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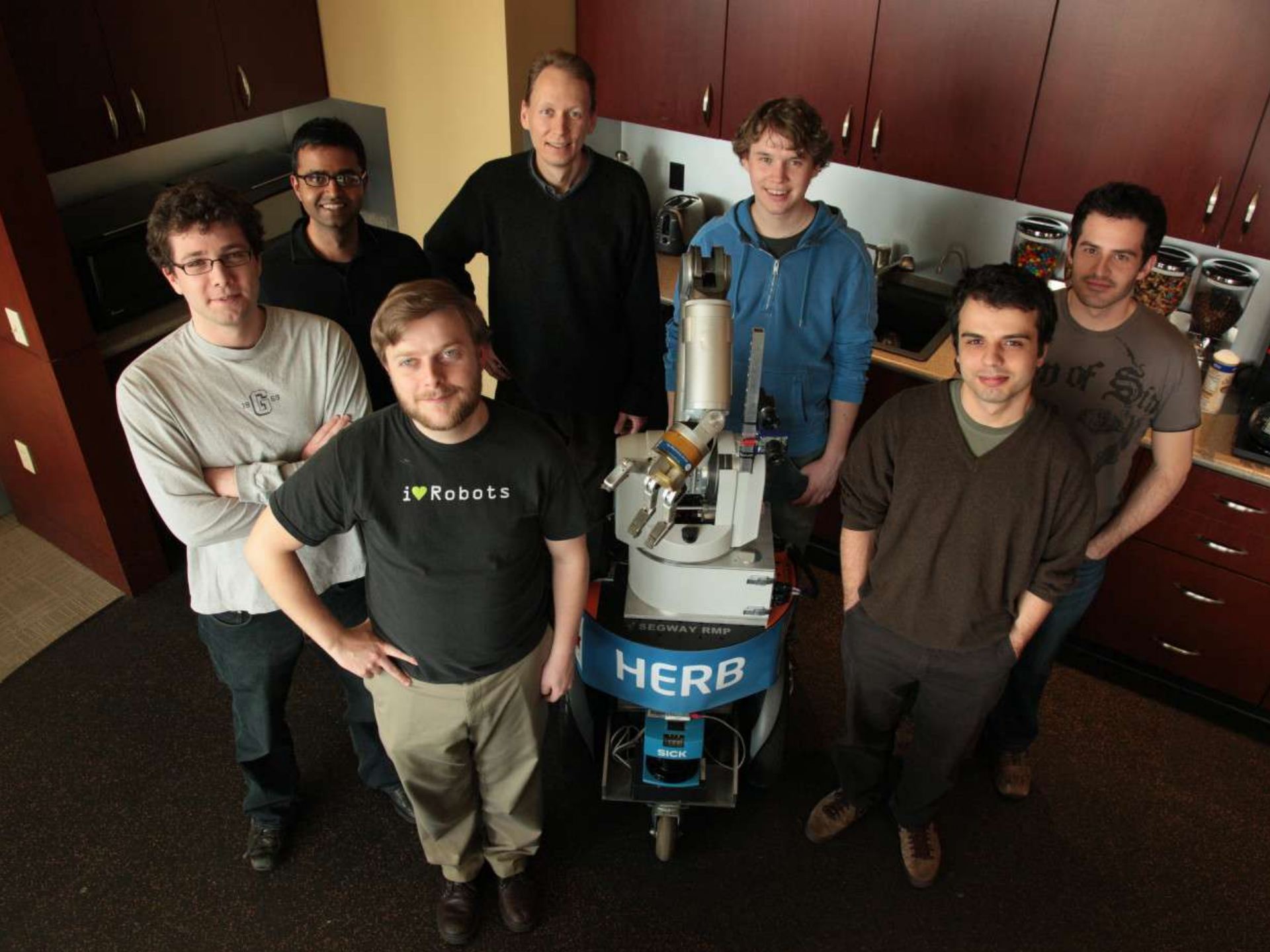
Intel Pittsburgh

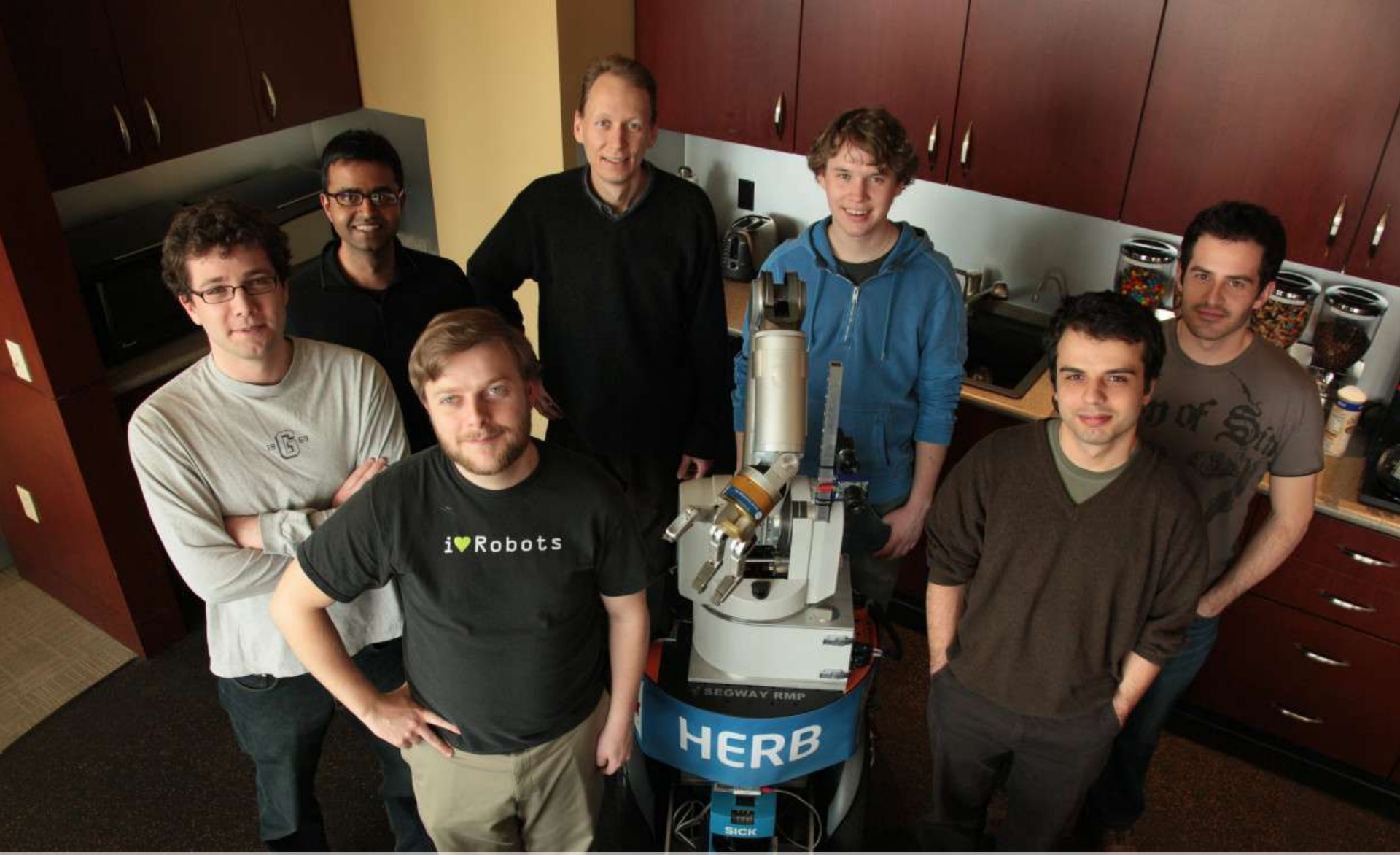
Manipulation Lab

The Robotics Institute

Carnegie Mellon University


intel
Intel Research
Pittsburgh
SEGWAY RMP
HERB
SICK


i♥Robots
SEGWAY RMP
HERB
SICK



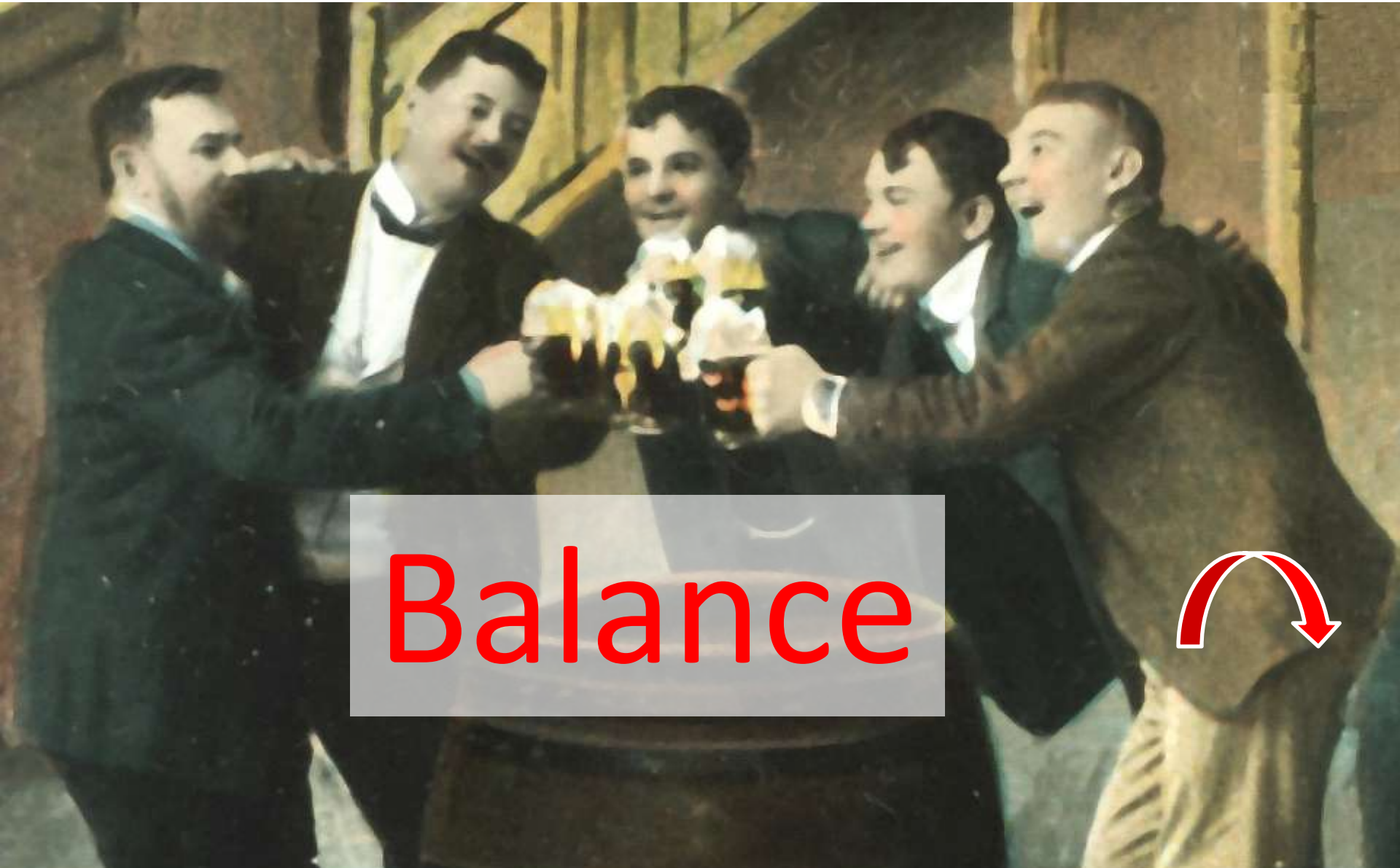
Manipulation Planning

Constraints

Constraints

Constraints

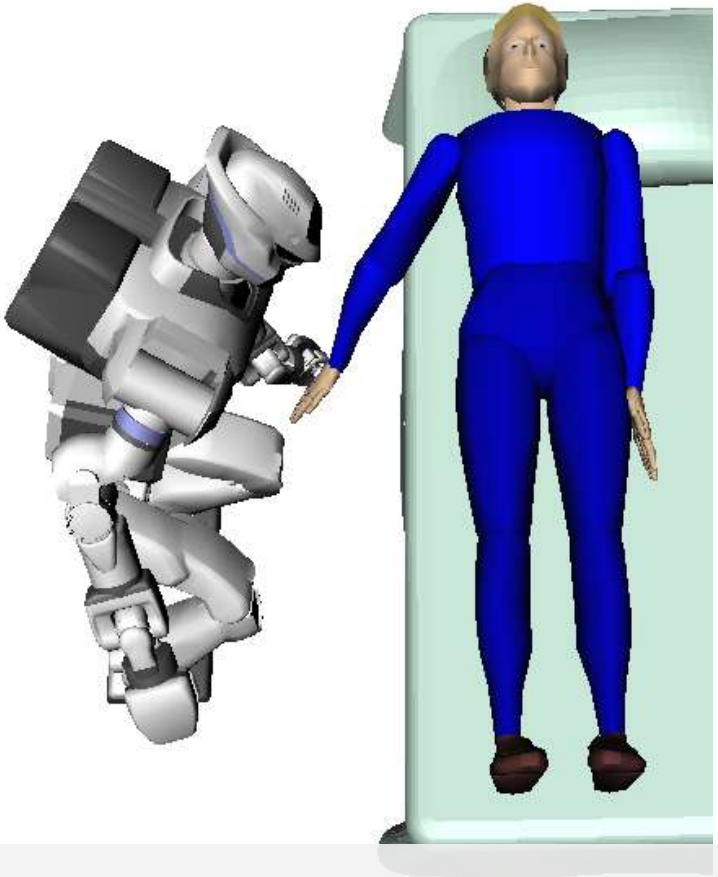
Constraints



Constraints

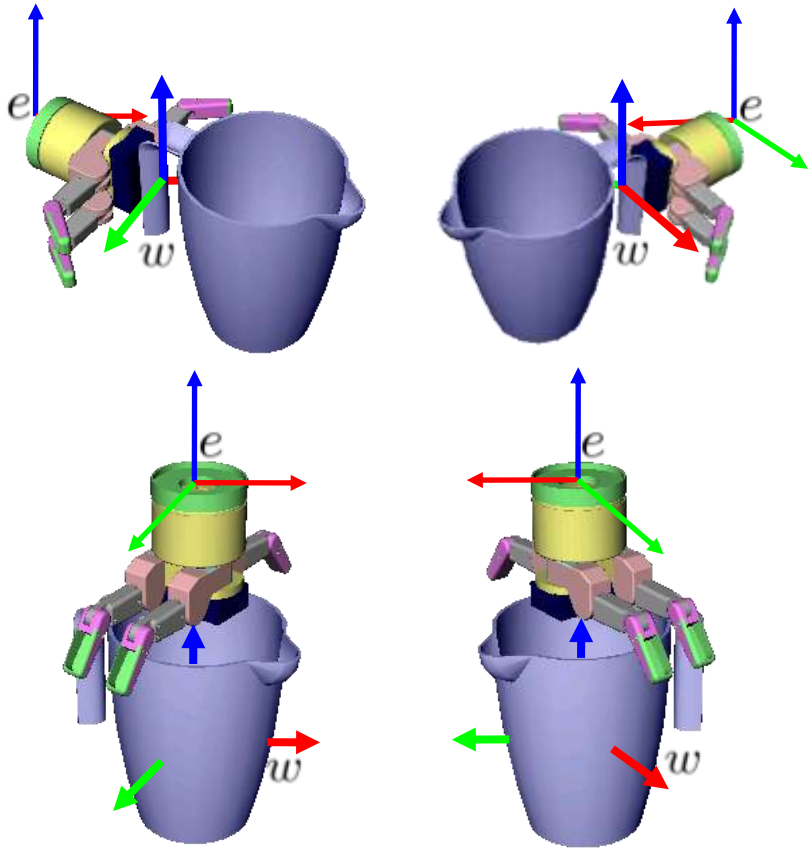
Closed Chains

Constraints



Underactuation

Affordances



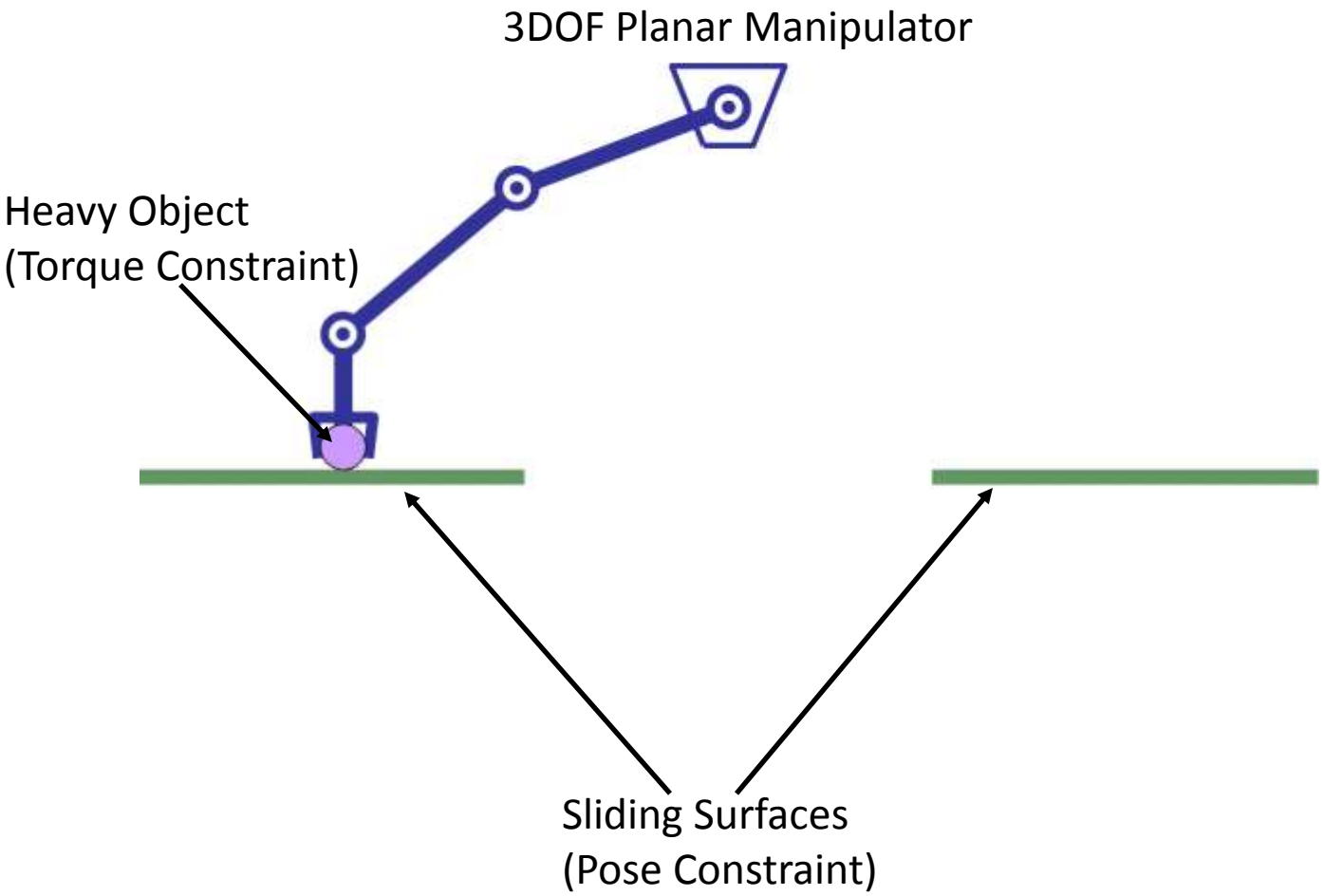
Goal Sets

Affordances

Goal Sets

Why is this hard?

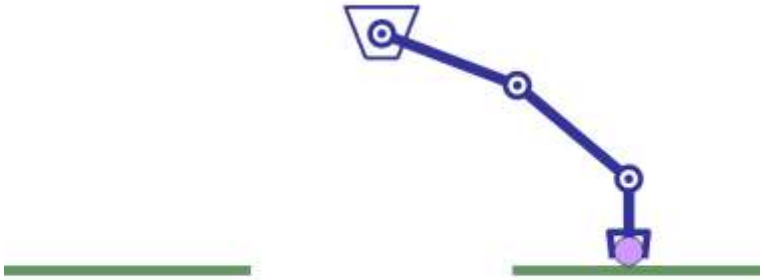
Representation

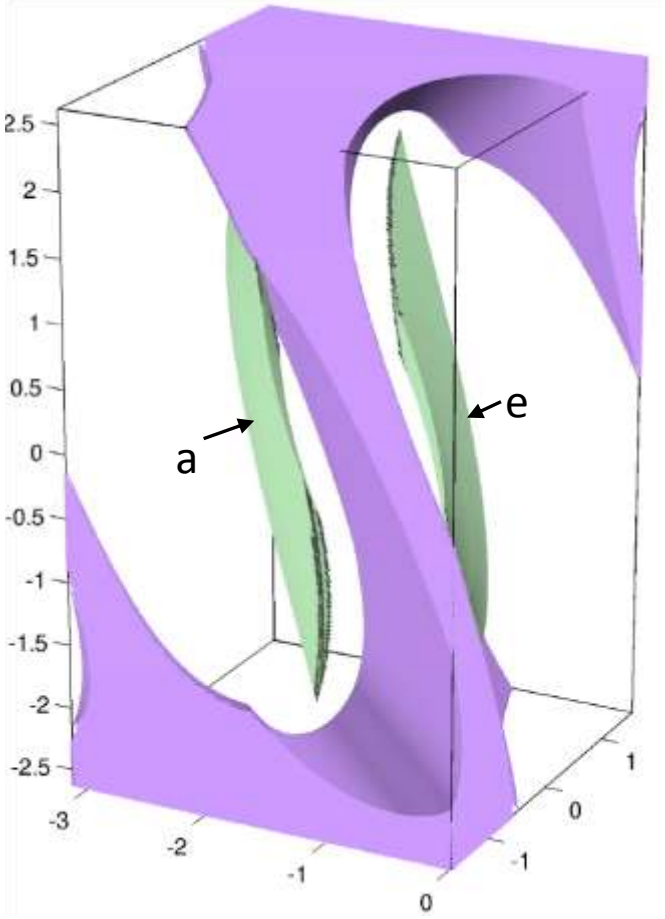


Representation

a:

e:

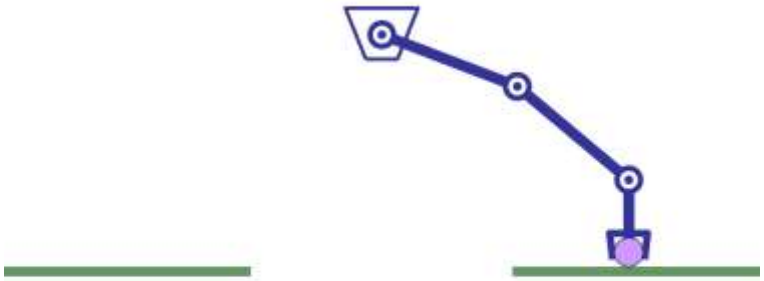


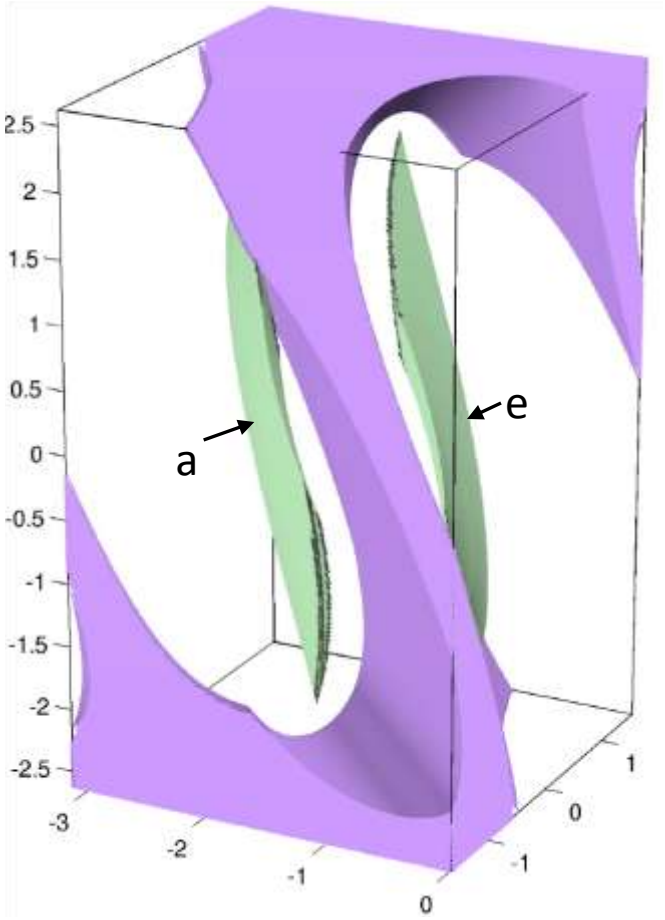


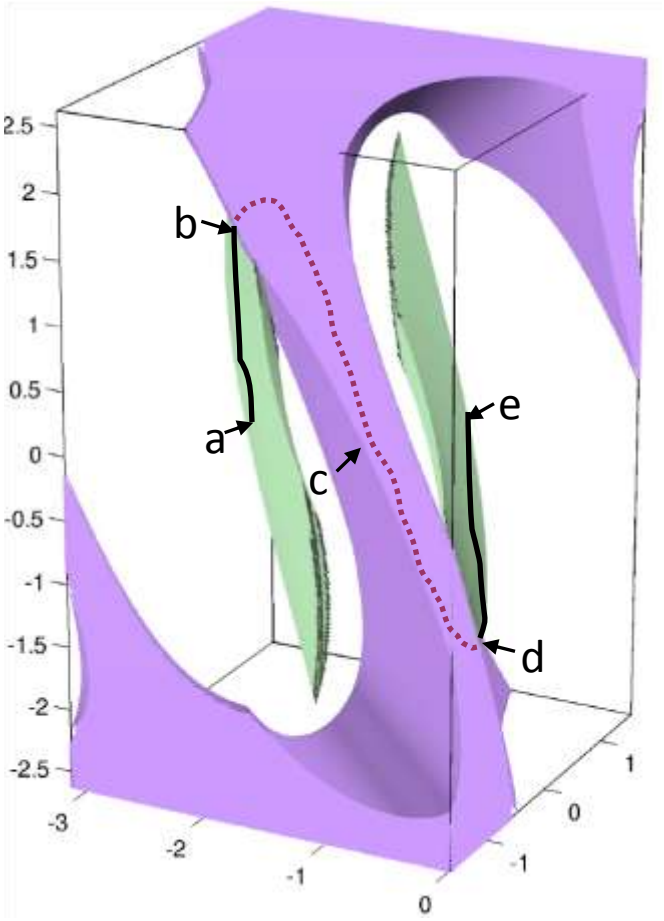
Search

a:

e:



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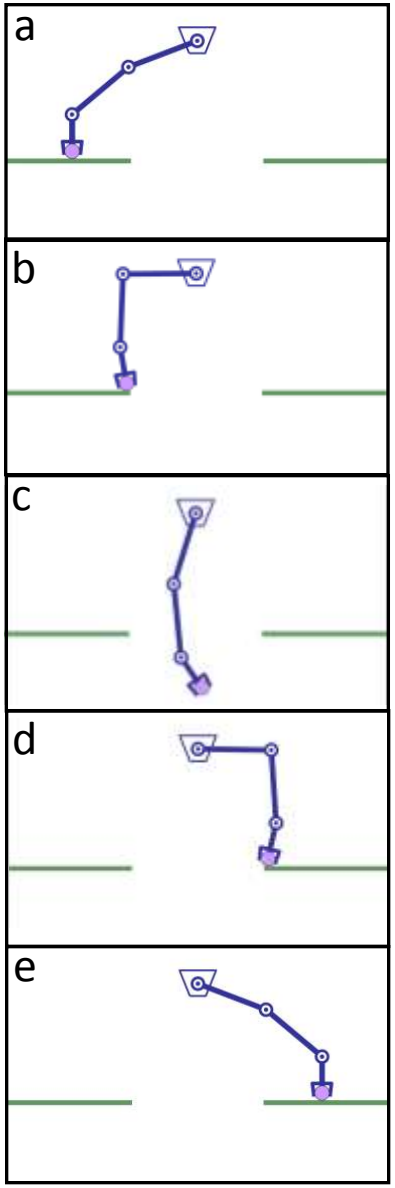
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-2
-1
0
1
0
-1
b
a
c
e
d


a
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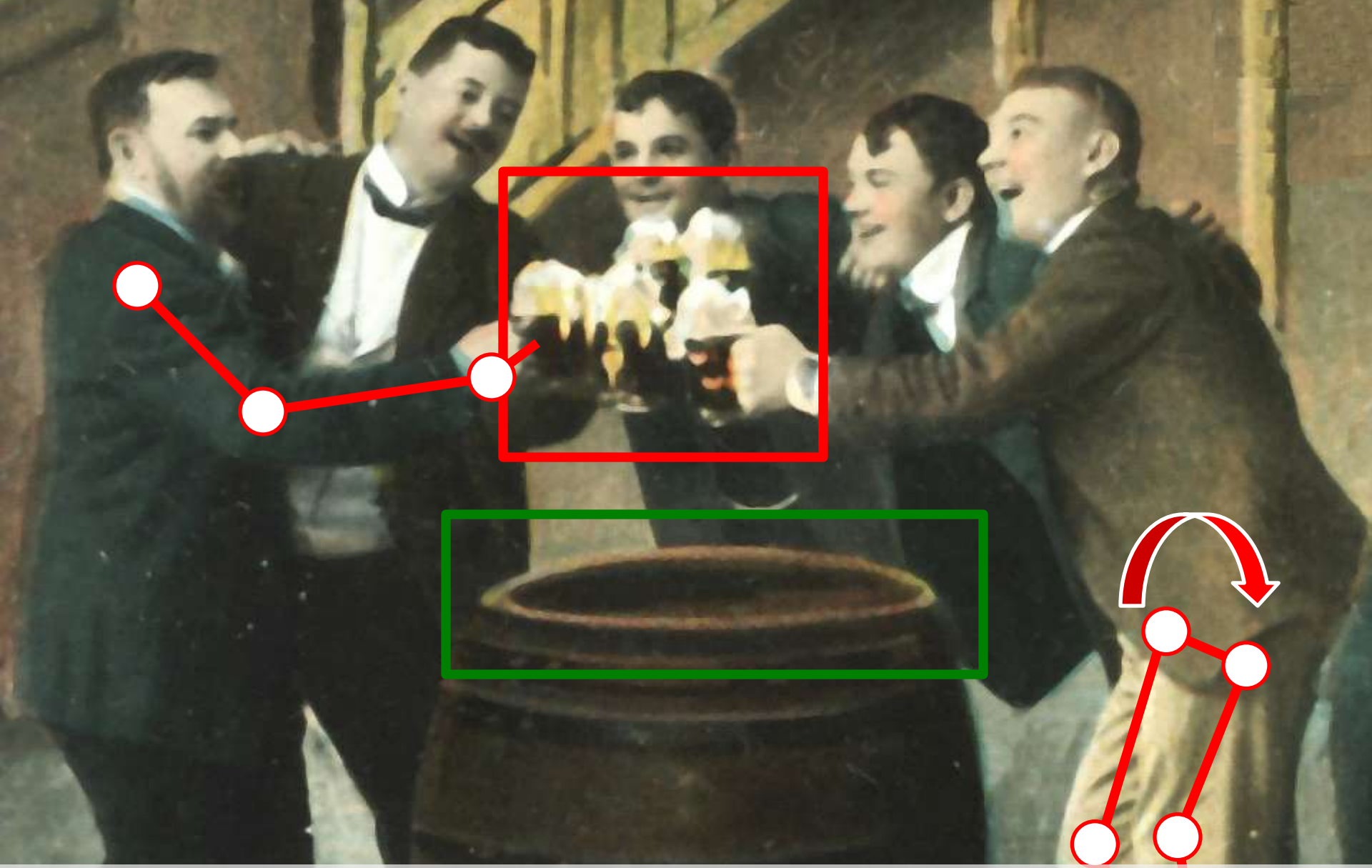
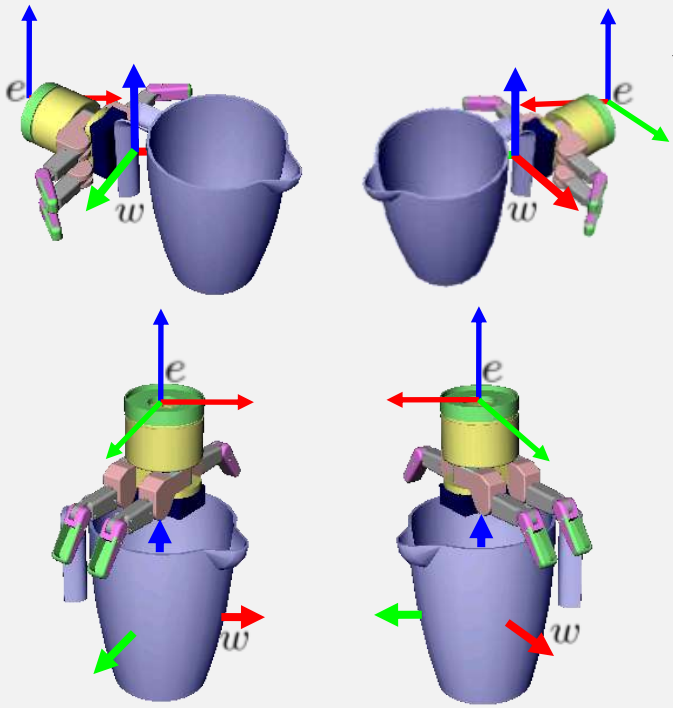
c
d
e



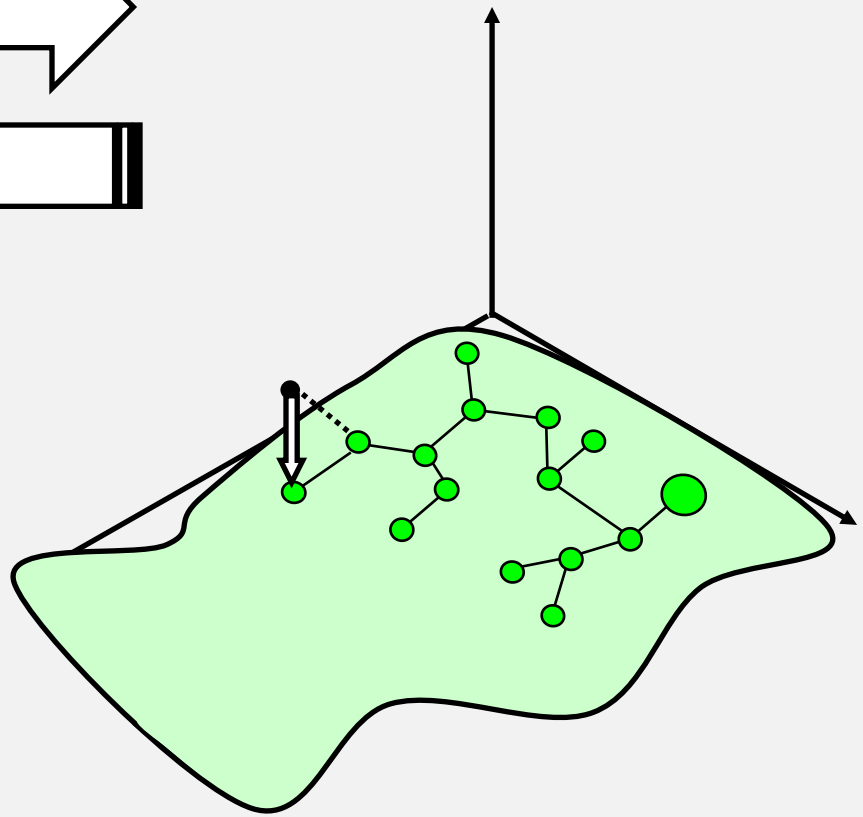
Point Solutions Exist

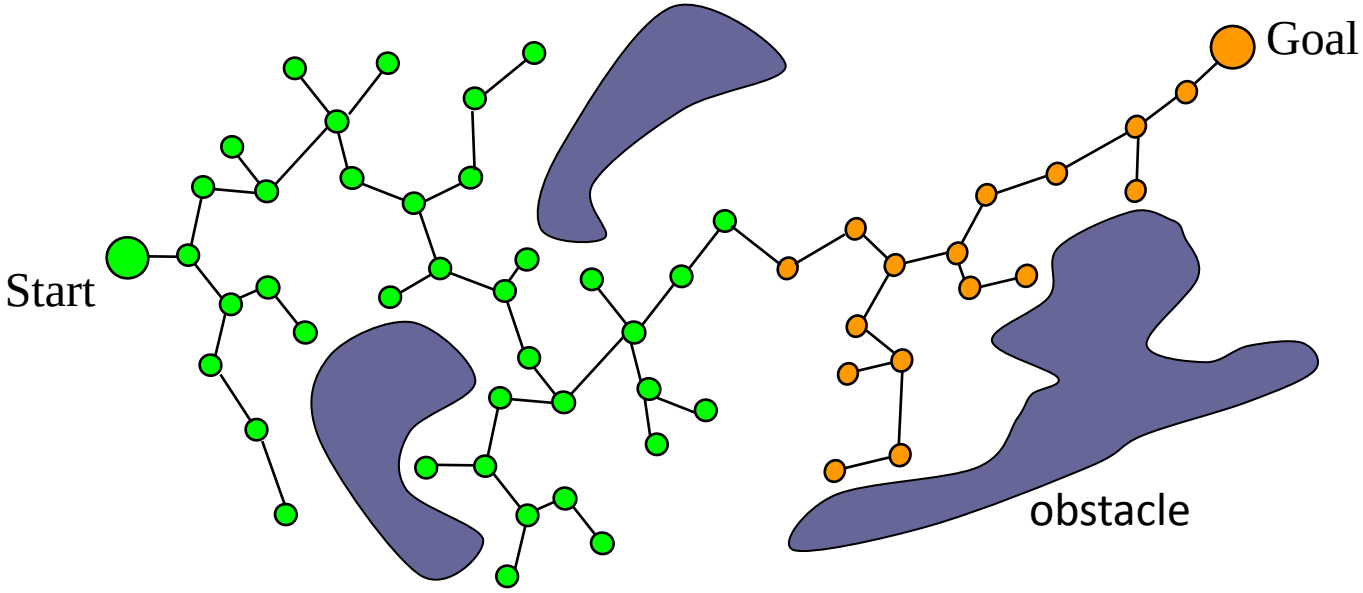

x3

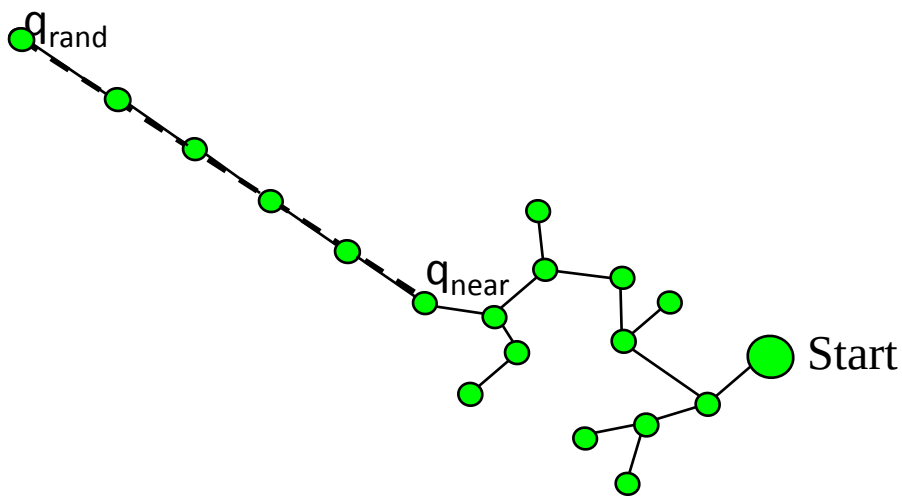
Task Space Regions

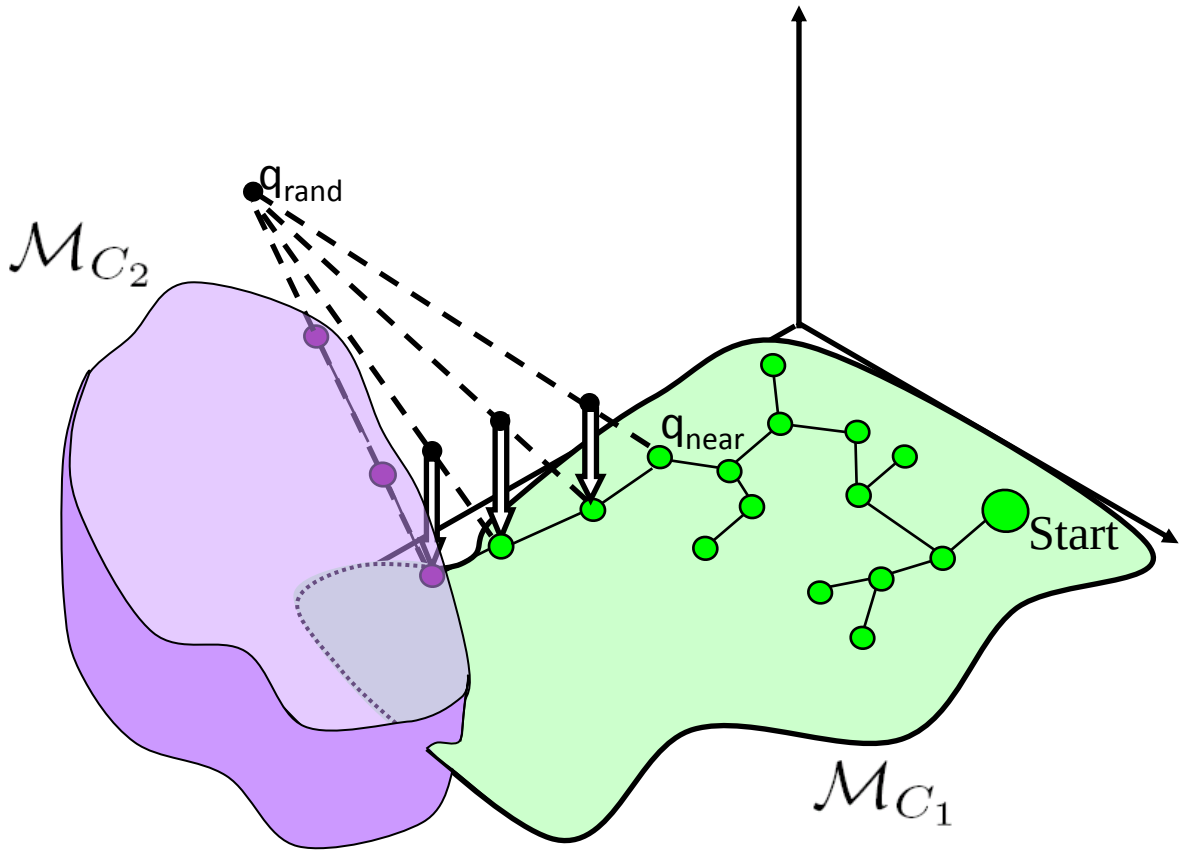


cBiRRT




Goal
Start
obstacle


q_{rand}
q_{near}
Start


q_{rand}
$\mathcal{M}_{C_2}$
q_{near}
Start
$\mathcal{M}_{C_1}$

Will this work?

- Properties of P
- Implementing P
- Manifold Coverage
- Exploration
- Probabilistic Completeness
- **How does it work on a real robot?**

Yes [IJRR'10]

- Properties of P [ICRA'10]
- Implementing P [ICRA'09a,b]
- Manifold Coverage [ICRA'10]
- Exploration [ICRA'10]
- Probabilistic Completeness [ICRA'10]
- How does it work on a real robot? [ICRA'09a,b IROS'09 Humanoids'09]


TLE
ettle

What’s next?

Manipulation Planning

What's next?

Fast

Feasbile

Geometric

Manipulation

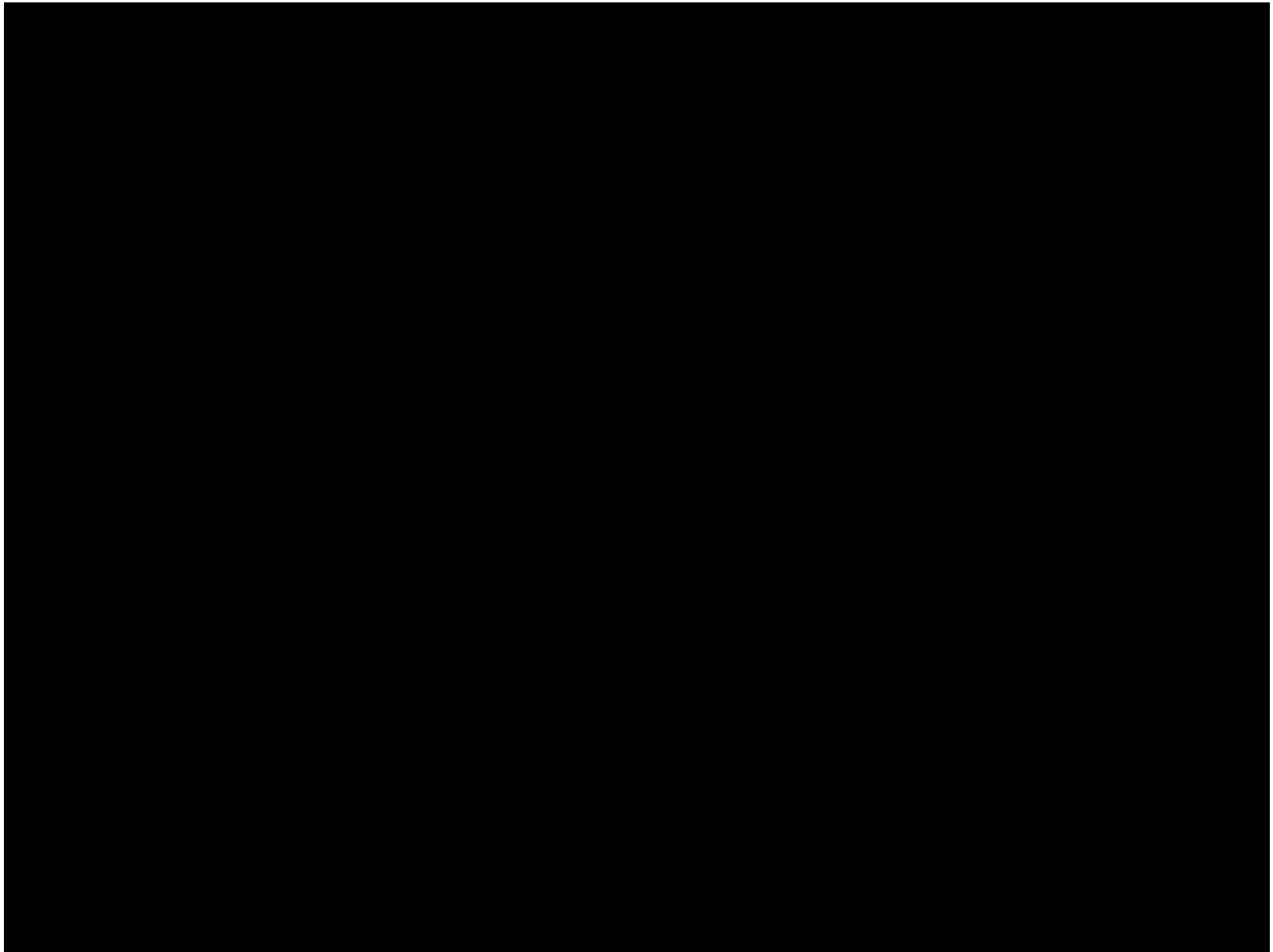
Planning

Geometry -> Physics

with Lillian Chang, Nancy Pollard, ICRA'10

Geometry -> Physics

with Mehmet Dogar, submitted IROS'10



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