Khurram Khalil

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Objective

An ambitious researcher who believes in result-oriented work. Have the ability to work as a team-led team player as well as can work as an individual player. Have an extensive knowledge of design and management of research projects and its implementation.
Research interest in machine learning, deep learning, neuroscience, brain computer interface, and bio signals.

Education

Degree: PhD in CS AI Model Security & Optimization (DNN & Generative AI)
Institute: University of Missouri, Columbia
Session: Fall 2024-Present

Degree: MS Robotics and Intelligent Machine Engineering
Institute: National University of Science and Technology (NUST), Islamabad
Session: Fall 2018-2021

Degree: BS Electronics Engineering
Institute: International Islamic University (IIU) , Islamabad
Session: Fall 2013-2017

Experience

- **AxcelerateAI** ***Dec 2023 - Aug 2024***
  - *Sr. Machine Learning Engineer*
    - Diffusion Models, Stable Diffusion, Computer Vision, Image Inpainting, OpenAI APIs, Large Language Models (LLM), Novel 3D Image editing methods, MLOPs, GCP, guiding a skilled team in AI Strategy, Data Analytics, and Tech Transformation. Focused on sectors like Digital Healthcare, Fintech, Retail AI, and Smart City Solutions, ensuring our AI implementations drive tangible business outcomes.
- **Center for Computing and Artificial Intelligence (CENTAIC), PAF** ***Nov 2020- Dec 2023***
  - *Sr. Machine Learning Engineer*
    - Pattern Analysis, Multi-sensor multi-object tracking, Spatiotemporal analysis, Multiple-hypothesis tracking, Explainable Machine Learning algorithms, Scientific Visualization of high dimensional data, End to end Artificial Intelligence algorithms deployment
- **Stealth AI, New York, USA (Remote)**
  - *Sr. Deep Learning Engineer*
    - Virtual try-on via densepose, Openpose, detectron2. Algorithmic trading via deep reinforcement learning, quant finance
- **Arbisot, Westwood, Lahore (Remote)** ***Jun 2022 – Sep 2022***
  - *Artificial Intelligence Engineer*

- Constraint based linear optimization, Dynamic optimization, Machine Learning, Time series analysis, Bass diffusion model for electric vehicles (EV) fleet

- **Spotmydot AB, Massachusetts, USA (Remote)**
  - *Deep Learning Engineer*
    - Custom Auto-grad implementation, computer vision, image recognition. Particle Swarm Optimization (PSO), Genetic Algorithms (GA)
- **Europe Union's Horizon2020 project** ***Sep 2018 – Apr 2021***
  - *Early-Stage Researcher (ESR)*
    - Machine Learning & Deep Learning, Rehabilitation and assistive bio robotics, Medical Image Analysis, Brain Signal Processing
  - *Research Associate (RA)*
    - Neuroimaging (fNIRS + EEG), Brain activity localization, Mental workload analysis, Brain Computer Interface, Socio-technical systems

Publications

1. **Khalil, K.**, Asgher, U., Ali, S., Li, Y. & Ayaz, Y. (May 2023). **Time and accuracy based comparative analysis between machine learning and deep learning algorithms: an fNIRS study.** *Artificial Intelligence in Medicine*. Article status: **Under review**.
2. Mughal NE, Khan MJ, **Khalil K**, Javed K, Sajid H, Naseer N, Ghafoor U and Hong K-S (2022). **EEG-fNIRS-based hybrid image construction and classification using CNN-LSTM.** *Frontiers in Neurorobotics 16:873239. doi:* https://10.3389/fnbot.2022.873239
3. **Khalil, K.**, Asgher, U., & Ayaz, Y. **Novel fNIRS study on homogeneous symmetric feature-based transfer learning for brain-computer interface.** *Nature's Scientific Reports 12, 3198 (2022).* https://doi.org/10.1038/s41598-022-06805-4
4. Mughal, N. E., **Khalil, K.**, Khan, M. J. (March 2021). **fNIRS Based Multi-Class Mental Workload Classification Using Recurrence Plots and CNN-LSTM.** In *International Conference on Artificial Intelligence and Mechatronics Systems (AIMS 2021)*, 2021, pp. 1-6, https://doi.org/10.1109/AIMS52415.2021.9466084
5. Asgher U, Khan MJ, Nizami MH, **Khalil K**, Ahmad R, Ayaz Y, & Naseer N (2021). **Motor training using mental workload (MWL) with an assistive Soft Exoskeleton system; an fNIRS Study for brain-machine interface (BMI).** *Frontiers in Neurorobotics*, 15, 17. https://doi.org/10.3389/fnbot.2021.605751.
6. Asgher, U., **Khalil, K.**, Khan, M. J., Ahmad, R., Butt, S. I., Ayaz, Y., ... & Nazir, S. (2020). **Enhanced Accuracy for Multiclass Mental Workload Detection Using Long Short-Term Memory (LSTM) for Brain-Computer Interface.** *Frontiers in Neuroscience*, 14, 584. https://doi.org/10.3389/fnins.2020.00584.
7. **Khalil, K.**, Asgher, U., Ayaz, Y., Ahmad, R., Nazir, S., Ali, S., ... & Oka, N. (2020, July). **Efficient Extreme Learning Machine (ELM) Based Algorithm for Electrocardiogram (ECG) Heartbeat Classification**. In International Conference on Applied Human Factors and Ergonomics (pp. 312-318). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_41.
8. Asgher, U., **Khalil, K.**, Ayaz, Y., Ahmad, R., & Khan, M. J. (2020, January). **Classification of Mental Workload (MWL) using Support Vector Machines (SVM) and Convolutional Neural Networks (CNN).** In 2020 3rd International Conference on Computing, Mathematics and Engineering Technologies (iCoMET) (pp. 1-6). IEEE. https://doi.org/10.1109/iCoMET48670.2020.9073799.

9. **Khalil, K.**, Asgher, U., Ayaz, Y., Ahmad, R., Ruiz, J. A., Oka, N., ... & Sajid, M. (2020, July). **Cognitive Computing for Human-Machine Interaction: An IBM Watson Implementation**. In International Conference on Applied Human Factors and Ergonomics (pp. 400-406). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_53.
10. **Khalil, K.**, Asgher, U., Khalil, M., Khawaja, K., Ayaz, Y., Nazir, S., ... & Sajid, M. (2020, July). **Organizational Socialization: An Important Factor for Knowledge Creation in Knowledge-Based Industrial Organizations and Enterprises.** In International Conference on Applied Human Factors and Ergonomics (pp. 445-451). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_59.
11. **Khalil, K.**, Asgher, U., Khalil, M., Khawaja, K., Ayaz, Y., Nazir, S., ... & Ruiz, J. A. (2020, July). **An Empirical Study on Organizational Socialization and Its Relationship with Employees' Age and the Knowledge Management**. In International Conference on Applied Human Factors and Ergonomics (pp. 355-361). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_47.
12. Asgher, U., Ruiz, J. A., Ayaz, Y., Sajid, M., **Khalil, K.**, & Ali, S. (2020, July). **Multi-level Optimization of Reactive Power Compensation in Industrial Nets with Heuristic Modelling Techniques.** In International Conference on Applied Human Factors and Ergonomics (pp. 429-438). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_57.
13. **K Khalil**, N Ehsan, M J Khan, **"Spiking neural networks: a potential solution for efficient spatiotemporal processing"**, Abstract in Neuromatch.io, March 30, 2020
14. **Khalil, K.**, & Khan, M. S. (2018, March). **Futiling eavesdropping in harvested energy powered cognitive radio networks under secrecy constraints and multi slot spectrum sensing schedule**. In 2018 International Conference on Computing, Mathematics and Engineering Technologies (iCoMET) (pp. 1-6). IEEE. https://doi.org/10.1109/ICOMET.2018.8346367
15. Asgher, U., Ruiz, J. A., Gutiérrez-Gualotuña, E. R., Ayaz, Y., Sajid, M., **Khalil, K.**, & Ali, S. (2020, July). **Mathematical Modeling and Optimization of Downdraft Gasifiers Using Artificial Neural Networks (ANN) and Stochastic Programming Techniques**. In International Conference on Applied Human Factors and Ergonomics (pp. 375-384). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_50.
16. Johar, A. H., Yousaf, T., Asgher, U., Ayaz, Y., Nazir, S., Khan, M. J., ... & **Khalil, K**. (2020, July). **Investigation of EEG Correlate in NIRS Signal for BCI**. In International Conference on Applied Human Factors and Ergonomics (pp. 319-325). Springer, Cham. https://doi.org/10.1007/978-3-030-51041-1_42.
17. **Semester Projects: - EEG based prosthetic hand control, Medical Images Annotating, MNIST data classification, SLAM P-30 Robot, Hand gestures recognition, Machine Learning Algorithms implementation using Python**

Projects

- **Temporal pattern analysis** *Oct. 2022-Present*
  Performed analysis of time-based events in real-time. Github
  - **Tools & technologies used**: NumPy, Pandas, shapely, rtree, Pyproj
- **Multi-object Tracking (MOT)** *Dec. 2021 - Jun. 2022*
  Multi sensor, multi target tracking that are neither fully nor directly observable. Github
  - **Tools & technologies used**: NumPy, networkx, plotly, math
- **Spatio-temporal constraint optimization** *Jun. 2021 – Jul. 2022*

Real time constraints based non-linear, non-convex dynamic optimization. Github
  - **Tools & technologies used**: NumPy, ortools, gekko, time

Additional subjects and Certificates

- How Google does Machine Learning by Google Cloud
- Introduction to Git and GitHub by Google
- Convolutional Neural Networks in TensorFlow by deeplearning.AI
- Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning by deeplearning.AI
- Computational Neuroscience by University of Washington
- Fundamental Neuroscience for Neuroimaging by Johns Hopkins University.

Technical skills

- Programming: Python, SQL, JavaScript
- Tools & OS: Git, Jupyter Notebook, Google Colab, Linux, Windows
- Libraries/Frameworks: Numpy, Pandas, scikit-learn, PyTorch, Tensorflow, Keras, shapely, rtree
- Web Skills: HTML/CSS/JS, Plotly, Dash

Achievements

Author of 4 Journal Papers, 7 book chapters, 3 conference papers during master's degree	*2020-2022*
Early Stage Researcher and Team Lead at "ENHANCE" Horizon 2020 project	*2020*
"Efficient Extreme Learning Machine (ELM) Based Algorithm for Electrocardiogram (ECG) Heartbeat Classification", nominated for best paper in Applied Human Factors and Ergonomics (AHFE) 2020 Conference.	*2020*

References

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