BENI MULYANA

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Researcher and engineer with background in real-time brain modulation, neuroimaging, computational neuroscience, and telecommunication. Passionate about leveraging advanced technologies to enhance our understanding of the brain and develop innovative therapeutic interventions.

Professional Experience

Postdoctoral Research Associate in the Department of Bioengineering at the University of Illinois at Urbana-Champaign | January 2024 – Now

- Focusing on cutting-edge research in brain imaging and data analysis, specifically in EEG, EMG, Biodex, NI DAQ, Digitimer, TMS, MRI, and non-invasive brain stimulation protocol development.
- Contribute to advancements in rehabilitation for individuals with chronic stroke or other neurological disorders.
- Impactful research and publishing high-quality articles.

FPGA Design Engineer - Universal Real Time Power Conversion, Milwaukee, WI | August 2022 - February 2023

- FPGA design using Verilog and VHDL (design, synthesize, place & route, timing analysis optimization, testing, testbench simulation)
- Experienced in using FPGA Altera Intel software: Quartus, ModelSim.
- Develop various projects including microprocessor peripherals such as Ethernet, JTAG, UARTS using Intel Stratix 10 GX/MX and Cyclone V/IV devices.
- Experienced using DDR4, Intel High Bandwidth Memory (HBM2) to improve throughput using AXI4/Avalon protocol.

Ph.D. Graduate Researcher Laureate Institute for Brain Research, Tulsa, OK | October 2016 - August 2022

- Conducted groundbreaking research in the field of online closed-loop real-time transcranial electrical stimulation (tES) and functional magnetic resonance imaging (fMRI) for brain modulation.
- Developed a comprehensive approach integrating tES and fMRI in a closed-loop system, enabling real-time brain activity modulation during scanning.
- Addressed feasibility and safety considerations, ensuring the reliability and applicability of concurrent tES-fMRI studies.
- Collaborating with other researchers to develop real-time fingertip electrical stimulation and functional magnetic resonance imaging (fMRI) for post-stroke training and therapy.
- Accelerated GRAPPA MRI image acquisition using Nvidia GPUs by optimizing reconstruction functions and implementing parallel computing techniques.
- Published technical reports and contributed to the advancement of the field.
- Proficient in statistical data analysis using Python, R, MATLAB, and AFNI.
- Developed equipment for MRI laboratories, clinics, and schools to support research objectives.

Ph.D. Research Assistant University of Oklahoma | 2016 - 2022

- Developed and enhanced Globally optimal Generalized Maximum Multi Clique problem (GMMCP) for multiple pedestrian tracking algorithms using Python and optimized computational processes for improved speed and accuracy.
- Utilized deep learning algorithms to predict the price of Bitcoin, comparing different neural network architectures for accurate predictions.
- Conducted a comprehensive survey on deep reinforcement learning algorithms for robotic manipulation tasks, highlighting recent advances, reviewing various algorithms, and discussing unresolved research issues and future directions.

Traffic and Capacity Transport Engineer at Telkomsel Indonesia Ltd | January 2012 - October 2016

- Analyzed system performance that included network traffic, security and capacity while maintaining five-nines availability.
- Estimated cost for the implementation and operation of systems and network elements, which can save a significant amount of operational and capital expenditure.
- Tested 2G, 3G, and 4G mobile devices and script development on test equipment, preserving a 100% performance level.

Transmission Net Design Engineer at Telkomsel Indonesia Ltd | May 2006 - December 2011

- Used various network and hand tools to test equipment and circuits.
- Design wireless network to attain five-nines availability, RF link budget planning, generate bill of materials (BOM) of wireless network design.
- Design network diagrams, site configurations, and floor plans, do site acquisition area for new and existing facilities to obtain 100% compliance.
- Manage and maintain an inventory of active transport services.
- Built open and positive relationships with vendors by creating transparent lines of communication and meeting both parties' needs for technical and system specifications for hardware and software.

Radio Frequency Engineer at Quasar Cipta Mandiri Ltd | January 2001 - December 2004

- Designed, simulated, and tested technical operation of baseband and radio frequency hardware such as modem (BPSK, QPSK, QAM) and antennas (parabolic, patch, yagi) to preserve durable 100% operation such PCB design using OrCAD, impedance matching using Smith Charts, 3D EM using Ansys, OTA measurements using anechoic chamber, EMI, ESD and RF signal routing

PCBA Engineer at TEAC Electronics Indonesia Ltd | June 1998 - June 2000

- Tested finished PCBA products (CD-ROM and Floppy disk) for compliance with tolerances and overall quality by creating function-circuit test (FCT) and In-circuit test (ICT) machine using LabVIEW software and NI USB-6008/9 as the I/O analog or digital interface between LabVIEW and the design under test (DUT).
- Identified defective items and made repairs according to department standards.
- Collaborated with other line workers and team members to assemble and repair parts.
- Read and interpreted blueprints, schematics, and drawings to assemble parts and products.
- Build guidelines for compliance testing and operator testing.
- Followed all safety measures and protocols, enabling department to meet ISO9001 safety rating for annual consecutively.
- Recognized and reported defective material and equipment to shift supervisor.
- Planned and paced work efficiently to meet daily, weekly, project or production goals.

Skills

- Strong understanding of neuroimaging techniques (fMRI) and brain transcranial electrical stimulation methods (tES).
- Experience with neural networks, deep learning, and statistical data analysis (Python, R, MATLAB, AFNI).
- Proficient in CUDA C++, Python, MATLAB, R, AFNI, and FPGA programming (Vitis HLS, Vivado).
- Operating system: Linux, Windows, Android
- Excellent problem-solving and optimization skills.
- Publication record and experience presenting research findings.
- Collaborative team player with effective communication and interpersonal skills.

Education/Awards

- Ph.D. in Electrical and Computer Engineering, University of Oklahoma (USA), 2016-2022, GPA: 4.00
- Master in Telecommunication Engineering, Bandung Institute of Technology (Indonesia), 2003-2005, GPA: 3.65
- Bachelor in Telecommunication Engineering, Telkom University (Indonesia), 2001-2003, GPA: 3.53
- Diploma III in Telecommunication Engineering, Telkom University (Indonesia), 1994-1998, GPA: 3.13
- Recipient of Educational Award by The International Society for Magnetic Resonance in Medicine for 2019, 2020, & 2021

References

- Dr. Martin Paulus, advisor in Laureate Institute for Brain Research (email: mpaulus@laureateinstitute.org)
- Dr. Masaya Misaki, advisor in Laureate Institute for Brain Research (email: mmisaki@laureateinstitute.org)

Publications

Han D, Mulyana B, Stankovic V, Cheng S. “A Survey on Deep Reinforcement Learning Algorithms for Robotic Manipulation. Sensors.” 2023; 23(7):3762. https://doi.org/10.3390/s23073762

Mulyana, Beni and Tsuchiyagaito, Aki and Smith, Jared, et. al. “Online closed-loop real-time tES-fMRI for brain modulation: A technical report” Brain and Behavior. 2022;12:e2667; doi: https://doi.org/10.1002/brb3.2667.

Mulyana, Beni and Tsuchiyagaito, Aki and Smith, Jared, et. al. “Online Closed-Loop Real-Time tES-fMRI for Brain Modulation: Feasibility, Noise/Safety and Pilot Study.” bioRxiv. 2021.04.10.439268; doi: https://doi.org/10.1101/2021.04.10.439268.

Ghazaleh Soleimani, Beni Mulyana, Michael A Nitsche, Til Ole Bergmann, et. al. "Closing the loop between brain and electrical stimulation: Towards precision neuromodulation treatments." PsyArXiv. July 16. doi:10.31234/osf.io/mxy85.

Hamed Ekhtiari, Beni Mulyana, Peyman Ghobadi-Azbari, Axel Thielscher, et al. “A Checklist for Assessing the Methodological Quality of Concurrent tES-fMRI Studies (ContES Checklist): A Consensus Study and Statement.” medRxiv 2020.12.23.20248579; doi: https://doi.org/10.1101/2020.12.23.20248579

Misaki, Masaya, Mulyana, Beni, Zotev, Vadim, et. al. “Hippocampal volume recovery with real-time functional MRI amygdala neurofeedback emotional training for posttraumatic stress disorder”. *Journal of Affective Disorders.* Vol. 283. 2021. Pages 229-235.

Luo, Q, Misaki, M, Mulyana, B, Wong, C-K, Bodurka, J. “Improved autoregressive model for correction of noise serial correlation in fast fMRI”. *Magn Reson Med*. 2020; 84: 1293– 1305. https://doi.org/10.1002/mrm.28203