Firas Al-Hafez

Darmstadt, Germany | 20th July 1994 | hidden on public version

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EDUCATION

Ph.D. in Robot Learning
Technische Univerität Darmstadt, Germany *since November 2021*
Intelligent Autonomous Systems Group

Supervisor: Jan Peters
Field: Understanding neuromuscular gait control using inverse reinforcement learning for assistive exoskeletons and humanoids.

Master of Science
Technische Univerität Braunschweig, Germany *October 2017 – April 2021*
Electronic Automotive and Aerospace Systems

Thesis*: "*Comparing reinforcement learning algorithms and evolution strategies on robot manipulation tasks*"

Master of Science
Technische Univerität Braunschweig, Germany *April 2017 – December 2020*
Mechanical Engineering field Automotive Engineering

Thesis**: "*Development of a tactical maneuver planner for automated driving systems in urban areas using reinforcement learning*"

Bachelor of Science
Technische Univerität Braunschweig, Germany *October 2013 – May 2017*
Industrial Engineering field Mechanical Engineering

Thesis*: "*Assessment of energy balance for electrified powertrains (hybrid, plug-in-hybrid, battery or fuel cell vehicles) in comparison to conventional powertrains*"

EXPERIENCE

Institute of Robotics and Process Control @ TU Braunschweig August 2020 - April 2021
*Student Worker (2nd Master Thesis)** *Braunschweig, Germany*

- Implementing different reinforcement learning agents and evolution strategies for comparison on robot manipulation tasks with joint-space actions (trained with RLBench using a Franka Emika Panda robot-arm).
- Adding an action-bias generated using redundancy resolution and secondary objectives to enhance the policy's safety and applicabilitiy. This allows straightforward zero-shot transfer of policies trained in simulation on the real robot-arm.
- Training a pose estimator for real-world objects based on simulated images only. This approach is based on domain randomization, as well as two seperately trained networks: 1. background removal network (U-Net); 2. position estimation network using only the foreground (Yolov2).

Volkswagen Group April 2019 - December 2019
*Machine Learning Intern (1st Master Thesis)*** *Wolfburg, Germany*

- Developing a tactical decision-making instance for maneuver planning in urban environments using Deep Reinforcement Learning (DRL), in particular, Deep Q-Learning (DQN/DDQN).
- Initializing the weights of the DRL agent using values attained from model-based dynamic programming to enhance performance and reduce training time.
- Combining DRL and Monte Carlo Tree Search (MCTS) to enhance the agents foresight on long-lasting episodes/scenarios.

Volkswagen Group October 2018 - March 2019
Software Engineering Intern *Wolfburg, Germany*

- Developing a modular simulation environment for tactical maneuver planning in urban environments by modeling road networks according to the OpenDRIVE format and by using the software Virtual Test Drive (VTD) as the back end.
- Evaluating the simulation environment by using a sampling-based maneuver planning approach with separate speed profile generation for collision-free trajectories.

Daimler Group September 2016 - April 2017
*Simulation Engineering Intern (Bachelor Thesis)**** *Stuttgart, Germany*

- Modeling fuel cell and conventional hybrid drive trains to analyze the holistic energy consumption, including mechanical, thermal and electrochemical sub-systems by using the vehicle simulation software GT-SUITE and MATLAB.
- Developing efficient operation strategies for the primary energy source, the battery, the gearbox, and the thermal management system.

AWARDS

Robotic Talents Award 2021 [read more] *December 2021*
Granted by the Ministry of Economic Affairs, Labour, and Digitalization
- Received for the best Master's thesis in field of robotics in Lower Saxony

TEACHING

Teaching Fellow
Lecture: Introduction to Machine Learning *April 2020 – August 2020*
Institute of Robotics and Process Control @ TU Braunschweig
- Assisting the lecture and exercises
- Lecturer: Prof. Dr. Jochen Steil

HIGHLIGHTED SKILLS

– Computer Skills –

Python	
C++	
ROS	
Tensorflow/Pytorch	
others	Matlab, Java, Linux, Git, SQL, Blender, Unity

– Scientific Skills –

Proficient with Reinforcement Learning, Evolution Strategies, Computer Vision, Robotics, Computer Architectures, Control Engineering

– Languages – English, German, Arabic

VOLUNTARY COMMITMENTS

Member of Formula Student Electric *Januar 2016 – August 2016*
Lions Racing Team TU Braunschweig
· Developing a fully-electric racing car and participating in international races

PUBLICATIONS

F. Al-Hafez and J. Steil. *Redundancy Resolution as Action Bias in Policy Search for Robotic Manipulation.* Presented at Conference on Robot Learning (CoRL), London UK, November 2021.
[paper] and [project website]

PATENTS

M. Helbig, J. Hoedt, and **F. Al-Hafez**. *Method and Device for Supporting Maneuver Planning for an Automated Driving Vehicle or a Robot.* 2020.
Patent No.: US20210263526A1

OUTSIDE INTERESTS

Sports Bouldering, cycling, running
Hobbies Raspberry Pi and Arduino projects for home automation