

ELEC 3210

Introduction to Mobile Robotics

Lecture 19

(Machine Learning and Information Processing for Robotics)

Huan YIN

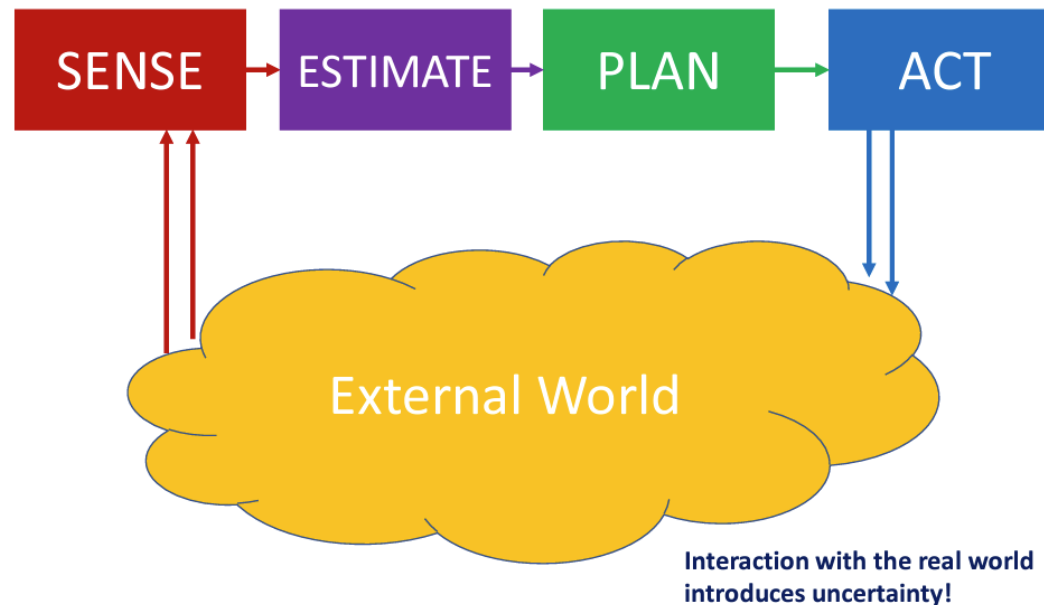
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What we learned

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



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, Robotician << 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



The video player interface displays the title "A Culture of Robotics Research" and the speaker's name "Marc Raibert" in large blue text. Below this, his titles "Executive Director, The AI Institute" and "Chairman, Boston Dynamics" are listed. The event is identified as the "IROS 35th Anniversary Forum" on "October 25, 2022". The top of the player shows the "IROS KYOTO 2022" logo and the full name of the conference: "IEEE/RSJ International Conference on Intelligent Robots and Systems". It also specifies the dates "October 23-27, 2022" and the location "Kyoto International Conference Center, Japan". A row of logos for IEEE, IEEE Robotics & Automation Society, IAS, RSJ, SICE, and NTF is present. On the right side of the player, there is a portrait of Marc Raibert, a man with glasses and a beard, wearing a blue patterned shirt. The video progress bar at the bottom indicates a duration of 0:00 / 1:00:39. The caption below the player reads "IROS 35th Anniversary Forum Plenary 2: Marc Raibert -- A Culture of Robotics Research".

IROS KYOTO 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems

October 23-27, 2022, Kyoto International Conference Center, Japan

A Culture of Robotics Research

Marc Raibert

Executive Director, The AI Institute
Chairman, Boston Dynamics

IROS 35th Anniversary Forum.

October 25, 2022

IROS 35th Anniversary Forum Plenary 2: Marc Raibert -- A Culture of Robotics Research

Future Robotics

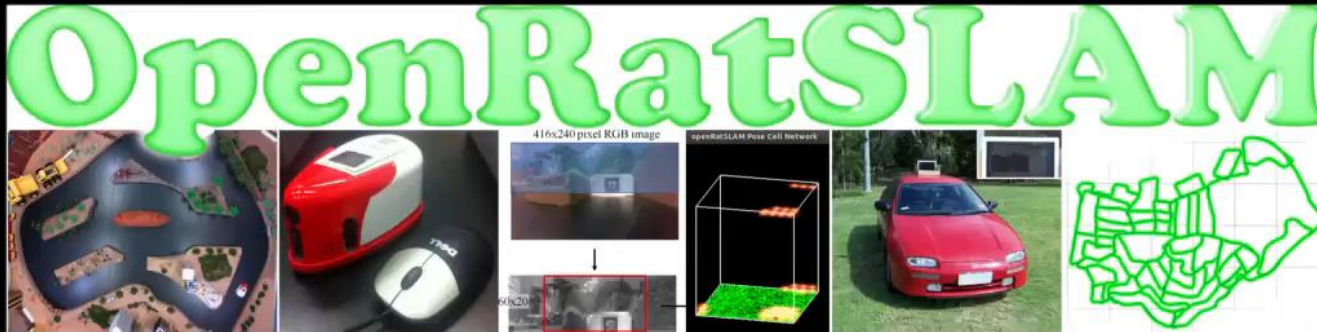
Do we Need Precise Localization?

- 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**. In IEEE International Conference on Robotics and Automation, 2004. Proceedings. ICRA'04. 2004 Apr 26 (Vol. 1, pp. 403-408). IEEE.



The code and datasets are open source and available from:
<https://code.google.com/p/ratslam/>

D Ball, S Heath, J Wiles, G Wyeth, P Corke and M Milford,
“OpenRatSLAM: an open source brain-based SLAM system”,
Autonomous Robots, 2013.
<http://link.springer.com/article/10.1007%2Fs10514-012-9317-9>



Robot Learning

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



Learn the Navigation

ViNT: A Foundation Model for Visual Navigation

Dhruv Shah[†], Ajay Sridhar[†], Nitish Dashora[†],
Kyle Stachowicz, Kevin Black, Noriaki Hirose, Sergey Levine

UC Berkeley

visualnav-transformer.github.io



[†] *Lead Authors*

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

Thanks



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

- Don't forget SFQ 😊
- Any suggestions are welcome to improve the course quality



**23-24-FALL-ELEC-3210-
L1-Instructor**

Student

<https://go.blueja.io/f6CqaKMy6kOGbjLf-OnKHA>



To access the evaluation, scan this QR code with your mobile phone.



**23-24-FALL-ELEC-3210-
L1-TSS**

Student

<https://go.blueja.io/ltZdso2PmUCy8Sn4rhzqHQ>



To access the evaluation, scan this QR code with your mobile phone.

Quiz Time