MOHAMED ELSHARKAWY, MSc

CONTACT INFORMATION

Address: 2301 S. Third St. Paul C.Lutz Hall, Room 309 J. B. Speed School of Engineering University of Louisville, KY, USA
Email: ***mohamed.elsharkawy@louisville.edu; mohmed.elsharkawy@mans.edu.eg***
Phone: +15028850800 (***USA***) – +201069662911(***Egypt***)

RESEARCH INTERESTS

Medical Image Analysis, Machine Learning, Deep Learning, Image Segmentation, and Computer Vision.

EDUCATION

[2023–Current] **Ph.D. Thesis:** Profs. Ayman El-Baz, and Adel Elmaghraby, *Thesis Co-advisors.*

University of Louisville, Louisville, KY

[2016–2022] **M.Sc. Thesis:** "*Role of Machine Learning in Early Detection of Retinal Diseases*", Profs. Ayman El-Baz, Ahmed Atwan, and Eman Eldaydamoni, *Thesis Co-advisors.*

University of Louisville, Louisville, KY, USA jointly with Mansoura University, Mansoura, Egypt (from 2019 to 2022).

[2011–2015] **B. S.:** B.S. in Information Technology Department, Faculty of Computers and Information Sciences,
Mansoura University, Mansoura, Egypt.
Sr. Project: "*Smart Intensive care Unit*".
Cumulative Grade: Distinction with Degree of Honor 90.2% (GPA = 3.7).
Department Rank: 1^{st} over a class of 160 students.

TEACHING EXPERIENCE

Teaching Assistant (Full Time): Mansoura University, Egypt Mar. 2015 – Present

- Main duties and responsibilities were to prepare, deliver, and organize laboratory and tutorial sessions; grading of quizzes and mid-term examinations; conduct laboratory experiments to teach computer science materials
- Assisted in teaching several undergraduate courses: Logic circuit; Electronic Fundamentals; Network programming; object-oriented programming; mobile computing; fundamental of programming; fundamentals of Statistics.

Teaching Assistant (Full Time): University of Louisville, USA Jan. 2023 – Present

- Main duties and responsibilities were to prepare, deliver, and organize laboratory and tutorial sessions; grading of quizzes and mid-term examinations; conduct laboratory experiments to teach Bioengineering materials

- Assisted in teaching undergraduate course: Bioengineering measurements and
  BIOSYSTEMS & SIGNALS and Computer Tools for Medical Image Analysis.

HONORS AND AWARDS

- Exemplary Research Scholarship Award from University of Louisville, April 2024. Click Here
- **Second Place** Doctoral Engineering Student Awards in Research ! Louisville, October 2023. Click Here
- The **Best Dissertation Award for Master's degree** from Mansoura University, July 2023.
- **Second Place** Master Engineering Student Awards in Research ! Louisville, September 2021. Click Here
- Exemplary Research Scholarship Award from University of Louisville, April 2023.
- Finalist, **3-Minute Thesis (3MT)** Competition, University of Louisville, 2023
- **Ranked first with honor degree,** Undergraduate class 2012, B.Sc., Mansoura University, Mansoura, Egypt.
- **Collage excellence award**, gifted to distinctive students, during all four undergraduate years (2011-2015).

SCIENTIFIC PUBLICATIONS AND IDENTIFIER

In my career path, I have gained extensive experience in the field of medical image analysis and computer-aided diagnosis with hands-on experience in cutting-edge machine learning and artificial intelligence tools. I have authored or co-authored more than 15 peer-reviewed publications appearing in prestigious journals and top-rank international conferences. The complete list of publications and identifiers can be accessed here: Google Scholar; Web of Science; Scoups; Research Gate; Mansoura University; Loop; and ORCID;

PATENTS AND DISCLOSURES

[1] **M. Elsharkawy**, A. El-Baz, A. Shalaby, A. Soliman, A. Sharafeldeen, A. Mahmoud, H. Sandhu, G. Giridharan "ASSESSMENT OF PULMONARY FUNCTION IN CORONAVIRUS PATIENT," *U.S. Patent Application # 63/156,171*. (In Progress)

PEER-REVIEWED JOURNAL ARTICLES

[1] El-Den, N.N., **Elsharkawy, M.,** Saleh, I., Ghazal, M., Khalil, A., Haq, M.Z., Sewelam, A., Mahdi, H. and El-Baz, A., 2024. AI-based methods for detecting and classifying age-related macular degeneration: a comprehensive review. Artificial Intelligence Review, 57(9), p.237.

[2] Abdelhalim, I., Nadmid, N., **Elsharkawy, M.,** Ghazal, M., Mahmoud, A. and El-Baz, A., 2025. Mask-UnMask Regions (MUMR) Framework for Classifying AMD Grades Using Inter-Regional Interaction Analysis. IEEE Access.

[3] **Elsharkawy, M.,** Sharafeldeen A., Khalifa, F., Soliman, A., Elnakib, A., Ghazal, M., Sewelam, A., Thanos, A., Sandhu, HS., El-Baz, A. A Clinically Explainable AI-Based Grading System for Age-Related Macular Degeneration Using Optical Coherence Tomography. IEEE Journal of Biomedical Health Informatics. 2024 Jan 17;PP. doi: 10.1109/JBHI.2024.3355329.

[4] El-Den, N.N., Naglah, A., **Elsharkawy, M.,** Ghazal, M., Alghamdi, N.S., Sandhu, H., Mahdi, H. and El-Baz, A., 2023. Scale-adaptive model for detection and grading of age-related macular degeneration from color retinal fundus images. Scientific Reports, 13(1), p.9590.

[5] Haggag, S.; Elnakib, A.; Sharafeldeen, A.; **Elsharkawy, M.,** Khalifa, F.; Farag, R.K.; Mohamed, M.A.; Sandhu, H.S.; Mansoor, W.; Sewelam, A.; El-Baz, A. A Computer-Aided Diagnostic System for Diabetic Retinopathy Based on Local and Global Extracted Features. Appl. Sci. 2022, 12, 8326. https://doi.org/10.3390/app12168326

[6] **Elsharkawy, M.,** Elrazzaz, M., Sharafeldeen, A., Alhalabi, M., Khalifa, F., Soliman, A., ... & El-Baz, A. (2022). The Role of Different Retinal Imaging Modalities in Predicting Progression of Diabetic Retinopathy: A Survey. Sensors, 22(9), 3490.

[7] Farahat, I. S., Sharafeldeen, A., **Elsharkawy, M.,** Soliman, A., Mahmoud, A., Ghazal, M., ... El-Baz, A. (2022). The Role of 3D CT Imaging in the Accurate Diagnosis of Lung Function in Coronavirus Patients. Diagnostics, 12(3), 696.

[8] **Elsharkawy, M.;** Sharafeldeen, A., Soliman, A., Khalifa, F., Ghazal, M., El-Daydamony, E., Atwan, A., Sandhu, H.S., El-Baz, A. "A Novel Computer-Aided Diagnostic System for Early Detection of Diabetic Retinopathy Using 3D-OCT Higher-Order Spatial Appearance Model," Diagnostics 2022, 12, 461.

[9] Sharafeldeen, A.*, **Elsharkawy, M.*,** Khaled, R., Shaffie, A., Khalifa, F., Soliman, A., ... El-Baz, A. (2022). Texture and shape analysis of diffusion-weighted imaging for thyroid nodules classification using machine learning. Medical physics, 49(2), 988-999. (**** indicates shared first authorship***).

[10] **Elsharkawy, M.,** Elrazzaz, M., Ghazal, M., Alhalabi, M., Soliman, A., Mahmoud, A., ... El-Baz, A. (2021). Role of Optical Coherence Tomography Imaging in Predicting Progression of Age-Related Macular Disease: A Survey. Diagnostics, 11(12), 2313.

[11] **Elsharkawy, M.,** Sharafeldeen, A., Taher, F., Shalaby, A., Soliman, A., Mahmoud, A., ... & El-Baz, A. (2021). Early assessment of lung function in coronavirus patients using invariant markers from chest X-rays images. Scientific Reports, 11(1), 1-11. .

[12] Sleman, A. A., Soliman, A., **Elsharkawy, M.,** Giridharan, G., Ghazal, M., Sandhu, H., ... & El-Baz, A. (2021). A novel 3D segmentation approach for extracting retinal layers from optical coherence tomography images. Medical Physics, 48(4), 1584-1595.

[13] Sharafeldeen, A.*, **Elsharkawy, M.*,** Khalifa, F., Soliman, A., Ghazal, M., AlHalabi, M., ... & El-Baz, A. (2021). Precise higher-order reflectivity and morphology models for early diagnosis of diabetic retinopathy using OCT images. Scientific Reports, 11(1), 1-16. (**** indicates shared first authorship***).

[14] Sharafeldeen, A., **Elsharkawy, M.,** Alghamdi, N. S., Soliman, A., & El-Baz, A. (2021). Precise Segmentation of COVID-19 Infected Lung from CT Images Based on Adaptive First-Order Appearance Model with Morphological/Anatomical Constraints. Sensors, 21(16), 5482.

[15] Sandhu, H. S., Elmogy, M., Sharafeldeen, A. T., **Elsharkawy, M.,** El-Adawy, N., Eltanboly, A., ... & El-Baz, A. (2020). Automated diagnosis of diabetic retinopathy using clinical biomarkers, optical coherence tomography, and optical

coherence tomography angiography. American journal of ophthalmology, 216, 201-206.

PEER-REVIEWED CONFERENCE PROCEEDINGS

[1] **M. Elsharkawy**, Abdelhalim, I., Ghazal, M., Haq, M.Z., Haq, R., Mahmoud, A., Sandhu, H.S., Thanos, A. and El-Baz, A., 2025. TransNetOCT: An Efficient Transformer-Based Model for 3D-OCT Segmentation Using Prior Shape. In International Conference on Pattern Recognition (pp. 301-315). Cham: Springer Nature Switzerland.

[2] Abdelhalim, I., **M. Elsharkawy**, Nadmid, N., Ghazal, M., Mahmoud, A. and El-Baz, A., 2024, December. MUMR: Mask-UnMask Regions Framework for AMD Grades Classification Based on Inter-regional Interactions. In International Conference on Pattern Recognition (pp. 213-223). Cham: Springer Nature Switzerland.

[3] Abdelhalim, I., Almalki, Y., Abbas, A., **M. Elsharkawy**, Karam, R., Alduraibi, S., Ghazal, M., Mahmoud, A., Contractor, S. and El-Baz, A., 2024, May. Twoviewdensity-Pvt: A Vision Transformer System for Accurate Bi-Rads Classification in Breast Cancer Grading From Mammogram Images. In 2024 IEEE International Symposium on Biomedical Imaging (ISBI) (pp. 1-4). IEEE.

[4] **M. Elsharkawy**, A. Sharafeldeen, A. Soliman, F. Khalifa, M. Ghazal, E. El-Daydamony, A. Atwan, H. Sandhu, and A. El-Baz, "Diabetic Retinopathy Diagnostic CAD System using 3D-OCT Higher Order Spatial Appearance Model," IEEE 18th International Symposium on Biomedical Imaging (ISBI), 28-31 March, Kolkata, India, 2022

[5] A. Sharafeldeen, **M. Elsharkawy**, A. Shaffie, F. Khalifa. Soliman, A. Naglah, R. Khaled, M. Hussein , M. Alrahmawy, S. Elmougy, J. Yousaf, M. Ghazal, and A. El-Baz, "Thyroid Cancer Diagnostic System Using Magnetic Resonance Imaging ," 26TH International Conference on Pattern Recognition (ICPR), August 21-25, Montréal Québec, 2022.

[6] Aboudessouki, A., Ali, K.M., **M. Elsharkawy**, Alksas, A., Mahmoud, A., Khalifa, F., Ghazal, M., Yousaf, J., Khalifeh, H.A. and El-Baz, A., 2023, October. Automated Diagnosis of Breast Cancer Using Deep Learning-Based Whole Slide Image Analysis of Molecular Biomarkers. In 2023 IEEE International Conference on Image Processing (ICIP) (pp. 2965-2969). IEEE.

BOOK CHAPTERS

[1] **Elsharkawy, M.**, Soliman, A., Mahmoud, A., Ghazal, M., Alhalabi, M., El-Baz, A., Thanos, A., Sandhu, H.S., Giridharan, G. and El-Baz, A., 2023. Prevention of age-related macular degeneration disease: current strategies and future directions. In Photo Acoustic and Optical Coherence Tomography Imaging, Volume 1: Diabetic retinopathy (pp. 13-1). Bristol, UK: IOP Publishing.

[2] **Elsharkawy, M.**, Sharafeldeen, A., Soliman, A., Khalifa, F., Mahmoud, A., El-Baz, A., Ghazal, M., Sandhu, H.S. and El-Baz, A., 2023. Early identification of diabetic retinopathy through a computer-assisted diagnostic system and a higher-order spatial appearance model of 3D-OCT. In Photo Acoustic and Optical Coherence Tomography Imaging, Volume 1: Diabetic retinopathy (pp. 12-1). Bristol, UK: IOP Publishing.

ABSTRACTS IN PUBLISHED PROCEEDINGS

[1] Haq, M.Z., El-Den, N.N., **Elsharkawy, M.,** Ghazal, M., Mahmoud, A., Sandhu, H., Mahdi, H. and El-Baz, A., 2024. A Novel AI Approach with Scale-Adaptive Integrated BiT-Autoencoder for Diagnosing Age-Related Macular Degeneration Using Fundus Images. Investigative Ophthalmology Visual Science, 65(7), pp.5663-5663.

[2] **Elsharkawy, M.,** Sharafeldeen, A., Soliman, A., Khalifa, F., Widjajahakim, R., Switala, A., ... & El-Baz, A. (2021). Automated diagnosis and grading of dry age-related macular degeneration using optical coherence tomography imaging. Investigative Ophthalmology & Visual Science, 62(8), 107-107. (poster)

[3] **M. Elsharkawy,** A. Sharafeldeen, F. Taher, A. Shalaby, A. Soliman, A. Mahmoud, M. Ghazal, A. Khalil, N. Alghamdi, A. Abdel Razek, E. Alnaghy, M. El-Melegy, H. Sandhu, G. Giridharan, and A. El-Baz, "Early Diagnosis of Lung Function in COVOID-19 Patients Using Invariant Markers from Chest X-Rays," In: Biomedical Engineering Society Annual Scientific Meeting (BMES'21), Orlando World Center Mariott, Orlando, FL, USA, October 6-9, 2021. (poster)

[4] **M. Elsharkawy,** A. Sharafeldeen, A. Soliman, F. Khalifa, R. Widjajahakim, A. Switala, A. Elnakib, S. Hassan, M. Draw, S. Schaal, H. S. Sandhu, J. Seddon, and A. El-Baz, "A comprehensive system for grading of dry age-related macular degeneration using optical coherence tomography imaging," In Biomedical Engineering Society Annual Scientific Meeting (BMES'21), Orlando World Center Mariott, Orlando, FL, USA, October 6-9, 2021. (poster)

[5] A. Sharafeldeen, **M. Elsharkawy,**, F. Khalifa, A. Soliman, M. Ghazal, M. AlHalabi, M. Yaghi, M. Alrahmawy, S. Elmougy, H. S. Sandhu, and A. El-Baz, "Early Diagnosis of Diabetic Retinopathy Based on Reflectivity and Morphology Models using OCT Images," Biomedical Engineering Society Annual Scientific Meeting (BMES'21), Orlando World Center Marriott, Orlando, FL, USA, October 6-9, 2021. (Selected for Oral Presentation)

[6] A. Sharafeldeen, **M. Elsharkawy,**, R. Khaled, A. Shaffie, F. Khalifa, A. Soliman, A. A. k. Abdel Razek, S. Taman, A. Naglah, M. Alrahmawy, S. Elmougy, J. Yousaf, M. Ghazal, and A. El-Baz, "Thyroid Nodules Classification Based on Texture and Shape Analysis of Diffusion-Weighted Imaging," Biomedical Engineering Society Annual Scientific Meeting (BMES'21), Orlando, FL, USA, October 6-9, 2021. (poster)

[7] A. Sharafeldeen, N. S. Alghamdi, **M. Elsharkawy,**, A. Soliman, A. A. k. Abdel Razek, and A. El-Baz, "Accurate Segmentation of COVID-19 Infected Lung using CT Images," Biomedical Engineering Society Annual Scientific Meeting (BMES'21), Orlando World Center Marriott, Orlando, FL, USA, October 6-9, 2021. (poster)

[8] E. Shawky, A. Sharafeldeen, **M. Elsharkawy,**, M. Bilal, A. A. k. Abdel Razek, S. Elmougy, M. El-Melegy, M. Ghazal, F. Taher, and A. El-Baz, "Early Assessment of Lung Function in Coronavirus Patients from 3D CT Images," Biomedical Engineering Society Annual Scientific Meeting (BMES'21), Orlando World Center Marriott, Orlando, FL, USA, October 6-9, 2021. (poster)

[9] A. Naglah, R. Khalid, A. Sharafeldeen, **M. Elsharkawy,**, A. Shaffie, F. Khalifa, A. Soliman, A. Abdelkhalek, A. El-Baz, "A Novel MRI-based CAD System of Thyroid Cancer by Learning Texture and Morphology Features," Biomedical

Engineering Society Annual Scientific Meeting (BMES'20), Virtual Meeting, USA, October 14-17, 2020. (e-poster)

[10] F. Taher, A. Soliman, H. Kandil, A. Sharafeldeen, **M. Elsharkawy,**, H. Abdeltawab, A. Mahmoud, A. Shalaby, and A. El-Baz, "A Segmentation Framework for Accurate Extraction of Cerebral Vasculature using a Convolution Neural Network," Biomedical Engineering Society Annual Scientific Meeting (BMES'20), Virtual Meeting, USA, October 14-17, 2020. (e-poster).

[11] I. Jouia, **M. Elsharkawy,**, A. Sharafeldeen, A. Mahmoud, A. Khalil, M. Ghazal, H. Sandhu, and A. El-Baz, "The effects of Age and Diabetic Retinopathy," Biomedical Engineering Society Annual Scientific Meeting (BMES'20), Virtual Meeting, USA, October 14-17, 2020. (e-poster).

PROFESSIONAL ACTIVITIES, SERVICE, AND AFFILIATIONS

Reviewer

Reviewer for **more than 15** journals and conferences. Full list can be found here

- IEEE Journal on Biomedical and Health Informatics
- Scientific Reports
- Artificial Intelligence In Medicine
- Artificial Intelligence review
- Computers in Biology and Medicine
- PLOS ONE
- International journal of biomedical imaging
- ISA Transactions
- Human-centric Computing and Information Sciences
- IEEE Access
- BMC Biomedical Engineering
- Wireless Communications and Mobile Computing
- Diagnostics
- International Conference on Pattern Recognition (ICPR)
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI)
- IEEE International Symposium on Biomedical Imaging (ISBI)

SOFTWARE AND SKILLS

Computer Programming: Matlab (Highly Competent), Python(very good), HTML; **Operating systems:** Windows, **Software and Toolkits:** Microsoft Office, LaTeX, OpenOffice

LANGUAGES

- **Arabic**: Mother tongue.
- **English**: Very Good.

ACTIVITIES AND HOBBIES

Tennis, Soccer, Traveling and Social relationships

REFERENCES

Available upon request