

Emmanuel Ugochukwu Ugwu

M.Sc. Student, Computer Science and Technology, University of Science and Technology of China (USTC), Hefei, China

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RESEARCH INTERESTS

Deep Learning, Computer Vision, Edge Computing, Cloud AI, Fire Safety, Medical Imaging, Smart Environments, Sustainable Systems.

EDUCATION

University of Science and Technology of China (USTC), Hefei, China 2023 — 2026 (expected)
Master of Science in Computer Science and Technology Cumulative GPA: 3.71/4.30
Thesis Title: SAM Enhanced Fire Segmentation: From Promptable Foundation Models to Efficient Architectures with Hybrid Refinement for Edge Deployment.
Advisor: Dr. Zhang Xinming

Jiangxi University of Engineering (JXUE), Xinyu, China 2019 — 2023
Bachelor of Engineering in Electronic and Information Engineering Cumulative GPA: 4.00/4.00
Thesis Title: Piezoelectric Shoe Insole: A Step into the Future of Renewable Energy.
Advisor: Dr. Parmod Kumar

ACADEMIC EXPERIENCE

University of Science and Technology of China (USTC) Hefei, China
Graduate Researcher, Wireless Networks & Big Data Research Lab 2023 — Present

- **LimFUNet:** Designed an efficient segmentation architecture for edge/mobile deployment using SE-enhanced Ghost convolutions and hybrid refinement. A novel lightweight U-Net variant achieving 21+ FPS on edge devices while maintaining high segmentation accuracy of 80.06% with model size of 0.35MB and less than 20k parameters.
- **ProFSAM:** Adapted promptable foundation models (SAM2.1) for fire segmentation with detection-guided bounding-box prompts for real-time operation. The first work to adapt and evaluate SAM2 for safety-critical video segmentation with detection-guided prompting strategy
- **Dual-Path Edge CNN for Medical Imaging:** Built an edge-aware dual-path network for medical image classification targeting efficiency and diagnostic accuracy.
- **Face Recognition & Attendance:** Developed and evaluated face detection/recognition modules for a classroom attendance system.
- **Adaptive IoT Safety System:** Implemented an adaptive neuro-fuzzy fire detection and temperature regulation system on Arduino.

Jiangxi University of Engineering (JXUE) Xinyu, China
Undergraduate Researcher, Renewable Energy and Robotics 2021 — 2023

- **Piezoelectric Insole Energy Harvester:** Prototyped a shoe insole using piezoelectric materials to convert gait into electrical energy; characterized power output and charging behavior.
- **Autonomous Robotics:** Built obstacle-avoidance and humanoid traffic-control robots with Arduino microcontrollers, sensors, and actuators.
- **Wearable Devices:** Developed a mobile fan-cap and leveraged the piezoelectric-powered AA battery from the insole project.

SKILLS

- **Programming:** Python, C, JavaScript (HTML/CSS), MATLAB, Bash
- **Machine Learning & CV:** TensorFlow/Keras, PyTorch, OpenCV, YOLO, Mask R-CNN, SAM (Segment Anything Model), data annotation (LabelImg, Roboflow), scikit-learn
- **Cloud & DevOps:** Linux (Ubuntu), Docker, Kubernetes, AWS (EC2, S3, VPC, IAM, CloudWatch, Route53), Terraform, Git/GitHub, GitHub Actions (CI/CD), shell scripting
- **Hardware/Embedded:** Arduino, Raspberry Pi, sensors and actuators, hardware interfacing
- **Networking/Security:** TCP/IP, VPN (OpenVPN), firewalls, packet analysis (Wireshark), network scanning (Nmap)
- **Other Tools:** Jira, Slack, Datadog

PUBLICATIONS

Journal/Conference

- **Ugwu, E. U.**, & Zhang, X. (2025, accepted). Promptable Fire Segmentation: Unleashing SAM2's Potential for Real-Time Mobile Deployment with Strategic Bounding Box Guidance. In *Proceedings of the 9th International Conference on Image and Graphics Processing (ICIGP '26)*, Wuhan, China. (arXiv:2510.21782).
- **Ugwu, E. U.**, Zhang, X., Tesfay, S. G., & Mehmood, M. H. (under review). Enhancing Real-time Fire Segmentation: LimFUNet with SE-Enhanced Ghost Convolutions for Edge Computing Applications. *The Visual Computer*.
- Mehmood, M. H., Zhang, X., & **Ugwu, E. U.** (2026). Edge-aware dual path network for medical image classification. *Machine Vision and Applications*, 37(2), 30. <https://doi.org/10.1007/s00138-026-01790-4>.
- **Ugwu, E. U.**, Zhang, X., Ouedraogo, E. B., Liemong, C. A. F. N. A., Sukianto, A., & Huang, S. (2026). FirESAM: An Ultra-Lightweight Prompt-in-the-Loop Distillation Model for Real-Time Fire Segmentation on Edge Devices and the FirESAM Semantic Segmentation Dataset (FSSSD). *International Journal of Computer Vision (IJCV)* (submitted, 2026).

SELECTED COURSES

Master's Courses

- Edge and Cloud Computing
- Deep Learning
- Parallel and Distributed Computing
- Image Understanding
- Image Processing
- Algorithm Design and Analysis

Bachelor's Courses

- Sensor Technology
- Microcontroller Principles and Applications
- Circuit Analysis
- Analog Circuits
- High-Frequency Circuits

Additional Courses

- Computer Vision and Intelligent Applications (Participation, 2023)
- Python-Programming Certificate (2023)

AWARDS

Chinese Government Scholarship, Ministry of Education Full scholarship for graduate studies in China	Hefei, China 2023–Present
Jiangxi Provincial Government Scholarship Awarded for academic excellence (top GPA)	Xinyu, China 2021–2023
Academic Excellence Award, JXUE Recognized for outstanding academic performance	Xinyu, China 2020–2021
First Prize, Chinese Language Competition, JXUE Two-time winner of university-wide language contests for international students	Xinyu, China 2020 & 2021

OTHER EXPERIENCES

Foreign Students Association (FSA), USTC <i>Board Member</i>	Hefei, China 2024 — 2025
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- Organized international student events and academic exchanges to support a multicultural campus community.

Invited Talk —2026 Academic Webinar, ANA <i>Why You Need Computer Vision: Real-World Applications and Tools for Modern Research</i>	Hefei, China Feb 2026
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- Gave a talk on **Why You Need Computer Vision: Real-World Applications and Tools for Modern Research** organized by The Association of Nigerians in Anhui (ANA). [YouTube link](#)

Open-Source Contributions <i>Contributor</i>	Remote Ongoing
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- Write cloud deployment scripts and tutorials on platforms like LinkedIn and Medium.
- Develop technical guides on IoT and deep learning on GitHub.

CERTIFICATIONS

- Digital Witch's DevOps and Cybersecurity Training – Certificate of Completion (2025)
- HSK 4 (Chinese) (2025)
- Python-Programming Certificate from HiiT Online Training (2023)
- Computer Vision and Intelligent Applications – Certificate of Participation (2023)
- Cisco Networking Academy: IT Essentials (2017)

LANGUAGES

- English: Fluent
- Chinese: Intermediate (HSK 4)

REFERENCES

Available upon request.