LTL for multiple agents

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2 paradigms

• Centralized:
  - one controller for a group of robots
  - Need to have full information

• Decentralized:
  - One controller for each robot
  - Little information about other robots
Centralized

• One LTL formula and one automaton for the whole group
  - Can maintain communication range
  - Global guarantees: no collisions, no deadlock
  - State space grows exponentially with the number of robots
Example

“Pick up items and take them to the appropriate room based on the material”
Decentralized

• One LTL formula and one automaton for each robot
  - Other robots are part of the environment
  - Scales well*
  - No global guarantees
Example

“Drive around while obeying traffic rules until you find a free parking space, and then park”

“Leave the block, while obeying traffic rules, through Exit $i$”
Challenges / future work

• Have the planning and control foundation

• Challenges / future work
  - Task-based group decomposition
  - Information passing between groups
  - Global guarantees
  - Scalability
Thank you