Master Project Practical Course SS 25

What is our goal?

- Develop on Physical Robot
- Achieve one demonstration or goal.
- Everyone needs to contribute.

Master Project Seminar SS 25

Shang-Ching Liu

	Date	Presenter Name	Session-Chair Name
Presentation Schedule	8 May 2025		
	15 May 2025		
Application Level Discussion	22 May 2025		
	5 June 2025		
	12 June 2025		
	19 June 2025		
	26 June 2025		
Method Level Discussion	3 July 2025		
	10 July 2025		
	17 July 2025		

Presentation - Requirement

- Each presentation is to be held by a **single** student.
- Presentation language is **English**.
- You are free too chose what tool to use to create your slides.
- If you chose LaTeX you can use this template for the presentation.
- The presentation shall be **PRACTICED MULTIPLE TIMES** before presenting. Your audience will know whether you did or not.
- This is also helpful to check if you keep in time.
- You're welcome to discuss your presentation with us before presenting.
- Here, here and here are some good examples slide sets from previous years.
- Try to get the viewers attention by giving a good motivation in the beginning ("Why should the viewer care about this topic?", "Why is this interesting?").
- Have some extra slides prepared after your presentation that you can use to answer questions.
- Try not to use too much text on the slides. Rather use a lot of images.
- Not everything you say should be on the slides. They are a visual aid for your listeners.

Presentation - Hint

- The presentation must include the following things:
  - A title page with the title, your name and the date of presentation
  - All slides should be **numbered** for easier reference in the following discussion
  - An introduction to the topic, necessary definitions and maybe a **short** introduction to its basics and history
  - A clear definition of the problem to be solved
  - Presentation of the approaches
  - Presentation of the results
  - Discussion of advantages and disadvantages of the presented approach(es) and its/their results
  - A comparison of the approaches (Method Level)
  - **All images/graphics which are not your interlectual property must be referenced**
  - You must submit your final set of slides (which you used for presentation) afterwards for upload

Presentation - Grading

The presentation will be graded according to:

- Amount of contained information and precision of your explanations
- Comprehensibility of your presentation and its slides
- Liveliness of your presentation
- Quality of your answers during discussion
- Adherence to requirements listed above and to the time limit

Presentation

- 25 minutes presentation. Being much shorter will decrease your grade or even lead to failing. We will warn you when time runs out and stop you after 25 min
- Moderate discussion afterwards
- You might discuss the topic with me **14 days before** your presentation.
- You must hand in your draft slides **by noon 7 days before your presentation** through e-mail: shang-ching.liu@uni-hamburg.de.
- Final slide must be sent to me **1 day after your presentation the latest.**

Topic Choosing

Requirement

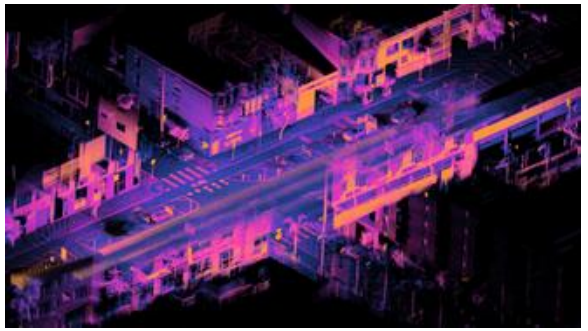
- Right scope - Example: "Kinematics" is too broad, "Actuating a Servo" is too narrow
- Right depth - Example: "Comparison of Resolution of Video Sensors" is too shallow, "The Effect of Color Depth of the Logitech C920 on Recognizing Grass" is too deep
- Scholarly standard - There is no "too scientific" but your topic has to be in recent active research
- Robotics - Your topic has to be useable/applicable/required on/in/for physical robots
- Intelligent - Example: "Manufacturing a Car" is not intelligent, "Analyzing, Understanding and Repairing a Broken Down Car" can be intelligent
- Recency - Your main references should be recent (published in the last 5 years)
- Please send your **Topic Proposal 17.04.25 11:59PM** by email (shang-ching.liu@uni-hamburg.de) to submit a description of your topic with at least 2 scientific references which you plan to talk about
- You can have a look at the topic list for inspiration, but you're very welcome to come up with your own ideas! Your idea must be robotics related and may be rejected if it does not fit the seminar.

First Step to Find Your Research Topic:

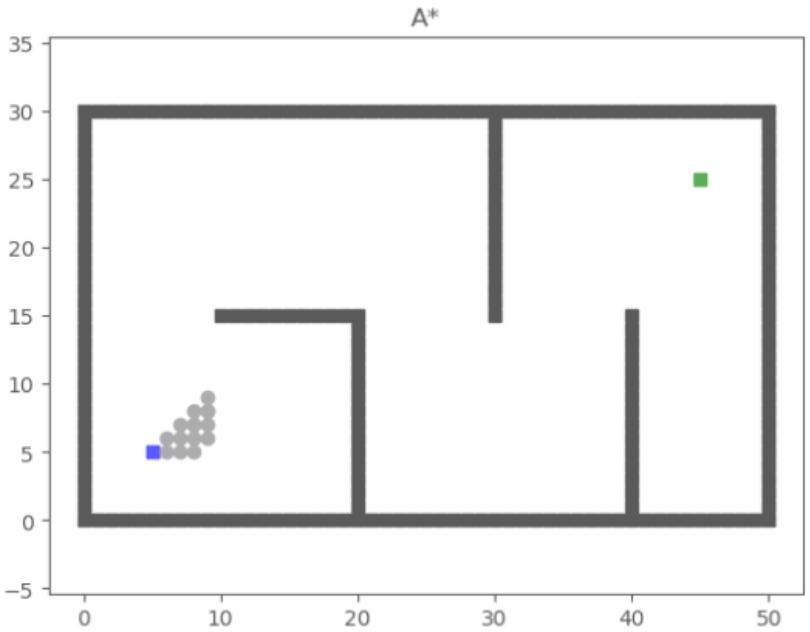
- **Identify Your Area of Interest**
  - Reflect on fields or topics that genuinely intrigue you.
- **Explore Prominent Conference Keynotes**
  - Example: Review keynote presentations from major conferences such as ICRA Keynotes.
- **Dive into Conference Proceedings**
  - Example: Access the video list from ICRA proceedings here: /informatik2/tams/internal/proceeding/icra/2024
- **Search by Keywords**
  - Choose a relevant topic from the conference or research field.
  - Use keywords for targeted searches.
    Examples:
    - "Motion Planning Survey"
    - "Leveraging ChatGPT and LLMs for Research Assistance" *(Note: Verify generated information thoroughly.)*

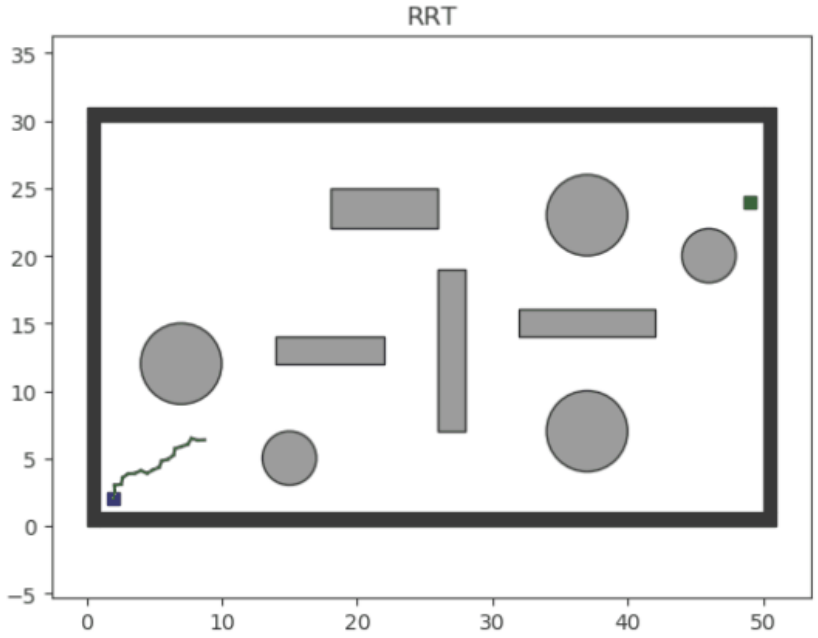
Localization and Path Planning

- SLAM (Simultaneous localization and mapping)
- Path Planning Algorithm



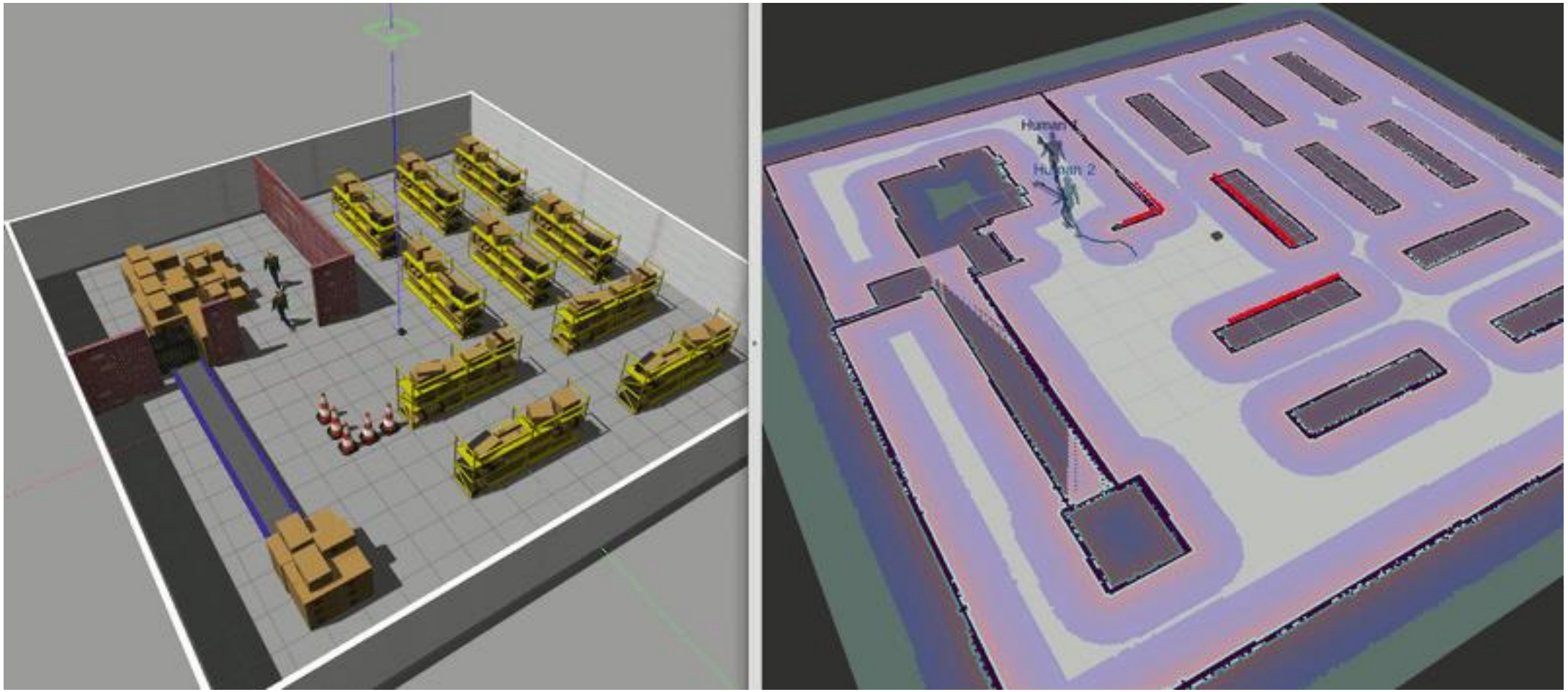
https://en.wikipedia.org/wiki/Simultaneous_localization_and_mapping





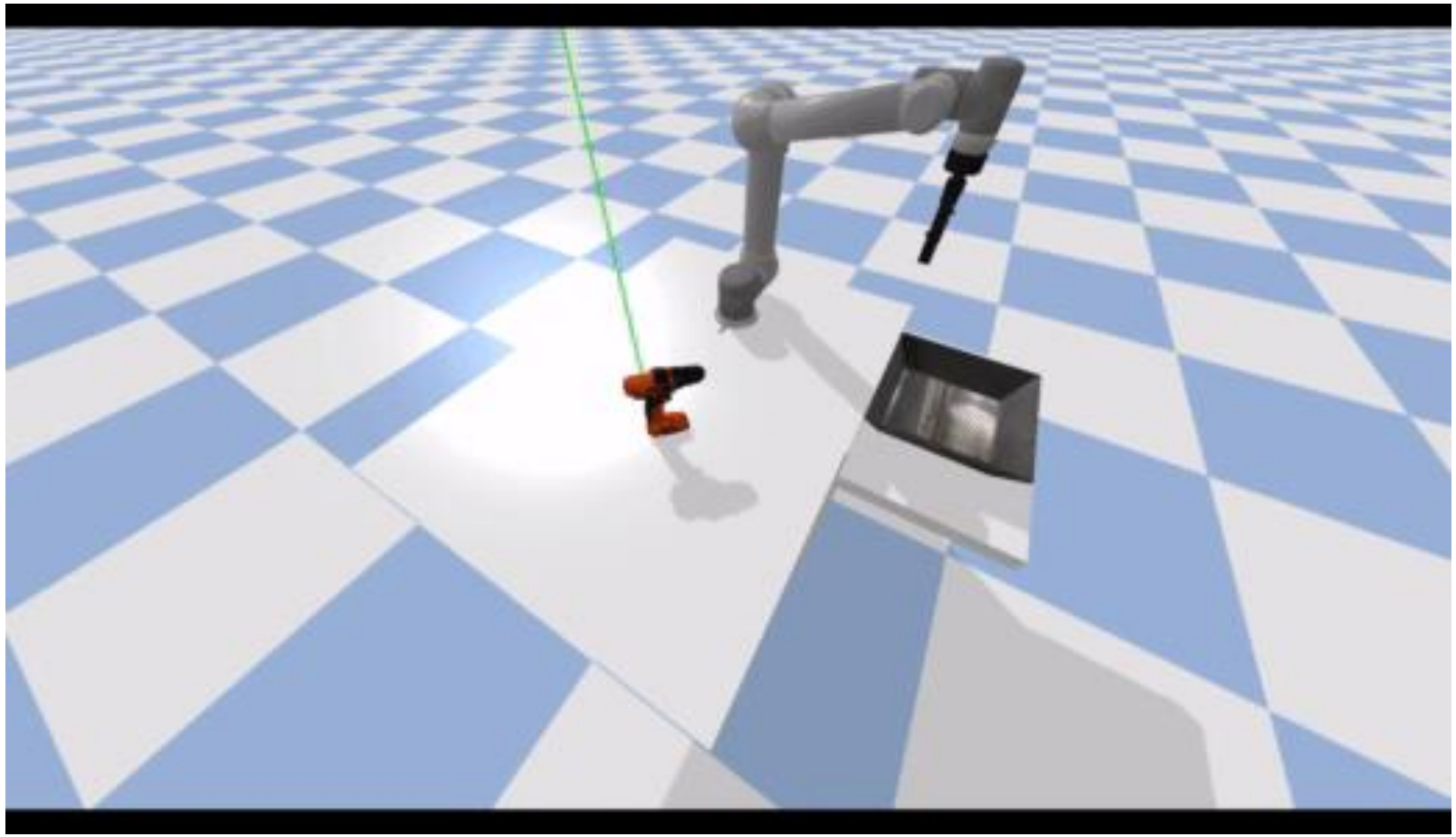
https://github.com/zhm-real/PathPlanning

Motion Planning



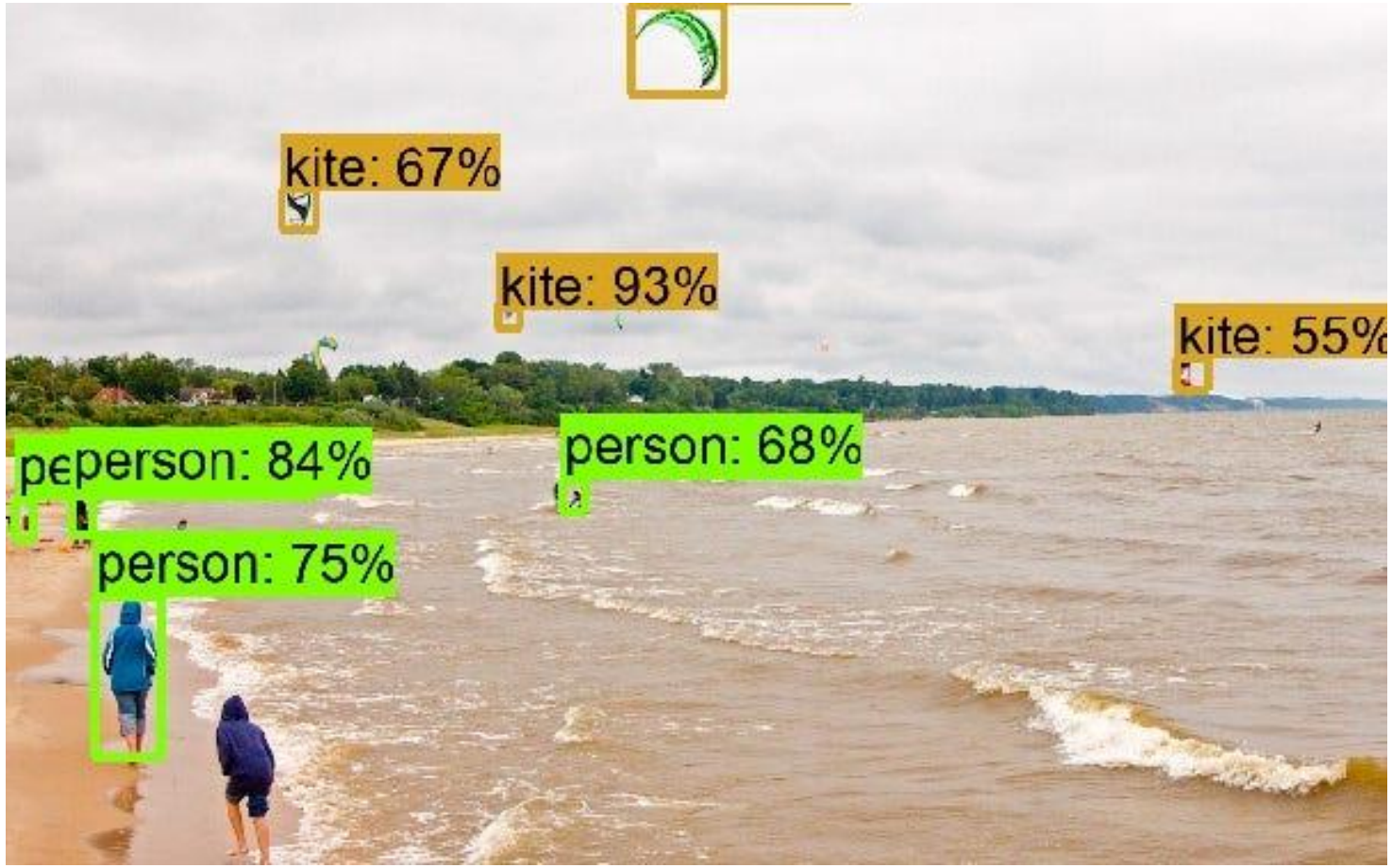
https://github.com/ai-winter/ros_motion_planning

Grasping



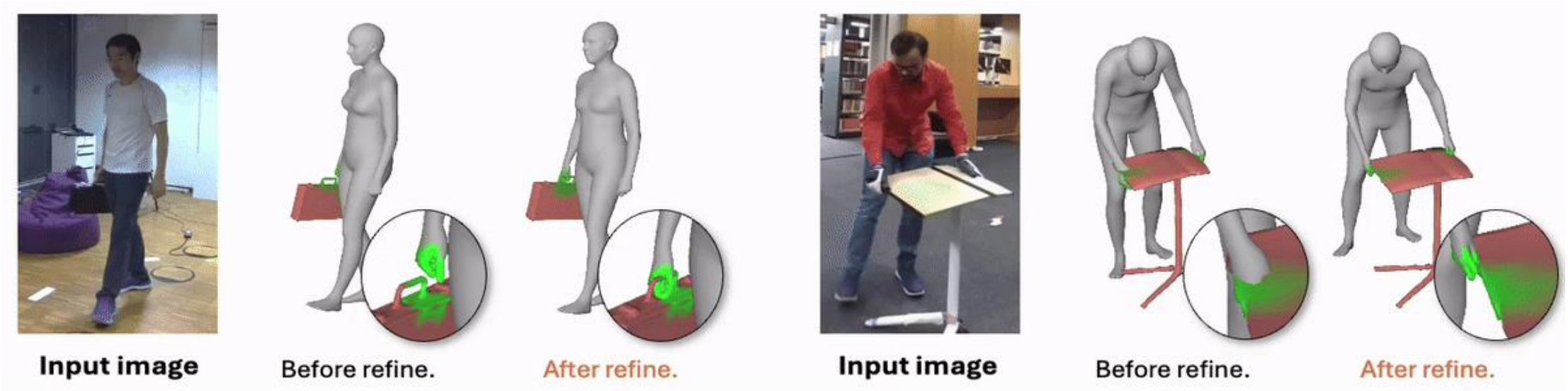
https://github.com/JeroenOudeVrielink/ur5-robotic-grasping

Object Recognition



https://github.com/CapstoneProject18/Object-Recognition

Object Reconstruction



https://github.com/dqj5182/CONTHO_RELEASE

Sound Localization and Recognition

(a) background music (b) playing guitar

(c) rubbish truck (d) aeroplane engine

(e) playing violin (f) wood sawing

https://github.com/shvdiwnkozbw/Multi-Source-Sound-Localization

Robot action deliberation

- State Machine
- Behavior Tree
- LLM based approach

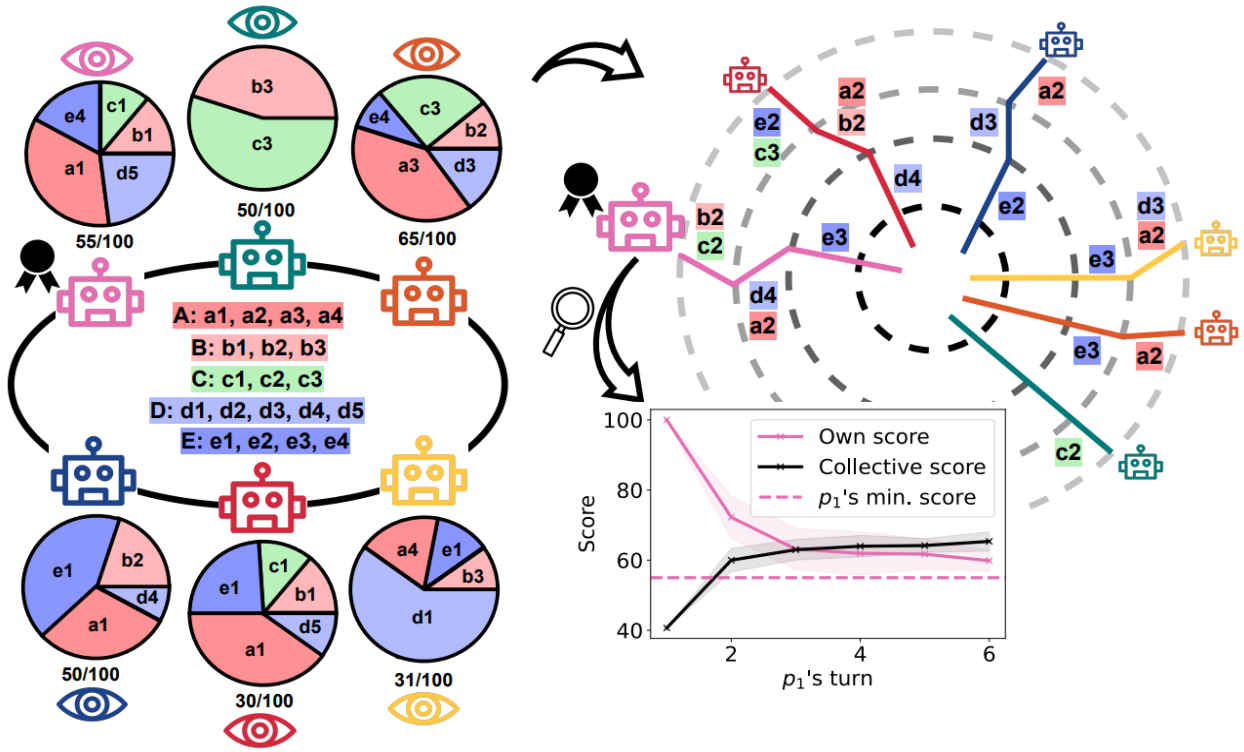


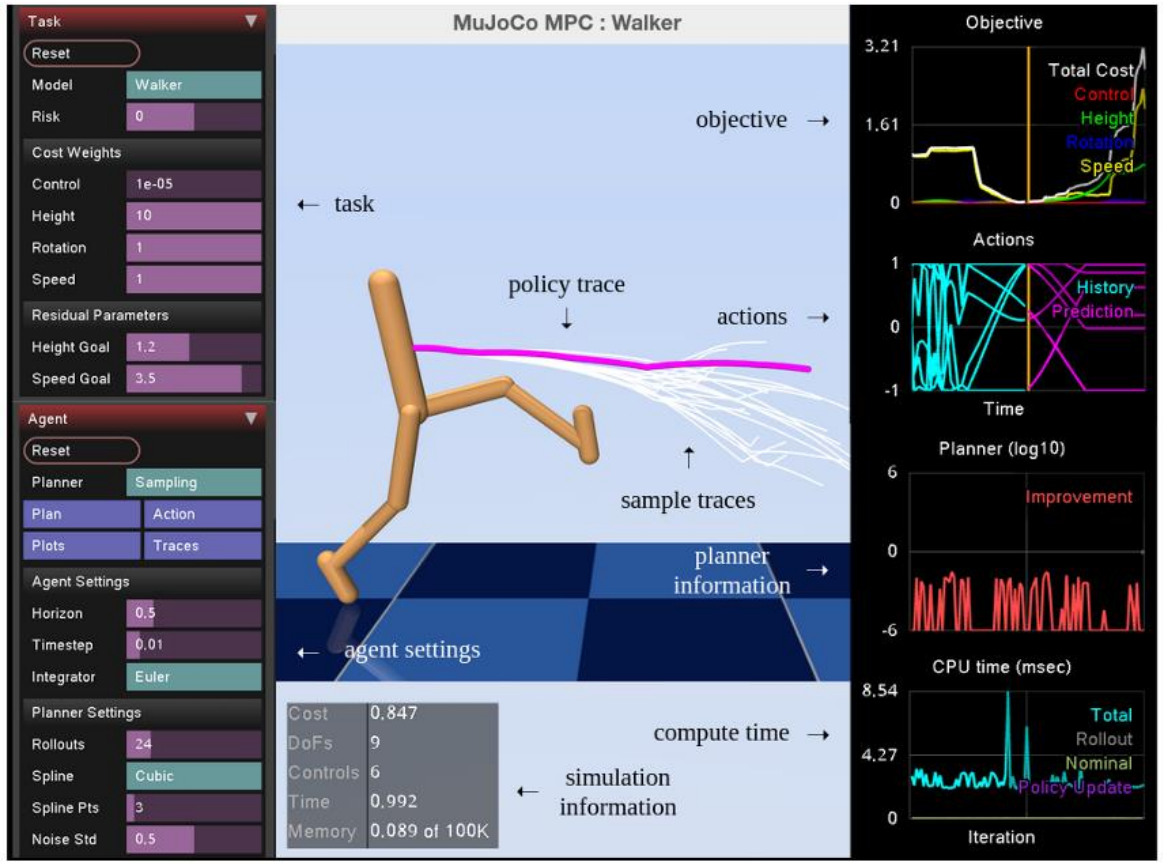
Figure 1: Left: Parties negotiate over 5 issues with different sub-options. Each party has its own *secret* scores, issue priorities, and a minimum threshold for acceptance. Right: Parties ideally reach a common ground by adjusting their optimum deal. This is visible in the graph; over rounds, the leading agent p_1 proposes deals that reduce its own score but increase all agents' collective score.

https://github.com/S-Abdelnabi/LLM-Deliberation

Force Control

https://github.com/hsp-iit/adaptive-tactile-force-control

Optimal Control / Model Predictive Control (MPC)



DeepMind (2022). Predictive sampling: Real-time behaviour synthesis with mujoco

Human-Robot Interaction