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Technical University of Munich
Arcisstraße 21
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Regensburg, 19.06.2025

Application for PhD Position in Software for Quantum Control

Dear Dr. Lienhard,

I am thrilled to apply for the PhD position in Software for Quantum Control at the Technical University of Munich (TUM), an institution globally renowned for its pioneering contributions to quantum technology, exemplified by its leadership in the Munich Quantum Valley initiative. TUM's recent advancements, such as the establishment of the Center for Quantum Engineering (ZQE) and its collaborative efforts with the Walther-Meißner-Institute, underscore its commitment to driving innovation in quantum computing. I am deeply motivated to contribute my expertise in software development and machine learning to support TUM's vision of advancing superconducting quantum technologies.

During my Master's in Artificial Intelligence at Deggendorf Institute of Technology, I cultivated expertise in Python and Linux, developing AI-driven solutions like autonomous navigation for Turtlebot3 using ROS and Gazebo. My passion for quantum computing ignited through an optional Quantum Computing course, where I built a Qiskit-based quantum coin flip simulator in Python, leveraging Hadamard gates to explore superposition and quantum randomness. Using NumPy for probability analysis and Matplotlib for outcome visualization, I compared quantum and classical coin flips, earning a grade of 1.0 (German scale) for my rigorous implementation and presentation. This project deepened my fascination with quantum systems, motivating me to pursue TUM's PhD in Software for Quantum Control. At AVL, I enhanced C++-based tools for automotive simulations, upgrading an FMU Generation Utility to FMI 3.0 and developing Adaptive AUTOSAR middleware for real-time Linux systems using Yocto. At Persystems, I developed Virtual TestBench, a Qt-based desktop application using for electrical component simulations, designing UI/UX in Qt Creator IDE and implementing a license check service using C++ and Qt's signal-slot mechanism.

Drawing from my Master's work, alongside my experience at AVL enhancing C++ simulation tools and at Persystems refining Qt-based simulation software, I am well-positioned to excel in TUM's PhD program in Software for Quantum Control. My proficiency in Python, C++, and Qiskit, demonstrated through implementing quantum circuits and optimizing automotive simulation tools, aligns with your need for advanced control and readout protocols for superconducting quantum circuits. My hands-on experience with machine learning frameworks like TensorFlow and PyTorch, coupled with CI/CD pipeline management and Linux expertise, equips me to leverage machine learning for optimizing quantum processor performance. Additionally, my collaborative work at Persystems and experience during academic projects prepare me to contribute to the EQuIPS project, mentor students, and engage with TUM's international research community through publications and conferences.

Among the many skills I have honed throughout my academic and professional journey, collaboration stands out as the most pivotal for advancing quantum research. My experiences have underscored that breakthroughs in technology are often the result of interdisciplinary teamwork and shared expertise. I am committed to contributing my utmost from the very start, beginning immediately.

I would be greatly honoured to receive an invitation for an interview.

Yours sincerely

Regensburg, 19.06.2025