

Collaborative Research: CPS: Medium: Sharing the World with Autonomous Systems: What Goes Wrong and How to Fix It

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<https://tichakorn.dev/project/inconsistencies/>

Challenge:

- The differences in perception and decision making between human-operated and autonomous systems cause them to exhibit different behaviors under the same situation
- Understanding the effect of these inconsistencies on the overall system is critical for the adoption and acceptance of autonomous systems

Solution:

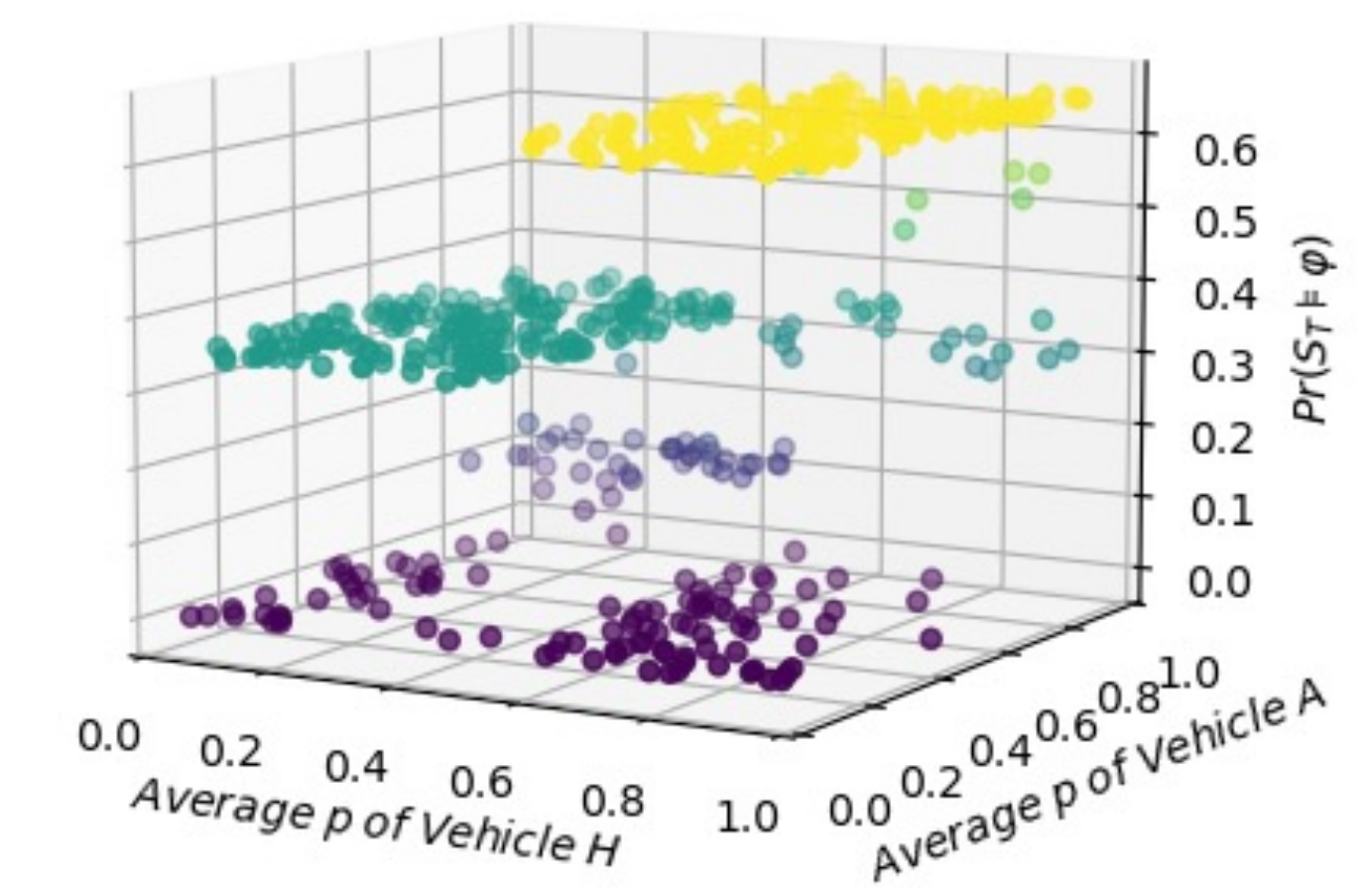
Algorithms that quantitatively and succinctly characterize the sources and effects of inconsistencies in perception and decision making among the interacting agents

Scientific Impact:

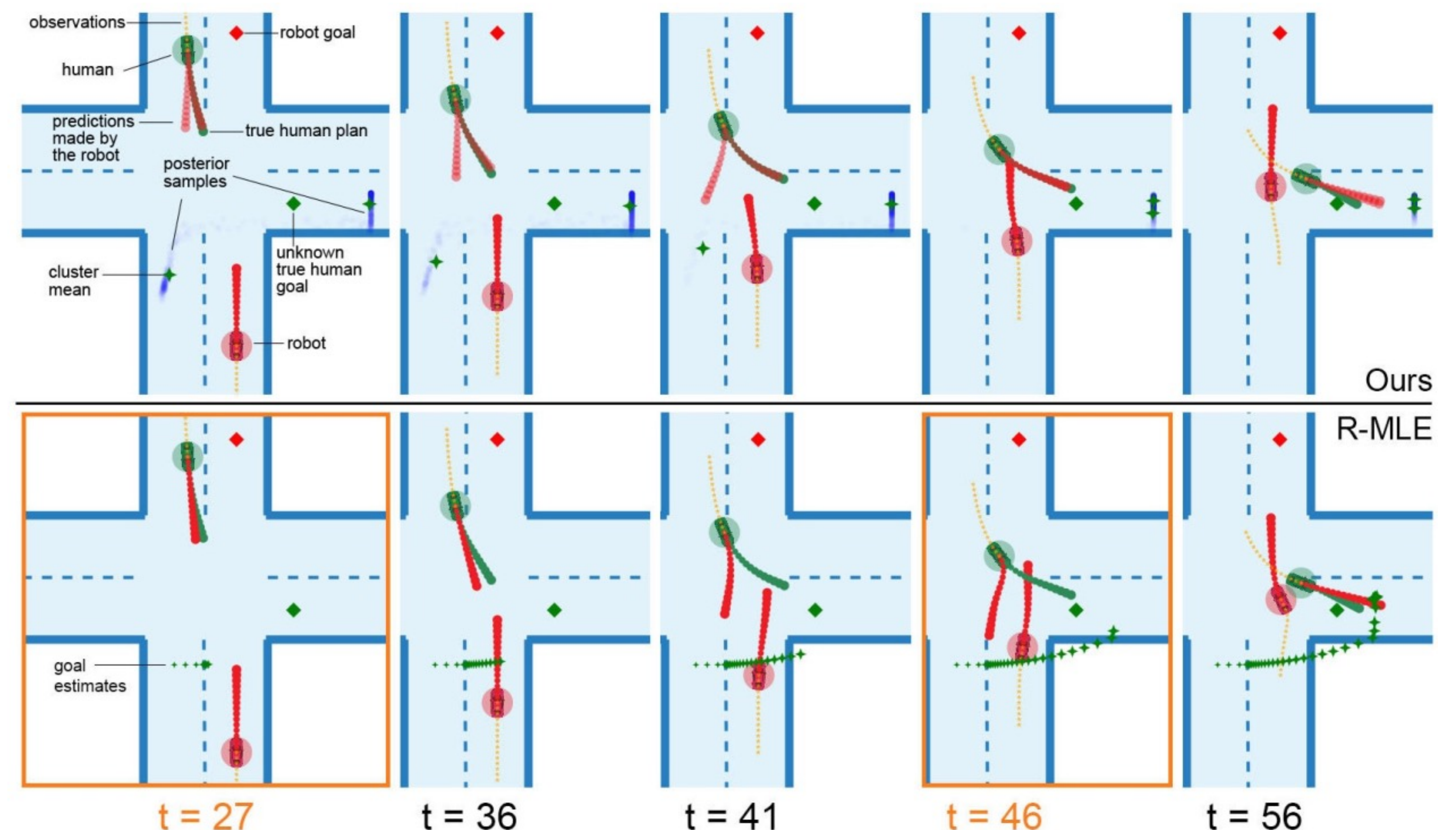
- Interaction with human-operated systems is common in many CPS applications
- The algorithms can be generalized to incorporate active perception and system-level objectives into control synthesis

Broader Impact:

- Enable an effective integration of autonomous systems into existing infrastructures and improve the public acceptance of the technology
- Various outreach activities with hands-on demonstrations to broaden participation in computer science and autonomous systems



Under partial observability, agents maintain beliefs over all the environment models. Perception discrepancies lead to inconsistent beliefs among the agents, resulting in violations of system-level specifications.



Embedding a differentiable game solver in a structured variational autoencoder infers the distribution of the human's objectives based on observations of their behavior