N93-31451

PATH PLANNING CONTROL

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- **Problem Statement**
  - ¶ **Motion planning for redundant robots in a constrained environment**

- **Current Approaches**
  - ¶ **Model Based**
  - ¶ **Sensor Based**
  - ¶ **Hybrid**

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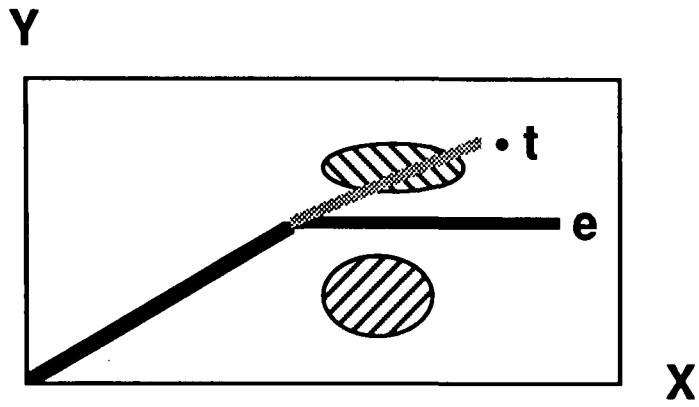
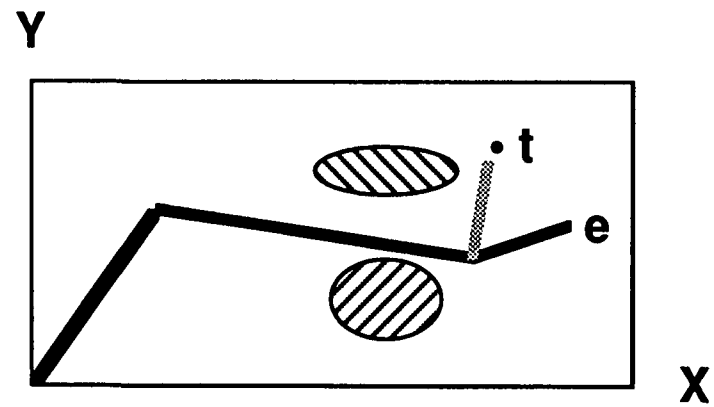
PLANAR MODEL

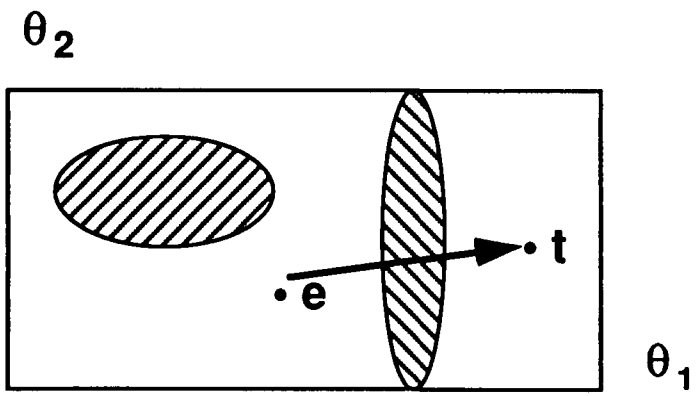
Task Space

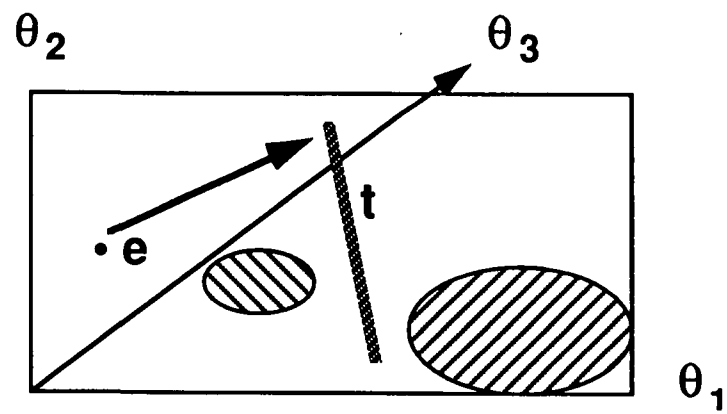


2 Degree of Freedom



3 Degree of Freedom
(redundant)



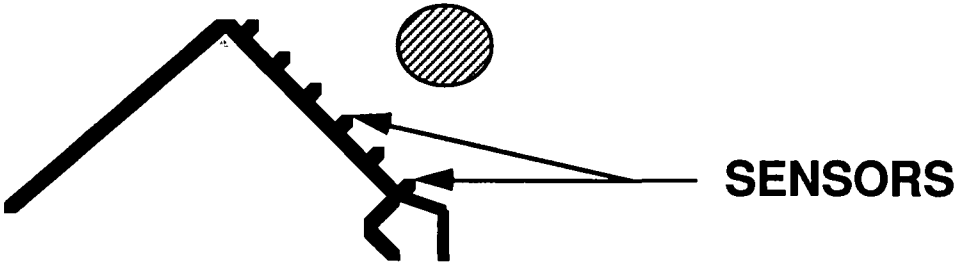


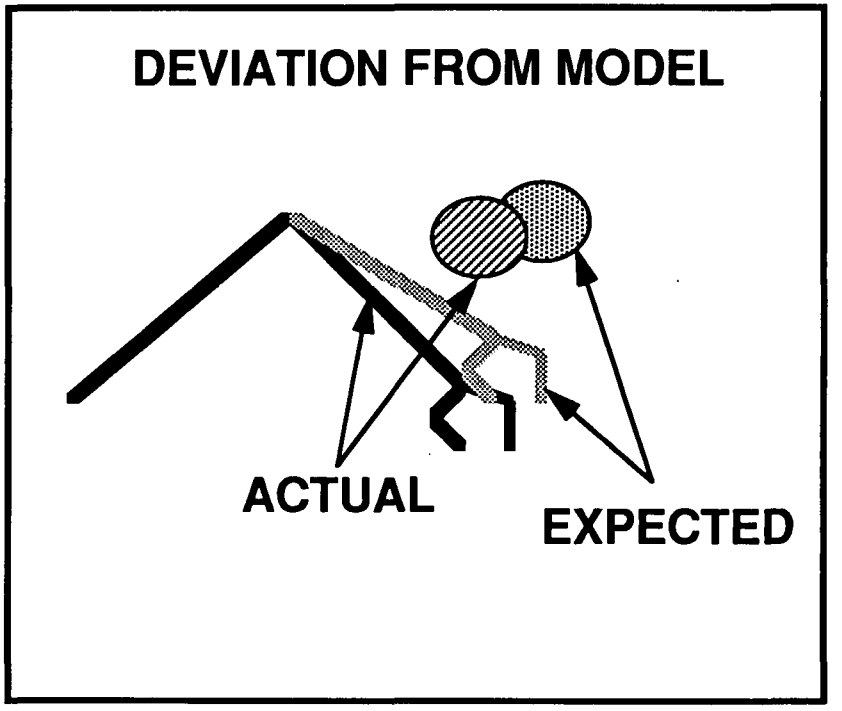
Join Angle Space

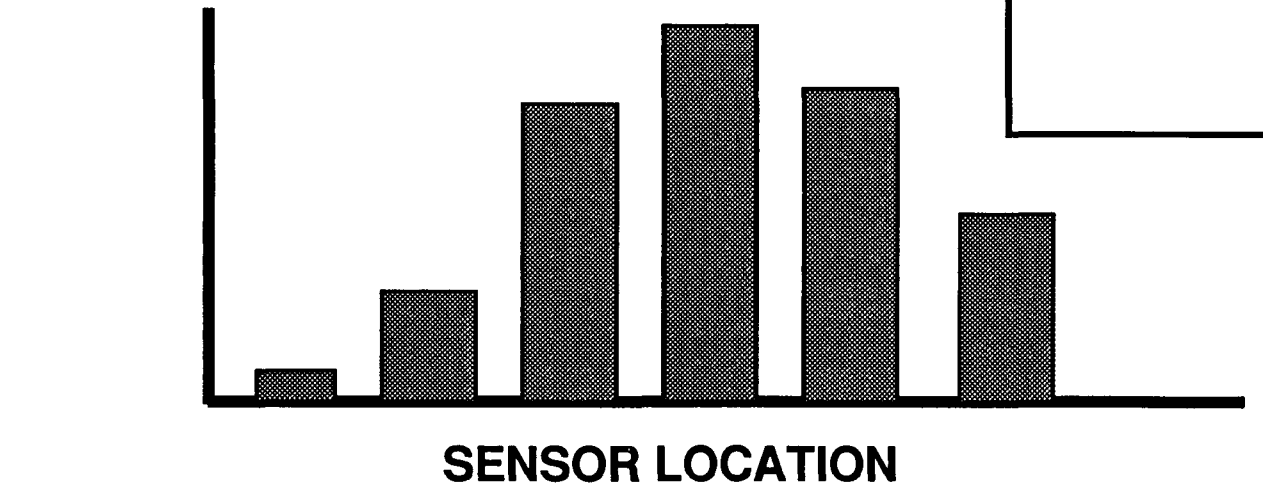
APPROACHES

- Model Based Path Planning
  - Uses CAD model (a priori knowledge)
  - Transformations done offline
  - Uses large granularity for efficiency
  - Large search space (exponential in DOF)
  - Environment must be static (i.e. no humans)
- Sensor Based Path Planning
  - Detect obstacles before collision
  - Non-optimal path (may wander)
  - May have very high degree of sensor redundancy
  - Sensors usually located on robot (work in robot space)
- Hybrid Path Planning
  - Best of both worlds
  - Requires fusion of model and sensor information

PROXIMITY SENSOR ARRAY







APPLICATIONS FOR FUZZY LOGIC

- Model based
  - No closed form solutions for redundant manipulators
  - Large search space
  - Interpolations between tessellations
- Sensor based
  - Combine redundant information
  - Can calculate approximate range and size of obstacles
  - Optimal path between 2 obstacles
- Hybrid
  - Same as model and sensor
  - Resolving conflicts between model and sensor data

Topic: Path Planning Control
Presenter: Malcolm McRoberts

No notes were taken during this presentation.