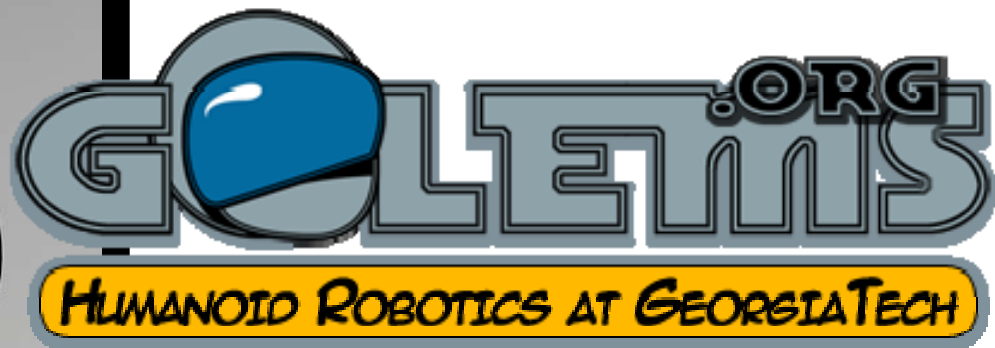




Planning Environment Interaction

Mike Stilman

**Assistant Professor
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Real World





MacGyver Robots

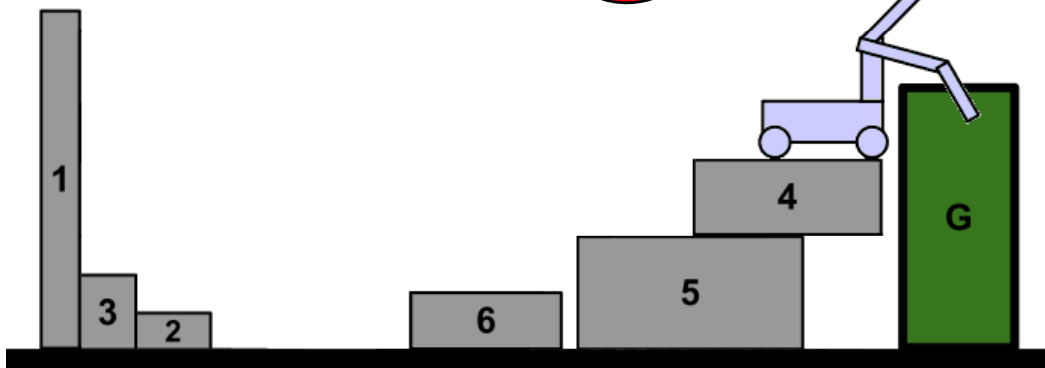
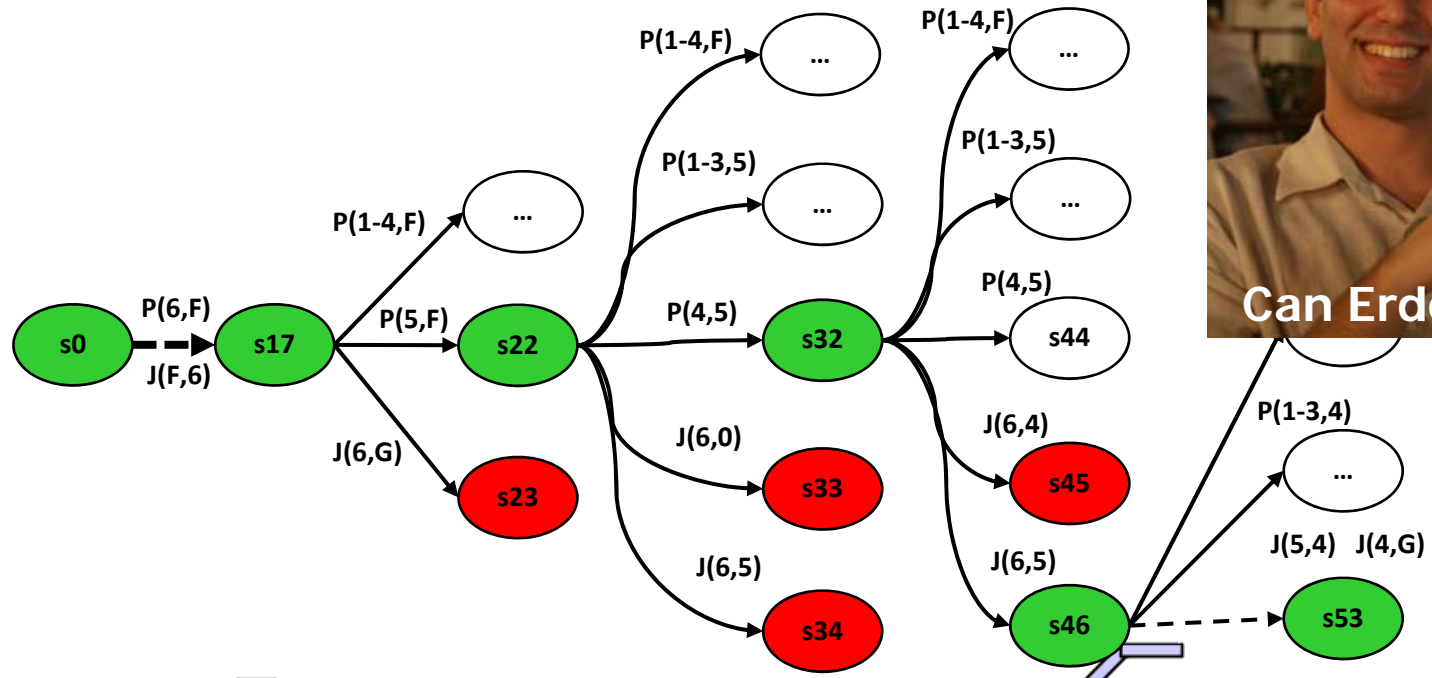




**Golem Krang 'MacGyver' Abilities
USING ENVIRONMENT OBJECTS AS TOOLS**



Planning in Constraint Space (ICRA 13)





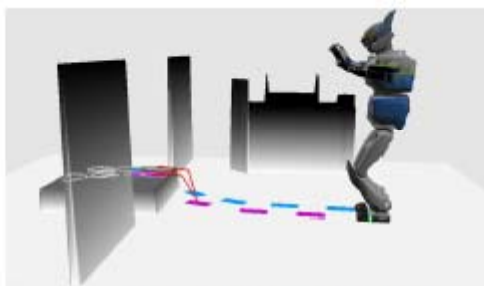
Constraint Relaxation (Submitted to ICRA 14)



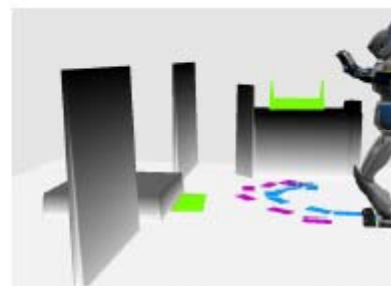
**Martin Levihn
with AIST**



(a) Start configuration



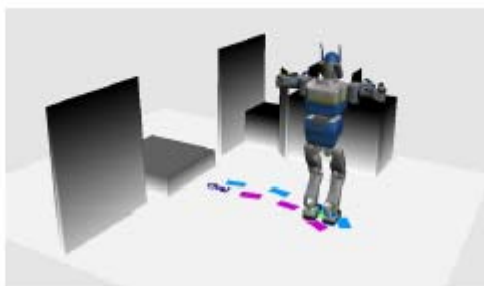
(b) Constraint relaxed planning output



(c) Constraint resolution output



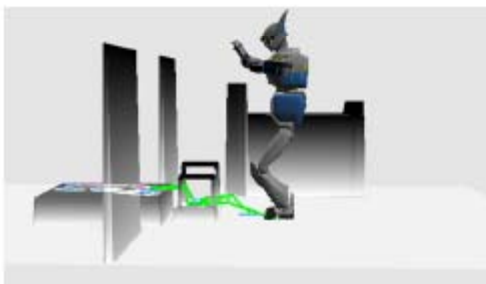
(d) Configuration after object pickup



(e) Drop planning output



(f) Drop motion execution



(g) Constraint relaxed planning output



(h) Locomotion to goal configuration



(i) Final configuration

Autonomous Environment Manipulation to Assist Humanoid Locomotion

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