Muhammad **Ahmad** Amin

Ph.D. Candidate @ South China University of Technology (SCUT), Guangzhou, China

PERSONAL INFORMATION

Email: eeahmadamin@mail.scut.edu.cn **Website:** https://7ahmadamin.github.io/
Github: https://github.com/7AhmadAmin **Linkedin:** https://www.linkedin.com/in/7ahmadamin/
Google Scholar: https://scholar.google.com/citations?hl=en&user=57ouxVcAAAAJ

RESEARCH INTERESTS

My research interest mainly focuses on developing lifelong evolving and metacognition-based algorithms for artificial general intelligence systems. In particular, I've been focusing on tackling real-world challenges in multi-disciplinary application domains, like multimedia forensics, information security, image/video processing, pattern recognition, machine learning, and computer vision. I currently focus on the following research topics:

- **Forensics:** Continual Learning for Domain Generalization, Deepfake Multimedia Content Detection
- **Image/Video Processing:** Image/Video Representation Learning, Image/Audio/Video Multi-modal Learning
- **Learning with Real-world Data:** Un-/Semi-supervised Learning

EDUCATION

Ph.D., Information and Communication Engineering *Sept. 2018 - Present*
South China University of Technology *Guangzhou, China*
- ***Thesis:*** *"Exploiting Bio-signals and Handcrafted Features for Deepfake Detection."*
- *Supported by Chinese Government Scholarship*
- *Supported by Guangdong Government Outstanding International Student*
- ***Adviser:*** *Prof. Yongjian Hu*
- ***Area of Study:*** *Multimedia Forensics, Machine Learning, Pattern Recognition, Privacy Preservation*

M.Eng., Information and Communication Engineering *Sept. 2016 - June 2018*
South China University of Technology *Guangzhou, China*
- ***Thesis:*** *"A Study on the Preprocessing of Finger Vein Recognition System."*
- *The Best M.Eng. Dissertation Award from School of Electronic and Information Engineering*
- *The Best M.Eng. Dissertation Award from School of International Education*
- *Supported by Chinese Government Scholarship*
- ***Adviser:*** *Prof. Yongjian Hu*
- ***Area of Study:*** *Bioinformatics, Machine Learning, Financial Technology, Information Security*

EXPERIENCE

Researcher Assistant & Teaching Assistant *Sept. 2016 - Present*
Research Centre of Multimedia Information Security Detection and Intelligent Processing @ SCUT *Guangzhou, China*
- *Supervised by Prof. Yongjian Hu.*
- *Researched on the finger vein recognition system's preprocessing, fake finger veins identification and Deepfake Detection.*
- *Co-supervised graduate students on their research, projects, and article reviews.*
- *Assisted in the subject of Information Hiding and Digital Investigation.*

Visiting Scholar & Research Collaborator *Sept. 2022 - Dec. 2023*
University of Warwick *Coventry, England*
- *Supervised by Prof. Yu Guan, and Prof. Yongjian Hu.*
- *Researched on exposing Deepfake frames through spectral analysis of colour channels in the frequency domain.*
- *Researched on exploring varying color spaces through representative forgery learning to improve Deepfake detection.*

Visiting Scholar & Research Collaborator *Mar. 2023 - Oct. 2023*
Deakin University *Victoria, Australia*
- *Supervised by Prof. Chang-Tsun Li, and Prof. Yongjian Hu.*
- *Researched on Deepfake detection based on cross-domain local characteristic analysis with multi-domain transformer.*

Algorithm Engineer & Architect *Oct. 2017 - July 2019*
Research and Development Institute, GRG Banking LTD. *Guangzhou, China*
- Researched and developed algorithms for finger vein recognition system and fake finger veins attack identification.
- Optimized preprocessing of vein data for better recognition, resolved on-device finger rotation errors.
- Designed and developed the overhead security analysis and cross-count systems.

PROJECTS

Collaborative Project *Sept. 2018 - June 2019*
GRG Banking LTD./SCUT/Guangdong Provincial Government *Guangzhou, China*
- Worked on Overhead Security Analysis & Cross-count System.

Research and Development Project *Oct. 2017 - Aug. 2018*
GRG Banking LTD./South China University of Technology *Guangzhou, China*
- Worked on Finger Veins Recognition System.

PATENTS

An Adaptive Detection Method for the Upper and Lower Edges of the Low-quality Finger Vein Images
Innovator: Yongjian Hu, Muhammad Ahmad Amin, Wan Dongxia, Wang Yufei, and Beibei Liu
China National Intellectual Property Administration, China, 2022, vol. CN 109409181 B.

PUBLICATIONS

Exposing Deepfake Frames through Spectral Analysis of Color Channels in Frequency Domain
Muhammad Ahmad Amin, Yongjian Hu, Huimin She, Jicheng Li, Yu Guan, and Muhammad Zain Amin
In proceedings of the 11th IEEE International Workshop on Biometrics and Forensics (IWBF), Barcelona, Spain, 2023.

Exploring Varying Color Spaces through Representative Forgery Learning to Improve Deepfake Detection
Muhammad Ahmad Amin, Yongjian Hu, Yu Guan, and Muhammad Zain Amin
Digital Signal Processing, 2023. (Under-review)

Deepfake Detection based on Cross-Domain Local Characteristic Analysis with Multi-domain Transformer
Muhammad Ahmad Amin, Yongjian Hu, Chang-Tsun Li, and Beibei Liu
Alexandria Engineering Journal, 2023. (Accepted)

Notifyminer: Rule based User Behavioral Machine Learning Approach for Context wise Personalized Notification Services
Muhammad Faizan Khan, Lu Lu, Muhammad Toseef, Ahmed Musyafa, and Muhammad Ahmad Amin
Journal of Ambient Intelligence and Humanized Computing, vol. 14, no. 10, pp. 13 301–13 317, 2023.

Detecting Video Inter-frame Forgeries based on Convolutional Neural Network Model
Xuan Hau Nguyen, Yongjian Hu, Muhammad Ahmad Amin, Gohar Hayat Khan, and Van Thinh Le
International Journal of Image, Graphics and Signal Processing, vol. 14, no. 3, p. 1, Jun. 2020.

Three-dimensional Region Forgery Detection and Localization in Videos
Xuan Hau Nguyen, Yongjian Hu, Muhammad Ahmad Amin, Gohar Hayat Khan, Van Thinh Le, and Dinh Tu Truong
International Journal of Image, Graphics and Signal Processing, vol. 11, pp. 1–13, Dec. 2019.

AWARDS AND HONORS

Guangdong Government Outstanding International Student Scholarship *Sept. 2022 - July 2024*
- Ph.D.

Chinese Government Fellowship *Sept. 2016 - July 2022*
- Fully Funded Ph.D. degree
- Fully Funded Masters of Engineering degree

Excellent Graduate Student's Award *Sept. 2016 - July 2018*
- Masters of Engineering

SKILLS

Frameworks/Libraries: PyTorch, TensorFlow, Keras, Scikit-Learn, Matplotlib, Numpy, Pandas, OpenCV, Transformers.
Programming Languages: Python, C++, Javascript.
Online Courses: Machine Learning (Stanford University), Neural Networks and Deep Learning (Andrew Ng).

SERVICES

Reviewer: IEEE, Digital Signal Processing.
Volunteer: Member of Scout Association (Since 2007).
Organizer: China Information Hiding and Multimedia Security Workshop (CIHW 2018).

REFEREES

Professor Yongjian Hu
Email: eeyjhu@scut.edu.cn
School of Electronic and Information Engineering,
South China University of Technology, Guangzhou,
510641, Guangdong, China

Professor Chang-Tsun Li
Email: changtsun.li@deakin.edu.au
School of Info. Technology,
Deakin University, Geelong,
VIC, 3216, Australia

Associate Professor Yu Guan
Email: yu.guan@warwick.ac.uk
Department of Computer Science,
University of Warwick, Coventry,
CV4 7AL, England