

# Analysis and Coordination of Mixed-criticality Cyber-physical Systems

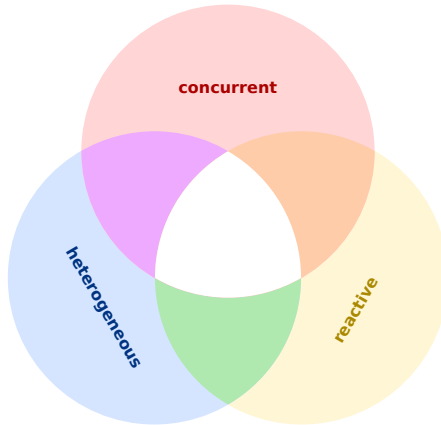
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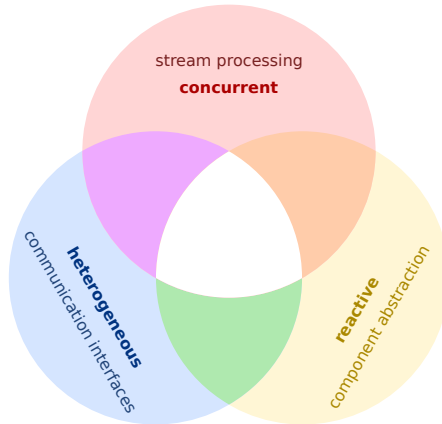
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## Problem Description and Contributions



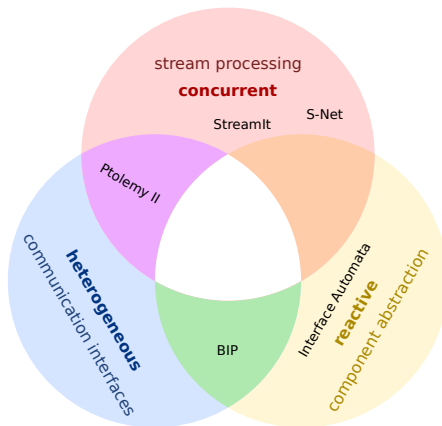
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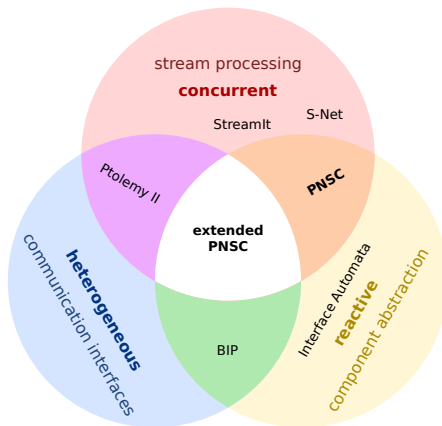
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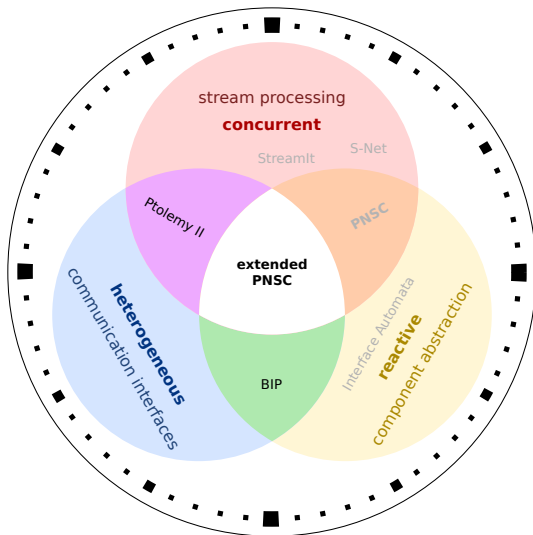
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## Problem Description and Contributions



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# Interfaces for Strongly Coupled Reactive Components

## Research Question

### Question

What are suitable interfaces for reactive components with strong coupling to ensure correct behaviour of a system of such components assembled in a network?

- support of complex components without loss of analysability
- detection of local and global permanent blocking situations
- composition of simple components into complex ones

### Answer

The Process Network with Synchronous Communication (PNSC) model and Synchronous Interface Automata (SIAs).

# Interfaces for Mixed-criticality Components

## Research Question

### Question

What are suitable interfaces for CPSs to integrate subsystems with different criticality levels?

- support of different communication schemes
- allow interaction while preventing unwanted interference
- fine-grained control on communication coupling

### Answer

The extension of the PNSC model with Cross-criticality Interfaces (CCIs) and rate control.



# A Coordination Language for Reactive Components

## Research Question

### Question

What are the implications of reactive components on an exogenous coordination language?

- structured programming for CPSs
- hierarchical construction of networks

### Answer

Using network operators to describe bidirectional communication.