Xueqiang FAN

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Research Area: Interdisciplinary research on AI & Optical Imaging Detection/Computational Biology

Education

★ **Hefei University of Technology** **School of Computer and Information** **Hefei, CHINA**
Doctor of Philosophy Student in Information and Communication Engineering *Jun*. 2022 – Present

★ **Zhejiang University of Technology** **College of Information Engineering** **Hangzhou, CHINA**
Master of Engineering in Control Science and Engineering *Jul*. 2019 – *May*. 2022

★ **Henan University of Urban Construction** **School of Electrical and Control Engineering** **Pingdingshan, CHINA**
Bachelor of Engineering in Automation *Sep*. 2015 – *Jun*. 2019

Research Interests

My recent endeavor focuses on ***Polarization Scattering Imaging***, with the goal of reconstructing objects concealed within scattering media. Concurrently, I am conducting research on Scene Confusing-Discovery, using ***Polarization Information*** to mine the Camouflaged/Confusing/Special yet meaningful object/region in the scene. I am working toward exploring useful cues and effective AI methods for ***Optical Imaging Detection***. Additionally, my early work focused on ***Computational Biology***, specifically identifying biochemical properties and functions of Proteins/RNA/DNA.

Research Publications

Published ***20*** SCI-indexed academic papers, including ***10*** First-Authored papers. Granted ***11*** National Invention Patents and obtained ***4*** Software Copyright Registrations. ***2*** First-Authored Manuscripts currently under Peer Review

★ First-Author Publications

(1) **Xueqiang Fan**, *et al*. "Joint intensity-spectral polarization hierarchical fusion guided efficient transparent object detection." *Optics & Laser Technology* 192 (2025): 113429. (SCI, JCR Q1, IF=5.0)

(2) **Xueqiang Fan**, Bing Lin, Zhongyi Guo. "Infrared polarization-empowered full-time road detection via lightweight multi-pathway collaborative 2D/3D convolutional networks." *IEEE Transactions on Intelligent Transportation Systems* 2024; 25(9):12762-75. (SCI, JCR Q1, IF=8.5)

(3) **Xueqiang Fan**, *et al*. "Meta-DNET-UPI: Efficient Underwater Polarization Imaging Combining Deformable Convolutional Networks and Meta-learning." *Optics & Laser Technology* 181 (2025) 111664. (SCI, JCR Q1, IF=5.0)

(4) **Xueqiang Fan**, *et al*., "Improved polarization scattering imaging using local-global context polarization feature learning framework." *Optics and Lasers in Engineering* 178 (2024):108194. (SCI, JCR Q1, IF=3.7)

(5) **Xueqiang Fan**, *et al*. "Ense-i6mA: Identification of DNA N^6-Methyladenine Sites Using XGB-RFE Feature Selection and Ensemble Machine Learning." *IEEE/ACM Transactions on Computational Biology and Bioinformatics* 2024; 21 (6): 1842-1854. (SCI, JCR Q1, IF=3.4)

(6) **Xueqiang Fan**, *et al*. "I-DNAN6mA: Accurate Identification of DNA N^6-Methyladenine Sites Using the Base-Pairing Map and Deep Learning." *Journal of Chemical Information and Modeling* 2023; 63 (3): 1076-86. (SCI, JCR Q1, IF=5.3)

(7) **Xueqiang Fan**, *et al*. "TSMPN-PSI: high-performance polarization scattering imaging based on three-stage multi-pipeline networks." *Optics Express*, 2023; 31 (23): 38097-113. (SCI, JCR Q2, IF=3.3)

(8) **Xueqiang Fan**, *et al*. "Full-space metasurface in mid-infrared based on phase change material of VO2." *Journal of Optics* 52 (2022): 1336-1344. (SCI, JCR Q3, IF=2.5)

(9) **Xueqiang Fan**, *et al*. "Predicting RNA solvent accessibility from multi-scale context feature via multi-shot neural network." *Analytical Biochemistry* 654 (2022):114802. (SCI, JCR Q2, IF=2.5)

(10) **Xueqiang Fan**, *et al*. "Improved protein relative solvent accessibility prediction using deep multi-view feature learning framework." *Analytical Biochemistry* 631 (2021): 114358. (SCI, JCR Q2, IF=2.5)

★ Two First-Author Manuscripts Currently *Under Review*

(11) **Xueqiang Fan**, *et al*. LSTSM: Towards a General-Purpose Framework for Multi-Modality Polarization Scattering Imaging. (Manuscript Submitted ID: TIP-34020-2024)

(12) **Xueqiang Fan**, *et al.* Model-Informed Semi-Supervised and Explainable Framework for Underwater Polarization Imaging. (Manuscript Submitted ID: TGRS-2025-05898)

★ Cooperative Publications (*Partial*)

(13) Haojie Ding, Xiaopeng Gao, **Xueqiang Fan**, *et al*. "Polarimetric Observable-based Analysis of Spontaneous Emission in Heterogeneous Layered Scattering Environments." *Opt. Lasers Eng.* 2025 *In Press*. (SCI, JCR Q1, IF=3.7)

(14) Bing Lin, Longyu Qiao, **Xueqiang Fan**, *et al*. "Large-range Polarization Scattering Imaging with an Unsupervised Multi-task Dynamic-modulated Framework." *Optics Letters* (2025). (SCI, JCR Q2, IF=3.3)

(15) Bing Lin, Weiyun Chen, **Xueqiang Fan**, *et al*. "Transformer-based improved U-net for high-performance underwater polarization imaging." *Optics & Laser Technology* 181 (2025) 111664. (SCI, IF=5.0, JCR Q1)

★ Personal Website ★ Google Scholar ★ ResearchGate ★ Web of Science

(16) Bing Lin, **Xueqiang Fan**, *et al*. "Self-attention module in multi-scale improved U-net (SAM-MIU-net) motivating high-performance polarization scattering imaging." *Optics Express* 31 (2023), 3046-3058. (SCI, JCR Q2, IF=3.3)

(17) Bing Lin, **Xueqiang Fan**, *et al.* "Dynamic polarization fusion network (DPFN) for imaging in different scattering systems." *Optics Express* 32 (2024), 511-525. (SCI, JCR Q2, IF=3.3)

(19) Bing Lin, **Xueqiang Fan**, *et al*. "High-Performance Polarization Imaging Reconstruction in Scattering System under Natural Light Conditions with an Improved U-Net." *Photonics* 2023, 10(2), 204. (SCI, JCR Q3, IF=1.9)

(19) Peng Peng, Kui Fan, **Xueqiang Fan**, *et al*. "Real-time Defect Detection Scheme Based on Deep Learning for Laser Welding System." *IEEE Sensors Journal* 2023; 23 (15):17301-17309. (SCI, JCR Q1, IF=4.5)

★ Granted 11 National Patents (*Partial*)

(1) Protein solvent accessibility prediction method via multi-perspective learning. China Patent, ZL202110558859.4

(2) Prediction method for protein-protein interactions using recurrent networks. China Patent, ZL202110086831.5

(3) Protein solvent accessibility prediction method via iterative search strategy. China Patent, ZL202011030157.0

(4) DNA binding residue prediction method via convolutional neural networks. China Patent, ZL202010918314.5

★ Granted 4 Software Copyright Registration (*Partial*)

(1) Jun Hu, **Xueqiang Fan**. Protein structure alignment system *V1.0*. Registration No. 2020SR1186669

(2) Jun Hu, **Xueqiang Fan**. Protein docking system *V1.0*. Registration No. 2020SR1243909

Research Experience

★ Research on Polarization Scattering Imaging 2022 - 2025

◐ ***Motived***: The development of *one model capable of simultaneous imaging through both surface and volume scattering media* has received limited attention.
◐ ***Solutions***: Established the ***first*** AI-based polarization feature-driven multimodal scattering imaging framework *LSTSM*. Developed a new AI-based polarization feature-driven ***semi-supervised underwater imaging framework*** $S^2UPiP^2N^2$.
◐ ***Outcome***: Published one paper in ***Opt. Express***, one paper in ***Opt. Lasers Eng.***, one paper in ***Opt. Laser Technol.*** Two Manuscripts currently under *Peer Review*

★ Research on Polarization Object Detection 2023 - 2025

◐ ***Motived***: The joint analysis among multiple polarization characteristics, sparse inter-channel information (along the *z*-axis), and dense intra-channel information (inside the *x*-*y* plane), have not been considered.
◐ ***Solutions***: Proposed an ***infrared polarization-empowered full-time road detector*** based on lightweight multi-pathway ***collaborative 2D/3D convolutional networks***. Constructed a joint ***intensity-spectral polarization-enhanced transparent object detector***.
◐ ***Outcome***: Published one paper in ***IEEE Trans. Intell. Transp. Syst.***, one paper in ***Opt. Laser Technol***.

★ Research on Computational Intelligence & Computational Biology 2019 - 2023

◐ ***Motived***: Using wet-lab experimental technologies to Identify Protein/RNA/DNA's function is cost-intensive and time-consuming, which cannot meet the current demand for functional determination of a large number of sequences.
◐ ***Solutions***: Proposed ***Proteins/RNA solvent accessibility prediction methods*** and ***DNA N^6-Methyladenine Sites Identification methods*** by designing ***sequenced-based feature representations*** and developing ***Deep-Learning framework***
◐ ***Outcome***: Published one paper in ***J. Chem. Inf. Model.***, one paper in ***IEEE/ACM Trans. Comput. Biol. Bioinf.***, two paper in ***Anal. Biochem***.

Projects

(1) ***Key Investigator***, National Defense Science and Technology Project: Bionic Polarization Vision Infrared Target Recognition Technology (B). October 2022 to October 2024

Academic Conferences & Part-time Engagements

★ **Oral Presentation: Xueqiang Fan**. "Polarization Feature-Intelligent Driven Scattering Imaging and Target Detection Technology" Photonics and Modern Physics Innovation Symposium (PMPIS), August 7, 2024, Harbin Institute of Technology

★ **Journal Reviewer:** Served as a reviewer for journals including *IEEE T-ITS*, *Infrared Physics and Technology, Journal of Supercomputing, BioData Mining, Scientific Reports, and Photonics*

Honors & Awards

◐ National Scholarship, Awarded by Ministry of Education (Award Rate: 0.2% nation-wide), China, 2024
◐ The Scholarship for a Doctor's degree (First-Class), Awarded by Hefei University of Technology, 2022-2025
◐ The Scholarship for a Master's degree (First-Class), Awarded by Zhejiang University of Technology, 2019-2022

Research Skills

◐ Language: Mandarin (Native); English (Keep learning)
◐ Skills: Python, C, MATLAB, LINUX, PyTorch
◐ Interests: Running, Road Cycling, (Folk) Music, and Movies