The Potential of Affordance Wayfields

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Affordance Wayfields for Task and Motion Planning

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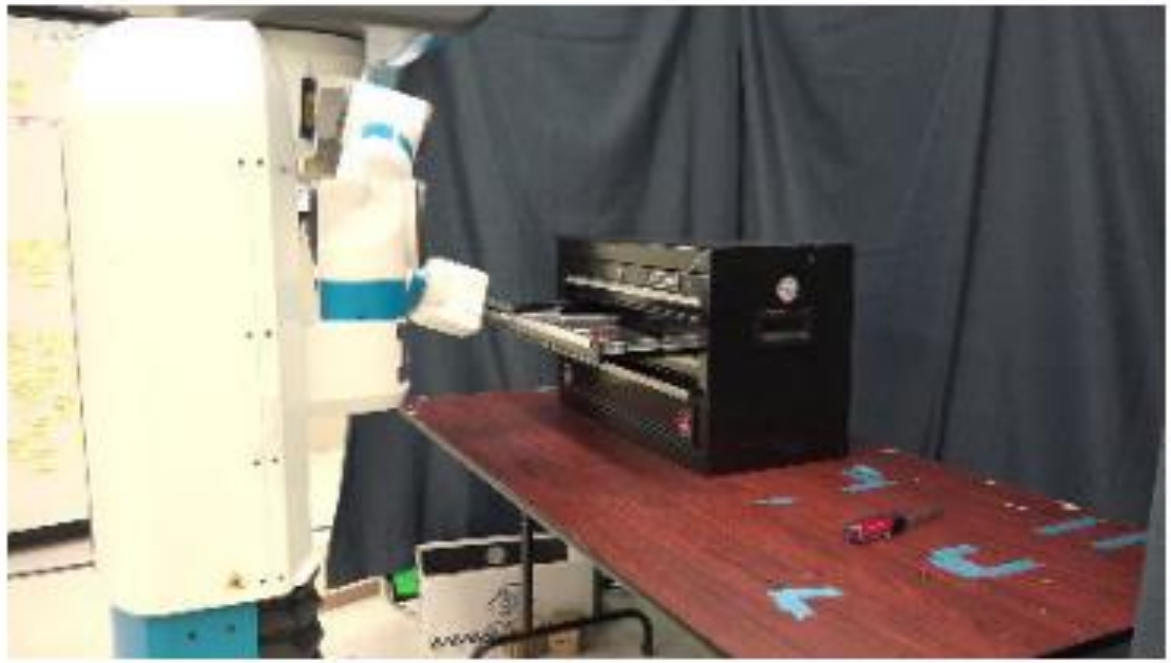
Object Affordances

- Beyond pick-and-place
- Action possibilities



Affordance Wayfields

- Regions of configuration space
- Objective functions mapped over configuration space

Screwdriver Task

- Move along axis of motion

$$\phi_u$$

- Move towards goal location

$$\phi_m$$

- Move using screwing motion

$$\phi_s$$

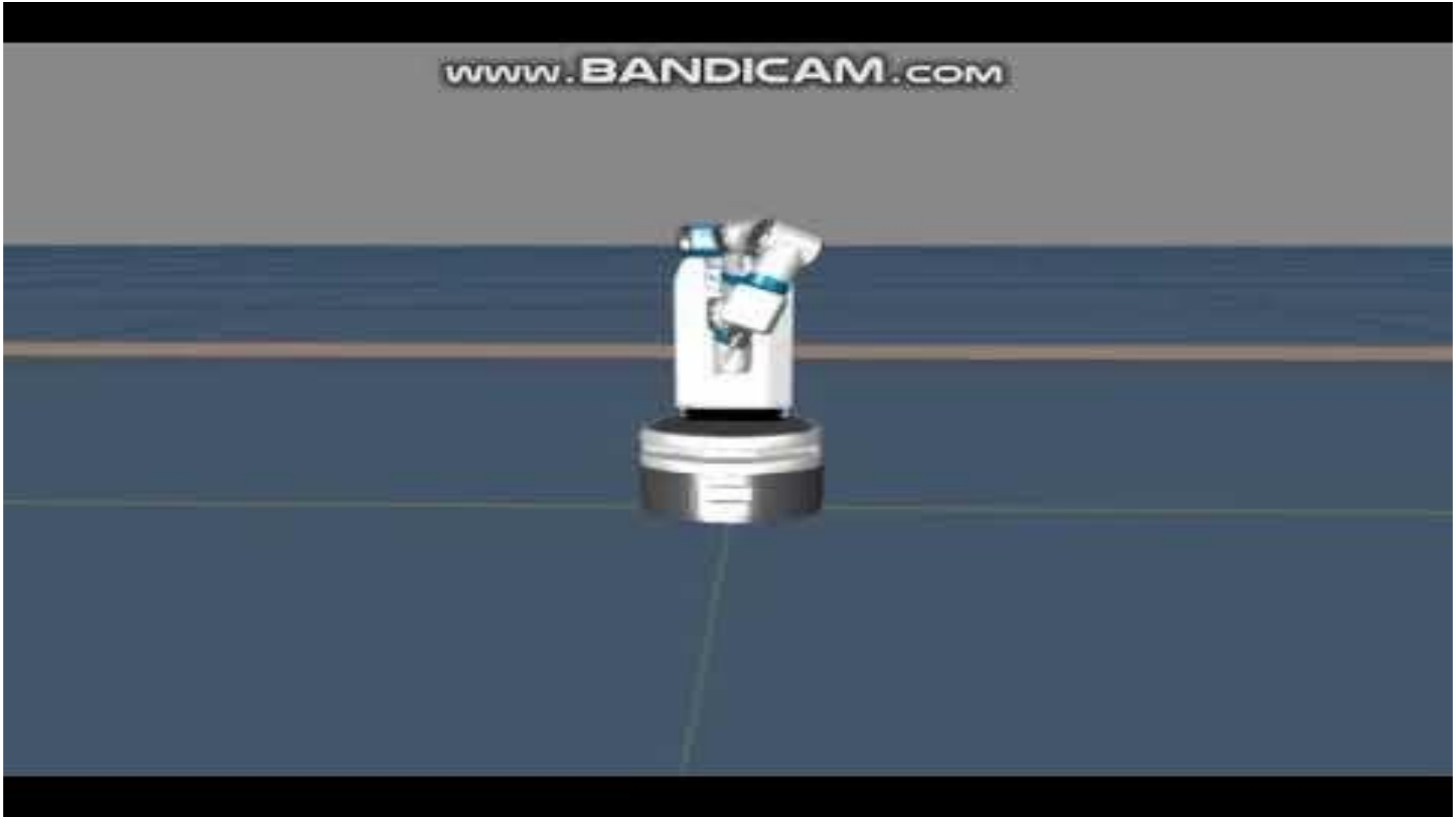
Screwdriver Task

- Compose potentials

$$\phi_u \triangleleft \phi_m, \phi_s$$

- Compute total change in configuration

$$\frac{\partial \mathbf{q}}{\partial t} = \frac{\partial \mathbf{q}_s}{\partial t} + \frac{\partial \mathbf{q}_m}{\partial t} + \mathcal{N} \frac{\partial \mathbf{q}_u}{\partial t}$$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Drawer Task

- Move along axis of motion

$$\phi_u$$

- Move towards goal location

$$\phi_m$$

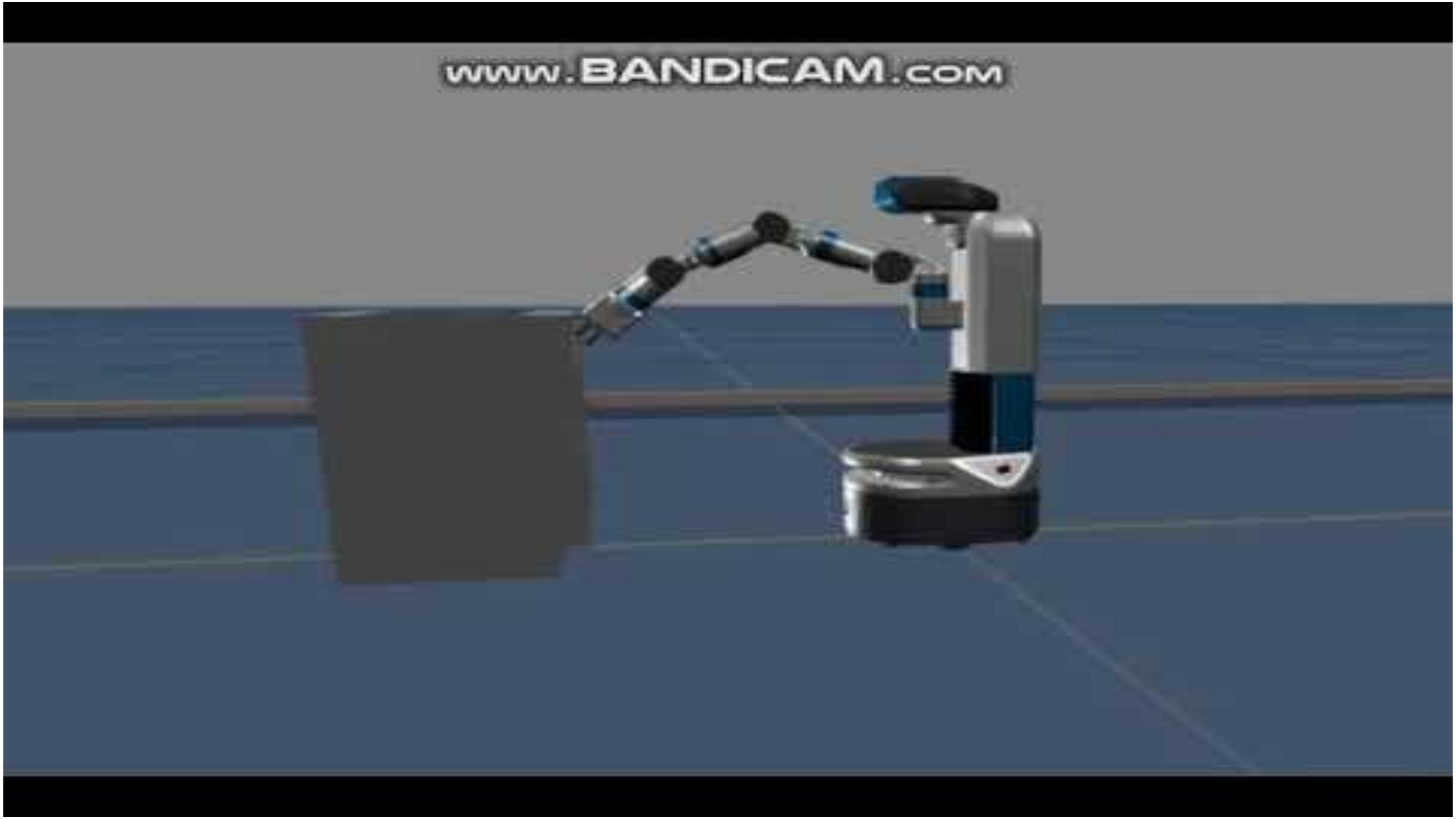
Drawer Task

- Compose potentials

$$\phi_u \lhd \phi_m$$

- Compute total change in configuration

$$\frac{\partial \mathbf{q}}{\partial t} = \frac{\partial \mathbf{q}_m}{\partial t} + \mathcal{N} \frac{\partial \mathbf{q}_u}{\partial t}$$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Conclusion

- Affordance wayfields as potential functions
- Importance of theoretical foundation