

Asynchronous Information

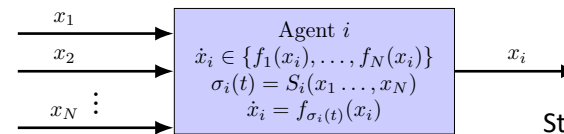




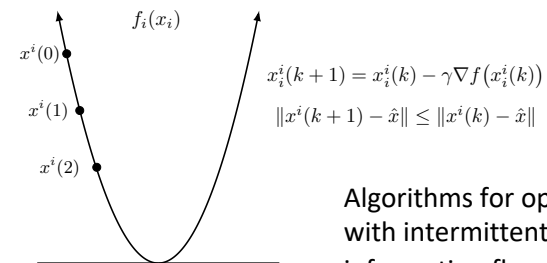
Asynchronous Information

- Investigate stability analysis methods for hybrid dynamic systems incorporating delays due to asynchronous communications and computations
- Design asynchrony-tolerant algorithms for distributed optimization for a range of multi-agent tasks
- Refine switching algorithms for online optimization and computation to render desired sets invariant
- Experimentally validate these approaches to networked hybrid systems through implementation on mobile autonomous agents

RT4 will develop tools for the design of networked hybrid systems resilient to delayed and asynchronous information, producing novel generalizations of the hybrid analysis methods and new insights into shared computations even beyond cloud-based collaboration



Strategies to use exogenous information to make an endogenous switch



Algorithms for optimizing with intermittent information flows in networks

Asynchronous Information



- Communications and computations delay information
- Intermittent information informs when agents switch among modes
- New strategies are needed for agents to stably switch at different times using different information



Asynchronous Information

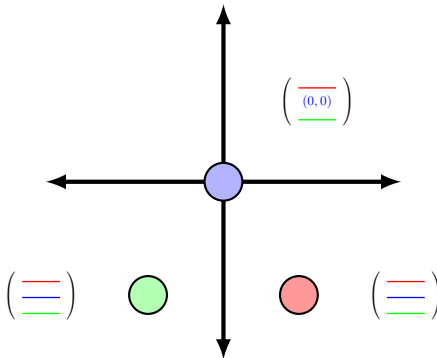


- Asynchronous communications give agents differing information
- Agents disagree as they work together
- Mitigating asynchrony requires new algorithm designs and analyses that succeed under these disagreements



What's happening here?

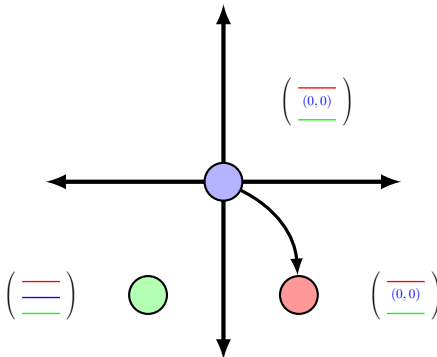
- ▶ Computations and communications occur with any timing
- ▶ No agent ever stops completely, but delays can be long





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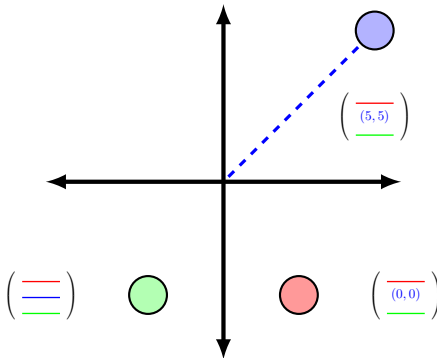
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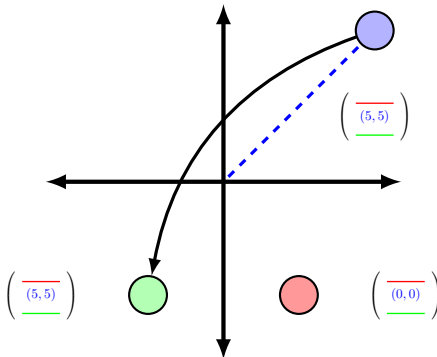
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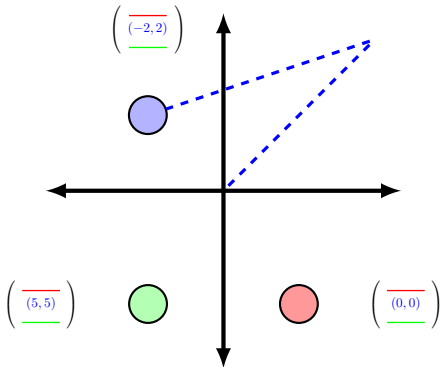
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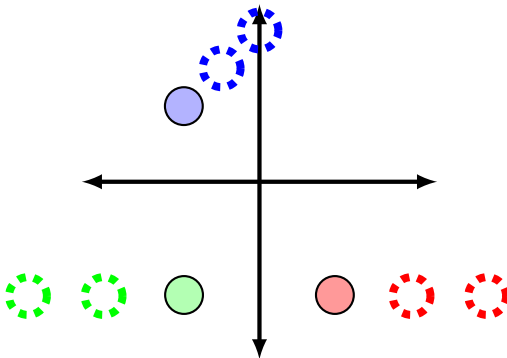
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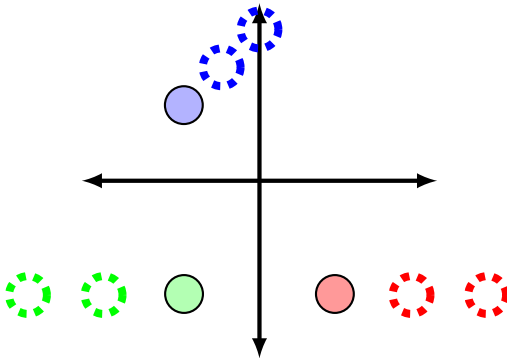
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What's happening here?

- ▶ Computations and communications occur with any timing
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- ▶ Agents have different information
- ▶ We're never sure of what they have



Up next: Ricardo Sanfelice on synchronizing hybrid systems with intermittent information