


# Robotics: Final project

Vladimír Petrík

vladimir.petrik@cvut.cz

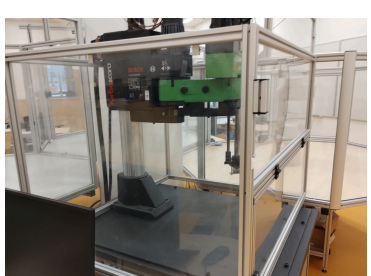
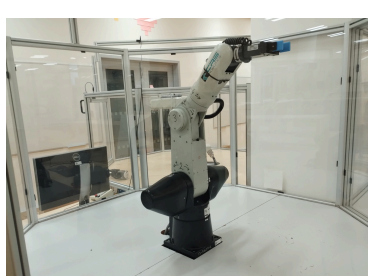
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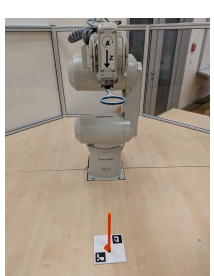
# Overview

- Motivation: hands-on experience with real hardware
  - solve a given task on a real industrial robot
  - robot kinematics, computer vision and trajectory planning in practice
- Team of three students (you form the team yourselves)

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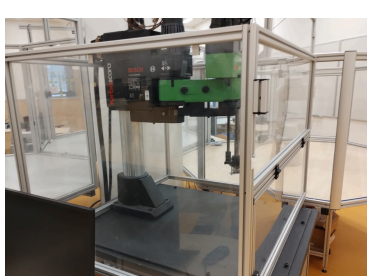
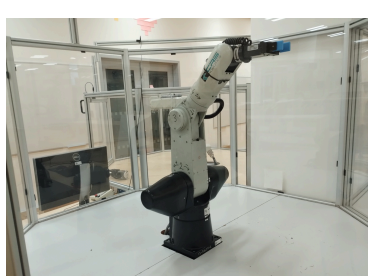
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- Industrial robots, each station with a Basler RGB camera and a rotary table
  - 4-DoF robot Bosch; 6-DoF robots CRS93, CRS97, RV6S
  - station descriptions: robotics-robot-stations.readthedocs.io

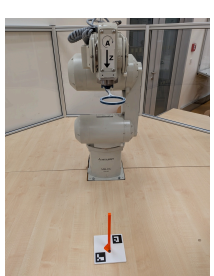



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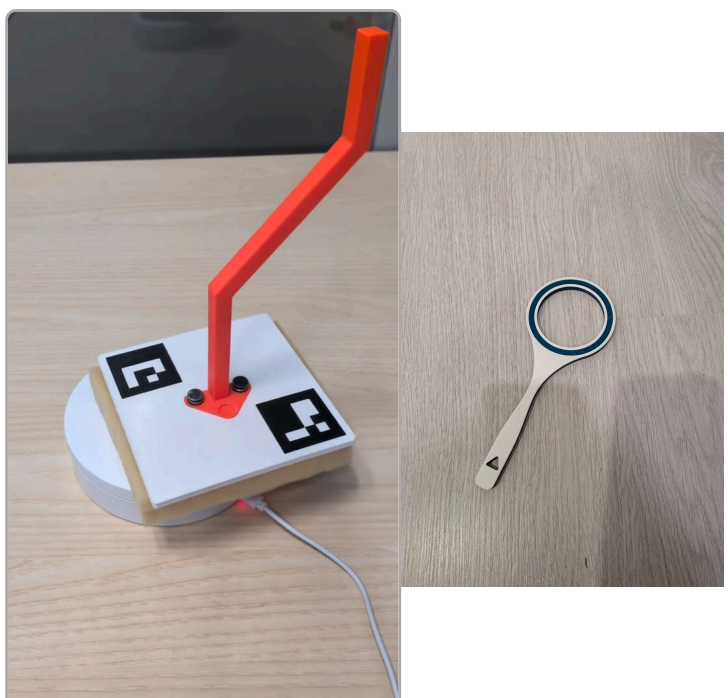
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- Individual project for a bachelor thesis with a real manipulator (contact us)

# Task: maze on a rotary table

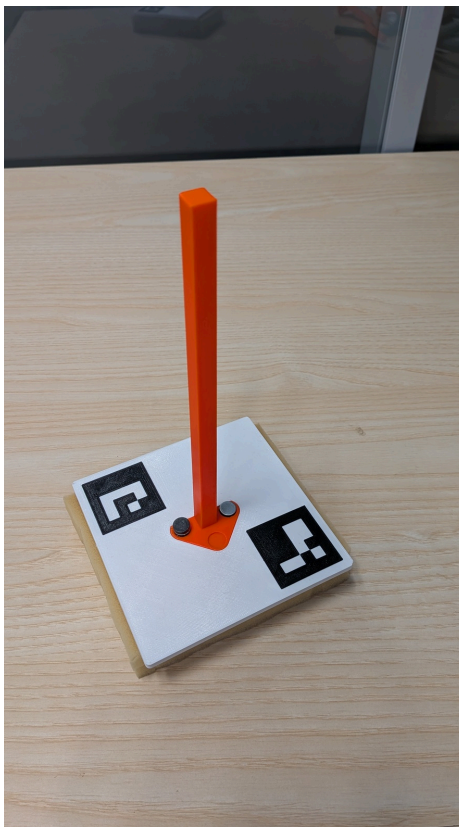
- The maze stands on a rotary table in the robot workspace
  - the table rotates at its slowest speed during the attempt (press SR twice after power-on)
  - the team chooses the direction; both directions earn a bonus
- ArUco markers on the base for localization
- Maze, table and hoop dimensions are known: github.com/pilcsimo/ROB1-2025-hw
- The robot holds a contrasting hoop that must pass through the maze



# Variants and scoring

| | Variant | Points | Robots |
|---|---|---|---|
| **A1** | **straight rod, no rotary table** | **2** | 4-DoF, 6-DoF |
| A2 | straight rod anywhere on the rotary table; unreachable rod must be reported | 8 | 4-DoF, 6-DoF |
| B | more complex planar trajectory | 12 | 4-DoF, 6-DoF |
| C | trajectory leaving the plane | 15 | 4-DoF, 6-DoF |
| D | trajectory with hoop rotation | 18 | 6-DoF only |
| Bonus | works for both rotation directions (the teacher chooses at the demo) | +2 | A2–D |

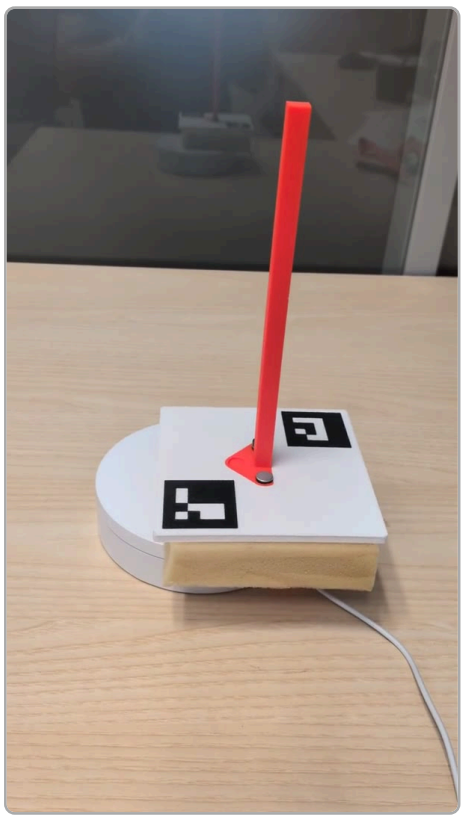
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- 4-DoF robot: A1–C only (max 15 + bonus); variant D needs a 6-DoF robot



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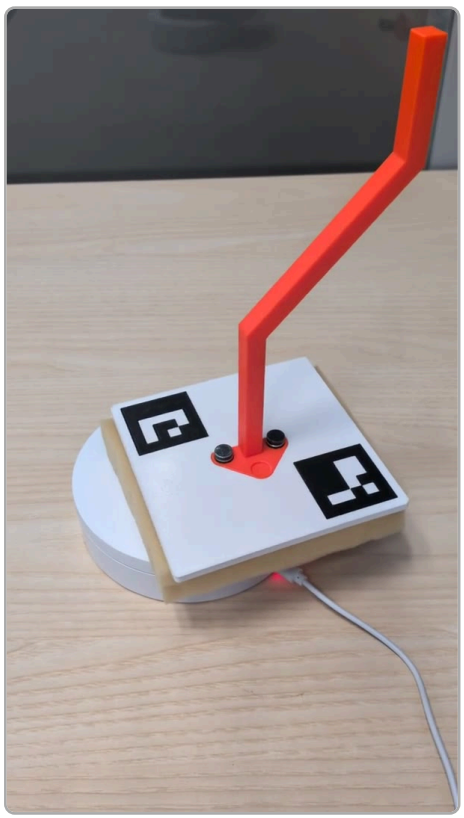
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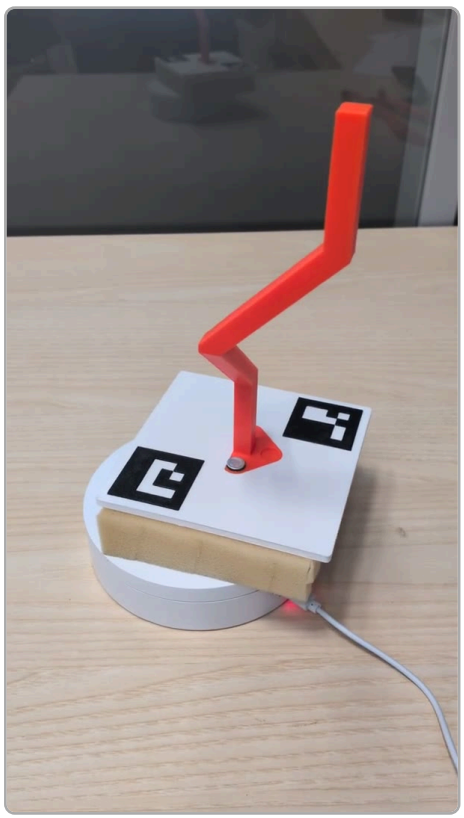
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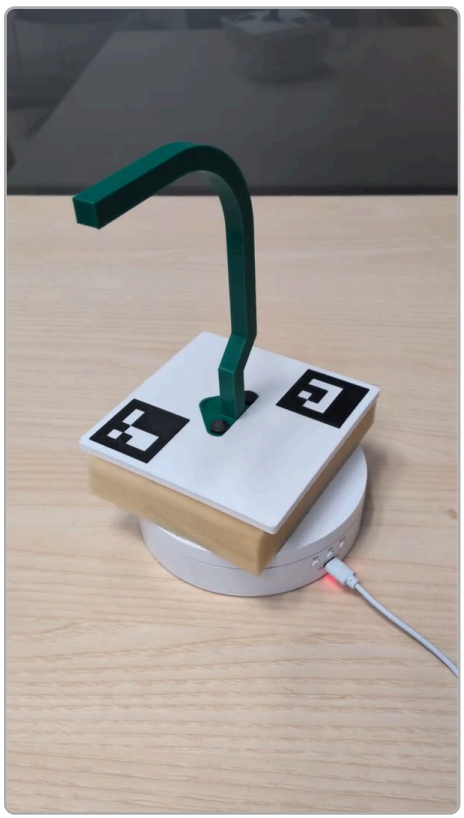
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# Rules

- Successful attempt: the hoop passes the maze (or the rod) and ends lower than 4 cm above the ArUco base
- Time limit: 2 minutes per attempt
- At most 3 failed attempts (e.g. touching the maze wall or the rod)
- **Disqualification: collision of the robot with the table, the rotary table or itself**
  - touching the maze after the task is completed is allowed
- Unreachable maze: the program must detect and report it instead of moving; the attempt does not count as failed

# Submission

- Technical report describing your solution
  - uploaded to BRUTE before the demonstration
  - lecture on writing a technical report: youtu.be/eZF6jhuBbRU
- Demonstration of the working solution to one of the teachers (Krsek, Smutný, Petrík)

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- **Mandatory chapters of the report**
  - Experiments: how you verified the implementation, e.g. a map of the workspace showing where it works
  - Contribution of each team member to the technical solution; “implementation vs. report” split is not acceptable, each member explains their part at the demo
  - Use of AI in implementation and writing: recommended! 2–5 bullets on how you used it and what helped most

# Deadlines and bonus points

- Standard submission: last week of the semester and the exam period, book a slot in the reservation system
- **Contact all teachers by e-mail if you want to submit earlier**

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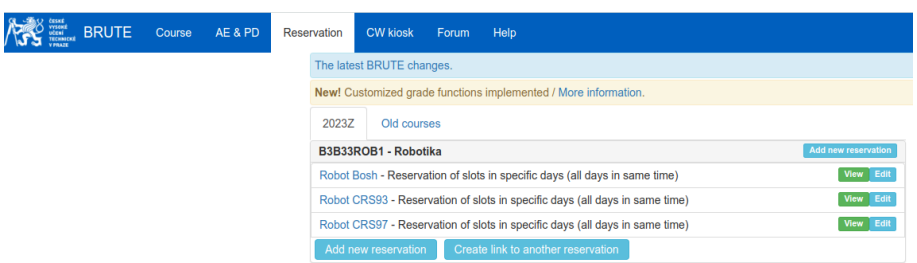
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- Bonus for early submission of the report in BRUTE (always by 23:59)
  - +5 points by 17. 11. 2026
  - +4 points by 24. 11.
  - +3 points by 1. 12.
  - +2 points by 8. 12.
  - +1 point by 15. 12.

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  - +1 point by 15. 12.
- Regular deadline 5. 1. 2027 23:59; afterwards –1 point for every 3 days
- No submission possible after 24. 1. 2027 23:59

# Laboratories

- Shared resources: reservation system in BRUTE



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- Shared resources: reservation system in BRUTE
- Consultations: e-mail all three teachers
  - vladimir.petrik@cvut.cz
  - vladimir.smutny@cvut.cz
  - pavel.krsek@cvut.cz

