

# Towards Inclusive and Resident-centric Software Engineering Practices for Participation within Digitalized Energy Systems

**Tamara Ahmed**  
tamara.ahmed@lut.fi

**Annika Wolff** (Supervisor)  
annika.wolff@lut.fi

**Sanaul Haque** (Supervisor)  
sanaul.haque@lut.fi

## Overview

- Digitalization is key to optimizing energy production, distribution, and usage. Home Energy Management Systems (HEMS) provide people a way to interact with energy systems, but present challenges in usability and inclusivity.
- The focus is on integrating human-computer interaction (HCI) principles in designing accessible and effective HEMS software.

## Research Question

**How can software engineering practices be enhanced to design inclusive and user-friendly HEMS for diverse user groups?**

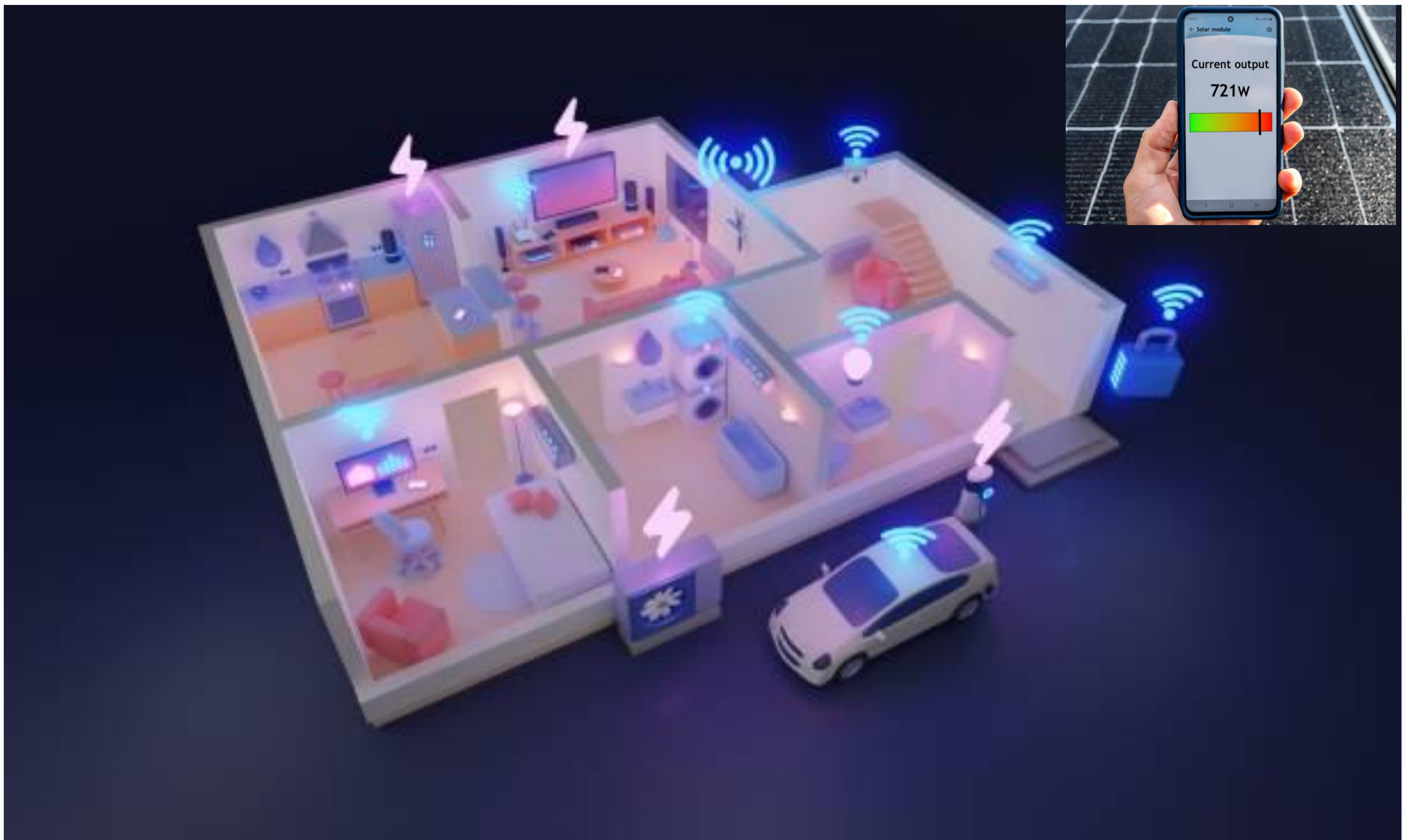
## Objectives

### Main Objective:

- Understand the primary software engineering challenges in improving HEMS usability.

### Sub-objectives:

- Examine how variations in user skills, economic backgrounds, and energy needs affect software design.
- Explore the role of generative AI or similar technologies in improving HEMS design and functionality.
- Develop user-centric software engineering methodologies to enhance HEMS accessibility and user experience.



## Relation to Software Engineering

- Application of human-computer interaction (HCI) principles in designing HEMS.
- Enhancing software engineering practices to create accessible, user-friendly HEMS.
- Integrating generative AI and other technologies to improve software architecture and user interfaces.

## Planned Methodology

### Research Through Design (RTD):

- **Year 1:** Literature review, interviews, and surveys to identify usability challenges.
- **Year 2:** Co-design sessions with end-users and technologists; integrate generative AI or similar Technology
- **Year 3:** Feasibility studies and formalization of user-centric methodologies.