

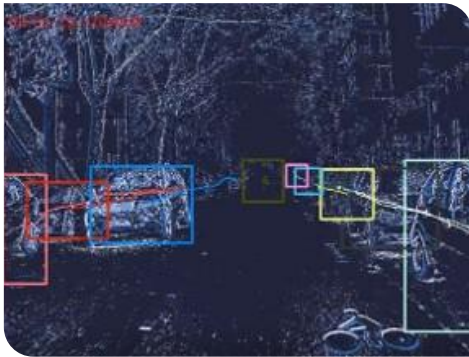
Forschungspraktikum am ITIV

**Kontakt am ITIV: forschungspraktikum@itiv.kit.edu
<http://www.etit.kit.edu/forschungspraktikum.php>**



Forschungspraktikum am ITIV

Am ITIV bieten wir eine Vielzahl von interessanten und interdisziplinären Themen für das Forschungspraktikum an. In den folgenden Folien sind einige dieser Themen dargestellt. Bei Interesse wenden Sie sich bitte an forschungspraktikum@itiv.kit.edu.



Forschungspraktikum am ITIV

■ Arbeitsumfang

- 12 Wochen
- Mindestens 35 Stunden pro Woche
- freie Zeiteinteilung in Abstimmung mit dem Betreuer
- Arbeiten finden am ITIV und FZI statt

■ Ziele

- Interdisziplinäre Projektarbeiten
- Recherche / Bewertung / Einordnung / Umsetzung / Dokumentation

■ Ergebnispräsentation

- Schriftliche Ausarbeitung in Form eines Praktikumsberichts
- Präsentation 3-5 Folien, Pitch



Smart Textiles: Wearable Electronics

Flexible and wearable sensors are getting closer to market and hybrid flexible electronics will be integrated in many end-user products. Especially in healthcare these new electronic sensors elements offer numerous possibilities. In cooperation with Robert Bosch GmbH and ITK Engineering GmbH we develop a shirt with integrated hybrid flexible sensors.

- Software
 - Data handling
 - Visual representation
- Hardware
 - Integrating electronic elements into textile
 - PCB design
 - Firmware / Data Pipeline
- Machine Learning
 - Data analysis
 - Anomaly detection



Artificial Intelligence for Digitizing Handwriting

There are numerous situations in daily life where we take notes and afterwards realize that we need the content in a digital form (like meeting notes, protocols, forms or lecture notes). But how to digitize your handwritten notes? There are different products like document scanners, tablets with a stylus or smart pens. All of these solutions require additional equipment or special paper to work correctly. In close cooperation with STABILO International GmbH, we are currently exploring the possibilities of improving a system that is able to digitize handwriting in form of trajectory with a pen that writes on regular paper and which is equipped only with inertial and geomagnetic sensors.

■ Machine Learning

- Optimization of the ML algorithms for embedded systems
- Data analysis
- Quantization strategies

■ Hardware-Software Codesign

- Simulation framework for pre-estimating power and performance
- Demonstrator design
- Implementation of neural networks in firmware



Neuromorphic Vision

Neuromorphic Engineering presents a paradigm shift in computing that takes close inspiration from biological brains. Akin to the impulse-based information processing in brains, neuromorphic systems compute on an abstraction of such impulses, referred to as events. This includes neuromorphic sensors such as event-based cameras which mimic the human eye. We develop such neuromorphic systems to perform action recognition and perception tasks.

- Software
 - Data preprocessing and networking
 - User interface development
- Hardware
 - Platform evaluation
 - VHDL design
- Machine Learning
 - Training of Spiking Neural Networks

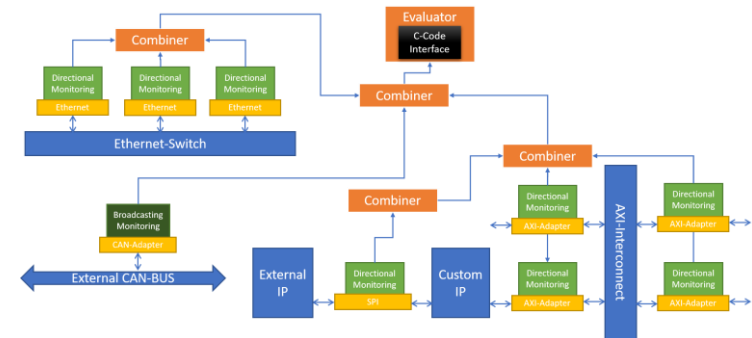


Source: Prophesee

Communication System Adapter for Abstract Monitoring Components

The increasing networking and interoperability of components in vehicles with the capability for autonomous driving lead to a constant exchange of information, for which source and destination cannot always be clearly determined due to the use of multiple bus systems. By using an extensible and abstract hardware library of different reconfigurable hardware components, which allows non-invasive monitoring of different communication systems, many different communication protocols can be monitored. The goal is creating an adapter between abstract monitoring components and concrete bus systems.

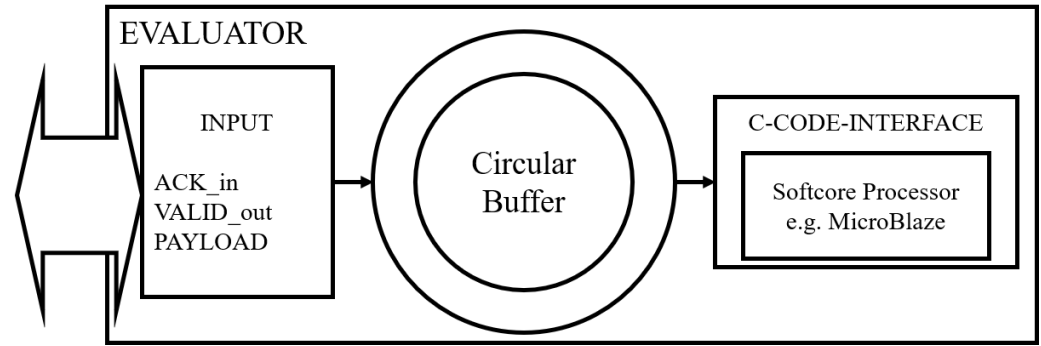
- Implementation of an adapter for used communication systems
- Prerequisites:
 - Knowledge of communication systems and protocols
 - Knowledge in HLS



Online Datagram Tracing Evaluation

The increasing networking and interoperability of components in vehicles with the capability for autonomous driving lead to a constant exchange of information, for which source and destination cannot always be clearly determined due to the use of multiple bus systems. By using an extensible and abstract hardware library of different reconfigurable hardware components, which allows non-invasive monitoring of different communication systems, many different communication protocols can be monitored. Creating an evaluator of monitored datagram traces using softcore processors is your task.

- Implementation of an evaluation using Softcore Processors in FPGA
- Prerequisites:
 - Knowledge in HLS
 - Knowledge in VHDL



Apps als ein Medizinprodukt

In Deutschland erkranken jedes Jahr 300.000 Menschen neu an einer Demenz. Leider wird es keine Wunderpille geben, die diese Entwicklung aufhält. Jüngste Studien legen jedoch nahe, dass Demenz im Frühstadium behandelbar ist, indem "Risikofaktoren" angegangen werden. Dabei geht es darum, den Gesundheitszustand des Patienten ganzheitlich zu verbessern. Digitale Werkzeuge wie mobile Apps, KI und Wearables können eine solche Behandlung in der realen Welt ermöglichen. Das ist die Vision von METIS: Wir wollen Hightech-Apps und -Geräte zu gefährdeten Patienten bringen und Demenz vorbeugen. Werden Sie Teil des Teams und beginnen Sie mit uns, etwas zu bewegen.

- Erstellung (Flutter SDK) von Demenz-Interventions-Apps
- Implementierung von medizinischen Softwareanwendungen
- Plattformübergreifende Implementierung von Apps
- Dev-Devices und Dev-Server-Zugang werden zur Verfügung gestellt

