

Master Thesis Offer

Multifunctional robot integrated in AI-driven human centric home care system for elder people

Background and Motivation

As the aging population grows, traditional assistive technologies are insufficient because they lack the cognitive ability to address complex issues like social isolation, mental health decline, and acute clinical triage. The transition to HealthCare 5.0 represents a paradigm shift from reactive treatment to **personalization, prevention, and human-centric care**. Recent studies by Krebs et al. demonstrate that social integration, reminders and constant care are among the most desired use cases for elderly care robots .

Research Goal

This requires a shift from isolated devices and data silos towards integrated personalized AI-driven systems, where smart home infrastructure and mobile robots are orchestrated. This thesis aims to build a cognitive ecosystem that supports both the psychological, clinical and practical needs of the elderly living at home.

Methodology

- Literature review on smart medication management, Ambient Assisted Living, and multi-agent AI systems
- Design of a modular architecture integrating IoT sensors, a shared knowledge base
- Development of specialized AI agents for specific use cases
- Simulate the AI agents in a Webots simulatoin environment
- Implement and demonstrate a proposed design using Pepper/NAO robot and LangChain
- Integration of robot and IoT using MQTT, Home Assistant, and a FastAPI-based communication layer
- Evaluate the system performance with suitable metrics (latency, accuracy) and in user feedback in real life demonstrations

Available for Bachelor/Master thesis/Master APR project



Interested? Then write an email and we can define goal and method in detail.

Prof. Dr.-Ing. Wiehl
Email: m.wiehl@oth-aw.de