User perspective on eco-driving HMIs for electric buses in local transport

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**Eco-driving in Electric Buses**

- Electrification of local public bus transport is a key measure to reduce transport emissions. [1]
- Eco-driving plays a crucial role in the optimal use of electric buses. [2]
- Electric vehicles have specific energy dynamics (e.g., regenerative braking) that create new challenges for eco-driving. [3]
- HMIs can support eco-driving. [4]
- Bus driving is a challenging context because of many concurrent tasks (e.g., time management, communication, passenger service).

What are – from users’ perspective – the essential elements of an action-integrated eco-driving support system?

**Approach:**
1. Develop a first prototype of an action-integrated eco-driving support system.
2. Conduct an interview study with electric bus drivers to examine the user perspective and extract key features.

**Interview Study**

- 10 bus drivers (2 female)
- Electric bus experience (driving hours): $M = 14.6$ (SD = 8.8)

Video-Introduction of the “Eco-Assistant” (https://youtu.be/s7QYyBVJ7iw)

**Interview Questions:**
- “...would this interface support you ... ?”
- “...information ... well comprehensible?”
- “...information ... helpful?”
- “...further information missing?”

Recordings transcribed and in-vivo coded

All mentioned features listed and clustered as feature groups

**Conclusion + Next Steps**

1. All indicators generally perceived as relevant.
2. Information condensation as key requirement in this context.
3. “Green range”-feedback preferred over “reward/punishment”-feedback.
4. Adequate reference route that allows for comparability.

- **Challenge:** Reducing information volume vs. providing more precise and action-oriented indicators instead of only overall energy efficiency.

**Authors at the Conference**

- **Markus Gödker**
  - Markus Gödker is a PhD candidate in the field of Engineering Psychology. His current project is about user-range interaction in electric buses.

- **Thomas Franke**
  - Thomas Franke is a professor of Engineering Psychology and Cognitive Ergonomics.

**The “NuR.E” Project**

**Objective:** Development of a system that optimally supports electric bus drivers and dispatchers in their range management.


**Approach:** Support of range assessment and range extension via enhanced range information and action-integrated feedback to reduce uncertainties in user-range interaction.

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**References**


“[*] Please note that all names and institutions have been anonymized for publication purposes.