Research Center AI, Software and Safety

RESEARCH CENTER AI, SOFTWARE AND SAFETY

FOAIS Evolution

> 2009 „Vienna Institute for Safety and Systems Engineering"
 > Functional Safety and System Safety
  > Inherent System Safety

> 2022/08 integration into the faculty Computer Science
  > Expansion of research area to include **AI**, **IoT** and **Software**
  > *„Research Center AI, Software and Safety"*

FOAIS Current Main Research Topics

> Autonomous Railway Operations
>> People Mover (Neurokit2E, TARO)
>> Sensor Systems (iLIDS4SAM)

> Embedded AI & Safety (Neurokit2E, SensoGrip)

> AI & XR
>> AI & XR Lab, Endowed professorship

> Resilient Infrastructure / Smart Villages
>> Internet of Things
>> Resilient community management (climate change, disaster control)
>> Research cooperation with municipality of Neuhaus

> Interdisciplinary Software Projects (e.g. Guide2Care)

> Serious Gaming (e.g. EthiCare)

NEUROKIT2E

> Open-Source Deep Learning Platform dedicated to Edge/Embedded AI
>> HORIZON-KDT-JU-2021-2-RIA
>> 27 participants, 22M€ budget
>> FOAIS 355k€
> Project duration 06/2023-05/2026
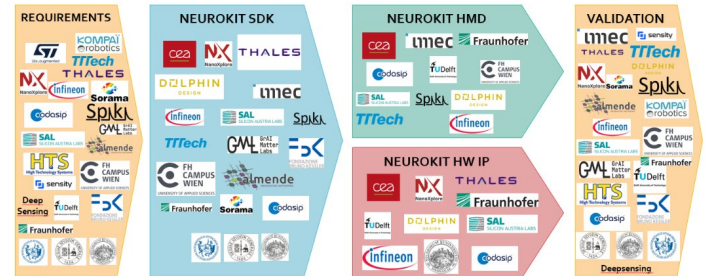
> Develop a unified and versatile SDK and hardware modelling framework
> Innovative, hardware-aware, machine learning optimization techniques
> Low-cost specialized hardware generation
> Reunite deep learning and **neuromorphic**
> **Embedded neuronal networks for usage in safety-critical environments**

https://neurokit2e.eu/

Towards Automated Railway Operation (TARO)

>Creating a digital model of the rail infrastructure.

>Single-track secondary railway lines

> Small, flexible rail cars (People Mover)

> On-demand Mode

> 24/7 Operations

>Completed 12/2023
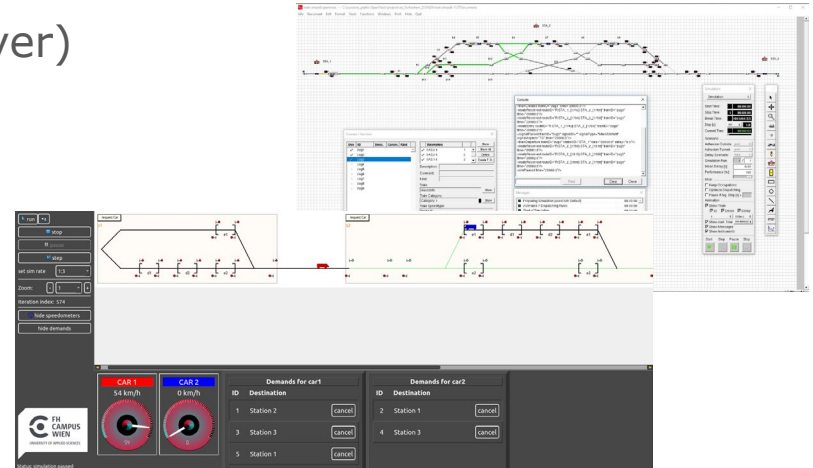
Youtube TARO: Digitaler Zwilling Infrastruktur

iLIDS4SAM

iLIDS4SAM
Integrated LIDAR Sensors
for Safe & Smart Automated Mobility

> Integrated LiDAR Sensors for Safe & Smart Automated Mobility
>> Safety analysis of critical traffic situations with autonomous vehicles
>> Definition of requirements for safe sensor systems for autonomous driving
>> Generation of safety proof in defined use cases
>> Exploit synergies for the people mover concept
> Completed 12/2023

https://www.ilids4sam.at/home
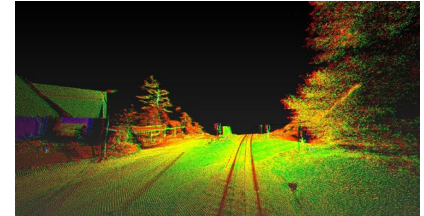
Smart Village Neuhaus

> Resilient infrastructure

> Ensuring security of supply despite climate change

> Budgetary and staffing constraints add to challenges for small communities.

> ARGOS: monitoring solution for water supply operation

>> Real-Time water balance reports

> ML models for anomalie detection

> Winter service

https://www.fh-campuswien.ac.at/forschung/projekte-und-aktivitaeten/forschungskooperation-smart-village-neuhaus.html

Interreg Project KaraMON

> Resilient infrastructure through digital innovation

> Start planned 12/2024

AI & XR Lab

> Enables interdisciplinary research

> In cooperation with other departments

> Close integration into study programmes

> Project duration 10/2021 - 09/2026

Guide2Care

> Development of a digital platform that offers healthcare professionals and caregivers convenient access to evidence-based knowledge to enhance care quality.

> Cooperation with Center for Aplied Nursing Research

> Project budget 490 k€ (MA23 funding rate 80%)

  > FOAIS 294k€ / ZAP 196k€ (235k€/156k€)

> Project duration 01/2025 - 12/2028

➤ Evidence-based knowledge: offers up-to-date nursing knowledge digitally.

➤ Target group: Healthcare professionals and laypersons in need of care

➤ User-friendly: Cross-platform web app with search and bookmarking features.

➤ Quality improvement: Enhances professional development and care quality.

EthiCare: Play Serious – Act Moral

> Development of a Serious Moral Game for Ethical Competence Acquisition in Nursing Education

> Cooperation with Center for Applied Nursing Research

> Project budget 385k€ (MA23 funding rate 80%)
  > FOAIS 186k€ / ZAP 199k€ (149k€/159k€)

> Project duration: 01/2025 – 01/2028

➢ Praxisnahe Problemstellungen – Fallbeispiele aus pflegerischen Settings

➢ Einbettung in ein didaktisches Konzept

➢ Einsatz und Evaluation in der Lehre
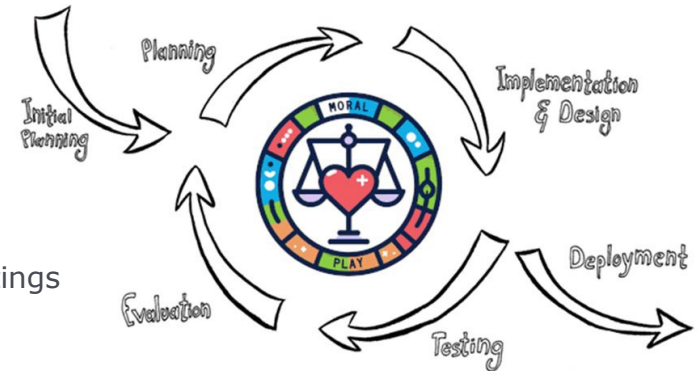
Grip'n'Play

> Serious Games for training pencil grip and control to support children in primary school in learning writing skills.

> SensoGrip System to be further developed within the project

> Games developed based on Game Mechanic Models and the Gamification Framework "Octalysis."

> In Cooperation with Digital Health and Care

https://www.fh-campuswien.ac.at/forschung/projekte-und-aktivitaeten/gripnplay-den-stift-im-griff-1.html

Protein structure and function prediction with Deep Learning

> Cooperation with MedUni Vienna

> Prediction of protein structure and function using DL

> Combination of in vitro and in silico methods through collaboration with molecular biologists

> Visualization using virtual reality
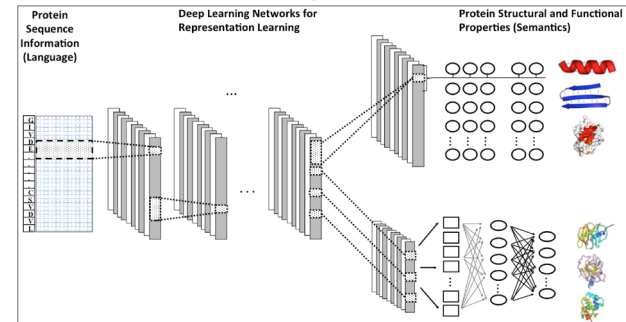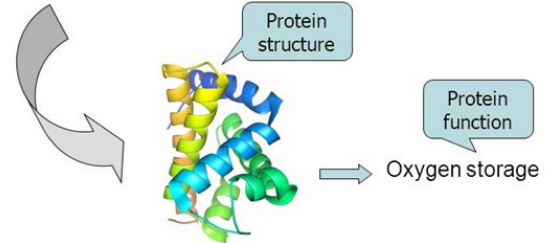
FH-Prof. Dipl.-Ing. Heimo Hirner

Research Center AI, Software & Safety
heimo.hirner@fh-campuswien.ac.at