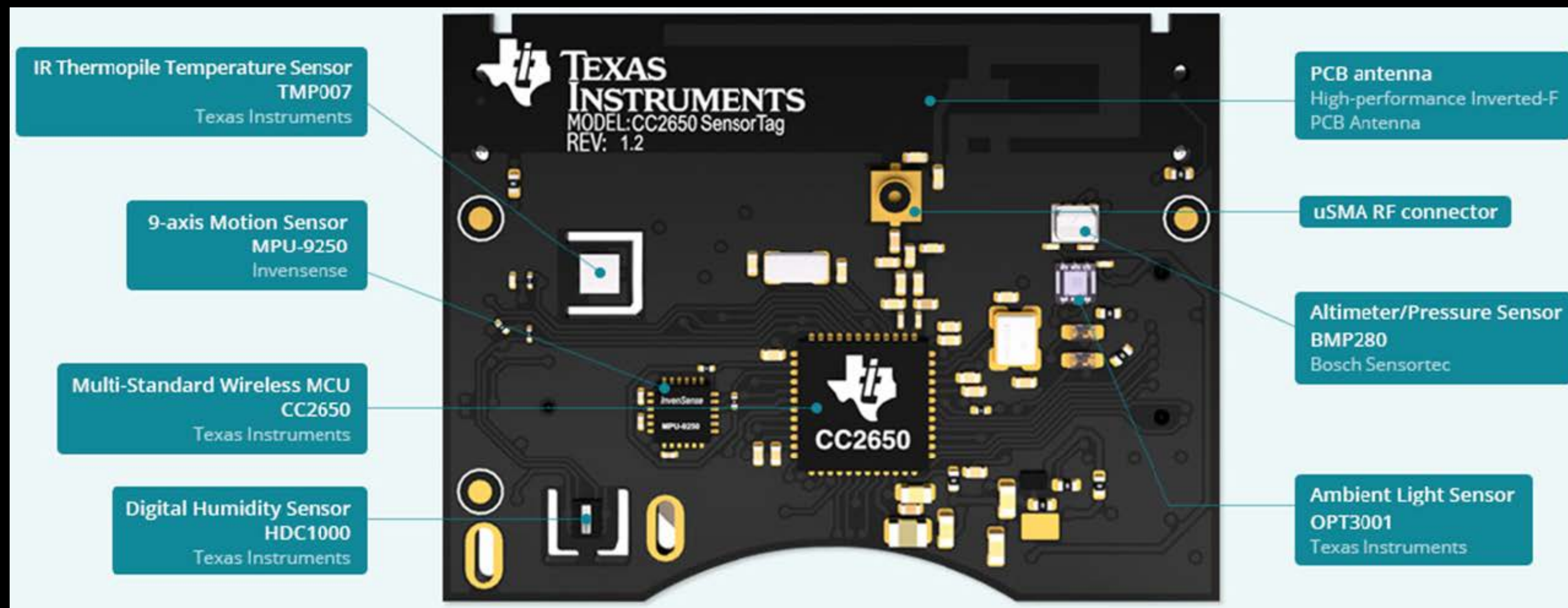
Internet Of Things Toolkit

TI SensorTag based on TI CC2650

openness in communication: BLE, 6lowPAN, ZigBee

software: open firmware and libraries → own enhanced versions made

hardware: well documented, design files, schematics, own housings



Study: Sampling Of Participants

groups: age and constellations of relation and living

I: four households

- elderly volunteers (58 – 68)
- not knowing each other
- heterogeneous living, spread across the city area

II: two households

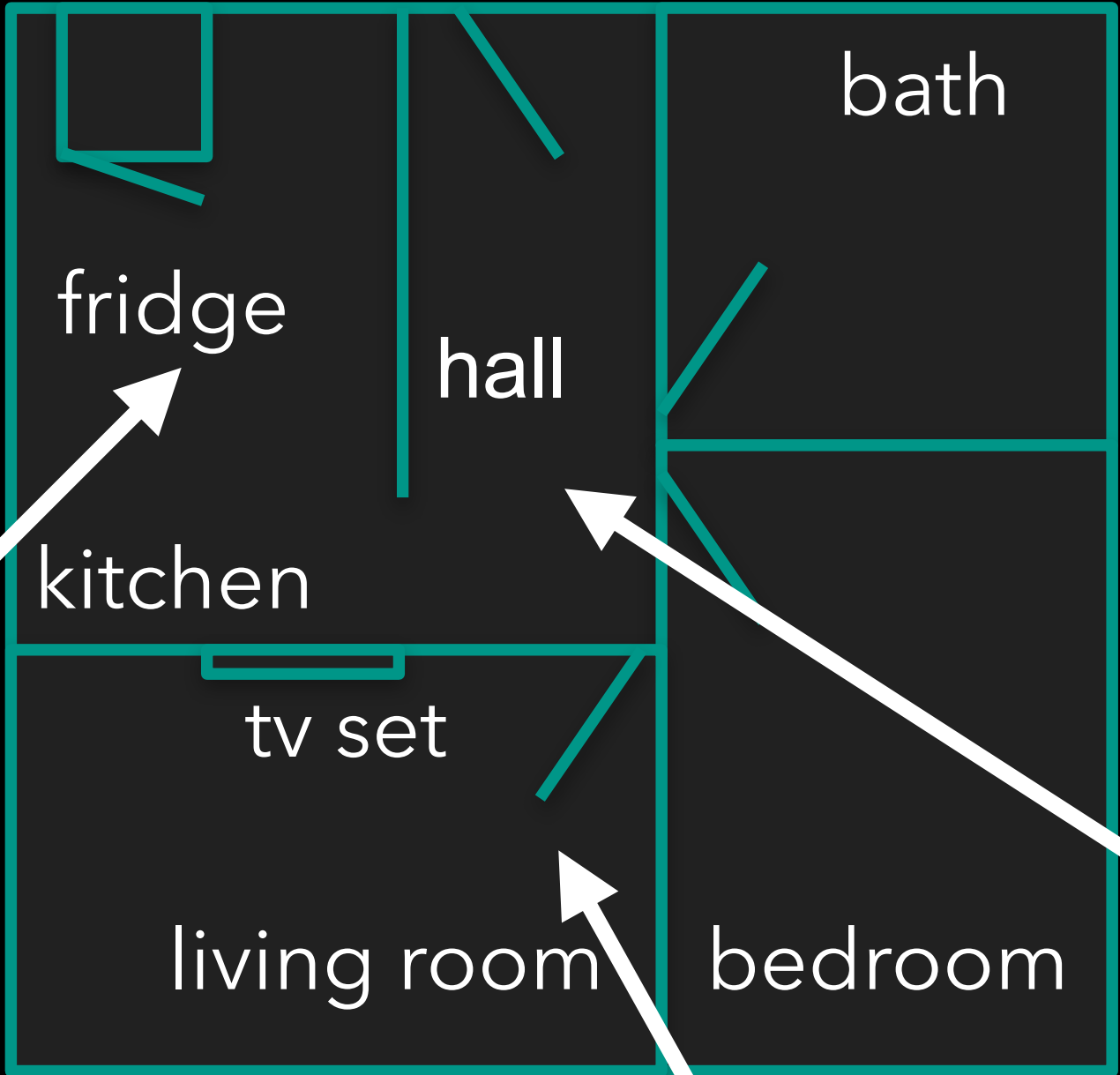
- younger volunteers (25 – 40)
- related (aunt and nephew)
- living in relative proximity (same neighborhood), knowing each other's flat

III: three households

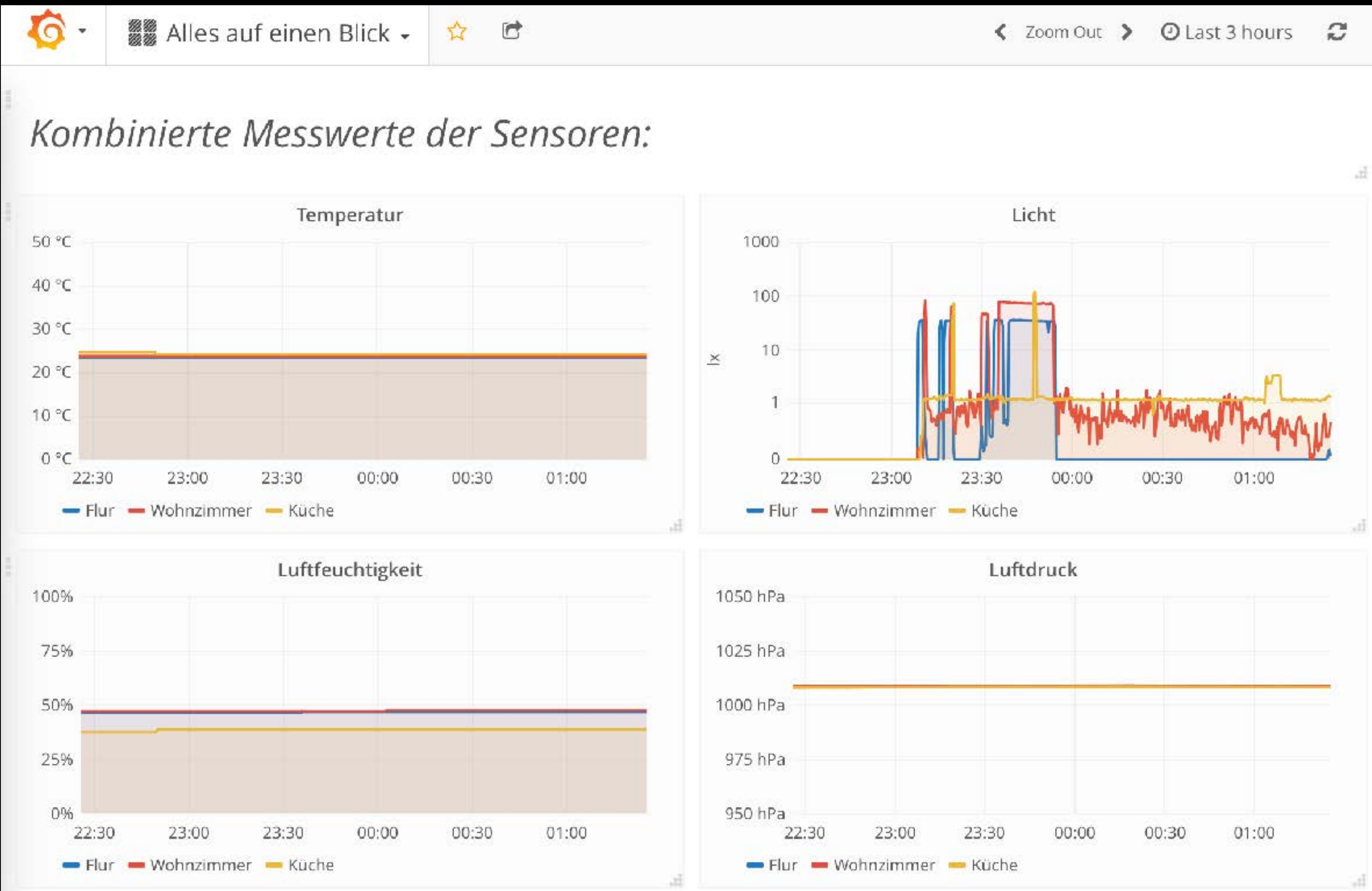
- elderly volunteers (50 – 75)
- not knowing each other
- living in the same apartment block in comparable flats

Study

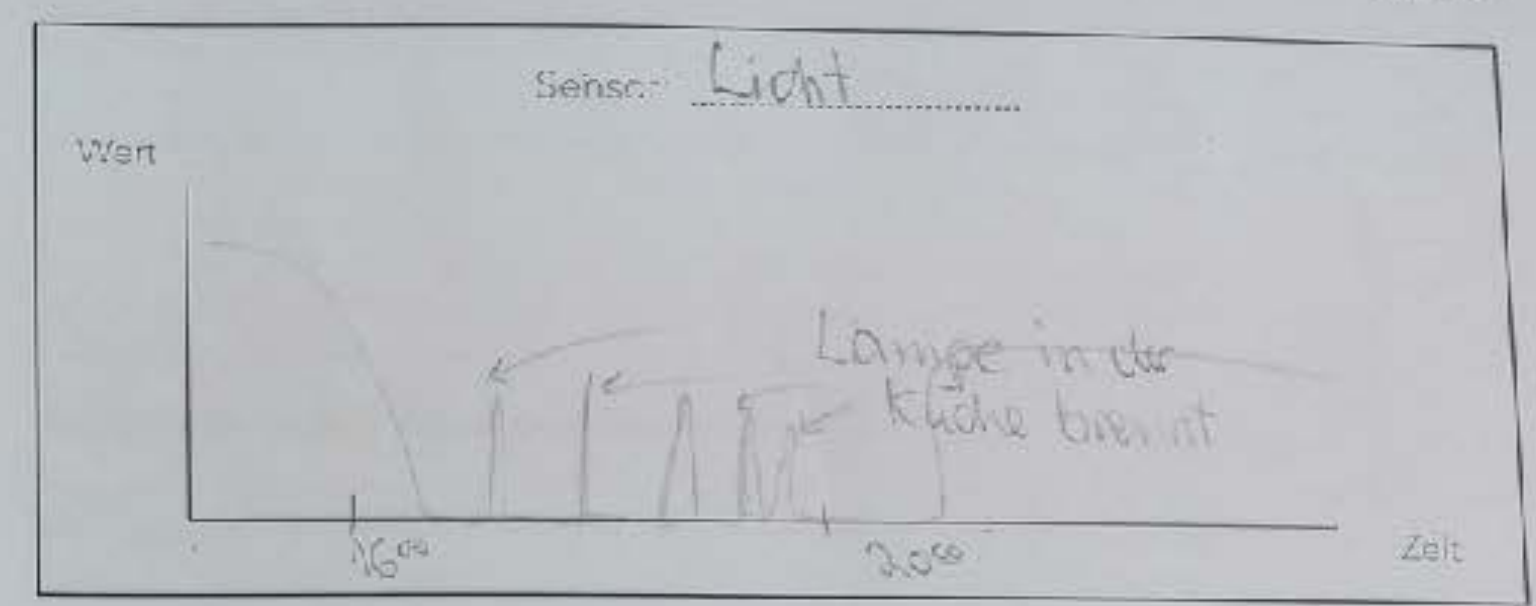
data collection
nine households
two weeks



Study: Data Browsing, Documenting, Annotating

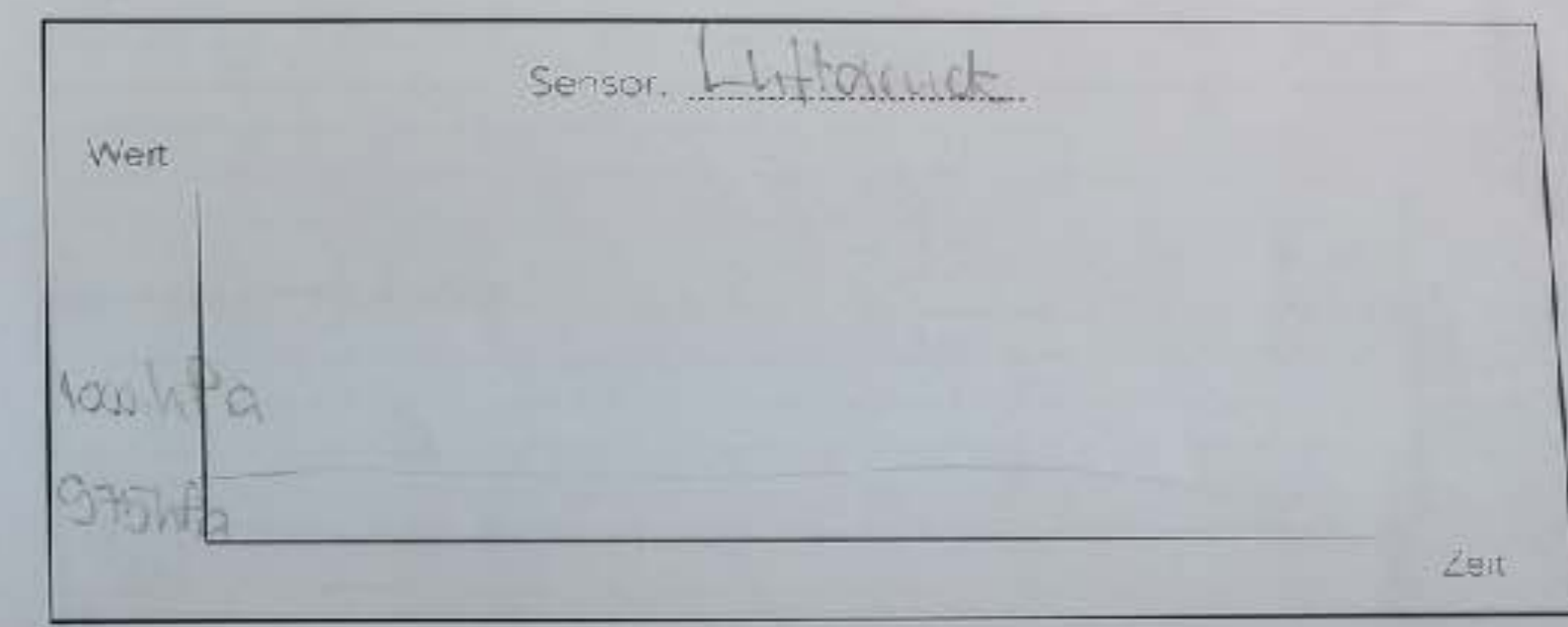


Bildschirmfoto am



Interpretation: Durch Betätigen der Küchenlampe →
 steigt Licht durch starkes Fenster ein,
 da vorher bis er ins Wohnzimmer geschallt
 wird, wo die Lampe angeschaltet ist

Bildschirmfoto am



Interpretation: Der Luftdruck bleibt ca. gleich,
 ich hatte gehofft, das sich etwas ändert,
 Die deutliche Erwärmung scheint sich nicht

Wie wurde/n er/sie benutzt?

.....

.....

.....

.....

Study: Preparation Of A Group Discussion

after data collection and before group discussion

selecting interesting data sections for group discussion as stimulus

group of researchers thinking about the data and the participants,

reconstructing the situated knowledge for interpretation

→ 10 to 12 relevant sections in total, some of everybody in study group

selection of annotated material by participants

selection of interesting data section in the view of us as researchers

Study: data driven group discussion Guess the Data



Albrecht Kurze, Andreas Bischof, Sören Totzauer, Michael Storz, Maximilian Eibl, Margot Brereton and Arne Berger. 2020. Guess The Data: Data Work To Understand How People Make Sense Of And Use Simple Sensor Data From Homes. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI) 2020. <https://doi.org/10.1145/3313831.3376273>

Analysis and Findings: Privacy

„So that was relatively funny, because he [her partner] was away and said: “Yes, I will go immediately into the garden”. I don't know where I was, but four hours later I came back and he said “I have been in the garden all the time”.

And there I laughed and said “This cannot be true, because the apartment door only opened at 17:30.”

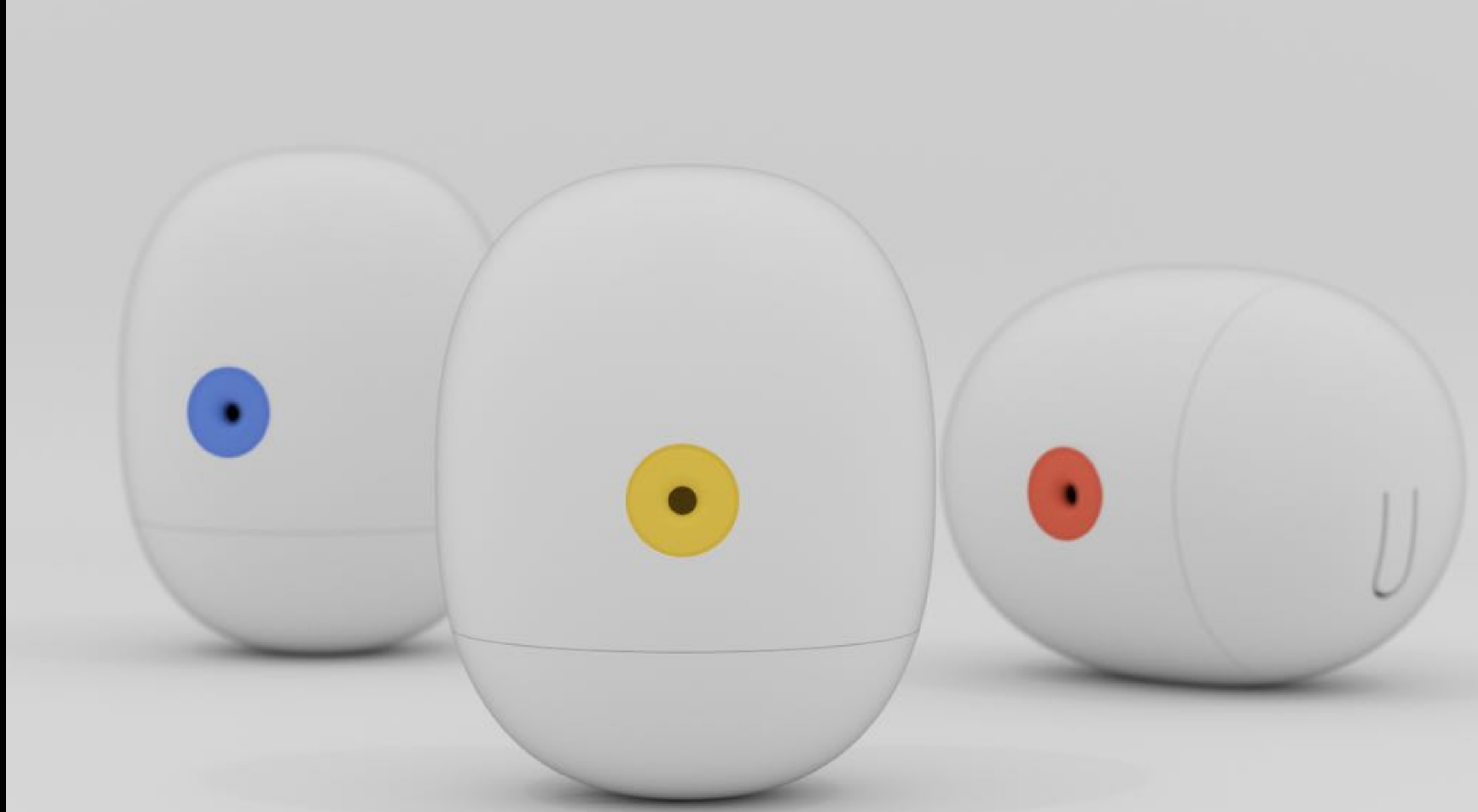
And he said “Really?” I said: “What did you do?” “I think, I was laying on the sofa for an hour and slept.” I said: “Yes, but you were not in the garden.”

And he said: “Did you monitor me?” “Yes.” This was funny. I did not explain to him, how it works.”

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www.hs-anhalt.de
Thank you!



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Co-Design Tool: Loaded Dice

