

AI Introduction & AI Agent

Human-Centric Computing 2019
Nick Wang

Official Welcome

- 採果機器人
- 物品歸位機器人
- 自動採草莓機器人
- 校園送餐車
- 核災應變機器人
- 智慧工廠自動化監控系統
- 水域機器人
- 情緒辨識系統

Duckietown



AI Driving/Robotics Summer School 2018



Duckiepond

Duckiepond: A Reproducible, Flexible, and
ML-Compatible Education and Research Platform for
a Fleet of Autonomous Maritime Vehicles

Ni-Ching Lin¹, Yu-Chich Hsiao¹, Yi-Wei Huang¹, Ching-Tung Hung², Tzu-Kuan Chuang¹,
Pin-Wei Chen¹, Jui-Te Huang¹, Chao-Chun Hsu¹, Andrea Censi⁴, Michael Benjamin³,
Chi-Fang Chen², and Hsueh-Cheng Wang^{1,*}

National Chiao Tung University, Taiwan¹

National Taiwan University, Taiwan²

Massachusetts Institute of Technology, USA³

ETH Zürich, Switzerland⁴

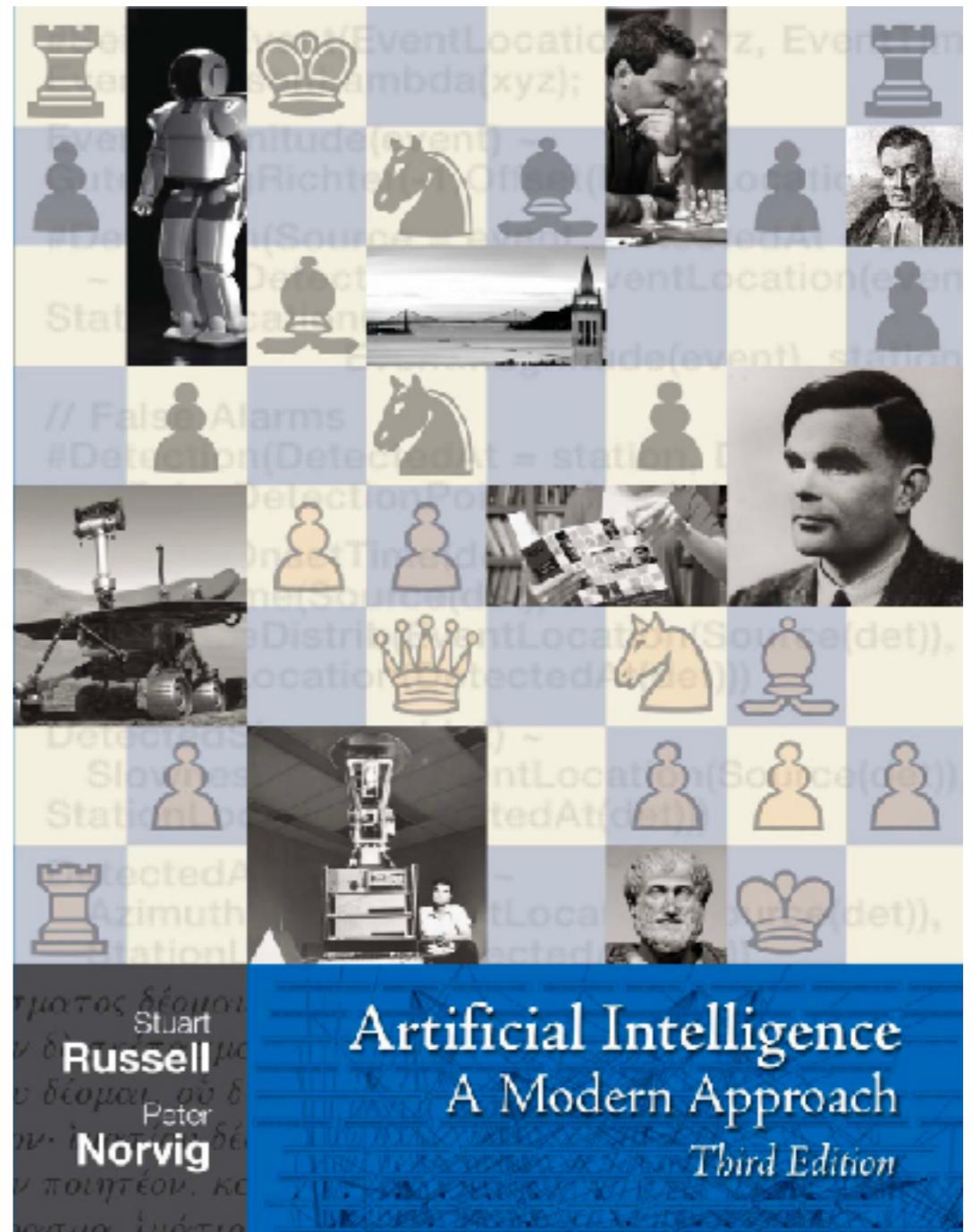
Manipulations

Reasoning Pose-aware Placing with Semantic Labels - Brandname-base
Affordance Prediction and Cooperative Dual-Arm Active Manipulation

Yung-Shan Su, Shao-Huang Lu, Po-Sheng Ser, Wei-Ting Hsu, Wei-Cheng Lai, Biao Xie,
Hong-Ming Huang, Teng-Yok Lee, Hung-Wen Chen, Lap-Fai Yu, Hsueh-Cheng Wang

Schedule for the Month

- 3/07 WS, Docker, Python
- 3/14 Search (BFS, DFS)
- 3/21 Navigation with A*
- 3/28 Checkpoint 1

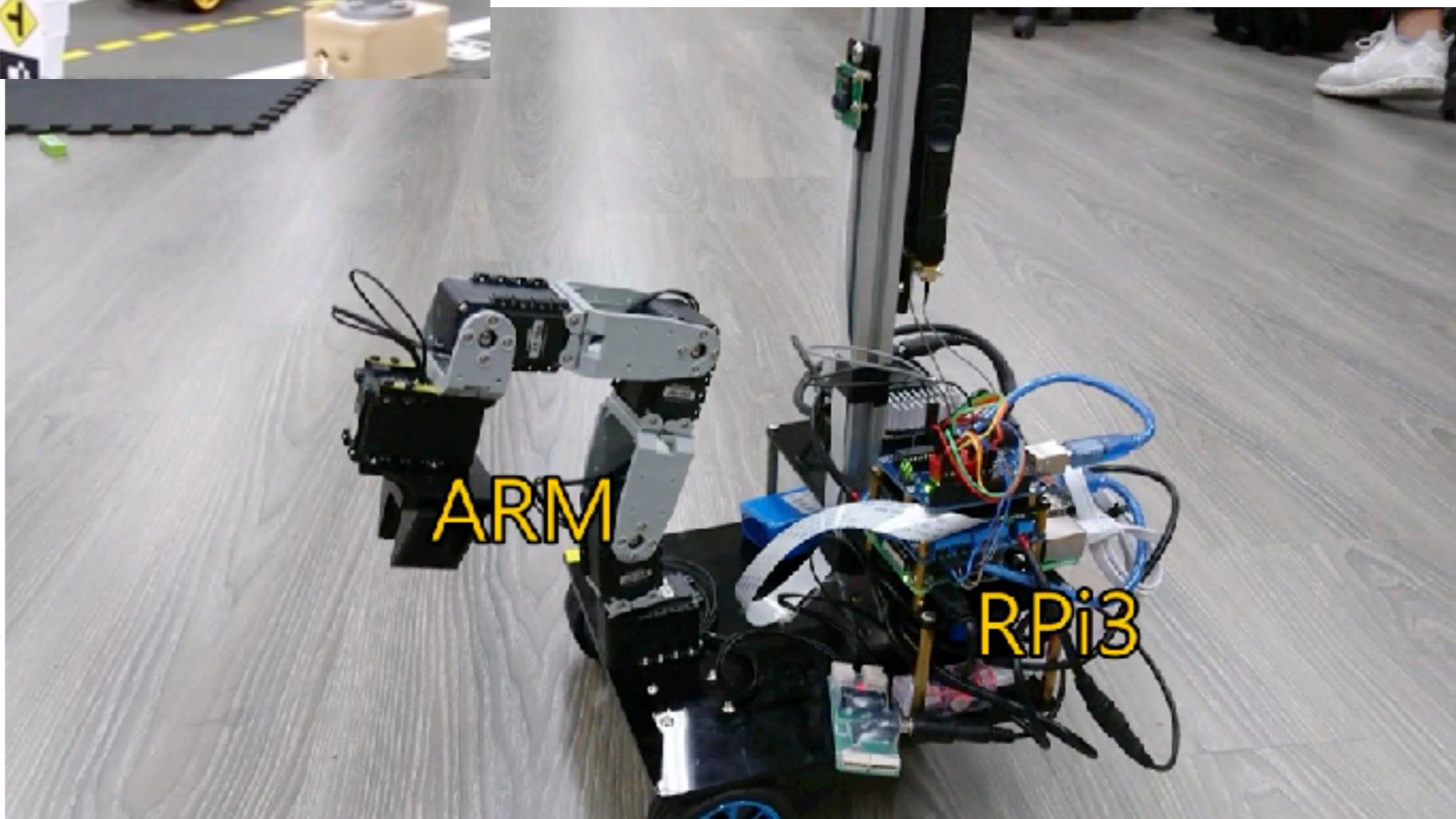


Platforms Available



- 採果機器人
- 物品歸位機器人
- 自動採草莓機器人

- 校園送餐車
- 智慧工廠自動化監控系統
- 情緒辨識系統

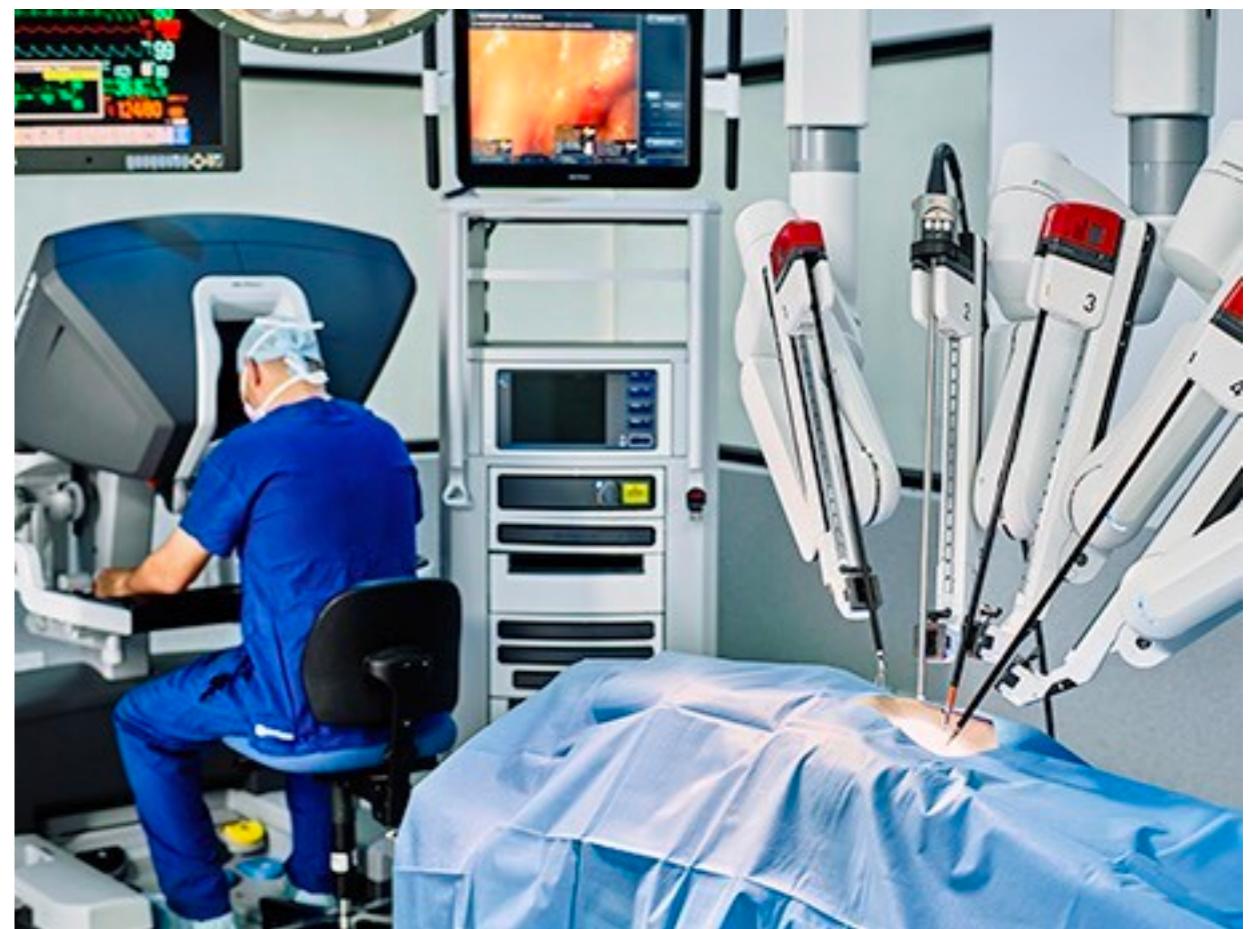
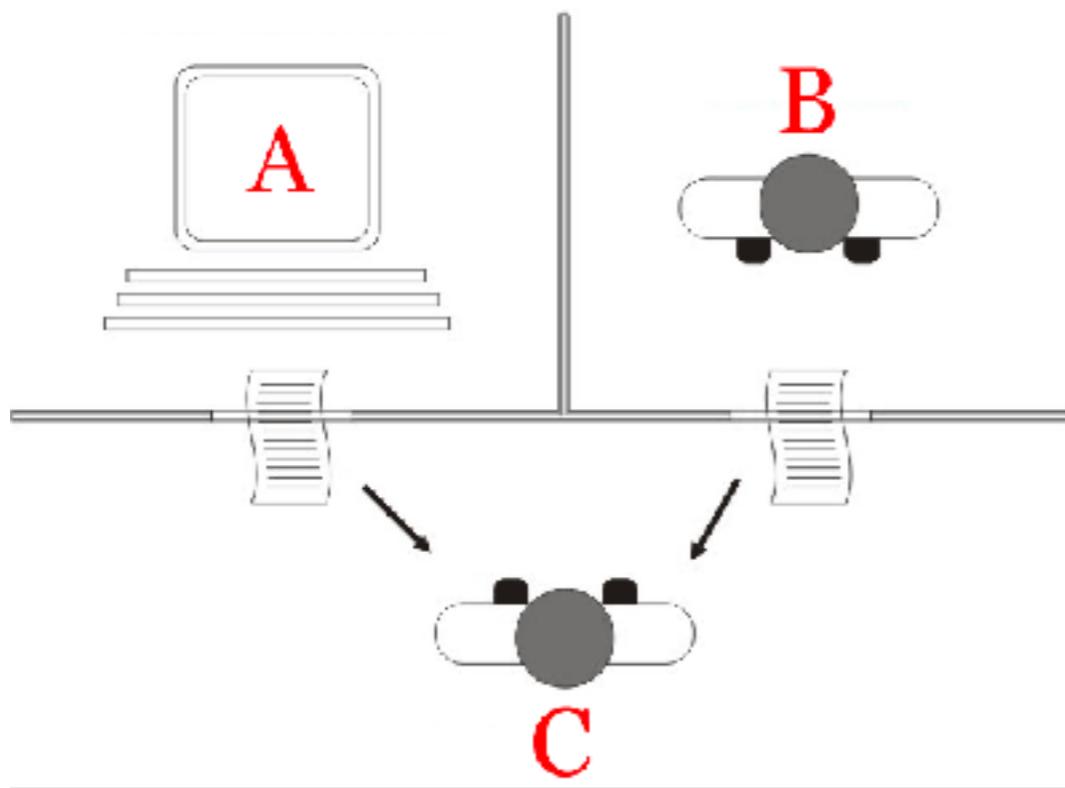


Schedule for the day

- Lecture
 - AI Introduction
 - Discussions
 - AI Agent
- Hands-on Materials
 - WS Access, ...

What is AI? AI vs. Robot

- Tuning Test
- What AI is not? da Vinci Surgical Robot? Chatbot?



Where do we learn about AI Robots?



What journalists think how well they work

Adapted from Dr. J. Xiao's slides



What we think how well they work

Adapted from Dr. J. Xiao's slides

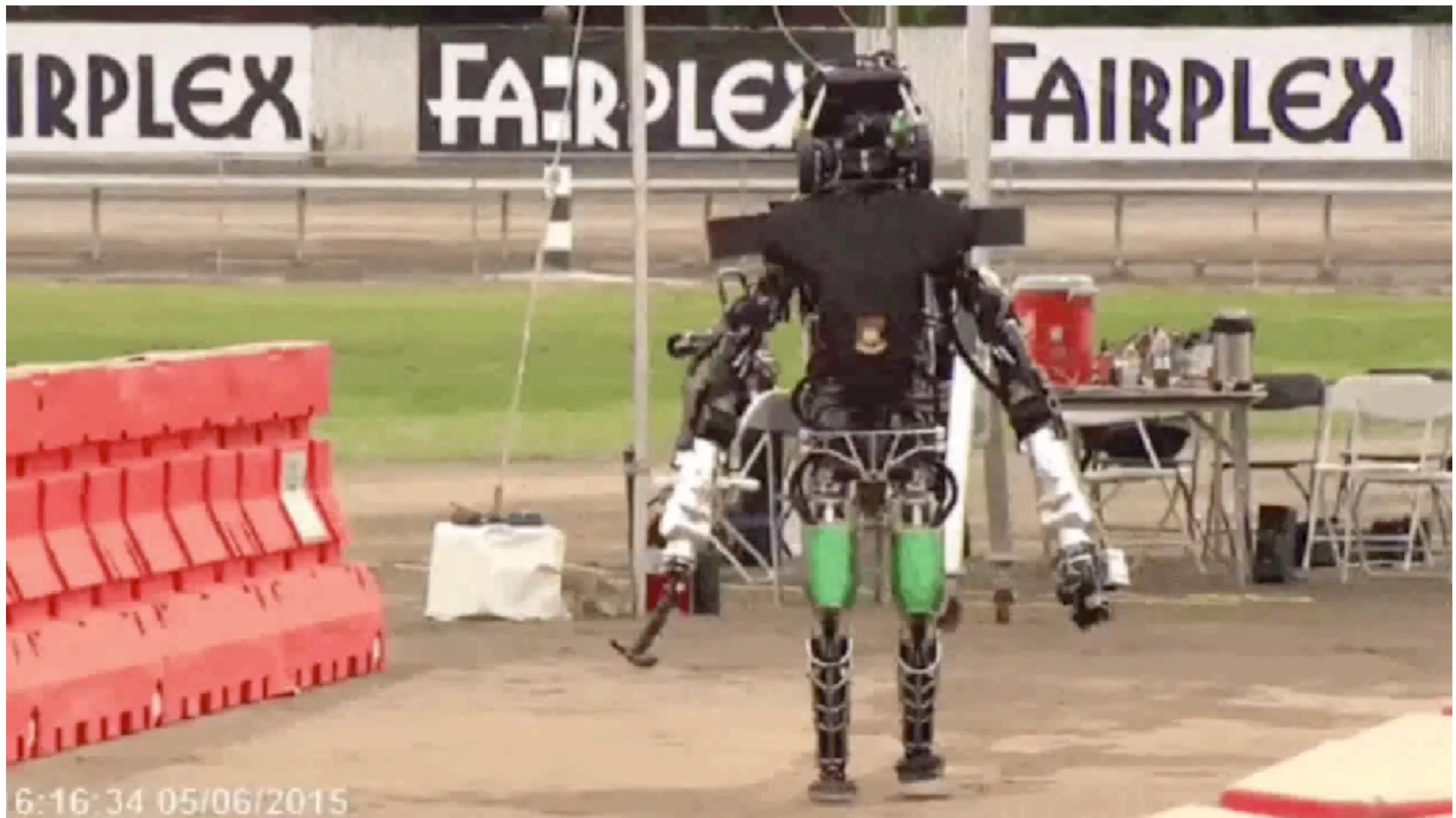
DRC 2013-2016



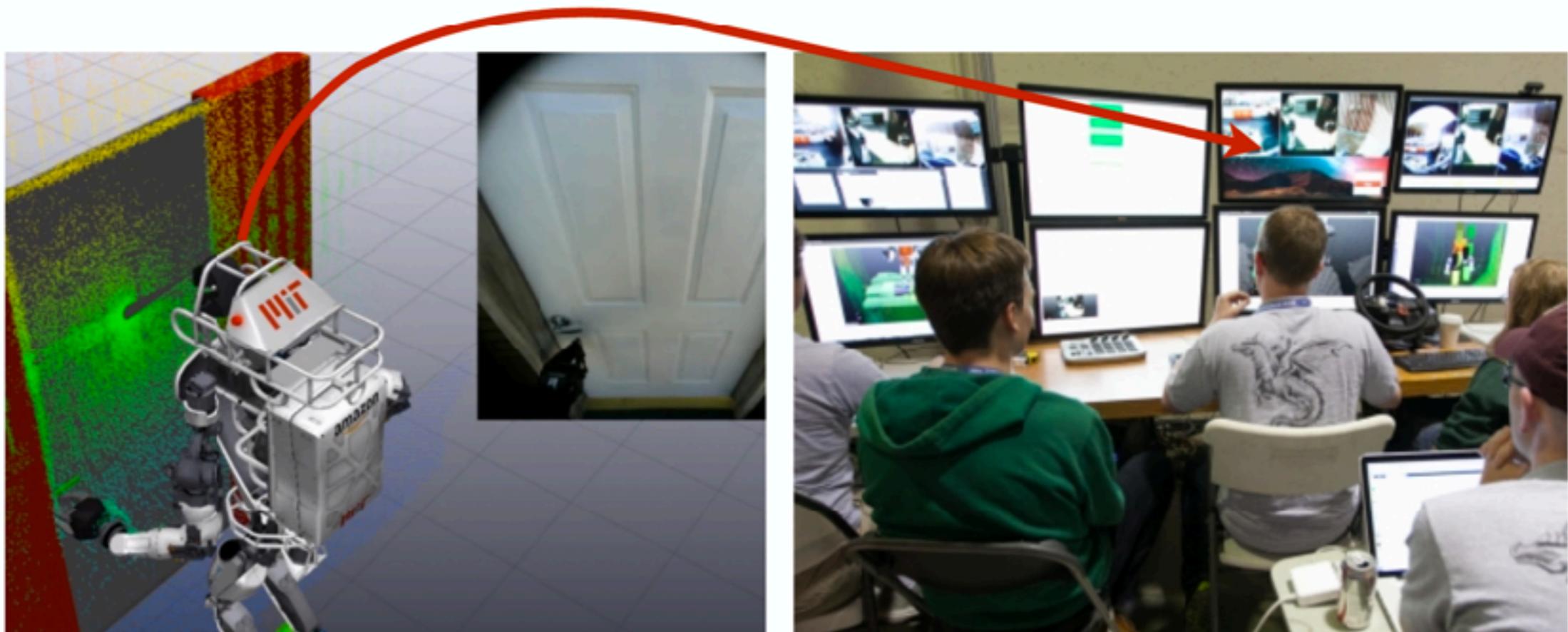
How well they really work (from DRC)

Adapted from Dr. J. Xiao's slides

Falling Robots



Today's Robotics



Today's robots are still mostly blind

Adapted from Dr. J. Xiao's slides

AI from the Perspectives of DARPA 題目就在影片中

The second wave of AI

Statistical Learning



- <https://m.youtube.com/watch?v=-O01G3tSYpU>

Discussions

- First Wave of AI
- What tasks are carried out well here?
- What are the limitations?

Discussions

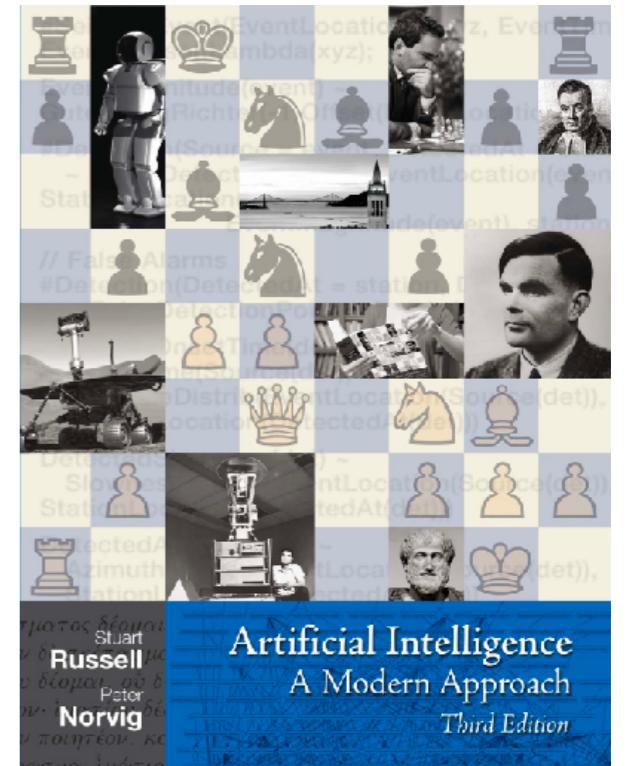
- Second Wave of AI
- What tasks are carried out well here?
- What are the limitations?

Discussions

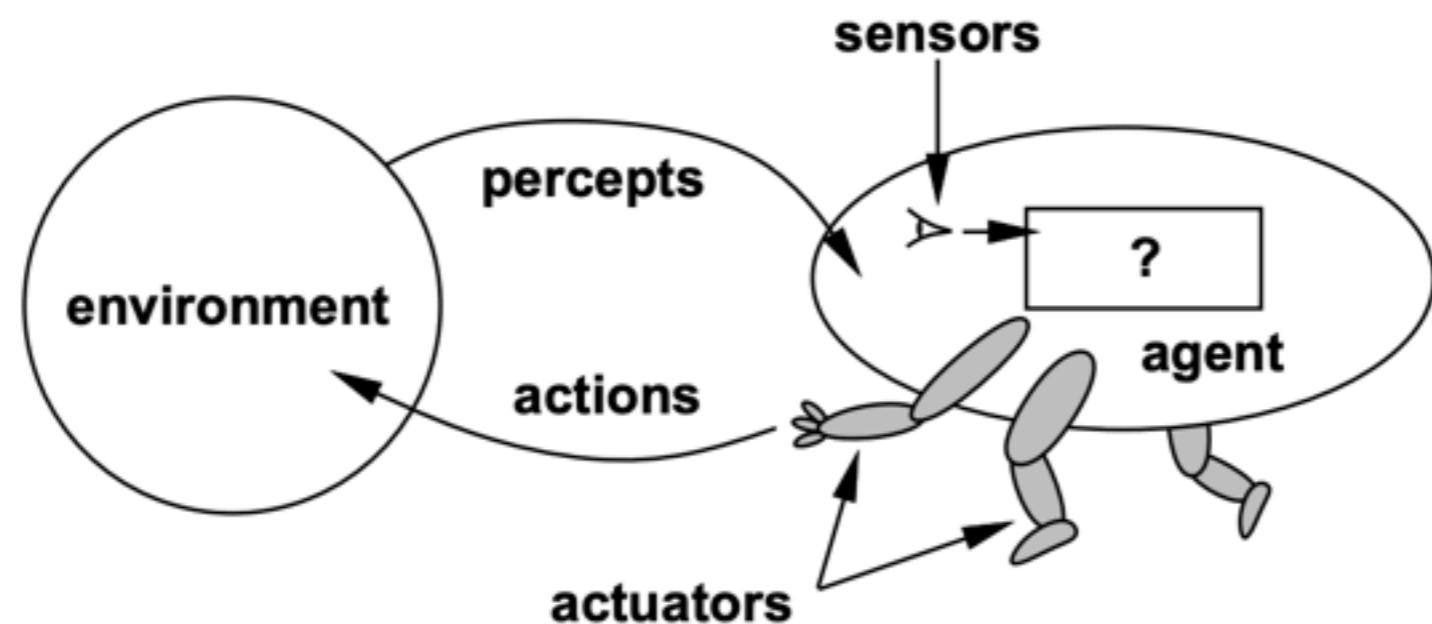
- Third Wave of AI
- What tasks are carried out well here?
- What are the limitations?

AI Agent

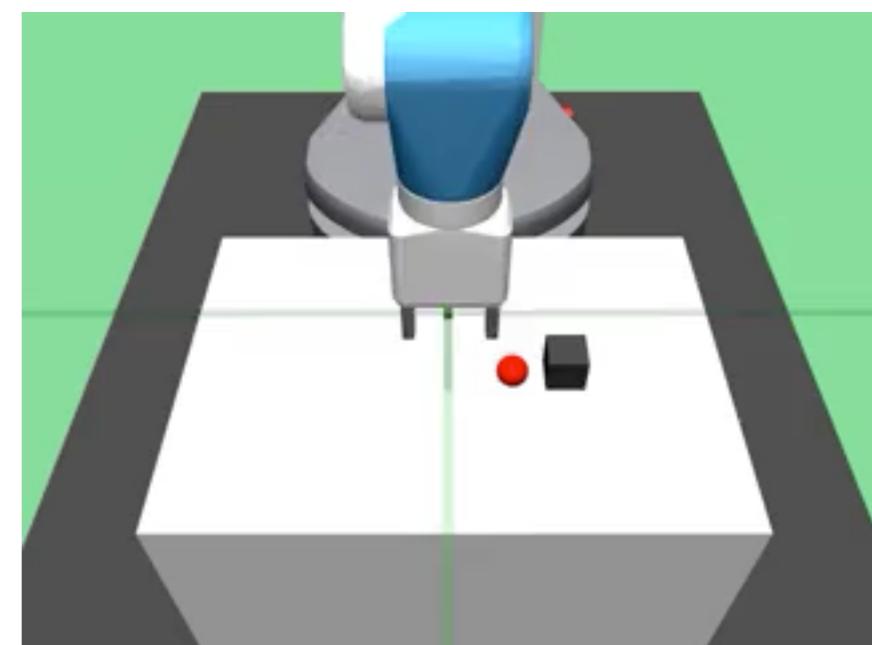
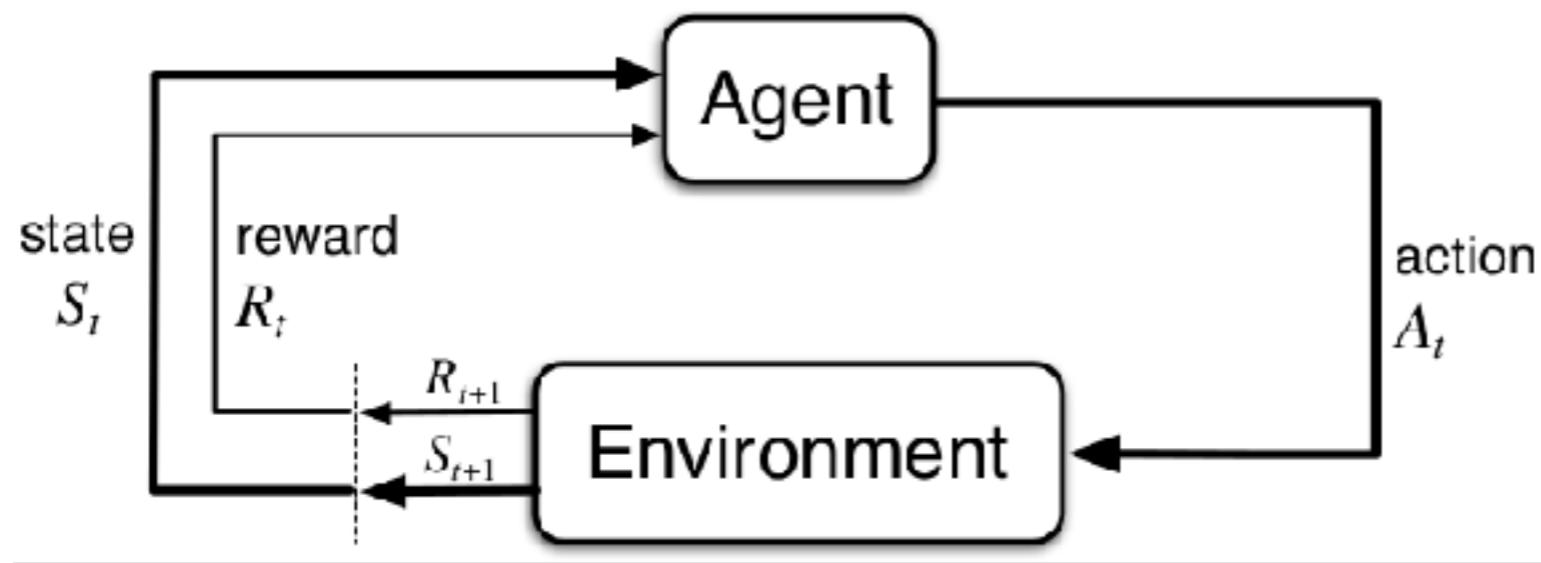
- Environment & Agent
- Observations & Actions



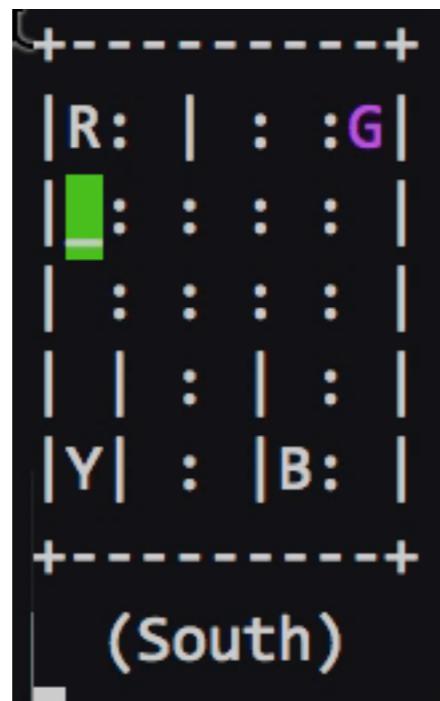
Agents and environments



Reinforcement Learning



- state
- environment
- action, observation
- reward



```

import gym
import NAME_OF_GYM_EXTENSION

env = gym.make("NAME-OF-ENVIRONMENT")

observation = env.reset()

EPISODES = 10

done = False

for episode in range(EPISODES):
    while not done:

        action = PICK_ACTION(observation)

        observation, reward, done, misc = env.step(action)

        UPDATE_AGENT(observation, reward, done, misc)

        # this next line is optional
        env.render("human")

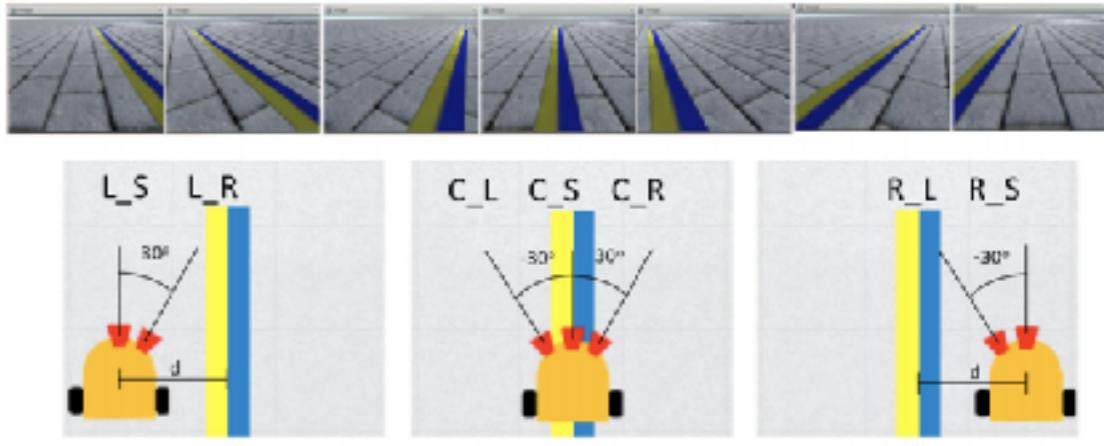
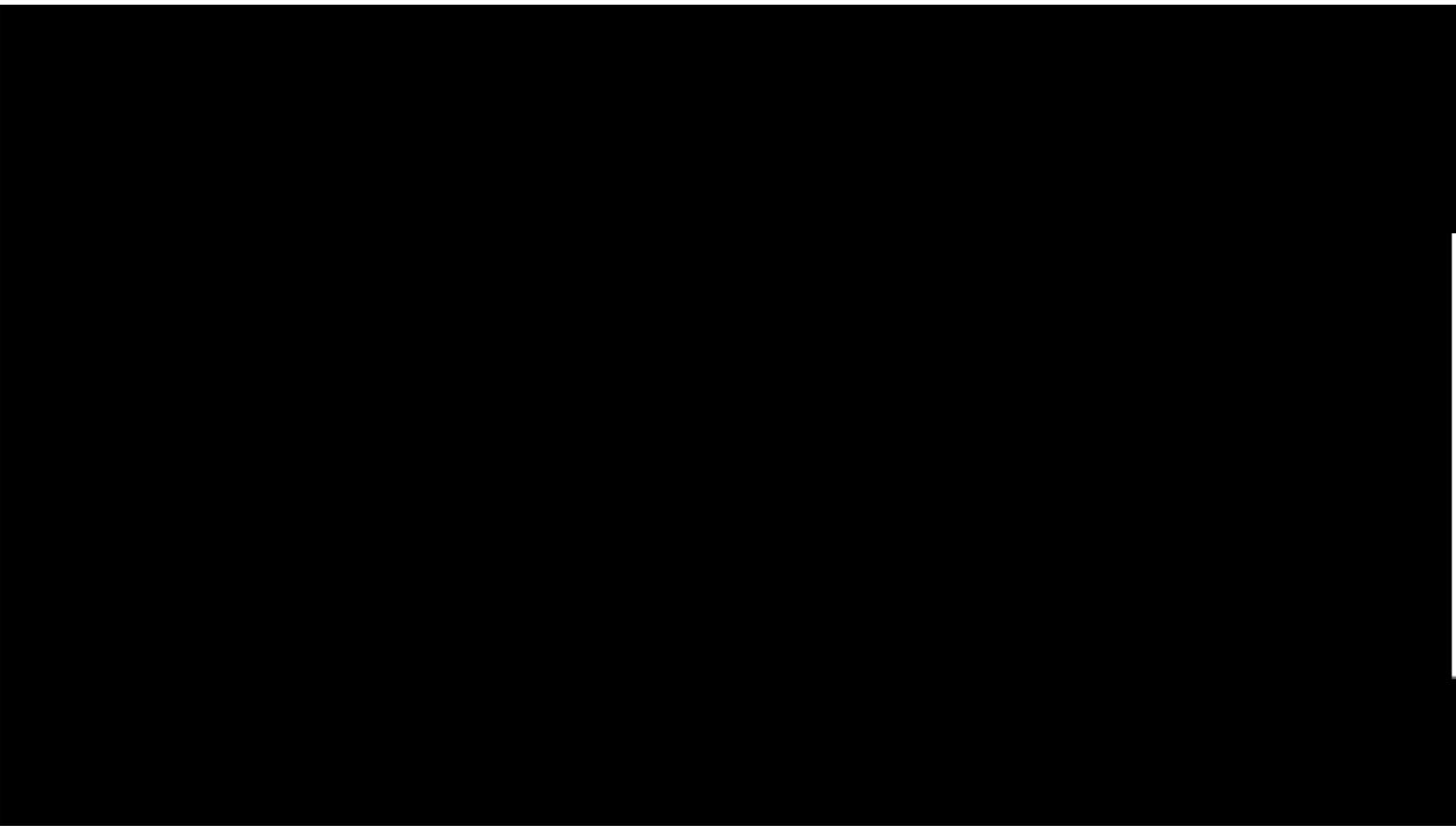
    env.reset()

env.close()

```

Statistic Learning

- Computer Vision vs. Robotic Vision?
- State? Observation? Action?



- <https://youtu.be/umRdt3zGgpU>

Summary

- AI Agent
 - **State, Action, Observation, (Reward)**
- Reinforcement Learning
- Statistic Learning (统计)
- Probabilistic Robotics (Bob)
- Interaction with Human (王, You)