Fri Dec 7th 08:00 AM -- 06:30 PM @ Room 517 C

Workshop

Modeling the Physical World: Learning, Perception, and Control

Jiajun Wu · Kelsey Allen · Kevin Smith · Jessica Hamrick · Emmanuel Dupoux · Marc Toussaint · Josh Tenenbaum

Workshop Home Page

Jiajun Wu »

Kelsey Allen »

Kevin Smith »

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The origins of common sense

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How should we model the world ?

Many ways of conceptualizing models of physics in computational terms, each with their complementary strengths and weaknesses. Eg.,

- Physical simulation engines with “built-in” knowledge of physics, using symbolic (qualitative) or analytic (numerical) frameworks
- Neural network methods that learn approximate, differentiable system dynamics.

While more precise, symbolic models of physics might be useful for long-term prediction and physical inference, approximate, differentiable models might be more practical for inverse dynamics and system identification.

The design of a physical dynamics model fundamentally affects the ways in which that model can, and should, be used.

Questions for the day

- How do we choose among different paradigms for building and learning physical models: neural networks, physics engines, structured probabilistic generative models?
- How to combine model-based and model-free approaches to physical prediction?
- How to use physics models in higher-level tasks such as navigation, video prediction, robotics, etc.?
- How do perception and action interact with physical representations?
- How can we model and control the physical world more richly? Nonrigid objects, nonsolid substances, liquids, particulates, and hybrids (e.g., pouring into a glass from a pitcher of ice water).
- How can cognitive science and computational neuroscience inform the design of AI systems for physical intelligence?
- Development of new datasets or platforms for studying physical intelligence and its grounding for common sense.

08:40 AM	**Opening Remarks: Josh Tenenbaum** (Talk) *Josh Tenenbaum*
09:00 AM	**Talk 1: Zico Kolter** (Talk) *J. Zico Kolter*
09:30 AM	**Talk 2: Emo Todorov** (Talk) *Emanuel Todorov*
10:00 AM	**Contributed Talk 1: ChainQueen: A Real-Time Differentiable Physical Simulator for Soft Robotics** (Talk) *Andrew E Spielberg*
10:10 AM	**Contributed Talk 2: To Stir or Not to Stir: Online Estimation of Liquid Properties for Pouring Actions** (Talk) *Tatiana López-Guevara*
10:20 AM	**Contributed Talk 3: Learning Robotic Manipulation through Visual Planning and Acting** (Talk) *Angelina Wang*
10:30 AM	**Coffee Break 1 (Posters)** (Break) *Ananya Kumar, Siyu Huang, Huazhe Xu, Michael Janner, Parth Chadha, Nils Thuerey, Peter Y Lu, Maria Bauza, Anthony Tompkins, Guanya Shi, Thomas Baumeister, André Ofner, Zhi-Qi Cheng, Yuping Luo, Deepika Bablani, Jeroen Vanbaar, Kartic Subr, Tatiana López-Guevara, Devesh Jha, Fabian Fuchs, Stefano Rosa, Alison Pouplin, Alex Ray, Qi Liu, Eric Crawford*
11:00 AM	**Talk 3: Jitendra Malik** (Talk) *Jitendra Malik*
11:30 AM	**Talk 4: Chelsea Finn - An agent that can do many things (by modeling the world)** (Talk) *Chelsea Finn*

02:00 PM	**Talk 5: Peter Battaglia** (Talk) *Peter Battaglia*
02:30 PM	**Talk 6: Dan Yamins** (Talk) *Daniel Yamins*
03:00 PM	**Coffee Break 2 (Posters)** (Break)
03:30 PM	**Talk 7: Jeannette Bohg - On perceptual representations and how they interact with actions and physical models** (Talk) *Christin Jeannette Bohg*
04:00 PM	**Talk 8: Leslie Kaelbling** (Talk) *Leslie Kaelbling*
04:30 PM	**Talk 9: Marc Toussaint** (Talk) *Marc Toussaint*
05:00 PM	**Panel Discussion**