# Firas Al-Hafez

A Darmstadt, Germany

**20**<sup>th</sup> July 1994

hidden on public version

GitHub

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🕽 www.firasalhafez.com

#### **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

 $\textbf{Thesis}^* \colon \quad \text{``Comparing reinforcement learning algorithms and evolution strate-}$ 

gies 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

Industrial Engineering field Mechanical Engineering

October 2013 - May 2017

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 Student Worker  $(2^{nd} Master Thesis)^*$ 

August 2020 - April 2021 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 applicability. 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

Machine Learning Intern (1st Master Thesis)\*\*

April 2019 - December 2019 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

Software Engineering Intern

October 2018 - March 2019 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

Simulation Engineering Intern (Bachelor Thesis)\*\*\*

September 2016 - April 2017 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

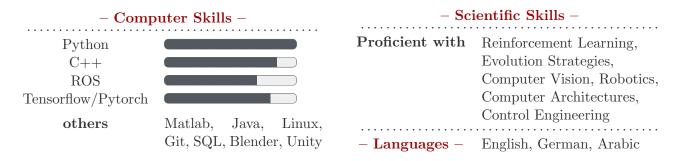
## Lecture: Introduction to Machine Learning

April 2020 - August 2020

Institute of Robotics and Process Control @ TU Braunschweig

- · Assisting the lecture and exercises
- · Lecturer: Prof. Dr. Jochen Steil

#### HIGHLIGHTED SKILLS



#### **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