Robot Planning in the Real World: Research Challenges and Opportunities

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Remote Presence Robots

RP-VITA

Ava 500
Application domains to motivate planning

- Socially-aware navigation
- Extending independent living
Socially-aware navigation

- Robots increasingly operate in busy human environments
- Navigation is a social interaction:
  - e.g., nonverbal cues: gaze, proxemics, etc.
- No robot today has adult-level social navigation skills
- Planning problems:
  - How should a robot actively use nonverbal cues to navigate?
  - When should a robot ask people to move versus find another route?
Extending independent living (EIL)

• iRobot’s CEO has stated a long-term goal to extend independent living through our robots
• How do you help a senior live independently?
  • or, delay the transition to a long-term care facility?
• Activities of Daily Living:
  • Eating, bathing, toileting, dressing, transferring/walking
• Instrumental activities of daily living:
  • Housekeeping, shopping, meal preparation, finances, transportation, telephone/communication
• Faculties decline with age:
  • flexibility, balance, vision, hearing, mental acuity
Planning challenges for EIL

• How does a robot help a person get dressed?
  • Close interaction on cooperative tasks with humans

• How can a robot prepare, serve, and clean up after a meal?
  • Ill-defined or not easily modeled objects and processes

• How does a robot offer assistance before it is requested?
  • Inferring the goal, plan, and status from observation
  • Determining what the robot should do (if anything) to help