

Muhammad **Ahmad** Amin

Research Assistant @ South China University of Technology (SCUT), Guangzhou, China

PERSONAL INFORMATION

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Google Scholar: <https://scholar.google.com/citations?hl=en&user=57ouxVcAAAAJ>

RESEARCH INTERESTS

My research focuses on the dynamic intersection of machine learning, computer vision, pattern recognition, and deep learning, specifically within multi-disciplinary application domains, like multimedia forensics, image/signal processing, information security, multimodal learning, and biometrics. I currently focus on the following research topics:

- **Biometrics and Forensics:** Continual Learning for Domain Generalization, Deepfake Multimedia Detection
- **Image/Audio/Video Processing:** Representation Learning, Multimodal Learning
- **Learning with Real-world Data:** Un-/Semi-/Supervised Learning

EDUCATION

Ph.D., Information and Communication Engineering

South China University of Technology

Sept. 2018 - Present

Guangzhou, China

- **Thesis:** "Exploiting Bio-signals and Handcrafted Features for Deepfake Detection."

- Supported by Chinese Government Scholarship

- Supported by Guangdong Government Outstanding International Student Scholarship

- **Adviser:** Prof. Yongjian Hu

- **Area of Study:** Multimedia Forensics, Machine Learning, Pattern Recognition, Privacy Preservation, Image Processing

M.Eng., Information and Communication Engineering

South China University of Technology

Sept. 2016 - June 2018

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, Image Processing

EXPERIENCE

Researcher Assistant

Sept. 2016 - Present

@Research Centre of Multimedia Information Security Detection and Intelligent Processing at SCUT Guangzhou, China

- Supervised by Prof. Yongjian Hu.

- Research on the preprocessing of finger vein recognition systems, fake finger vein identification, and Deepfake detection.

- Developed new algorithms for multimedia forensics and published multiple research articles and a patent.

- Co-supervised graduate students on their research, projects, and article reviews.

- Assisted in teaching the subject of "Information Hiding and Digital Investigation".

- Collaborated on multiple research and development projects with GRG Banking LTD.

Research Collaborator

Dec. 2023 - Mar. 2024

@University of New South Wales, Australian Defence Force Academy

Canberra, Australia

- Supervised by Prof. Jiankun Hu and Prof. Yongjian Hu.

- Researched and developed novel algorithms for Deepfake video detection based on temporal coherence analysis.

Research Collaborator

Mar. 2023 - Feb. 2024

@School of Information Technology, Deakin University

Victoria, Australia

- Supervised by Prof. Chang-Tsun Li and Prof. Yongjian Hu.

- Researched Deepfake detection based on cross-domain local characteristic analysis with a multi-domain transformer.

Research Collaborator

Sept. 2022 - Feb. 2024
Coventry, England

@Department of Computer Science, University of Warwick

- Supervised by Prof. Yu Guan and Prof. Yongjian Hu.

- Published research on "exposing Deepfake frames through spectral analysis of color channels in the frequency domain."

- Researched exploring varying color spaces through representative forgery learning to improve Deepfake detection.

Algorithm Engineer

Oct. 2017 - July 2019
Guangzhou, China

@Research and Development Institute, GRG Banking LTD.

- Researched and developed algorithms for finger vein recognition systems and fake finger vein attack identification.

- Optimized preprocessing of vein data for better recognition and resolved on-device finger rotation errors.

- Designed and developed the overhead security analysis and cross-count systems.

PROJECTS

Collaborative Project

Sept. 2018 - June 2019
Guangzhou, China

@GRG Banking LTD./SCUT/Guangdong Provincial Government

- Worked on Overhead Security Analysis and Cross-count System.

Research and Development Project

Oct. 2017 - Aug. 2018
Guangzhou, China

@GRG Banking LTD./South China University of Technology

- Worked on Finger Veins Recognition System.

- Developed new algorithms to improve the recognition of low-quality finger vein images.

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

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, 2024.

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, 2024.

Analyzing Temporal Coherence for Deepfake Video Detection

Muhammad Ahmad Amin, Yongjian Hu, and Jiankun Hu

Electronic Research Archive, 2024. (In Process)

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.

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
- Ph.D.

Sept. 2022 - July 2024

Chinese Government Fellowship
- Fully Funded Ph.D. degree
- Fully Funded Masters of Engineering degree

Sept. 2016 - July 2022

Excellent Graduate Student's Award
- Masters of Engineering

Sept. 2016 - July 2018

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

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*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*