goal

– Develop **automatic motion strategies** to take a virtual character from one configuration to another.

– Considering:

  • **geometry** of the character and the environment,
  • **kinematics** of the character’s skeleton,
  • **time** constraints.
**main difficulties**

- highly redundant mechanisms,
- 3-dimensional collision avoidance,
- large number of degrees of freedom,
- locomotion is usually performed together with other tasks,
- eye-believable motions.

**idea**

- construct a roadmap,
- find a path/trajectory to the goal,
- follow the trajectory.
two main approaches:

• One-stage planners:
  – all DOFs are specified after **one planning stage** (footprint-based, FSM).

• Multi-stage planners:
  – two or more stages are required to produce a whole-body trajectory.

one-stage planners:

• path from footprints

• path from examples (FSM)
multi-stage planners

• Ingredients:
  – a bounding volume for the character,
  – a task controller for each function,
  – motion editing techniques.

functional decomposition

• minimal sub-mechanisms to provide a behavior.
• adaptability manages the redundancy of the system.
• allow the use of simpler controllers.
bounding volume

• allow to have a gross path to the goal considering kinematic and geometric constraints.

independent motion controllers

• assign values to every DOF.
• example-based control.
• IK-based control.

[Pettré, et. al. 2006]

[Siggraph 2008]

[Ferré, et. al. 2005]
Example: 3 stage planner (1)

- plan

Example: 3 stage planner (2)

- animate
Example: 3 stage planner (2)

- edit
extensions: which planner?

• rough-terrains?
• combined behaviors?
• complex motions?
• cooperation among characters?
• dynamics?