Analysis and Coordination of Mixed-criticality Cyber-physical Systems

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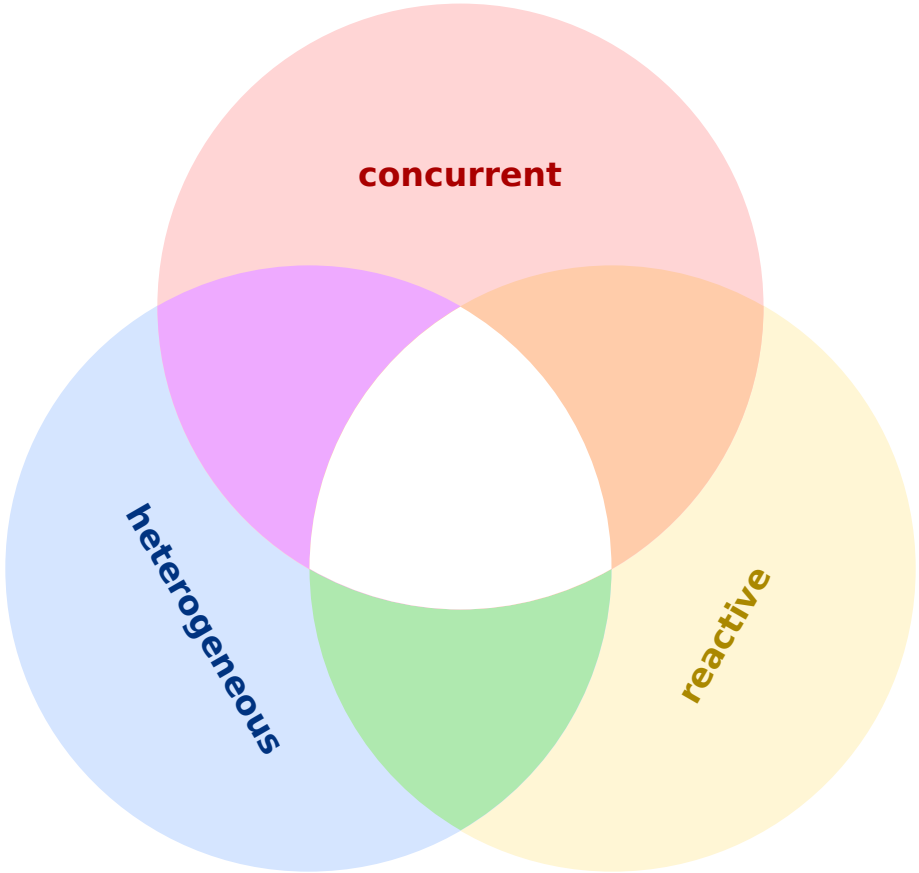
Analysis and Coordination of Mixed-criticality CPSs

Problem Description and Contributions



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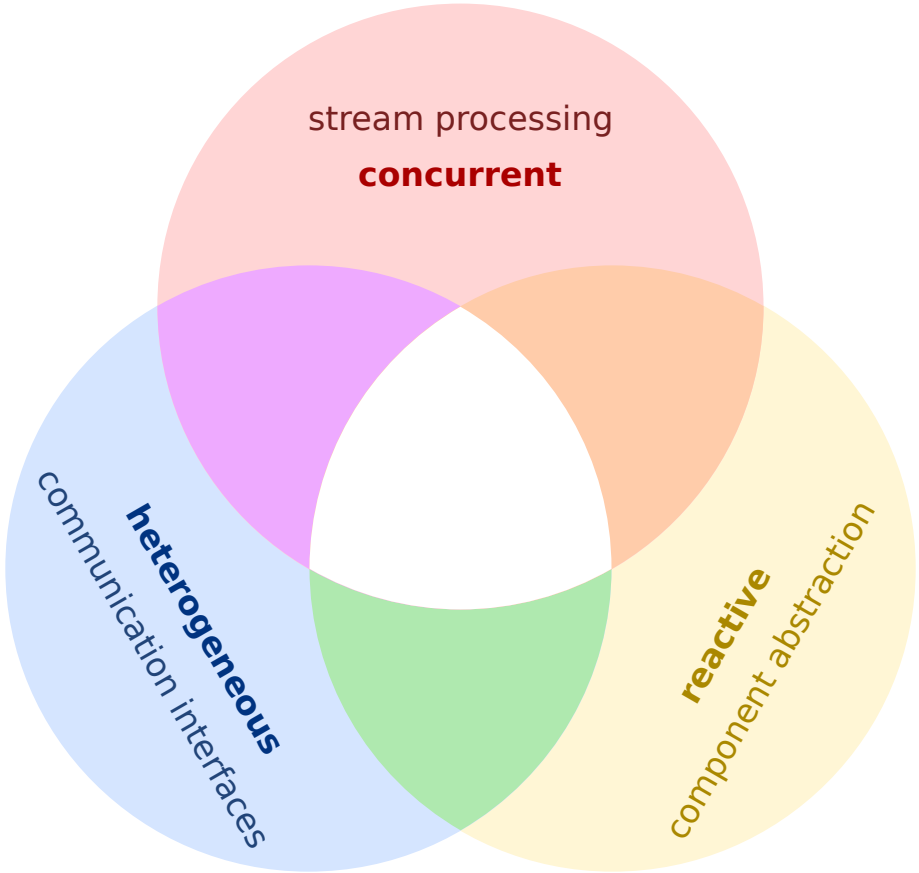

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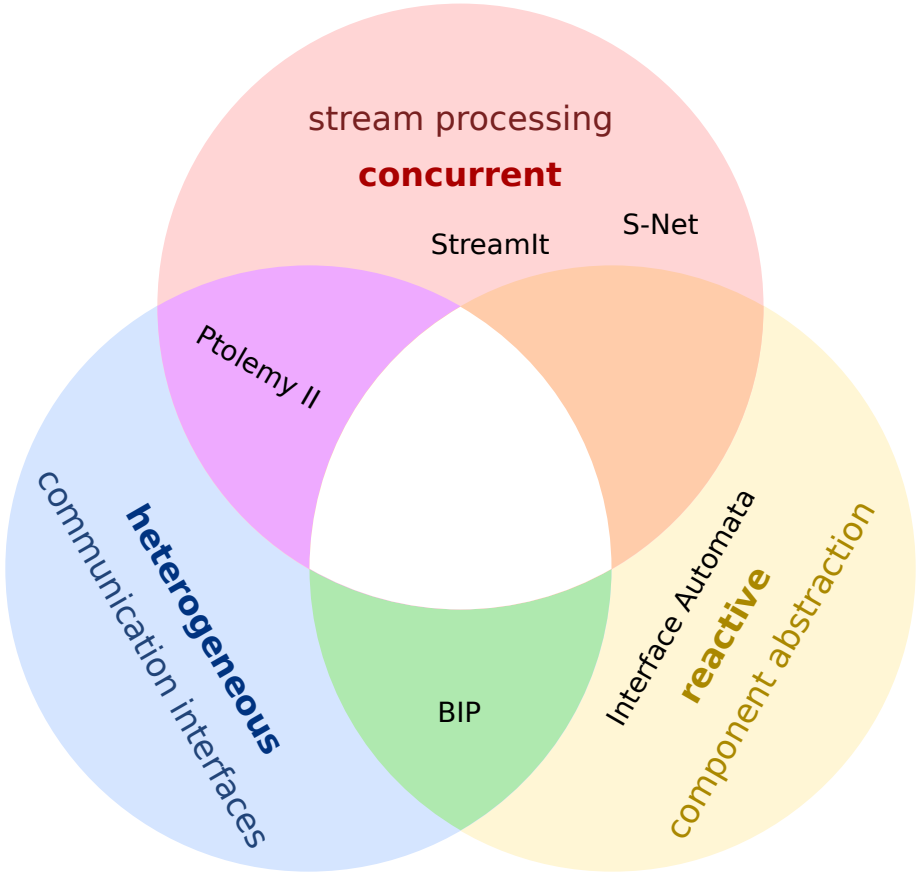

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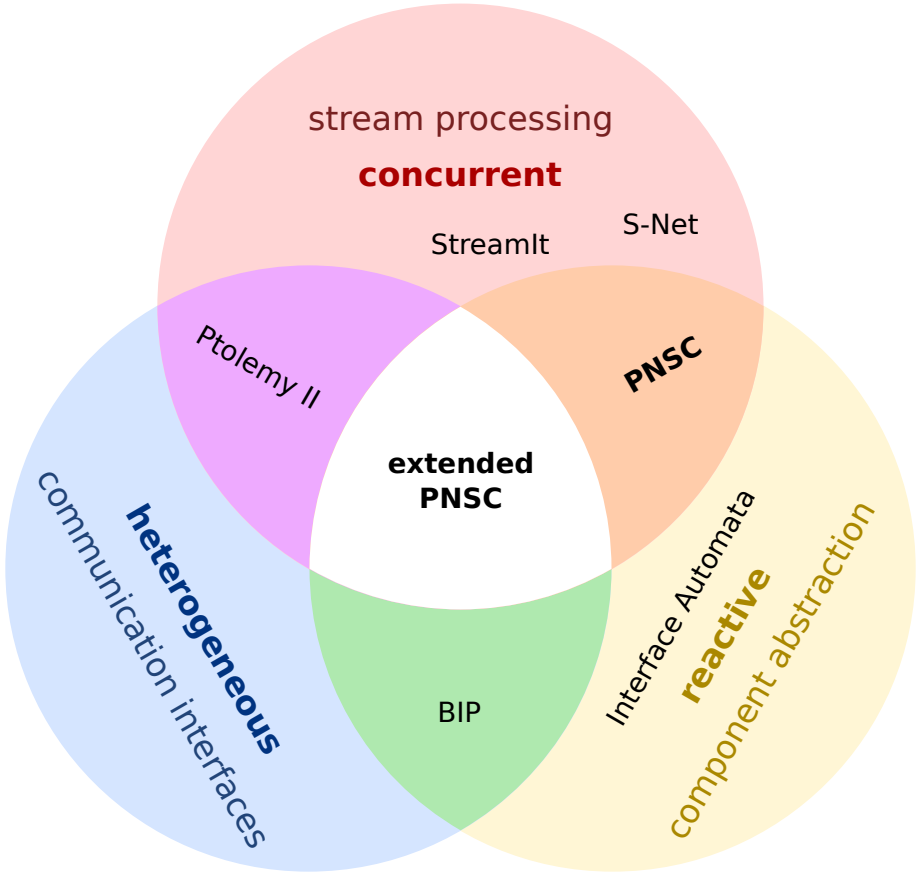

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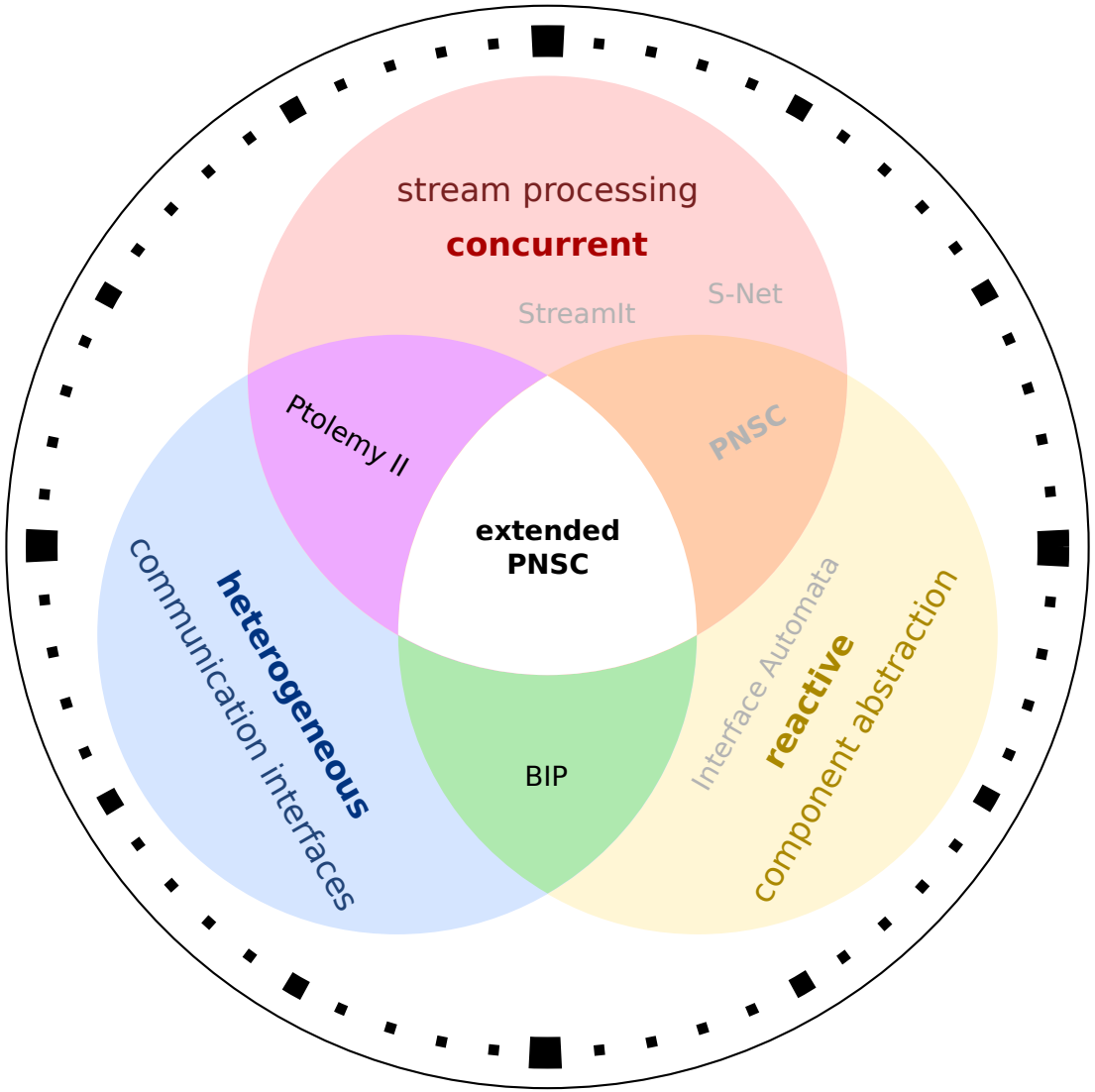

Interfaces for Strongly Coupled Reactive Components

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 for 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 Syncronous 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 for 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.