

PANORover: Autonomous Driving System Development Platform

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Security | AI | Architecture | Modelling

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Heterogeneous HW/SW Platform with AI

Use Case

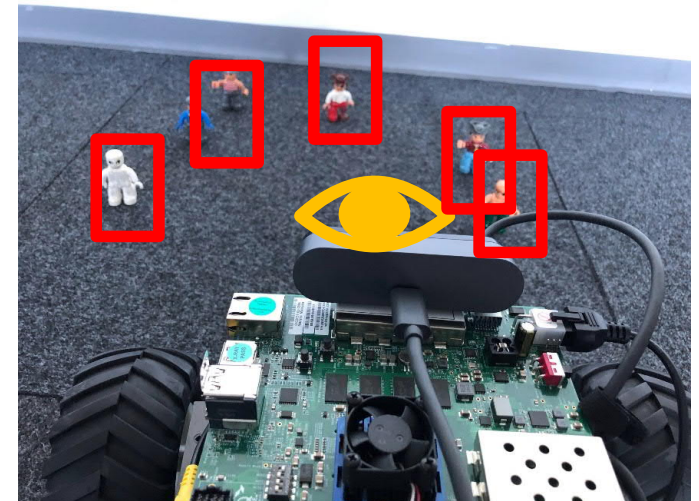
Rover with automated braking and collision avoidance ADAS function

Function

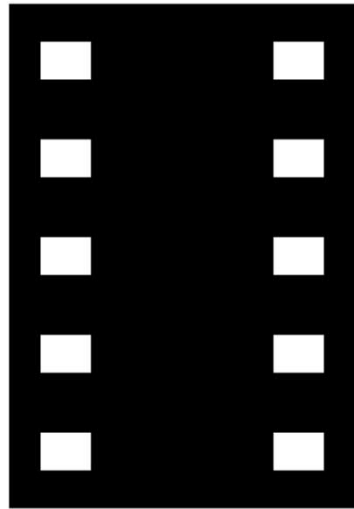
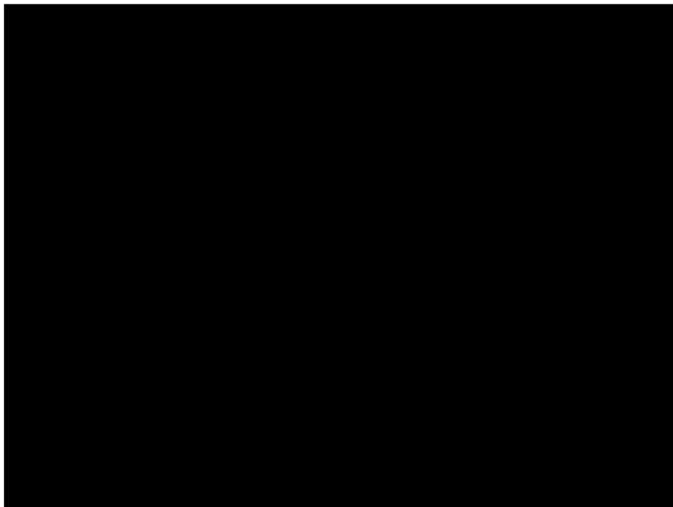
- Avoid collisions by measuring distance
- Reduce speed when detecting traffic signs or pedestrians

Heterogenous Hardware and Software

- HW boards: Xilinx ZCU104, Arduino MEGA 2560, Mentor Calypso Board
- Perception: USB Camera, IR distance sensors
- HW accelerated AI based pedestrian detection
- Communication: CANBus and Ethernet (planned)
- SW: bare metal, Petalinux, Nucleus RTOS, AUTOSAR (VSTAR)



Video



Safety Analysis using Component Fault Trees (CFTs)

Extension of classic fault trees with a component concept

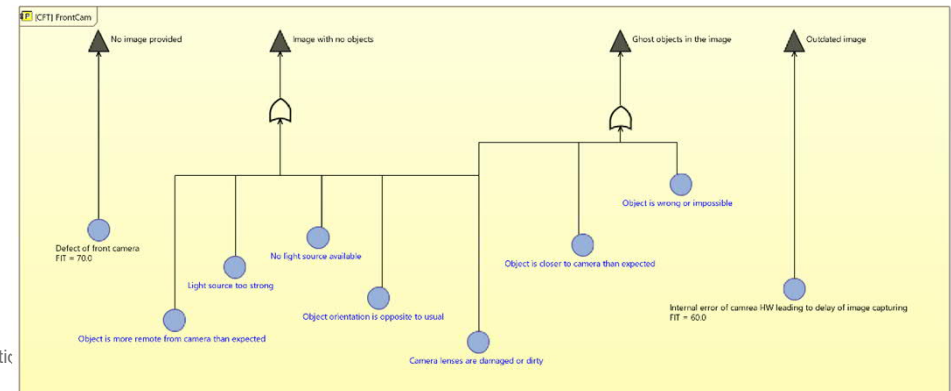
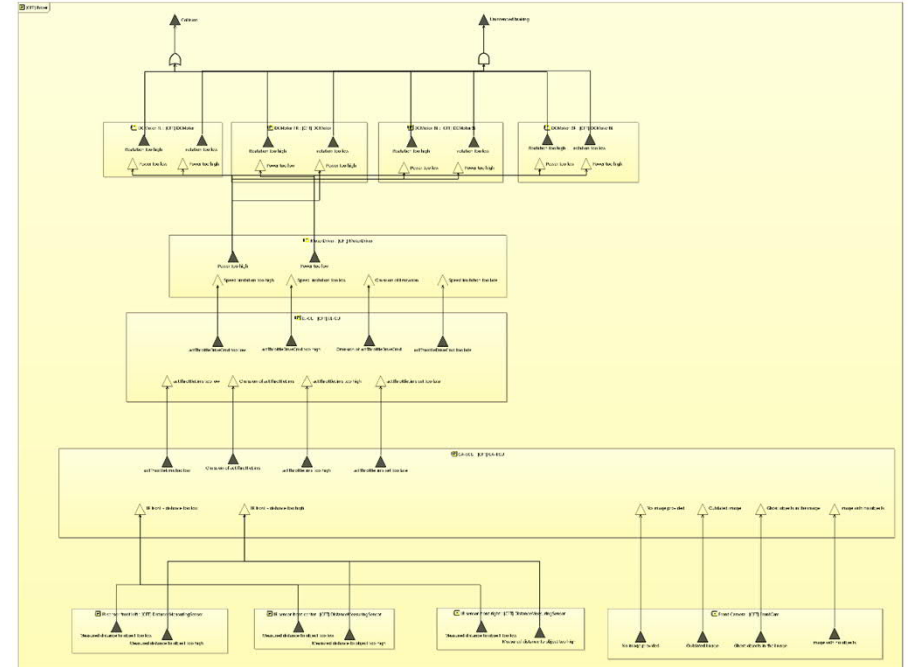
- Fault trees trace back influences to a given hazard or failure
- Graphically explain causal chains leading to the hazard
- Focus on failure modes of an encapsulated system component
- One CFT per component contain more than one top event (instead of one 'classic' fault tree for each top event)

Challenge in heterogeneous systems

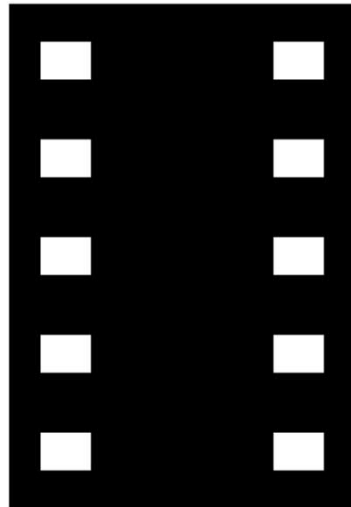
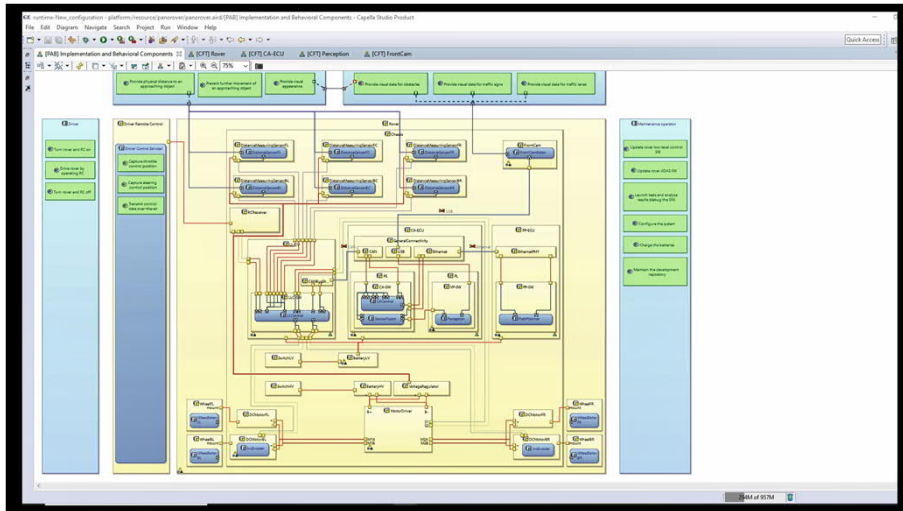
- Safety Of The Intended Functionality (SOTIF) must be considered (ISO 21448) in heterogeneous systems incl. AI
- Failures + functional insufficiencies must be considered in safety analysis

Solution

- Extension of the CFT methodology to describe cause-effect-relationships for failures & functional insufficiencies and system hazards
- Qualitative Safety Analysis of PANORover is performed using CFTs
 - To show that all hazards are mitigated sufficiently
 - Combined analysis of functional safety and SOTIF aspects



Video



Thank you for your Attention!

Questions ?

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