Faizan Muhammad

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Google   July 2020 – Present
Software Engineer   *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)   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]
    * 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   Sep 2015 – Jul 2016
Pakistani Team   *HKUST, Hong Kong*

Publications

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[1] **Gemini: A Family of Highly Capable Multimodal Models** *(27 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

Technical Skills

Languages: Python, C++, C, Golang   **Tools**: TensorFlow, ROS, PyBind, Docker, Unity