

Forschungspraktikum

Investigation and Implementation of Reinforcement Learning Algorithms on a Robot Arm

Generalizing the operation of robots in dynamical environments regardless of the task complexity is one of the ultimate goals of robotics researchers. Learning from demonstration approaches supported by transfer learning and user feedback offer a remarkable solution to achieve generalization. The main idea behind such approaches is teaching robots new skills with human instructors and training parametric models with data from demonstrations to achieve and update the desired skills under changing conditions. Recently, skill transfer with deep reinforcement learning techniques even allow for training directly with a real robot.



Panda robot

Project assignment

- Adaptation and implementation of existing reinforcement learning algorithms for the robot (in simulation)
- Establishing a connection between a sensor glove and the robot
- Adaptation of the implemented algorithms for learning from demonstration (on real robot)
- Documentation and presentation of results

Requirements

- Experience in ROS
- Experience in programming with Python
- Basic knowledge of Machine Learning/ Reinforcement Learning

References

Cansev, M. E., Xue, H., Rottmann, N., Bliet, A., Miller, L. E., Rueckert, E., & Beckerle, P. (2021). Interactive Human–Robot Skill Transfer: A Review of Learning Methods and User Experience. *Advanced Intelligent Systems*, 2000247.

Meyes, R., Tercan, H., Roggendorf, S., Thiele, T., Büscher, C., Obdenbusch, M., & Meisen, T. (2017). Motion planning for industrial robots using reinforcement learning. *Procedia CIRP*, 63, 107-112

Start: immediately

Supervisor: M.Sc. Adna Bliet

Supervisor: M.Sc. Ege Cansev

Examiner: Prof. Dr.-Ing. Philipp Beckerle

Email: adna.bliet@fau.de

Email: ege.cansev@fau.de