Growing Green Habits:

Unobtrusive Gamified Eco-Feedback to Motivate Sustainable Behavior

Fabian Plichta[1], Annett Mitschick[1], Konstantin Klamka[1], Raimund Dachselt[1,2]

[1] Interactive Media Lab Dresden, Technische Universität Dresden [2] Centre for Tactile Internet with Human-in-the-Loop (CeTI)

MENSCH UND COMPUTER 23
BUILDING_BRIDGES

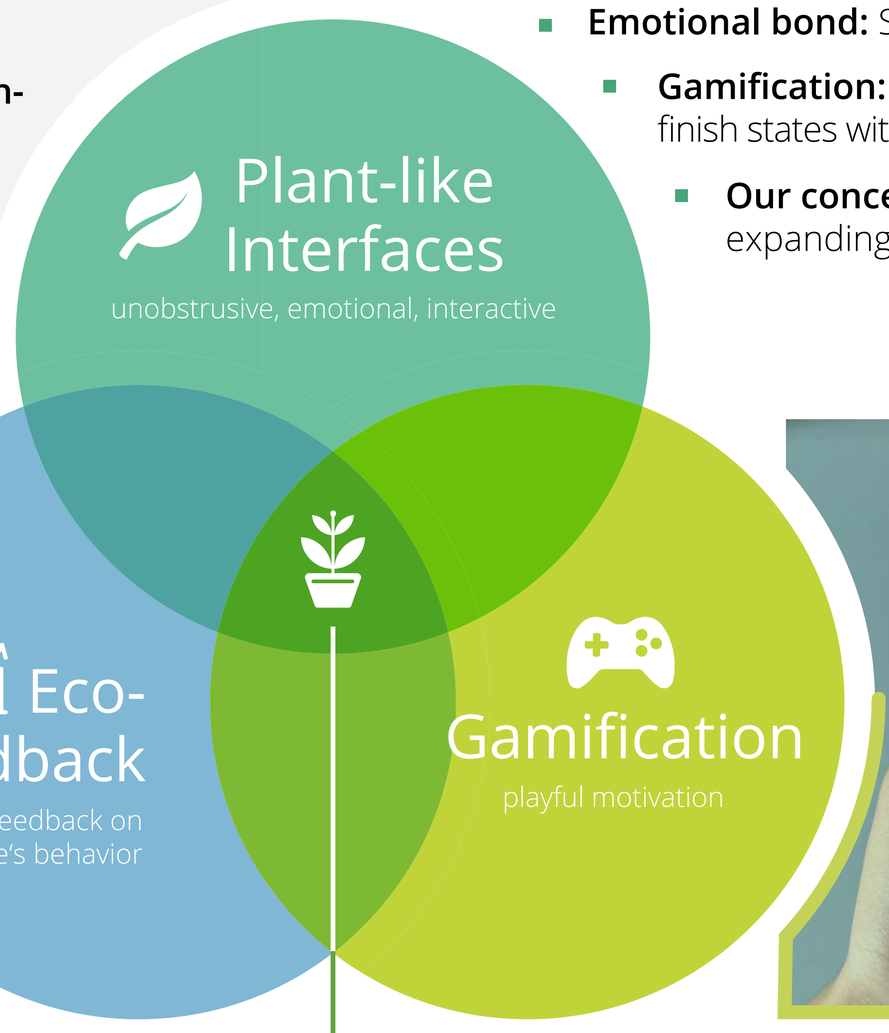
Motivation

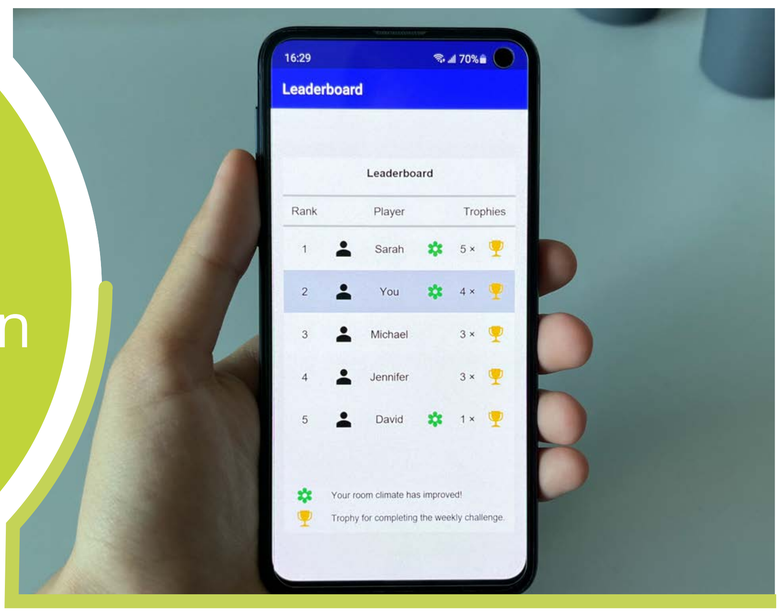
Goal: Reduction of heating energy consumption and greenhouse gas emissions of households

Method: Promoting environmental awareness and sustainable behavior. Therefore, we developed a system that combines the three promising fields of research (- -)

A Gamified and Nature-inspired Eco-Feedback Approach

- Our system supports users in maintaining an **environmentally friendly** and **healthy indoor climate** in households with the focus on saving heating energy and ventilation habits
- Information from various sources is represented in a physical, **shape-changing artifact** that is **inspired by nature**





Plant-like Interfaces

- **Decoration:** The artifact blends aesthetically and unobtrusively into the environment of the room
- **Physical artifact:** To be more persuasive and meaningful (A+B)
  - **Emotional bond:** Simulating a living being
    - **Gamification:** The plant should have obvious start and finish states with intuitive, continuous and slow transitions
      - **Our concept designs:** Blossom unfolding (A) or expanding plant parts (B)

Eco-Feedback

- **Measuring user behavior:** Sensors for room, heater and outdoor temperature, relative humidity and CO_2 concentration
- **Feedback targets almost all senses:**
  - Shape of the plant model: Determined by evaluated data from sensors
  - Ambient lighting: Information about the current room climate
  - Integrated speaker: Acoustic outputs
  - Vibration motor: Haptic feedback if the model is touched
  - Fragrance dispenser: Pleasant air to reward good room climate
- **Personal device:** To accompany users more flexibly and provide information on the state of the plant, indoor climate and gamification

Gamification

- **Points:** Awarded for an environmentally friendly and healthy indoor climate reflected by the corresponding physical transformation of the plant model
- **Weekly challenge:** Collect points over a whole week with the goal to reach the final state by the end of the week
  - Congratulation by using the output capabilities of the plant model
  - With the beginning of a new week, the plant model changes back to its start state
- **Personal smartphone** application offers additional gamification mechanics, such as leaderboards

Proof-of-Concept Prototype

- Blossom-shaped artifact[1] and a custom smartphone application
- Petals can be opened and closed by means of a servo motor
- Buzzer speaker, LED ring, button for further interaction
- Sensors for relative humidity, room and heating temperature
- Amount of completed weekly challenges is displayed via the LED ring
- Personal device connects to the plant model via Bluetooth LE

Related Work:

[1] Jon Froehlich. 2015. Gamifying Green: Gamification and Environmental Sustainability. In The Gameful World: Approaches, Issues, Applications. The MIT Press, Cambridge, MA, USA, 563–596.

[2] Matthias Laschke, Marc Hassenzahl, and Sarah Diefenbach. 2011. Things with attitude: Transformational Products. In Create11 Conference. London, UK, 1–2.

[1] Makes use of Jason Suter's 3D model "blooming flower night light" URL: https://makezine.com/projects/3d-print-this-blooming-flower-night-light/ (retrieved June 12, 2023)

TECHNISCHE UNIVERSITÄT DRESDEN
INTERACTIVE MEDIA LAB DRESDEN
CeTI Centre for Tactile Internet with Human-in-the-Loop

Project Website:
imld.de/growing-green/