Part 1 - Motion Planning

Applications to Computer Animation

[Kuffner 98] Grid-based planning

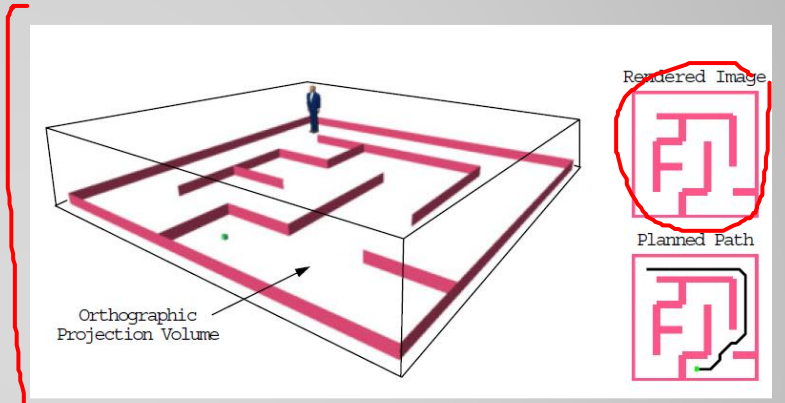
Character animated by motion capture cycles

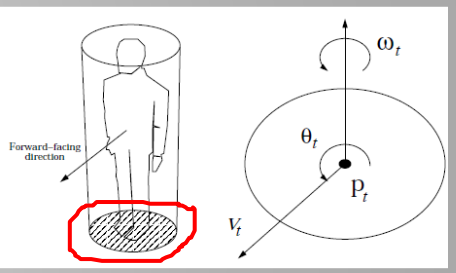
Motion is planned for a bounding box

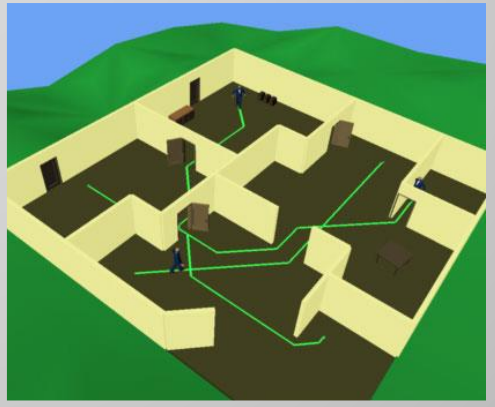
Environment is discretized with a grid

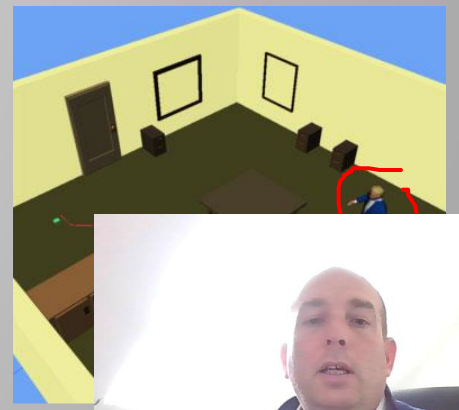
A* is used to find a collision free path

Planned trajectory serves as input to control the bounding shape









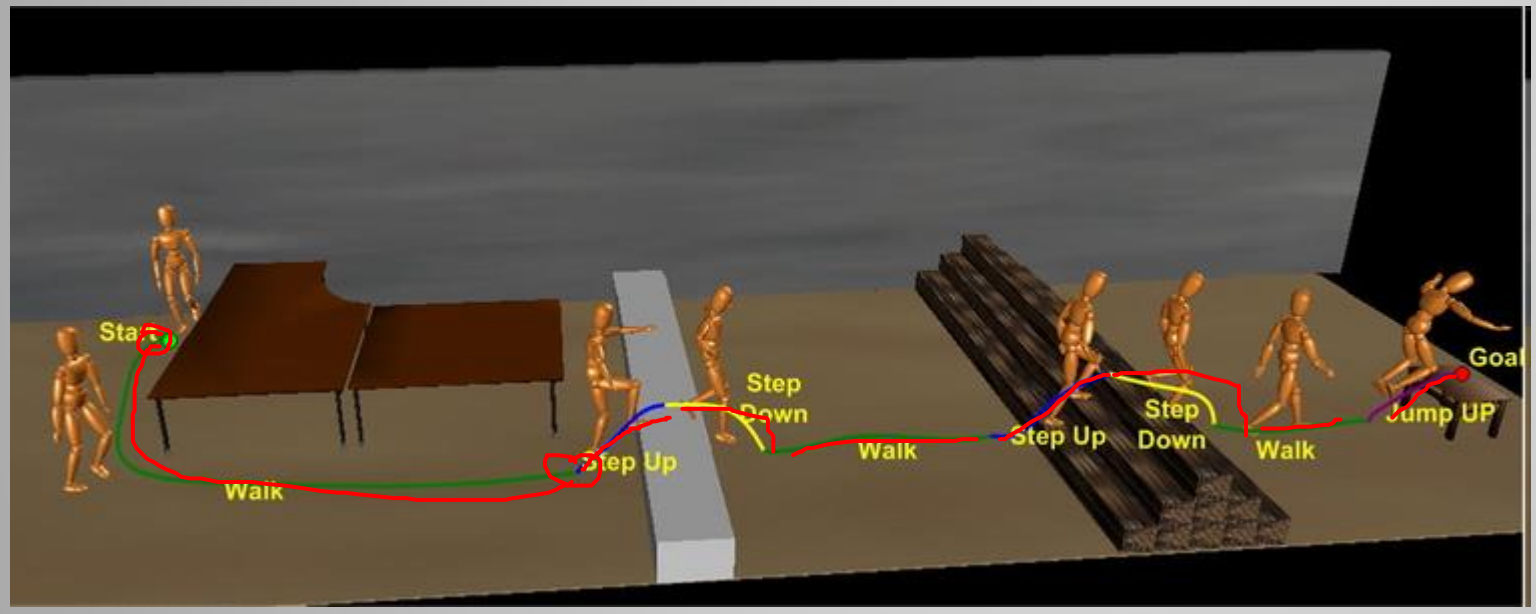
Kuffner, J. J. (1998). Goal-directed navigation for animated characters using real-time path planning
Modelling and Motion Capture Techniques for Virtual Environments (pp. 171-186). Springer, Berlin,

[Choi 03] Planning Bidep Locomotion

- PRM-like approach
- Foot prints are configurations
- Environment is sampled with footprints
- Edge are added between 2 connectible footprints
- Each edge matches a motion capture clip
- A solution path is a sequence of motion captures
- Motion is smoothed for continuity

Choi, M. G., Lee, J., & Shin, S. Y. (2003). Planning biped locomotion using motion capture data and roadmaps. *ACM Transactions on Graphics (TOG)*, *22*(2), 182-203.

[Zhuang et al. 05] Motion Programming



Zhuang, Y., Xiao, J., Wu, Y., Yang, T., & Wu, F. (2005). Automatic generation of human animation b
motion programming. *Computer animation and virtual worlds*, *16*(3-4), 305-318.

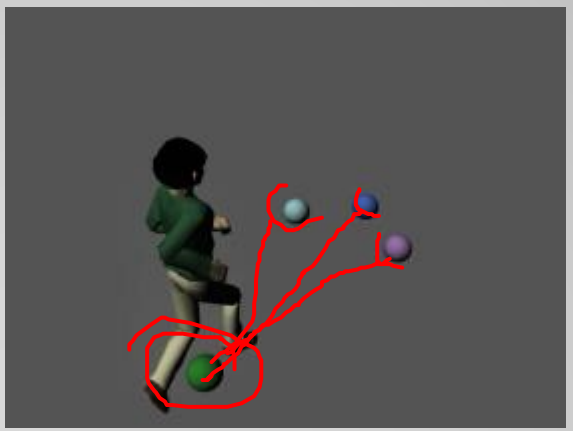
[Lau et al. 05]

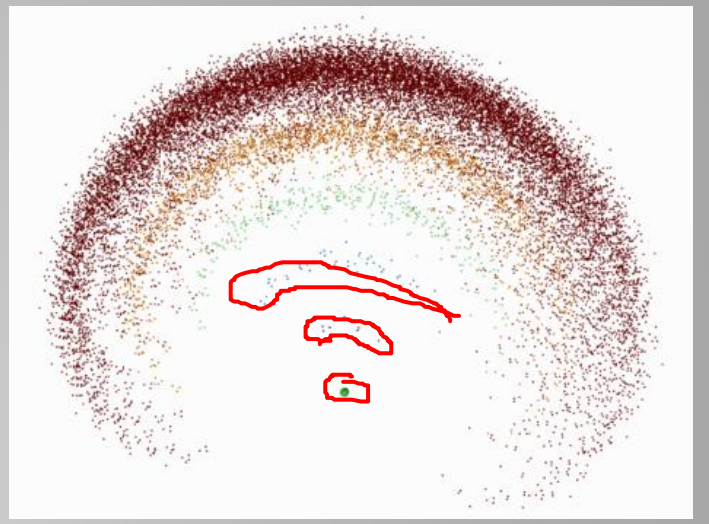
RRT like: locally builds a tree from motion sequences

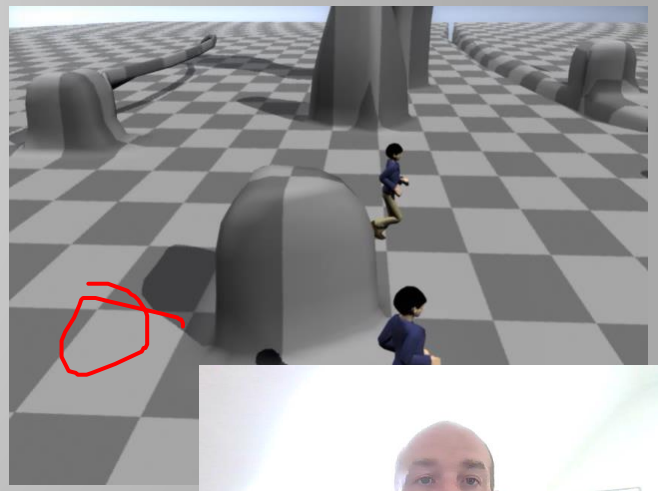
The development of the tree is guided by the goal

Can provide exact time parameterization

Can limitedly consider dynamic environments







Lau, M., & Kuffner, J. J. (2005, July). Behavior planning for character animation. In *Proceedings of the 2(* *SIGGRAPH/Eurographics symposium on Computer animation* (pp. 271-280). ACM.

[Kallmann 08] Grasping

Off-line: compute a graph of self collision-free motions for arms

Edge cost also depends on comfort

On-line: paths are tested against environment obstacles to plan grasping motions

Kallmann, M., Aubel, A., Abaci, T., & Thalmann, D. (2008, August). Planning collision-free reaching mo
interactive object manipulation and grasping. In *ACM SIGGRAPH 2008 classes* (p. 58). ACM.