

Youssef Shoeb
A427
Stralsunder Str. 14

13355 Berlin

Recommendation

To Whom It May Concern:

Youssef Shoeb, born on April 9th, 1997 was employed as a student assistant in the Interoperability and Testing group/ C2 Analytics team of the Department Information Technology for Command and Control at the Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE. He was employed from November 1st, 2020 to June 30th, 2022.

The Fraunhofer-Gesellschaft, headquartered in Germany, is the world's leading applied research organization. With its focus on developing key technologies that are vital for the future and enabling the commercial exploitation of this work by business and industry, Fraunhofer plays a central role in the innovation process. International cooperations provide worldwide contact to the most important current and future scientific and economic areas. At Fraunhofer FKIE, about 500 employees work in interdisciplinary research teams on selected research topics in information and communications technology. The institute has built up specialized knowledge ranging from the design over prototyping to studies and evaluations of highly innovative and disruptive technologies.

In our time together, Mr Shoeb worked on two different projects. The first was on the construction of a simulation environment for a board game, namely Guy Debord's »Game of War«, and the development of an interface for Reinforcement Learning. The simulation environment extends the OpenAI Gym interface. Within the environment, Mr. Shoeb conducted various experiments with different Deep Reinforcement Learning algorithms. He documented the experiments and their results in a comprehensive report. The second project was on investigation into the applicability of Graph Neural Networks for dynamic communication network modelling. He designed and implemented a Deep Learning algorithm to predict network flow in a 5G Network. The algorithm was trained and evaluated on a 5G communications network dataset. The result became part of his master thesis, which was supervised at FKIE.

Mr. Shoeb is very well organized, independent, open to criticism and reliable. He showed high commitment and always fulfilled his tasks to our complete satisfaction. His programming proficiency, including various machine-learning libraries as well as software engineering environments, is high and always up-to-date. We were impressed

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by his ability to learn, understand, implement and apply Reinforcement Learning Algorithms. Last but not least, he documented his work and wrote well-readable, clearly structured reports. Mr. Shoeb was a model student who was highly appreciated by his superiors and colleagues.

I have no hesitation in recommending him to any future employer. We would be pleased to work with Youssef Shoeb in the future and would like to thank him for his committed cooperation. We wish him all the best and continued success in his future career and life.

Wachtberg, Germany, January 23, 2023

A handwritten signature in black ink, appearing to read "Michael Gerz". The signature is fluid and cursive, with a long horizontal stroke at the end.

Dr. Michael Gerz
Abteilungsleiter Informationstechnik für Führungssysteme