

# Principles of AI Planning

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## CogX

An **robotic** project with focus on

- dialogue planning
- detection of knowledge gaps
- planning how to fill knowledge gaps

## Kontiplan

A **space mission** project with focus on automated planning in a real-world environment:

- temporal planning
- numerical planning
- **probabilistic planning**

## Setting

Similar to **nondeterministic** planning, but:

- Nondeterministic effects have **probability** attached
- Interleaved planning and **execution**  
⇒ decisions “step by step” rather than policy/strategy
- Maximize **reward** instead of achieve goal

## Planning System PROST

- Monte Carlo Tree Search (**UCT**)
- **Initialization** based on determinization
- **Action pruning** based on reasonable actions
- ...

## Potential topics for projects and theses

- Implementation of alternative algorithms in PROST for comparison, e.g. **Real Time Dynamic Programming**
- Support of **finite-domain representation** derived from **invariant synthesis**
- Initialization with heuristics from classical planning, e.g. **relaxation** or **abstraction** heuristics
- Anything related to **probabilistic planning** and **game playing**, both general and domain-dependent.