# KASHIF KHAN

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## RESEARCH INTERESTS

With a strong background in machine learning (ML) and signal modeling, my primary research interest lies in applying modern ML techniques to solve real-world problems with measurable impact. I aim to develop intelligent systems that can operate reliably in practical environments. My goal is to design ML solutions that are not only accurate but also efficient, interpretable, and applicable to real-time decision-making scenarios.

## EDUCATION

**Nazarbayev University, Astana, Kazakhstan**                          Aug. 2021 – Jun. 2023
MSc in Electrical & Computer Engineering
**Thesis:** Development of Machine Learning-Based Modeling Techniques for Advanced RF Devices
**CGPA:** 3.21/4.0

**University of Engineering & Technology (UET), Peshawar, Pakistan**                          Aug. 2015 – Aug. 2019
BSc in Electrical Engineering
**Thesis:** Road Power Generation using Freewheel Mechanism
**CGPA:** 3.36/4.0

## EXPERIENCE

**Radio Frequency (RF) Research Team, Nazarbayev University**                          Nov. 2021 – Present
*Research Assistant*

· **ML-Assisted Microstrip Filter Design (ADS):** Built an EM → ML-surrogate → optimization pipeline; integrated *Advanced Design System (ADS)* data with ML surrogates and metaheuristic search (e.g., Grey Wolf Optimizer) to reduce design time while maintaining accuracy; validated via fabrication and *Vector Network Analyzer (VNA)* measurements.
· **Behavioral Modeling of Advanced RF Devices (GaN HEMTs):** Benchmarked ANN/RBNN/GRNN/XGBoost/GPR for small-signal modeling up to 40 GHz (ongoing to 120 GHz); used global optimization for hyperparameter search; assessed interpolation vs. extrapolation across temperature, bias, and frequency; validated with Smith charts and response maps.
· **Research Process:** Curated large datasets; enforced leakage-proof evaluation; emphasized reproducibility (clear splits, ablations, reporting); co-authored IEEE publications and contributed to multi-institutional projects.

**Invest In Kids, Astana, Kazakhstan**                          Feb. 2023 – Present
*Instructor*

· Designed practical curricula in Python, ML fundamentals, and AI agent automation (n8n + LLMs).
· Supervised hands-on projects: Telegram AI chatbots, Google Sheets–connected agents, workflow automation; explained neural nets, model tuning, and orchestration in beginner-friendly modules.
· Mentored students on real systems (e.g., IELTS Speaking Coach, performance trackers, assistants); promoted project-based learning, code reviews, and iteration.

**PASBAN Human Rights, Protection & Welfare Organization**                          2016 – 2021
*General Secretary*

· Coordinated meetings and operations; ensured compliance and stakeholder communication.
· Maintained records and administrative workflows, improving organizational efficiency.

## SELECTED PROJECTS & RESEARCH

**Physics-Informed ML for MPPT under Partial Shading**                          *Python, Pandas/XGBoost, scikit-learn*
End-to-end pipeline for PV MPPT: synthetic data via physics-based simulator; robust feature engineering; grid-search tuning across ANN/XGBoost/LightGBM/CatBoost/SVR/GPR/RF/kNN; evaluated with regression + time-series tracking metrics, latency, and Wilcoxon tests; reproducible reports.

**Remaining Useful Life (RUL) — NASA C-MAPSS** *Transformers, TensorFlow (GPU, AMP)*
ConvFormer-style Transformer with leakage-proof evaluation (sliding windows, train-only standardization, Group-KFold by unit). Added bootstrap CIs and alarm-threshold grid (H,K) with F1/cost/lead-time; model complexity profiling (params, est. FLOPs, per-sample latency). *Examples:* FD001 RMSE ∼12.8, FD003 RMSE ∼10.0.

**Extrapolation-Aware Modeling of GaN HEMTs** *XGBoost + Grey Wolf Optimizer*
Small-signal S-parameter prediction across temperature, bias, and frequency. Controlled splits to study interpolation vs. extrapolation; GWO-tuned XGBoost reduced MSE/MAE and improved $R^2$ over defaults; validated via Smith charts and 3D response maps.

**ML-Assisted Microstrip Filter Design (GWO–ANN)** *ADS, ANN surrogate, VNA*
EM → ANN surrogate → GWO optimization → fabrication path for high-frequency microstrip filters; hardware verification with VNA; demonstrated design-time reduction with maintained specs.

## PUBLICATIONS

### Journal Articles

1. **K. Khan**, S. Husain, M. Hashmi, "GWO-ANN Based Approach for High-Frequency Microstrip Filter Design and Optimization," *Procedia Computer Science* (Accepted; Elsevier; **Scopus Indexed**, CPCI).

2. **K. Khan**, S. Husain, A. Jarndal, M. Hashmi, "Hybrid Approach for Performance Optimization of Gallium Nitride High Electron Mobility Transistors Small-Signal Behavioral Models," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields* (Accepted; Wiley; **SCIE/Scopus**).

### Conference Papers (IEEE Indexed)

1. **K. Khan**, S. Husain, A. Jarndal, M. Hashmi, "Development and Assessment of ML Based GaN HEMTs Small-Signal Modelling Techniques," *36th IEEE International Conference on Microelectronics (ICM)*, Doha, Qatar, Dec. 2024.

2. **K. Khan**, S. Husain, G. Nauryzbayev, M. Hashmi, "Development and Evaluation of ANN, RBNNs, and GRNNs Based Small-Signal Behavioral Models for GaN HEMT Up to 40 GHz," *IEEE Midwest Symposium on Circuits and Systems (MWSCAS)*, Springfield, USA, Aug. 2024.

3. **K. Khan**, S. Husain, G. Nauryzbayev, M. Hashmi, "Development and Evaluation of ANN, ACOR-ANN, ALO-ANN Based Small-Signal Behavioral Models for GaN-on-Si HEMT," *30th IEEE International Conference on Electronics, Circuits and Systems (ICECS)*, Istanbul, Türkiye, Dec. 2023, pp. 1–4.

4. **K. Khan**, S. Husain, G. Nauryzbayev, M. Hashmi, "On Temperature-Dependent Small-Signal Behavioral Modelling of GaN HEMT Using GWO-PSO and WOA," *IEEE Int'l Symposium on Networks, Computers and Communications (ISNCC)*, Doha, Qatar, Oct. 2023, pp. 1–6. *(Best Paper Award)*

5. S. Husain, **K. Khan**, G. Nauryzbayev, M. Hashmi, "Temperature Dependent I-V Models for Microwave Transistor Using Radial Basis NNs, Generalized Regression NNs and Feedforward NN," *5th IEEE Int'l Conference on Multimedia, Signal Processing and Communication Technologies (IMPACT)*, Aligarh, India, Dec. 2022, pp. 1–5. *(Best Paper Award)*

## AWARDS AND ACHIEVEMENTS

- **Best Paper Award** — IEEE ISNCC, Doha, Qatar (2023).
- **Best Paper Award** — IEEE IMPACT, Aligarh, India (2022).
- **Fully Funded Scholarship (Abay Kunanbayev)** — MSc, Nazarbayev University.
- **Fully Funded Scholarship (Diya Pakistan)** — BSc, UET Peshawar.
- **Prime Minister's Laptop Award** — Academic excellence (BSc).
- **Goodwill Scholarship** — Peshawar Model Degree College.

## ONLINE COURSES

- **Data Science Tools** — IBM (DS0105EN), Certificate of Completion.
- **Deep Learning Fundamentals with Keras** — IBM (DL0101EN), Certificate of Completion.
- **Data Science with Python** — Simplilearn (4405431), Certificate of Completion.

## TECHNICAL STRENGTHS

**Programming**

- C, C++; Python (scikit-learn, TensorFlow/Keras, Matplotlib, Pandas, NumPy)

**Simulation & Modelling**

- MATLAB/Python (system-level), ADS (EM/circuit), Mathematica; Anaconda (Spyder, Jupyter)

**ML & Optimization**

- Neural Networks, GPR, GBM/LightGBM/XGBoost
- Grey Wolf, Black Hole, Reptile Search, Spotted Hyena, Ant Lion, Whale Optimization

## SOFT SKILLS

- **Research Planning:** Methodology design, literature reviews, leakage-proof evaluation, and simulation setups.
- **Communication:** Clear technical writing, visuals (charts/tables), and talks for academic/industry audiences.
- **Team Collaboration:** Cross-functional teamwork and independent execution; mentoring/teaching experience.
- **Problem Solving:** Evidence-driven analysis, ablations, and iterative experimentation.
- **Adaptability:** Comfortable with new tools, domains, and fast-changing environments.

## LANGUAGES

- English: **IELTS 7.0 (CEFR C1)** — proficient in academic and research communication.
- Pashto (Native), Urdu (Native)