Muhammad Aasim Rafique (PhD)

Assistant Professor,
King Faisal University, KSA.
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BIO

An erudite professional, an astute researcher and an experienced technologist. I am PhD in Computer Science and Electrical Engineering from a reputed institute in Republic of Korea, with 30+ publications and a patent. I am currently working as an Assistant Professor at King Faisal University. Earlier I worked as a research professor in Gwangju institute of science and technology, Republic of Korea. We work on generative AI techniques, self-driving vehicles, digital-twins and segmentation in electron microscope images. I enjoy 15+ years of IT experience under various roles in industry and academia. I started my professional career working, as a programmer, developing a bare metal backup software for NeuroBackitUp. I have over 5+ years of experience working in multinational Telecom companies in Information Life Cycle Management, Business Continuity, Disaster Recovery and Datacenter management. During PhD I worked on neuromorphic systems, de-identification and self-driving vehicles as applications of Generative AI. My expertise in technology are particularly but not limited to artificial intelligence, machine learning, neural networks, data-centers, data-storage and data management. Leaping along my career I see myself in learning mode always and hereafter.

RESEARCH INTERESTS

- Machine Learning and Neural networks
- Neuromorphic Devices and Computational Neuroscience
- Self-driving Vehicles
- Affective Computing (Biotic Affective Computing)

CONFERENCE ACTIVITIES

- Program Chair and Member Organizing Committee: 2nd DeepView Workshop in Parallel with IEEE AVSS 2022
- Member technical committee 10th ICCMA 2022
- Program Chair and Member Organizing Committee: 1st DeepView Workshop in Parallel with IEEE AVSS 2021
- Sponsorship Co-Chair, IEEE ICoDT2 2021
- Technical Co-Chair, IEEE ICET 2018

PUBLICATIONS AND MANUSCRIPTS
Journal Submitted

1. Hussain, Muhammad Ishfaq; **Rafique, Muhammad**; Jeon, Moongu , "RVMDE: Radar Validated Monocular Depth Estimation for Robotics", *submitted*

Journal Accepted and Published

1. Hussain, Muhammad Ishfaq; **Rafique, Muhammad Aasim**; Jung, Wan-Gil ; Kim, Bong-Joong; Jeon, Moongu, "Segmentation and Morphology Computation of Spiky Nanoparticle using Hourglass Neural Network," ACS Omega, . IF: 4.13, Accepted

2. MI. Hussain, **M.A. Rafique**, J. Kim, M. Jeon and Witold Pedrycz "Artificial Proprioceptive Reflex Warning using EMG in Advanced Driving Assistance System,"IEEE Transactions on Neural Systems & Rehabilitation Engineering, , vol. 31, pp. 1635-1644, 2023 IF: 4.528,

3. Muhammad Ishfaq Hussain, **Muhammad Aasim Rafique**, Hyeonsoo Jang, Moongu Jeon, Daeyoung Shim.(2023).Camera-Radar Extrinsic Calibration for Autonomous Driving.KIISE Transactions on Computing Practices,29(1),38-43.

4. Dubey, Sheeka; Olimov, Farrukh; **Rafique, Muhammad**; Kim, J; Jeon, Moongu , "Label-Attention Transformer with Geometrically Coherent Objects for Image Captioning", *Accepted,* Information Sciences. IF: 8.23

5. Dubey, Sheeka; Olimov, Farrukh; **Rafique, Muhammad**; Jeon, Moongu , "Improving Small Objects Detection using Transformer", *Accepted, Journal of Visual Communication and Image Representation. IF: 2.7*

6. Farzeen Munir, Shoaib Azam, **Muhammd Aasim Rafique**, Ahmad Muqeem Sheri, Moongu Jeon, Witold Pedrycz, "Exploring thermal images for object detection in underexposure regions for autonomous driving", **Accepted**, Applied Soft Computing, 2022, https://doi.org/10.1016/j.asoc.2022.108793, IF: 6.725

7. Hussain, Muhammad Ishfaq; Azam, Shoaib; **Rafique, Muhammad**; Sheri, Ahmad M; Jeon, Moongu , "Drivable Region Estimation for Self-Driving Vehicles Using Radar", IEEE Transactions on Intelligent Transportation Systems, **Accepted** Vol. 00 , No. 00, Jan, 2022. IF: 5.978

8. **Rafique, M. Aasim**; Khaskheli, F.; Hassan, M. Tahir; Naseer, S.; Jeon, M., "Employing Automatic Content Recognition for Teaching Methodology Analysis in Classroom Videos", PLOS ONE, **Accepted,** Jan 2022. IF: 3.24

9. Azam, Shoaib; Munir, Farzeen; **Rafique, Muhammad**; Sheri, Ahmad M; Hussain, Muhammad Ishfaq; Jeon, Moongu , "N2C: Neural Network Controller Design Using Behavioral Cloning", IEEE Transactions on Intelligent Transportation Systems, **Accepted** Vol. 00 , No. 00, Dec, 2020. IF: 6.319

10. Sheri, Ahmad; **Rafique, Muhammad**; Hassan, Malik; Khurram, Junejo; Jeon, Moongu: 'Boosting Discrimination Information based Document Clustering using Consensus and Classification' , **IEEE Access, Volume 7,** Issue 1, Page(s) 78954-78962,

11. Sheri, Ahmad; **Rafique, Muhammad**; Jeon, Moongu; Pedrycz, Witold: 'Background Subtraction using Gaussian-Bernoulli Restricted Boltzmann Machine', IET Image Processing, 2018, DOI: 10.1049/iet-ipr.2017.1055

12. **M. A. Rafique**, M. T. Hassan and M. Jeon,"Deformable Object Tracking using Clustering and Particle Filter", Computing and informatics (Formerly, Computers and Artificial Intelligence) Vol 37, No 3 , pp 717-736 (2018)
13. **M. A. Rafique**, W. Pedrycz and M. Jeon, "Vehicle License Plate Detection Using Region Based Convolutional Neural Networks", Soft Computing, DOI 10.1007/s00500-017-2696-2, 2017.
14. **M. A. Rafique**, B. Lee and M. Jeon, "Hybrid Neuromorphic System for Automatic Speech Recognition", IET, f52(17), 1428-1430 (Aug. 2016)
15. A. M. Sheri, **M. A. Rafique**, W. Pedrycz, M. Jeon, "Contrastive divergence for memristor-based restricted Boltzmann machines", Engineering Applications of Artificial Intelligence, Vol 37, pp 336-342, Jan. 2015.

Conference

1. Muhammad Ishfaq Hussain, **Muhammad Aasim Rafique,** Ahmad Muqeem Sheri and Moongu Jeon "Drivable Region Estimation for Self-Driving Vehicles Using Radar", IEEE Intelligent Vehicles Symposium, Anchorage, Alaska, USA, June 4-7, 2023.
2. Muhammad Ishfaq Hussain, **Muhammad Aasim Rafique**, S. Khurbaev, Junbom Pyo, Taweook Kim, Brain J. d' Auriol, and Moongu Jeon, "Deployment of Digital Twin in Robotics and Autonomous Driving Using ROS Architecture," 3rd IFSA Automation, Robotics & Communications for Industry 4.0/5.0 (ARCI' 2023), Chamonix, France 22~24 February 2023.
3. **Muhammad Aasim Rafique**, Muhammad Ishfaq Hussain, Byung-Geun Lee, Hong Kook Kim and Moongu Jeon "Vehicle CAN Bus Data Prediction Using Transformers with Auxiliary Decoder Loss," 41st IEEE Int. Conf. on Consumer Electronics (ICCE), Las Vegas, US, Jan 6 ~ 9 , 2023.
4. MI. Hussain, **MA. Rafique**, Zafran Khan, Khurbaev Sayfullokh, Rasuljon Khalimjanov, Moongu Jeon. "Monocular Vision-based Autonomous Driving and PID Controller", Korea Software Congress 2022,Ramada Plaza Jeju, 2022.12.20. -12.23.
5. **Muhammad Aasim Rafique**, Muhammad Ishfaq Hussain, Mostafa Afifi Hassan, Wan-Gil Jung, Bong-Joong Kim, and Moongu Jeon, "Automated Single Particle Growth Measurement using Segmentation," 18th IEEE Int. Conf. on Advanced Video and Signal-Based Surveillance Hybrid (AVSS), Madrid, Spain, Nov. 29 ~ Dec 02, 2022.
6. **M.A. Rafique,** Muhamamd Ishfaq Hussain, Shikha Dubey, Khurbaev Sayfullokh and Moongu Jeon, A Monocular Camera Bird-Eye-View Generation using Lane Markers Prior, International Conference on Control, Automation and Systems **(ICCAS)**, Busan, South Korea, Nov. 27 ~ Dec 01, 2022.
7. Muhammad Ishfaq Hussain, **Muhammad Aasim Rafique**, Khurbaev Sayfullokh and Moongu Jeon, Exploring Data Variance challenges in Fusion of Radar and Camera for Robotics and Autonomous Driving, International Conference on Control, Mechatronics and Automation (ICCMA), Nov. 9 ~ 12, 2022.
8. Labina Shrestha, Shikha Dubey, Farrukh Olimov, **Muhammad Aasim Rafique**, Moongu Jeon,"3D Convolutional with Attention for Action Recognition," KIIT Summer Conference 2022, Jeju, 2022.06.02. - 06.04.

9. Muhammad Ishfaq Hussain, **M. A. Rafique**, H.Y. Su, M. Jeon. "Camer-radar external parameter calibration for autonomous driving", Korea Software Congress 2021, 2021.12.20 – 12.22. (**Best Paper Presentation Award**)
10. S. Azam, F. Munir, **M.A. Rafique** and M. Jeon, **"**object Modeling from 3D Point Cloud Data for Self-Driving Vehicles,**"IV'18,** Changshu, Suzhou, China, June 26-30, 2018
11. Munir, F., Azam, S., **Rafique, A.**, & Jeon, M. (2017). Automated Labeling of 3D Point Cloud Data. Korea Information Science Society KSC, 769-771, 2017
12. S. Azam, **M. A. Rafique**, A.M. Sheri and M. Jeon, "Mutli-sensor data collection and data fusion: Step towards self-driving cars,"BIC, Jeju Island, 2017.
13. S. Azam, **M. A. Rafique**, and M. Jeon, "Vehicle Pose Detection Using Region Based Convolutional Neural Network", *2016 International Conference on Control, Automation and Information Sciences (ICCAIS)*, Ansan, OCT- 27-29, 2016, pp. 194-198. doi: 10.1109/ICCAIS.2016.7822459
14. **M. A. Rafique**, S. Azam, J. Gwak and M. Jeon, "Character Segmentation of Korean Vehicle License Plate", the 4th SMA, Jan. 10-13, 2016, Danang, Vietnam.
15. J. Oh, J. Gwak, **M. A. Rafique** and M. Jeon, "A new image denoising scheme using spiking neuromorphic systems", *The 6th IASTED International Conference on Computational Intelligence,* Innsbruck, Austria, Feb. 16-17, 2015.
16. **M. A. Rafique**, K. H. Sim , M. T. Hassan and M. Jeon , "Implementation ofApproximate computing in Jikes RVM" , *Summer Conference of Electronics Engineering Society of Korea I* , 2015.05.22
17. **A. Rafique**, A. M. Sheri and M. Jeon, "Background scene modeling for PTZ cameras using RBM," *The 2014 International Conference on Control, Automation and Information Sciences (ICCAIS 2014)*, Gwangju, 2-5 Dec, 2014, pp. 165-169. doi: 10.1109/ICCAIS.2014.7020551

Patent
- **Rafique Muhammad Aasim**, Azam Muhammad Shoaib, Choi In-Moon, Jeon Moongu "Face DeIdentification Method", Domestic Application No .: 2017-0032265, Date of Application: 2017.03.15, Registration No .: 10-1861520 (Republic of Korea)

EDUCATION
- **Gwangju Institute of Science and Technology,** Republic of Korea
  Ph.D, EECS, (**2018)**
  GPA: 4.12/4.5
  Dissertation title: Predictive learning with generative modeling
  Research:
  - Change detection in images and videos
  - Intelligent transportation systems
  - Neuromorphic systems
  - Self-Driving cars
- **Lahore University of Management Science (LUMS),** Pakistan
  MS Computer Science (**2008)**
  Major (Machine Learning, Networking and Distributed Systems)
  GPA: 3.5/4.0
  Research:

- Optimization in energy constrained networks
- Cooperation in Ad-hoc networks
- Localization, coverage and connectivity in Sensor Networks
- Traffic Engineering in Networks
- Clustering in Data Mining

- **Quaid-i-Azam University Islamabad**, Pakistan
  M.Sc. Computer Science **(2004)**
  GPA: 73.6/100
  Thesis: Workflow Model of Private Branch Exchange (PBX)

- **Punjab University, Lahore**, Pakistan
  B.Sc. Mathematics and Statistics **(2001)**
  Honor: Top position in Institute

CERTIFICATIONS
- AWS Cloud practitioner foundation (Expires 2025)

TEACHING EXPERIENCE

- **Assistant Professor** at **SEECS, NUST (Sep, 2019 – todate (OnLeave))**
  - Digital Image Processing - Fall 2019
  - DeepLearning – Spring 2020

- **Assistant Professor** at **Quaid-i-Azam University Islamabad (Feb, 2018 – Aug, 2019)**
  - Deep learning with GPU Computing (Special Topics) - Spring 2019
  - Artificial Intelligence – Fall 2018
  - Advanced Operating Systems – Fall 2018
  - Computer Graphics - Spring 2018, Spring 19

RESEARCH POSITIONS
Research Associate, Networking Lab LUMS, Pakistan
- Energy constrained networks

Sr. Research Associate, Image Processing Lab, MCS, Pakistan
- Motion detection
- Image Recognition

TEACHING ASSISTANT
- Teaching Assistant at LUMS
  - Software quality assurance
  - Advanced networks
- Teaching assistant at GIST
  - Machine learning

- Pattern recognition

CAREER DEVELOPMENT

MTN Ghana
Consultant, May 2010 - Feb 2013
- Cloud storage services(HP, EMC, SUN, HDS and Hitachi)
- High performance platforms design and implementation(HP and SUN)
- SAN and LAN Networking

WARID Congo SA.
System Engineer, June 2008 - April 2010
- Data center operations
- Systems design and implementation
- SAN Storage

Ayesoft (pvt.)
Software Engineer, May 2004 – July 2005
- Backitup (Nero) Backup management software development (C++)
- Linux customization (Live CD, USB) to use as OS independent restores(linux kernel)

Tools and Technologies
Operating Systems
Windows Server, Solaris, Linux, HP-UX
* Created live CD small distribution using linux kernel
Virtualization
VMware server, VMware ESXi, VMware Vcenter, VMware VDI, MS virtual server, SUN virtual Box, Citrix Xen server

Applications
Active Directory, ISA, Orion NMS, CA Network Management System(NMS) i.e. Spectrum, ehealth and UDCC, CA Helpdesk, CA Desktop and Asset Management System, Veritas Netbackup, VxVM, SVM, , Sun Cluster 3.2, Oracle10g, SQL Server, DNS, DHCP, BIND, Windows 2003 server Cluster, IPMP, Squid

Development
Theano, PyTorch, Tensorflow, Caffe, Python, C/C++, Java, Matlab, MPI, OpenMP

AI Tools
GPT (ChatGPT, OpenaiAPI): Prompt Engineering ChatBot, Bard, LLaMA, Whisper, Dall-E (MidJourney), Amazon Sagemaker, Amazon AI and ML Services

LANGUAGES
- English - speak fluently and read/write with high proficiency
- Udru - native language
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- Arabic- Learning
- Korean - Learning