

# Faizan Muhammad

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## Google

July 2020 – Present

*Software Engineer*

*Mountain View, CA*

- Search AI:
  - \* Developing infrastructure at the intersection of LLMs, multi-step reasoning and knowledge representation
- Gemini:
  - \* Productionized multi-modal Gemini models for serving, quantization, fine-tuning and evaluation [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)

May 2019 – August 2019

*Software Engineering Intern*

*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

Sep 2016 – May 2020

*Student, Research Assistant*

*Boston, MA*

- DARPA SAIL Open-World Novelty [3]
  - \* Pioneered a cognitive architecture integrating symbolic and neural approaches to instill novelty resilience
  - \* Led a group of graduate and undergraduate students to implement and publish the system architecture [3]
  - \* AI Agent achieved top performance in independent external evaluations against other DARPA-selected teams
- ROS Augmented Reality Interface [4]
  - \* A fast, high-bandwidth and accessible medium to convey robot perception, belief and planning in AR
  - \* 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

Sep 2015 – Jul 2016

*Pakistani Team*

*HKUST, Hong Kong*

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## PUBLICATIONS

- [1] **Gemini: A Family of Highly Capable Multimodal Models** (*45 citations*) ArXiv  
Faizan Muhammad ∈ Gemini Team. [Paper Link](#)
- [2] **Systems and methods for contextualized interactions with an environment** (*7 citations*) USPTO  
Faizan Muhammad, Daniel Wetmore. [Patent Link](#)
- [3] **A Novelty-Centric Agent Architecture for Changing Worlds** (*21 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** (*37 citations*) HRI 2019  
Faizan Muhammad, Amel Hassan, Andre Cleaver, Jivko Sinapov. [Paper Link](#), [Demo Link](#)

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## TECHNICAL SKILLS

**Languages:** Python, C++, C, Golang

**Tools:** TensorFlow, ROS, PyBind, Docker, Unity