He Aohan

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EDUCATION

Jan 2016-Current PhD candidate, DEPARTMENT OF MECHANICAL ENGINEERING, **National University of Singapore**

Sept 2011-June 2015 Bachelor, DEPARTMENT OF MEASUREMENT CONTROL AND INFORMATION TECHNOLOGY, **Beihang University**

AWARDS

Research Scholarship, NUS (Jan 2016 - Current)

National Scholarship of China (2013)

First-prize Scholarship of Academic Performance of Beihang University (2012, 2013, 2014)

RESEARCH INTERESTS

Phase retrieval techniques for surface, displacement and strain measurement by optical coherent methods: the fringe patterns obtained by optical coherent methods, including Twyman-Green interferometry, digital speckle pattern interferometry, shearography, etc., are processed by proposed phase retrieval techniques to obtain the phase, which is related to the measuring quantities, such as surface curvature of optical components, displacement, and strain. Other fringe analysis techniques, e.g., optimization, filtering and normalization, fringe direction estimation, and phase unwrapping, are also included. Besides, the CUDA based GPU acceleration for the phase retrieval techniques is also investigated.

Optical encryption: design and attack on optical image cryptosystem; calibration and alignment of spatial light modulator.

EXPERIENCE

Jan 2016-Jan 2019 **Teaching and lab assistant** at NUS for the modules: mechanics of machines; engineering principles and practice; mechanics of materials.

Feb 2015-June 2015 **Research student** at Precision Opto-mechatronics Technology Lab of Beihang University. Participate in the lab project: **On-train dynamic rail wear measurement system** and finish my final year project: **Measurement of wheel inner diameter based on fringe projection profilometry and active computer vision**.

Sep 2014-Jan 2015 **Teaching assistant** for the module: photoelectric detective techniques and system.

July 2012 **Volunteer teacher** of the "Starlight-Piloting" volunteer team: teaching and volunteer work at Riyue primary and secondary school, Huangyuan County, Qinghai Province (Northwest China)

SKILLS

Computer vision As undergraduate, learn the basic knowledges from related modules: Digital Image Processing and Photoelectric Detective Techniques and System; in the undergraduate final year project, using active computer vision to measure the inner diameter of wheel (including camera calibration, structured light calibration, and laser stripe extraction, etc.). As undergraduate, further learn the related knowledges from modules: Machine Vision and Optical Techniques in Experimental Stress Analysis; use the related knowledges in research, e.g., fringe direction estimation, and residual wavefront correction of spatial light modulator.

Machine learning As graduate, learn the related knowledges from module: Neural Networks, Support Vector Machines and Reionforcement Learning. Attend related seminars about deep learning and transfer learning. Plan to use machine learning in research.

C++ As undergraduate, learn the basic knowledges from related modules: C Language and Fundamentals of Software Engineering. As graduate, use C++ in the research, e.g., implementation of GPU acceleration of phase retrieval techqniues.

MATLAB Learn the basic knowledges from modules and projects as undergraduate. Used frequently in PhD research.

PUBLICATIONS

[1] **A. He** and C. Quan, "Phase retrieval by GPU-based swarm intelligence algorithms on SLM generated interferograms", (Submitted).

[2] **A. He** and C. Quan, "Wavefront correction for spatial nonuniformity of the liquid crystal on silicon based spatial light modulator", **Optics and Lasers in Engineering**, vol. 121, pp. 377-388, 2019.

[3] **A. He** and C. Quan, "An improved principal component analysis based region matching method for fringe direction estimation," **Optics Communications**, vol. 413, pp. 87-102, 2018.

[4] **A. He**, B. Deepan, and C. Quan, "Simplified paraboloid phase model-based phase tracker for demodulation of a single complex fringe," **Applied Optics**, vol. 56, pp. 7217-7224, 2017.

[5] Y. Xiong, **A. He**, and C. Quan, "Security analysis and enhancement of a cryptosystem based on phase truncation and a designed amplitude modulator," **Applied optics**, vol. 58, pp. 695-703, 2019.

[6] Y. Xiong, **A. He**, and C. Quan, "Cryptoanalysis on optical image encryption systems based on the vector decomposition technique in the Fourier domain," **Applied optics**, vol. 58, pp. 3301-3309, 2019.

[7] Y. Xiong, **A. He**, and C. Quan, "Specific attack and security enhancement to optical image cryptosystem based on two random masks and interference," **Optics and Lasers in Engineering**, vol. 107, pp. 142-148, 2018.

[8] Y. Xiong, **A. He**, and C. Quan, "Security analysis of a double-image encryption technique based on an asymmetric algorithm," **JOSA A**, vol. 35, pp. 320-326, 2018.

[9] Y. Xiong, **A. He**, and C. Quan, "Hybrid attack on an optical cryptosystem based on phase-truncated Fourier transforms and a random amplitude mask," **Applied optics**, vol. 57, pp. 6010-6016, 2018.

[10] Y. Xiong, **A. He**, and C. Quan, "Cryptanalysis of an optical cryptosystem based on phase-truncated Fourier transform and nonlinear operations," **Optics Communications**, vol. 428, pp. 120-130, 2018.