ELEC 3210
Introduction to Mobile Robotics
Lecture 19

(Machine Learning and Infomation Processing for Robotics)

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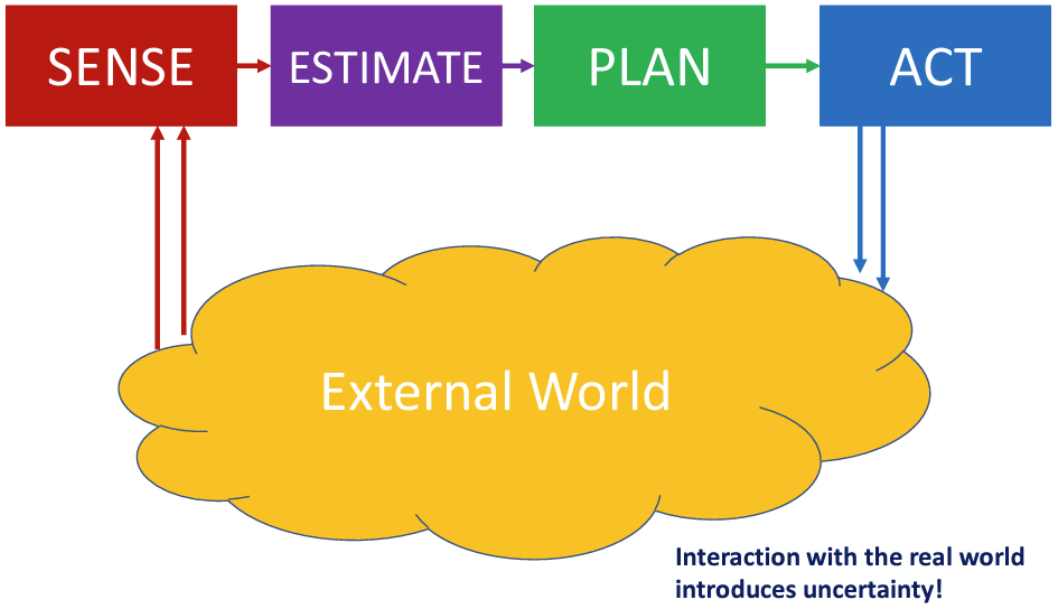
What we learned

- Sensing&Estimation - Estimate current and past robot pose
- Planning - Generate future robot pose
- Control - Stabilize robot pose



Courtesy: Nikolay Atanasov, PyPose Video

What we missed

- Robot Motion and Control (ELEC 4220 Prof Fumin Zhang)
- Robotic Manipulation (ELEC 4220 Prof Fumin Zhang)
- Drones and VIO (ELEC 5660 Prof Shaojie Shen)
- Mechanism and Robot Design (Very important)
- etc

Why Robotics so hard?

- In ELEC 3210, Projects + Homeworks + Quizzes + etc.
- In real life
  - Less researchers, Roboticist << CV Experts
  - Pay less than CVer
  - Less papers and less citations
  - But more things to learn

Before you learn

When you deal with real problems

A Culture of Robotics Research

- Founder of Boston Dynamics, ~10 minutes

Courtesy: IROS

Future Robotics

Do we Need Precise Localization?

- We (human beings) do not need ``pose'' when walking
- We are walking in ``memory''
  - may be a high-level place recognition?

Bio-inspired SLAM

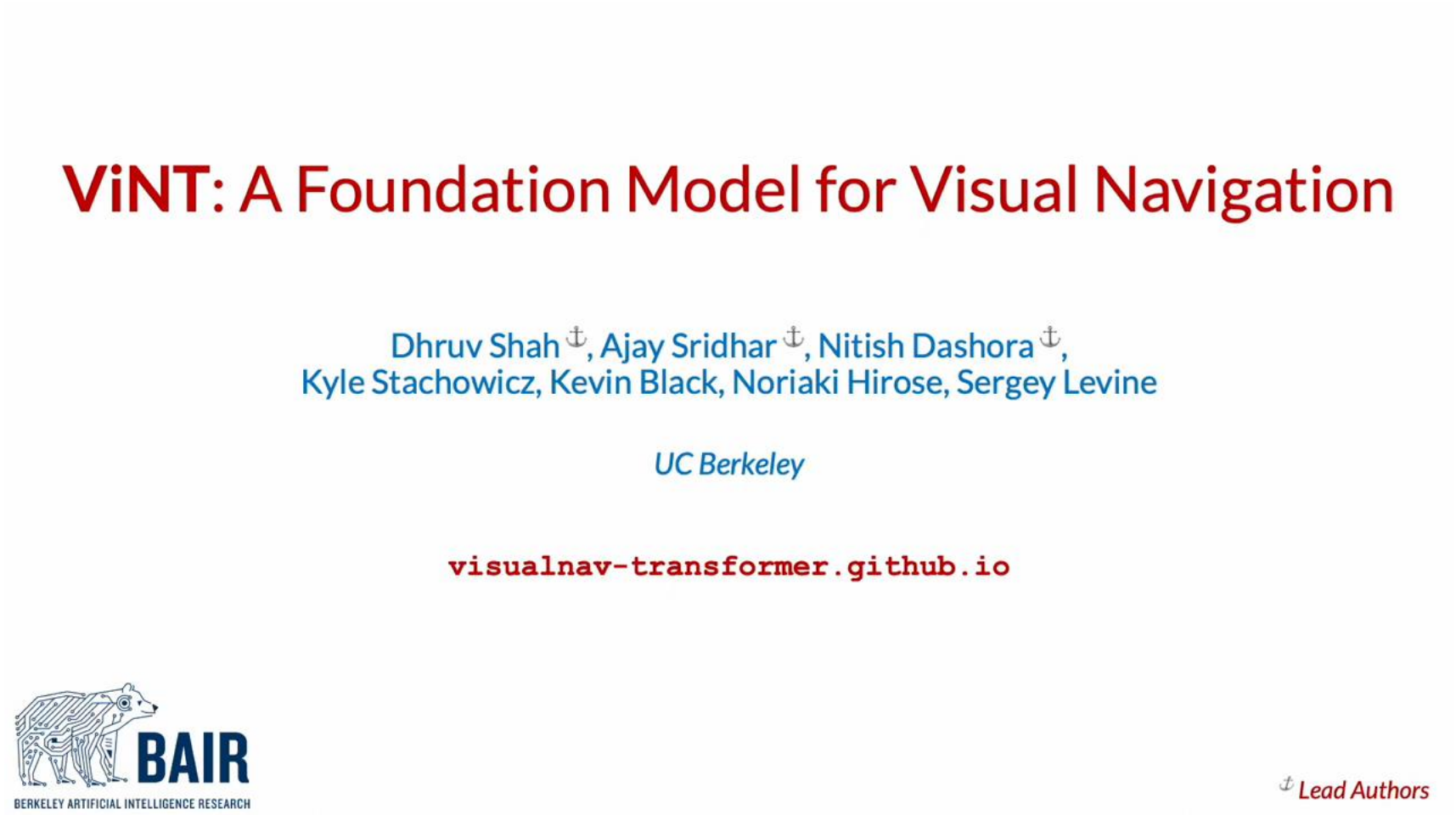
- Milford MJ, Wyeth GF, Prasser D. **RatSLAM: a hippocampal model for simultaneous localization and mapping**. InIEEE International Conference on Robotics and Automation, 2004. Proceedings. ICRA'04. 2004 2004 Apr 26 (Vol. 1, pp. 403-408). IEEE.

Courtesy: Michael Milford

Robot Learning

- Learning should be everywhere
- Do we need traditional model-based approaches nowadays?
  - Why commercial-used robot is still model-based?
  - Maybe a mixure mode in the future

Learn the Navigation



Courtesy: RAIL, UCB

Learn the Manipulation

RoboNinja:

Learning an Adaptive Cutting Policy for Multi-Material Objects

Zhenjia Xu Zhou Xian Xingyu Lin Cheng Chi Zhiao Huang
Chuang Gan† Shuran Song†

includes video narration

Courtesy: Robotics & Embodied Artificial Intelligence Lab

Thanks

- Public resources
- The two TAs
- Students that do not drop ELEC 3210

SFQ

- Don’t forget SFQ ☺
- Any suggestions are welcome to improve the course quality

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Quiz Time