



Bachelor's Thesis

The potentials of humanoid robots in a production and logistics context

Background

Humanoid robots are designed with bipedal structures, functional arms, hands, a head, and a torso, mimicking the human body to perform a wide range of tasks (Hirose et al., 2017; Siciliano & Khatib, 2019). Over the past decade, artificial intelligence (AI) has made significant advances, enabling humanoid robots to learn, adapt, and operate effectively in complex environments. In 2022, Tesla introduced its humanoid robot prototype, Optimus, equipped with AI for environmental sensing and dexterous fingers for object manipulation. Optimus is able to perform various tasks at relatively low cost (Malik et al., 2023). A recent report stated that BMW introduced humanoid robots in their shop floor (Carter, 2024). Similarly, UBTech has tested its humanoid robot 'Walker S' for tasks such as inspecting door locks and seat belts and collaborating with autonomous vehicles for logistics operations in a manufacturing setting (Wessling, 2024). Many tasks in production and logistics are repetitive, physically demanding, or hazardous. Employing humanoid robots, either independently or alongside human workers, presents a promising solution to improve efficiency, safety, and flexibility in such environments (Kheddar et al., 2019).

Objective

The objective of this thesis is to explore the potential applications, benefits, and challenges of using humanoid robots in a production and logistics context. To achieve the described objective, a systematic literature review should be applied as the main research method. It is expected to investigate state-of-the-art scientific works on use cases of humanoid robots and explore the human-robot collaboration task scenarios. Finally, a discussion should be formalized to gain insights and derive recommendations for practice.

References

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Supervisor: Dr. Ting Zheng (<u>zheng@pscm.tu-darmstadt.de</u>), Prof. Dr. Christoph Glock

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