

Research Project in the Computer Science profile

## Physical Robotics

### Initial situation

Robots powered by physical AI are no longer confined to research labs or factory floors. They're inspecting power grids, assisting in surgery, navigating city streets, and working alongside humans in warehouses. The transition from prototype to production is happening now.

Physical AI refers to artificial intelligence systems that enable machines to autonomously perceive, understand, reason about, and interact with the physical world in real time. These capabilities show up in robots, vehicles, simulations, and sensor systems. Unlike traditional robots that follow preprogrammed instructions, physical AI systems perceive their environment, learn from experience, and adapt their behavior based on real-time data. Automation alone doesn't make them revolutionary; rather, it's their capacity to bridge the gap between digital intelligence and the physical world.

In the nascent but rapidly evolving category of robots, physical AI turns robots into adaptive, learning machines that can operate in complex, unpredictable environments. The combination of AI, mobility, and physical agency enables robots to move through environments, perform tasks, and interact with the world in ways that fundamentally differ from enhanced appliances. Embodied in robotic systems, physical AI is quite literally on the move.

### Implementation / Methodology / Procedure

The autonomous navigation of a physical mobile robot is to be improved. Specifically, the robot is to be taught how to use passenger lifts. In order for this to be possible, various challenging sub-problems have to be solved, such as requesting a lift, selecting the floor, getting off on the right floor.

Required skills: Very good algorithmic programming skills, experience in computer vision and AI.

### Subtasks

The project can be carried out in 3 steps: P7 (introduction to the topic and ROS), P8 (request the lift and operate the lift) and P9 (get off on the right floor)

<b>Type of study:</b>	<input checked="" type="checkbox"/> Fulltime <input checked="" type="checkbox"/> Parttime 50%
<b>Organization:</b>	Member of a project team
<b>Project funding:</b>	Innosuisse
<b>Place:</b>	Windisch
<b>Advisor:</b>	Prof. Dr. Christoph Stamm

