

Faizan Muhammad

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Google

Software Engineer

July 2020 – Present

Mountain View, CA

- Gemini:
 - * Productionized multi-modal Gemini models for deployment, fine-tuning, and other experimentation [1]
- TensorFlow:
 - * Re-architected `tf.function` by introducing new abstractions to radically improve consistency and performance
 - * *FunctionType*: comprehensive signature representation that controls type-checking, dispatch and tracing
 - * *AtomicFunction*: minimized Python overhead at the heart of `tf.function` and sped up Keras training by 4%
 - * As owner of the `tf.function` codebase, provided support and design consultation to users and developers

CTRL Labs (acquired by Meta)

Software Engineering Intern

May 2019 – August 2019

New York City, NY

- Startup was developing a wrist-mounted, EMG-based neural interface for everyday use
- Added SLAM capabilities to the neural wristband by attaching a miniature 3D camera
- Devised interaction mechanisms combining localization and neural data and patented them [2]
- Implemented a neuromuscular teleoperation experience with a hexapod robot for an NPR show episode

Tufts University

Student, Research Assistant

Sep 2016 – May 2020

Boston, MA

- DARPA SAIL Open-World Novelty [3]
 - * SAIL-ON challenge tests AI agents ability to adapt to any change in simulated open-world environments
 - * Pioneered a cognitive architecture integrating symbolic and neural approaches to instill novelty resilience
 - * AI Agent achieved top performance in independent external evaluations against other DARPA-selected teams
 - * Led a group of graduate and undergraduate students to implement and publish the system architecture [3]
- ROS Augmented Reality Interface [4]
 - * Need for a fast, high-bandwidth and accessible medium to convey robot states for Human Robot Interaction
 - * Supports visualizations of robot perception, belief and planning in AR through HoloLens and mobile devices
 - * Published the system architecture [4] and won \$100K in further funding from Verizon 5G EdTech Challenge
 - * Received Outstanding Undergraduate Researcher Award HM by Computing Research Association
- Bachelor of Science in Computer Science
 - * *GPA*: 3.95, *Honors*: Summa Cum Laude, Lieutenant Commander Robert James Manning Prize
 - * *Highlight Courses*: RL, ML, Robotics, Computer Vision, Human Robot Interaction, Digital Circuits
 - * *Activities*: President @ Robotics Club, Organizer @ Undergraduate Research and Scholarship Symposium

International Mathematical Olympiad

Pakistani Team

Sep 2015 – Jul 2016

HKUST, Hong Kong

PUBLICATIONS

- [1] **Gemini: A Family of Highly Capable Multimodal Models** Google
Faizan Muhammad ∈ Gemini Team. [Paper Link](#)
- [2] **Systems and methods for contextualized interactions with an environment** (4 citations) USPTO
Faizan Muhammad, Daniel Wetmore. [Patent Link](#)
- [3] **A Novelty-Centric Agent Architecture for Changing Worlds** (20 citations) AAMAS 2021
Faizan Muhammad, Vasanth Sarathy, Gyan Tatiya, Shivam Goel, Saurav Gyawali, Mateo Guaman, Jivko Sinapov, Matthias Scheutz. [Paper Link](#), [Presentation Link](#)
- [4] **Creating a Shared Reality with Robots** (35 citations) HRI 2019
Faizan Muhammad, Amel Hassan, Andre Cleaver, Jivko Sinapov. [Paper Link](#), [Demo Link](#)

TECHNICAL SKILLS

Languages: Python, C++, C, Golang

Tools: TensorFlow, ROS, PyBind, Docker, Unity