

# Mohamed Hemdan

+1 (612) 715 1046

hemda001@umn.edu

linkedin.com/in/mohamed-hemdan

github.com/mo-hemdan

## Education

- Aug 2023 - Present **University of Minnesota, Twin-Cities, MN, USA** *Expected to graduate: Jun 2028*  
Ph.D. in Computer Science
- Jan 2023 **The American University in Cairo (AUC), Cairo, Egypt**  
B.Sc. *summa cum laude* (Highest Honors) – GPA: 3.94/4.00  
Major in Computer Engineering with a Minor in Mathematics

## Industrial Experience

- Feb – Jul 2023 **Microsoft, Cairo, Egypt**  
*Applied Science Intern*, Notifications team, WebXT  
○ Analyzed users' interactions, and features to determine high importance factors in user engagement with news and notifications.
- Jun – Aug 2022 **European Council for Nuclear Research (CERN), Geneva, Switzerland**  
*Openlab Summer Student*, Openlab, IT Department  
**Mentors:** Mr. José C. Holgueras, Dr. Sofia Vallecorsa  
**Topic:** Federated Learning in High-Energy Physics  
○ Distributed GAN model training for calorimeter simulations across CERN servers and the LHC computing grid, adapting the models to federated learning for large-scale data access
- Jul – Aug 2021 **envelope.network, Boston, MA, US (Remote)**  
*Data Science Intern*  
○ Developed a browser extension to extract interest from browsing history and match it with ads

## Research Experience

- Aug 2023 – Present **University of Minnesota, MN, USA**  
*Research Assistant*, Data Management Lab  
**Supervisors:** Prof. Mohamed Mokbel  
**Topic:** Spatial Data Management  
○ Developed a system to evaluate whether to match points to existing roads or use them to infer new roads due to map and GPS inaccuracies. Implemented a C++ based custom spatial join. Targeting submission to VLDB  
○ Developing a system parallel to OSM to manage map metadata like traffic information, road attributes (e.g., number of lanes and turn restrictions). Extracted Map Metadata from GPS trajectories.
- Feb – May 2022 **The American University in Cairo, Cairo, Egypt**  
*Independent Study Research (Computer Graphics and 3D Computer Vision)*, CSCE Department  
**Supervisors:** Prof. Mohamed Mostafa  
**Topic:** Improving 3D Reconstruction Techniques  
○ Studied computer graphics and conducted a literature survey on various 3D reconstruction techniques. Experimented with encoder-decoder architectures, including the *Pix2Vox* model, for multi-view shape prediction, improving Intersection over Union (IoU) accuracy.
- Sep 2021 – May 2022 **The American University in Cairo, Cairo, Egypt, (Undergraduate Thesis)**  
*Undergraduate Researcher*, CSCE Department  
**Supervisors:** Prof. Hamada Rizk, Prof. Hossam Sharara, Prof. Moustafa Youssef  
**Topic:** Improving the adaptability of Indoor localization systems  
○ Introduced the *virtual building* concept to deep learning-based indoor localization systems, making them adaptable to changes in WiFi access points (e.g., signal instability, replacements, and position adjustments), while maintaining comparable accuracy to previous systems

Jun – Aug **Alexandria University, Alexandria, Egypt**  
2021 *Summer Research Intern, Wireless Research Center (WRC)*  
**Supervisors:** Eng. Ahmed Shokry, Prof. Moustafa Youssef  
**Topic:** Improving data augmentation techniques for WiFi localization systems  
○ Introduced a new data augmentation technique for outdoor localization systems using conditional GANs. Improved the accuracy by 22.2%.

## Grants

Aug 2023 Three-year Ph.D. Fellowship, *College of Science and Engineering, UMN*  
Aug 2023 Greiling Fellowship, *Department of Computer Science and Engineering, UMN*  
2021 - 2022 Undergrad Grants UG#220911664, UG#22047986, UG#21091221 *AUC* – \$9,000  
2017-2022 Public School Scholarship Fund (PSSF) – Full-tuition undergraduate scholarship, *AUC*

## Awards & Certificates

May 2023 KAUST Ph.D. Fellowship, *KAUST* (declined)  
Mar 2023 Excellence in Undergraduate Research Award, *Academy of Liberal Arts, AUC*  
Feb 2023 Dr. Sherif El-Kassas Award, *AUC*  
Feb 2023 Dr. Abdel Rahman El Sawy Endowed Award, *AUC*  
2017-2022 Dean's List for outstanding academic achievement, *AUC*  
2021-2022 Micro Masters in Statistics and Data Science, *MITx* ([link](#))  
May 2022 Honors Student, *School of Sciences and Engineering, AUC*  
Nov 2021 2<sup>nd</sup> runner-up (bronze medal), *Student Research Competition (SRC), ACM SIGSPATIAL*  
Nov 2018 Outstanding Scholarship Student Award for Year 2017-2018, *AUC*

## Publications

- 1 (accepted) **Large Language Models for Spatial Analysis Queries**, Y. Hussein, M. Hemdan, M. Mokbel. (2025). VLDB
- 2 **Large Language Models for Urban Mobility**, Y. Hussein, M. Hemdan, M. Mokbel. (2025). IEEE MDM
- 3 (accepted) **Federated Learning Strategies of Generative Adversarial Networks for High Energy Physics Calorimeter Simulation**, M. Hemdan, J. Holgueras, S. Vallecorsa. (2024). Journal of Physics: Conference Series ([link](#))
- 4 **Indoor Localization System for Seamless Tracking Across Buildings and Network Configurations**, H. Rizk, A. Sakr, A. Ghazal, M. Hemdan, O. Shaheen, H. Sharara, H. Yamaguchi, M. Youssef. (2023). IEEE GLOBECOM. ([link](#))
- 5 (poster) **Federated Learning Strategies of Generative Adversarial Networks for High Energy Physics Calorimeter Simulation**, M. Hemdan, J. Holgueras, S. Vallecorsa. (2022). ACAT, Bari, Italy ([link](#))
- 6 (poster) **Data Augmentation using GANs for Deep Learning-based Localization Systems**, J. Boulis, M. Hemdan, A. Shokry, and M. Youssef. (2021). ACM SIGSPATIAL. ([link](#))

## Skills & Technical Experience

**Programming Languages:** Python, C++, C, Java, Javascript

**Big Data:** Map-Reduce using Apache Spark, data mining algorithms (frequent items, ...)

**Geospatial:** Spatial Join, Geo-pandas, folium, KeplerGL, OSM parsing

**Database Systems:** Advanced querying and geospatial processing with PostGIS, PostgreSQL, and NoSQL databases like MongoDB

**Machine Learning:** Deep learning architectures with experience in GANs (tuning, distributed training) and CNNs, VAEs using (TensorFlow, PyTorch, Keras, Scikit-learn)

**Others:** operating systems, linux shell, Containerization and orchestration (Docker, Ansible), version control (Git), Shell scripting, ray