

Muhammad Khan

Chicago, IL

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EDUCATION

Loyola University Chicago

BS, Software Engineering, Philosophy

Aug 2021 - Present

Chicago

- **GPA:** 3.9

- **Achievements:** Summa Cum Laude, Departmental Honors

Harry S Truman College

Dual Enrollment, Chemical Engineering

Jun 2019 - Jun 2021

Chicago

- **GPA:** 4.0

PUBLICATION

- M Khan, et al.. Identification and Analysis of the Spread of {Mis}information on Social Media. (CSoNET),* 2023

AWARDS

- **Loyola Outstanding Researcher Award - (2025):** Award for undergraduates who have conducted exceptional research
- **Dean's List (2021 - 2025):** Award for full-time undergraduates who earn a GPA of 3.5 or higher in a given semester
- **David Prasse Scholarship (2021 - 2025):** Scholarship to 5 graduating seniors from Senn High School attending Loyola
- **John Grant Health Equity Award - (2025):** Award for commitment to and research in health equity
- **Turing High Achievement Award - (2025):** Top graduating student in Software Engineering
- **Computer Science Departmental Honors (2025):** Distinction for advanced study and scholarly excellence

Technical Skills & Certifications

- **Languages:** Python, Java, JavaScript, English, Urdu, Bash/Shell, CSS, C++, React
- **Frameworks & Tools:** PyTorch, TensorFlow, MMLabs, Pandas, NumPy, Matplotlib, OpenCV, Hugging Face, Matplotlib
- **Systems & Platforms:** Linux, Git, Docker, Lambda Labs, Polaris Supercomputer, WiFi Pineapple, Raspberry Pi
- **Specialties:** Computer Vision, NLP, Video Transformers, GIS, Misinformation Detection, Research Writing, AI Design

Professional Summary

Innovative Computational Researcher with 4 years of experience in machine learning, cybersecurity, and geospatial intelligence. Demonstrated expertise in developing advanced AI models for violence detection and misinformation analysis, alongside proficiency in computer vision and natural language processing. Recognized for leading interdisciplinary research initiatives that drive ethical AI development and impactful solutions. Committed to leveraging high-performance computing and cloud systems to create technologies that enhance both resilience and intelligence in complex environments.

WORK AND VOLUNTEER EXPERIENCE

The Loyola University of Chicago

Machine Learning Researcher

Jan 2022 - May 2025

Chicago, IL

Malaria Detection & Geospatial Intelligence

- Developed a multimodal violence detection system by integrating UniformerV2 and VideoSWIN in a spatio-temporal ensemble, achieving 65% precision on previously unstructured and noisy real-world video data
- Created a cross-disciplinary design framework incorporating cognitive science, biophysics, and philosophical models of perception, enhancing ethically interpretable AI in threat recognition
- Captured and encoded over 200 hours of gaze-tracked footage using wearable eye-tracking glasses, then trained saliency-driven models that mimicked human perceptual weighting, improving frame-level accuracy by 23%.
- Created and implemented an IRB-approved human subject protocol, combining temporal annotation with gaze heatmapping, resulting in a unique dataset now under consideration for open-source release

Malaria Detection & Geospatial Intelligence

- Developed vision model (Mask-RCNN and Faster-RCNN) fine-tuned on satellite imagery with custom spectral-band augmentations, increasing malaria hotspot detection accuracy by 18% across low-visibility regions using localized population density.
- Built a pipeline fusing object detection with pixel-level spectral decomposition to generate spatial disease risk maps, enabling real-time resource targeting in rural Nigeria.
- Extracted and modeled surface-level geospatial indicators (elevation, vegetation index, water proximity) to enrich predictive layers, boosting model robustness against seasonal noise by 27%.

Human Action Recognition

- Designed and deployed a transformer-based HAR framework using VideoSWIN and text-guided prompts, demonstrating a 34% increase in cross-context generalization across three benchmark datasets (Moments in Time, Kinetics, SSV2).
- Diagnosed and resolved persistent GPU instability on Lambda Labs infrastructure by implementing fallback architectures, reducing downtime by 80% and preserving multi-day training runs.
- Refactored MMLabs pipelines for modularity and speed, cutting training time by 30% through efficient batching, lazy evaluation, and hardware-aware optimization.
- Engineered a Bluetooth-based unauthorized device detection system using Raspberry Pi, WiFi Pineapple, and Python scripts, enhancing real-time detection range by 30%.
- Designed hardware-software integrated solutions to identify and classify nearby Bluetooth devices, contributing to research on practical cybersecurity mitigation.
- Applied embedded systems programming and wireless communication protocols to create reliable, scalable detection platforms.

Misinformation Detection & NLP Research

- First-authored a study on COVID-19 misinformation spread, achieving 95% classification accuracy using a fine-tuned BERT pipeline across 50M tweets-among the largest undergraduate-led social media datasets to date.
- Directed a multi-level research team and engineered custom Twitter tools using Java and Python, reducing preprocessing latency by 40% and facilitating daily data ingestion at scale.
- Innovated with coreset and approximate nearest neighbor techniques to configure Twitter API rate limits, increasing usable data volume by 22% without compromising semantic integrity.
- Created publication-ready figures using Matplotlib and NumPy, and delivered insights to researchers and professors through conferences.

GlobeMed

Jun 2022 - May 2023

Director of Finance

Chicago, IL

- Raised \$5,200+ in external funding through grant writing, strategic partnerships, and SAGA advocacy, marking a 20% increase over prior years and ensuring operational sustainability.
- Secured 4+ premium fundraising locations through negotiation and early strategy sessions, doubling average campaign visibility and increasing donation yield by 35%.
- Presented financial justifications at university funding hearings, unlocking new vendor access and enabling the chapter to expand its outreach and education initiatives.