NSF

CPS: Medium: Collaborative Research: Data-Driven Modeling and Preview-Based Control for Cyber-Physical System Safety

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Challenge:

- Safety vs conservativeness trade-offs
- How to leverage new sensors, existing data sets, and learning algorithms?
- Multi-agent interactions with cooperative and noncooperative agents

Solution:

- Preview-based correct-by-construction control
- Learning dynamic policy models of external agents
- Run-time estimation and model selection
- Preview-aware multi-agent barriers for safety assurance

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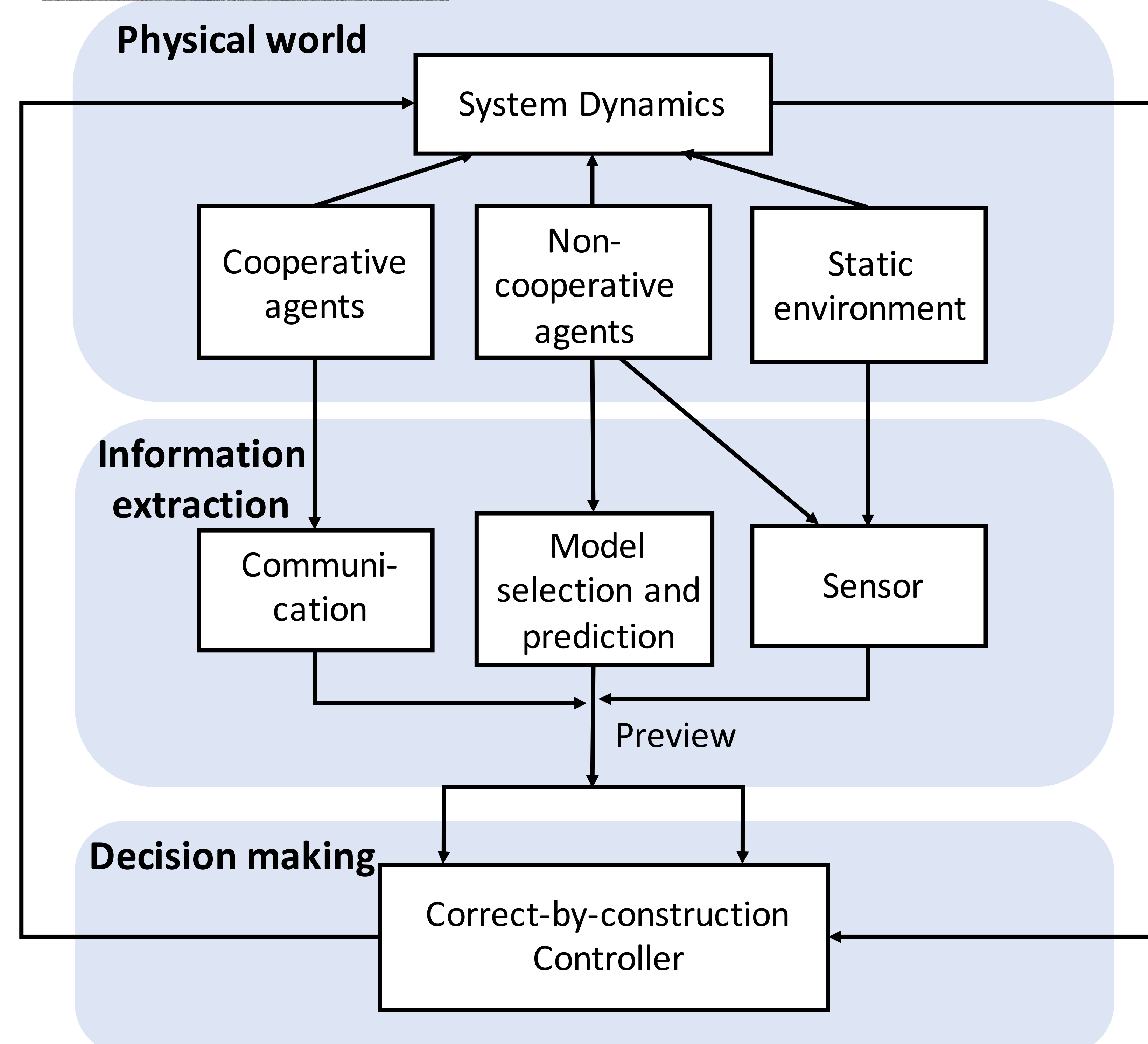
Scientific Impact: Theory and algorithms to:

- Enable the incorporation of preview information using preview automata
- Understand the role of multi-agent cooperation in providing preview information via data-driven models and communication

Broader Impact:

- Application focus: Driver assist systems
  - Improving driving safety can save lives
- Broadly applicable methodology
  - Can generalize to a wide class of CPS, e.g., UAVs, robots, medical devices
- Involve female undergrads at UM (incl. international partnerships in Mexico and Ethiopia) and minority undergrads at UCR and ASU to prepare and encourage them to pursue graduate studies in STEM.