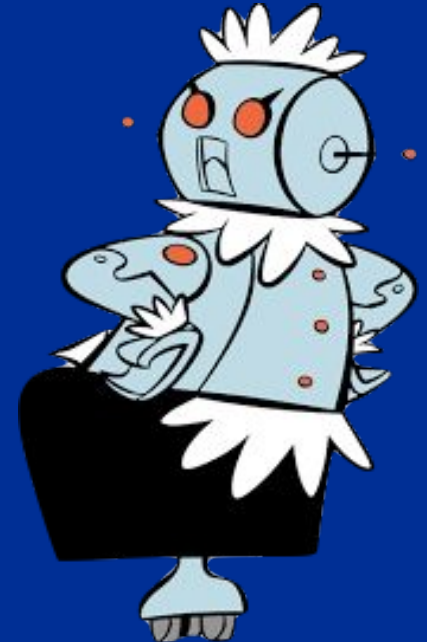蓝胖子机器人

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通用机器人的研发

Research & Development of

General Purpose Robot

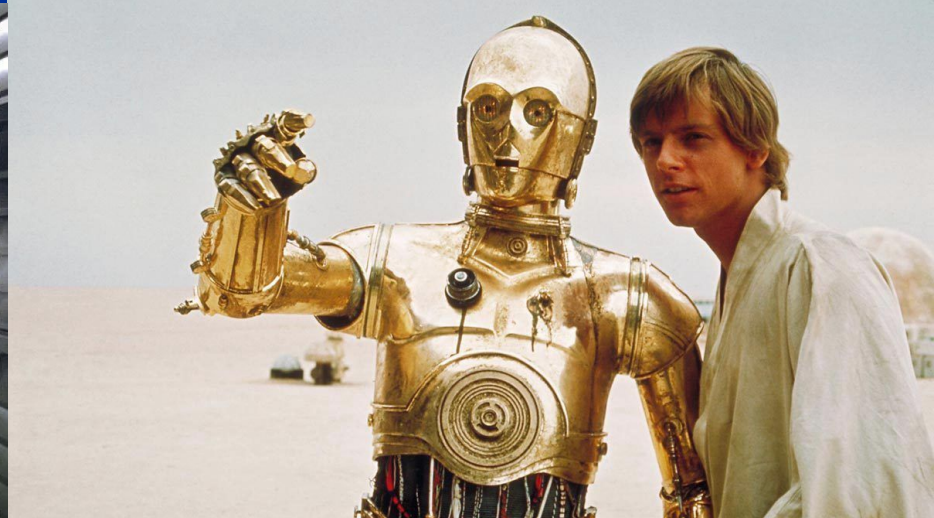**CTO**   **张浩**
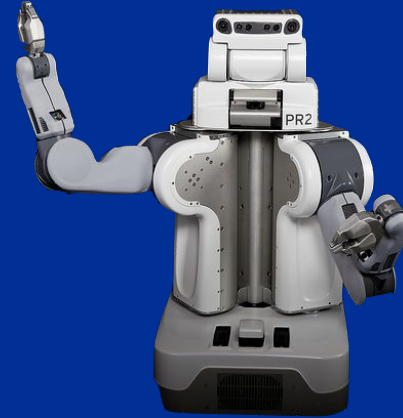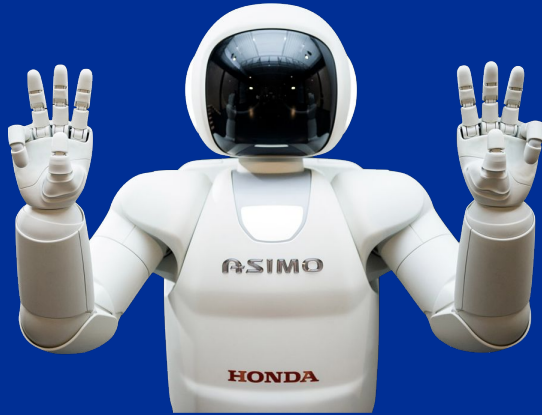
什么是通用机器人？

What is a General Purpose Robot?

什么是通用机器人？

What is a General Purpose Robot?

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什么是通用机器人？

What is a General Purpose Robot?

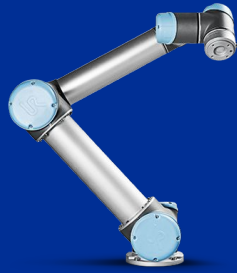# 这个神奇的等式是...?

The Magical Formula...?

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PR2

=

+ + + +

总结

To Sum Up...

通用机器人=

触觉传感器 + 机械手 + 机械臂 + 升降装置 + 移动底座

+ 视觉传感器 + 电脑

General Purpose Robot =

Tactile Sensor + Robot Hand + Robot Arm + Lifting

Mechanism + Mobile Base + Vision Sensor + Computer

我们的通用机器人...

Our General Purpose Robot...

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Video
If we have it ready on time

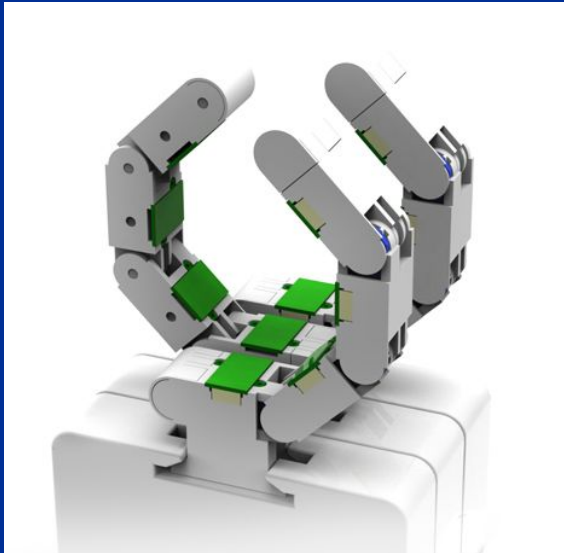Dexterous Hand 灵巧手

Tactile Sensors 触觉传感器

Robot Arm 机械臂

Vision Sensors 视觉传感器

Lifting Mechanism 升降装置

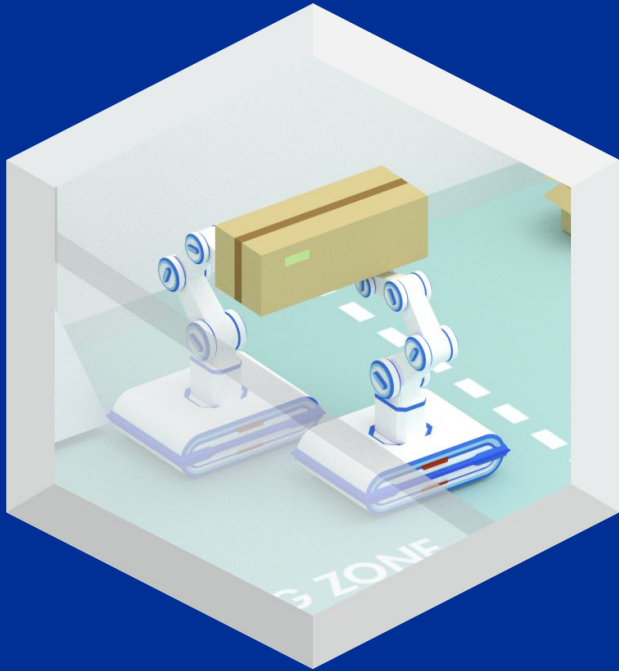Mobile Base 移动底座

灵巧手

Dexterous Hand

挑战与机遇

Challenges & Opportunities

移动机械臂

Mobile Manipulator

1. 全身运动规划
   Full-Body Motion Planning

2. 多移动机械臂协作
   Multiple Mobile Manipulator
   Collaboration

机械臂
Manipulator

1. 在高自由度配置空间中的狭窄通道进行轨迹规划

   Narrow Passage Problem in High-DOF Motion Planning

2. 机器人摄像头标定：快，简易，准确
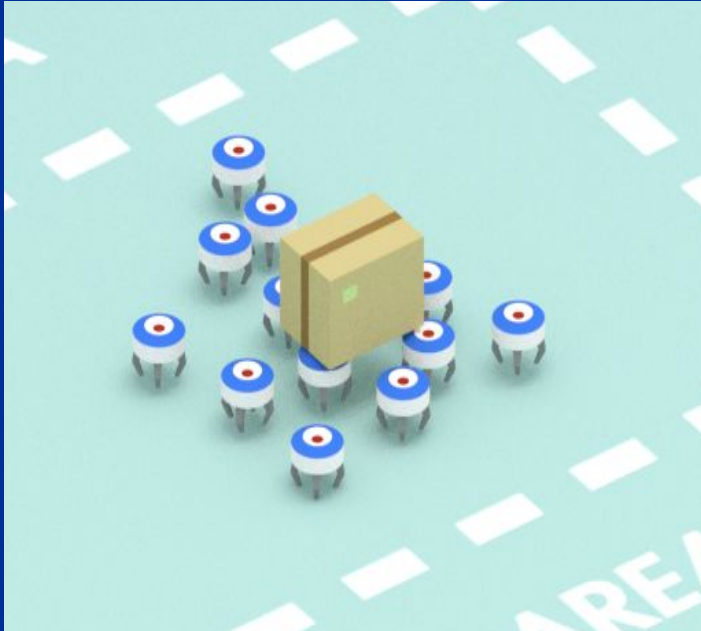
   Robot-Camera Calibration: Fast, Easy and Accurate

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引导下的策略搜索

Guided Policy Search

机器人集群
Multiple Mobile Robots

1. **机器人集群搬运大件物体**
    Swarm Robot Carrying
    Same Large Item

2. **多个机器人在同一区域进行导航**
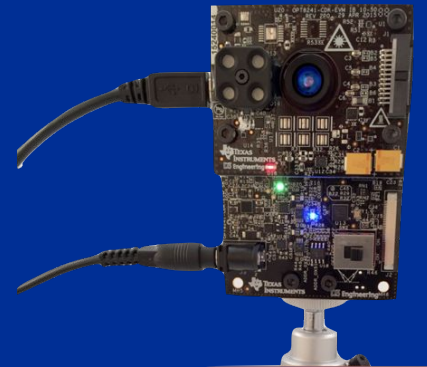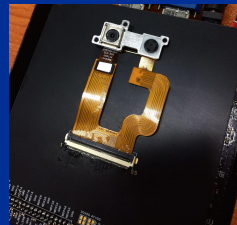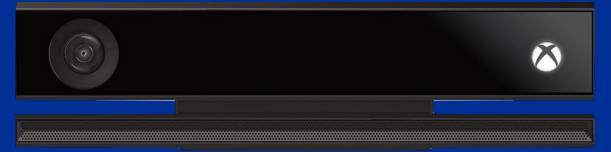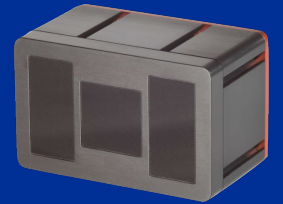   Multiple Robots Navigate
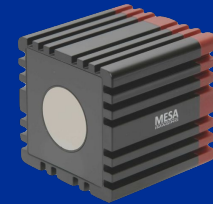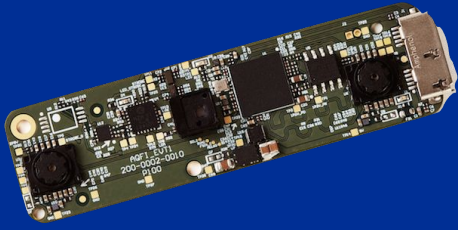   in the Same Environment

3D导航
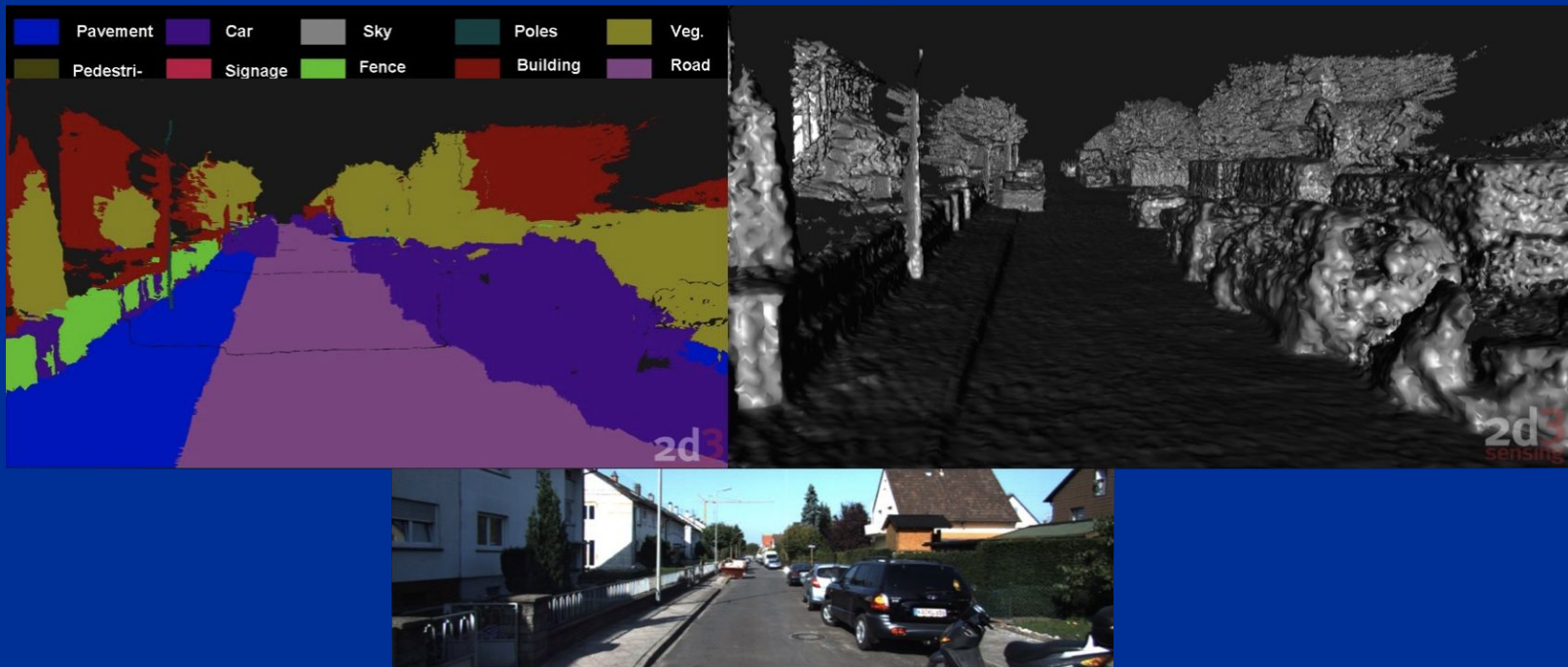## 3D Navigation

3D传感器
3D Sensors

3D导航
3D Navigation

3维世界表示、3维语义地图、3维定位

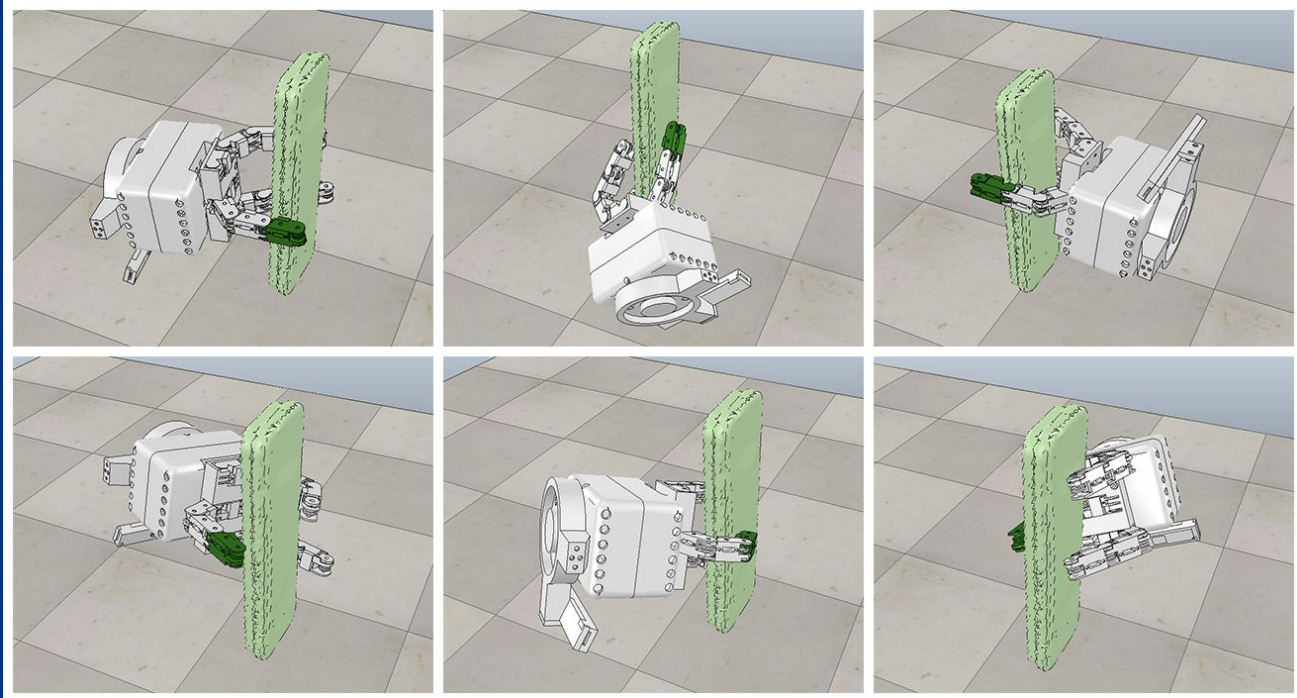3D World Representation, 3D Semantic Mapping, 3D Localization 3D

有触觉可重构的机械手

Tactile Sensor Enabled Reconfigurable Robotic Hand

1. 物体识别
   Object Recognition

2. 物体位姿估计
   Object Pose Estimation

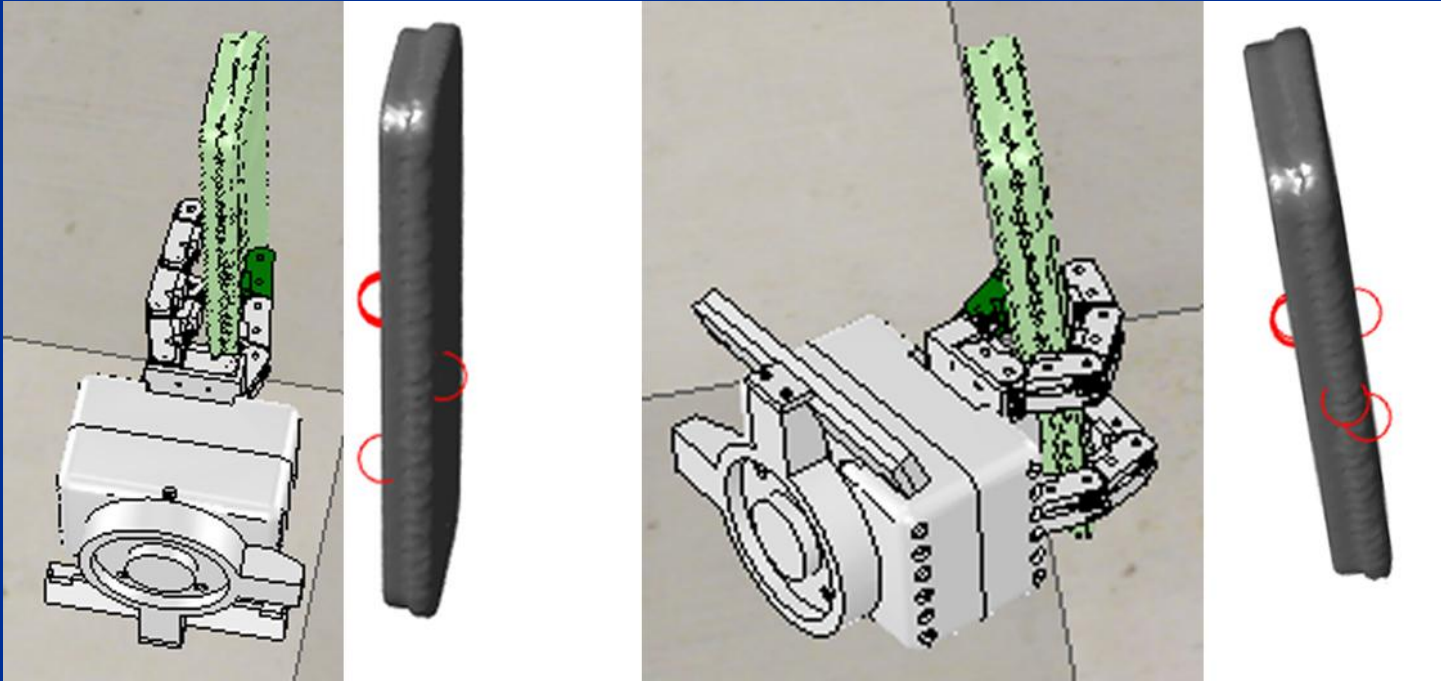3. 基于学习的抓取
   Learning-based Grasping

有触觉可重构的机械手

Tactile Sensor Enabled Reconfigurable Robotic Hand

触觉信息的空间分布
Spatial Tactile Information

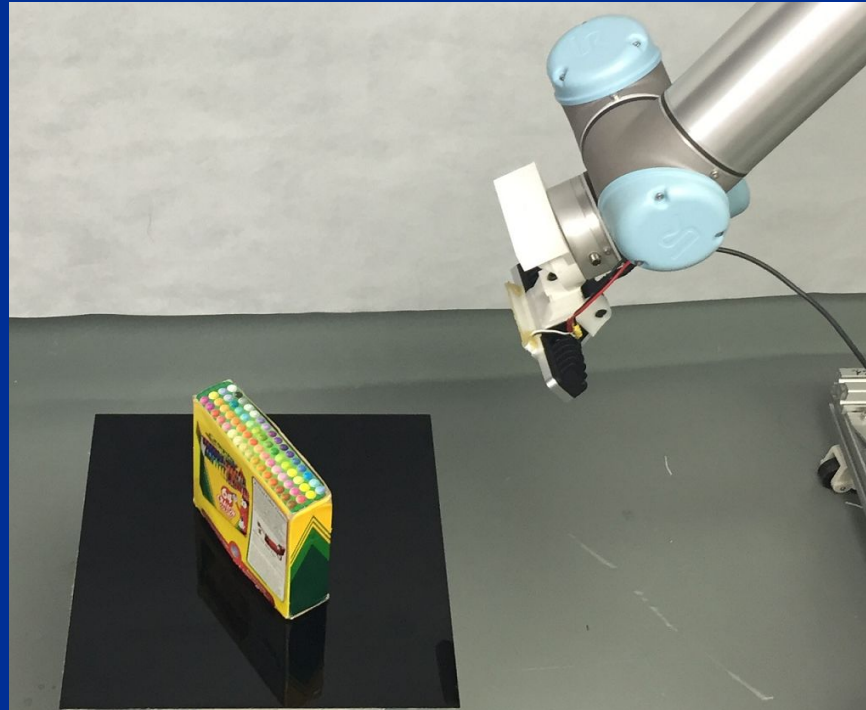# 深度强化学习
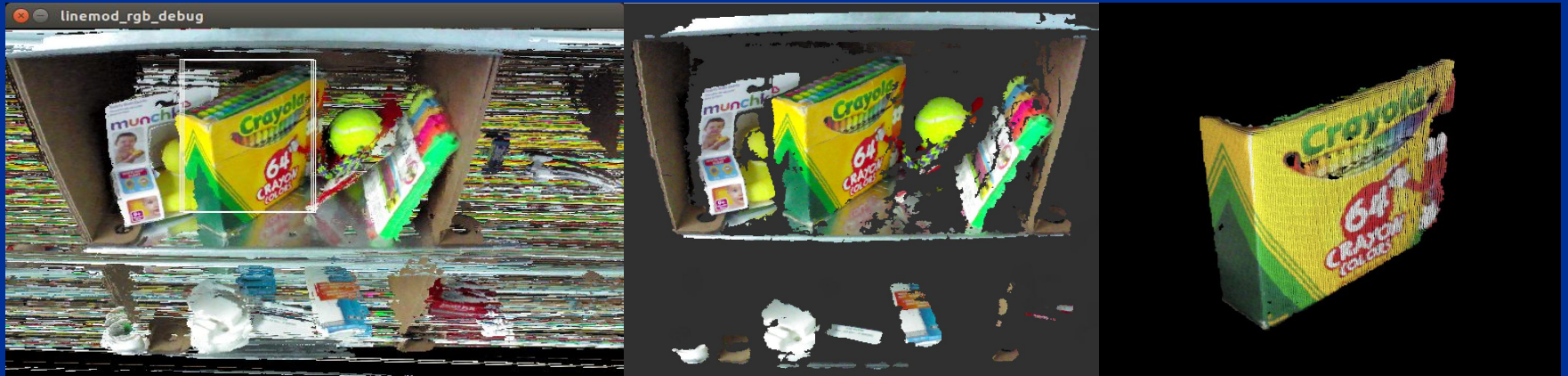## Deep Reinforcement Learning

视觉
Vision

1. 自动地高效学习新物品
Automatically learn new objects effectively

视觉
Vision

2. 可靠的识别物体
Recognize Object Robustly

视觉
Vision

3. 判断物体位姿
Determine Object's Pose

大数据
Big Data

在海量物品面前面对以上所有挑战
Face Challenges Above with Enormously Large Amount of Data

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谢谢
Thank You

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