# Yunfei Liu (刘云飞)

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**CONTACT INFORMATION**

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**EDUCATION**

**Beihang University**, Beijing                                          2017–2022 (expected)

- Ph.D. in State Key Laboratory of Virtual Reality and Systems

- Advisor: Prof. Feng Lu.

**Beijing Institute of Technology**, Beijing.                                          2013–2017

- B.Sc., School of Computer Science of Technology, Internet of Things Engineering

- Thesis: *Mobile Phone based Indoor Navigation and Browsing System*

**RESEARCH EXPERIENCE**

- **Visual Media Computing Lab**                                          2016.10–2016.12
  School of Computer Science and Technology, Beijing Institute of Technology.
  Advisor: Lei Zhang.
  ▷ Digital Video Stabilization
  Implementations for the project below were done in a mix of Qt and C/C++.

  ○ ARM-based video stabilization for data acquisition: Applications on automatic video stabilization. Algorithm with feature matching and motion models among frames is designed for digital video stabilization. Then the system is implemented on the Raspberry Pi with a self-designed GUI.

- **PHI-AI Lab @ State Key Lab of VR**                                          2017.10–Now
  School of Computer Science and Engineering, Beihang University.
  Advisor: Feng Lu.
  ▷ Big Data & Deep Learning based Automatic Construction for Multi-channel VR Environment
  >                                          2018.06–Now
  Based on network big data and deep learning, automatically build and generate multiple application scenarios for virtual reality environment.

  ○ Mainly participate in the research of visual computing, scene attribute analysis, low-level vision, *etc.*.

  ▷ Automatic Video Analysis based Assembly Process & Assembly Quality Monitoring
  >                                          2019.11–Now
  In the assembly process, the server-side is used for target detection and pose estimation; and the mobile terminal is on the basis of HoloLens II. These two sides work together to intelligently remind the assembly process.

  ○ Design the main framework; Deploy the DNN for multiple parts recognition; CNN based 6-DoF estimation; Designs of GUIs for Hololens II.

  ○ Lead the team to develop DNNs related algorithm and Unity XR-based design; Joint debugging for cross-platform.

  ▷ Distortion Calibration for Optical Transmission ARHUD System                    2020.09–2021.07
  Automatic correction and stable imaging of the head-up display part of the vehicle following the human eye.

- OpenCV & ArUco based for implementing the calculation of imaging distortion parameters and real-time correction of video.

▷ Anomaly Detection for Trackside Electrical Service Boxes                    2021.06–Now

Detect & locate the defect for the electrical box of the railway track under the condition of small samples.

- AutoEncoder based algorithm design; design and implementation for network structure and module.
- Labeling tool design and development; user interaction design.

## RESEARCH INTEREST

- **Computer Vision**: Include the intersection of machine learning, deep learning with computer vision, *e.g.* gaze estimation, dehazing, reflection removal, and other low-level visions.

- **Computational Photography:** Include applications with hyperspectral image.

- **AR/MR:** Include human-computer interaction, object rendering under AR/MR environment.

## HONORS AND AWARDS

- *Winner* in Physics Based Vision Meets Deep Learning - Hyperspectral City (ICCV Workshop). 2019

- *First prize* in China Aeromodelling Design Challenge (Vertical Take-Off and Landing (VTOL) track). 2015

- *National scholarship for Postgraduates*. 2020

- *President scholarship* for Research & Contest. 2020

## INDUSTRY EXPERIENCE

- **Neusoft Group**                                          2015.07 - 08; 2016.05 - 06

  Jilin, China; Tianjin, China.

  Embedded software internship.

  - Smart wearable medical equipment design. Based on STM32, capture a variety of biological signals of the human body and use the LED touch screen for data visualization and interaction.
  - Design of intelligent parking lot parking system. Based on Arduino and a variety of sensors (ZigBee, RFID, etc.) to realize automatic parking reminder and billing functions.

- **Da-Jiang Innovations**                                           2016.07–2016.09

  Shenzhen, Guangzhou, China.

  Summer camp. Within four weeks, the aircraft and ground robots are designed to work together automatically, taking dolls or golf balls from the designated area and dropping them into the target area. Get the highest score by combining different strategies within the specified time.

  - Responsible for overall plan formulation, visual target recognition and tracking of unmanned vehicles and drones (template matching).
  - Done positioning (ORB-SLAM), multi-machine communication (ROS) and path planning.

- **Da-Jiang Innovations**                                           2017.02–2017.05

  Shenzhen, Guangzhou, China.

  Visual perception group.

  - Design and deployment of video water ripple detection and removal algorithms. Use IMU data to compensate the camera shake on the drone to obtain a stable video stream.
  - Design of ground station software. Design Windows APP based on Qt to meet the visualization and interaction of various types of drone data.

**PROJECT EXPERIENCE**

- **PBRR: Physically Based Raindrop Rendering.** 2018.08–2018.10
  PBRR is a large scale, public dataset for raindrop removal of photo-realistic adherent raindrop images based on Cityscapes dataset.

**PUBLICATIONS (ACCEPTED)**

1. **Yunfei Liu**, Ruicong Liu, Haofei Wang, Feng Lu. "Generalizing Gaze Estimation with Outlier-guided Collaborative Adaptation". *IEEE/CVF International Conference on Computer Vision (ICCV)*, 2021.

2. **Yunfei Liu**, Sijia Wen, Feng Lu. "3D Photography with One-shot Portrait Relighting". *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 2021.

3. **Yunfei Liu**, Yu Li, Shaodi You, Feng Lu. "Unsupervised Learning for Intrinsic Image Decomposition from a Single Image". *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020.

4. **Yunfei Liu**, Xingju Ma, James Bailey, Feng Lu. "Reflection Backdoor: A Natural Backdoor Attack on Deep Neural Networks". *European Conference on Computer Vision (ECCV)*, 2020.

5. **Yunfei Liu**, Feng Lu. "Separate In Latent Space: Unsupervised Single Image Layer Separation". *AAAI Conference on Artificial Intelligence (AAAI)*, 2020, [**Oral**, Acceptance Rate 5%].

**(SUBMITTED)**

1. **Yunfei Liu**, Chaoqun Zhuang, Feng Lu. "Unsupervised Two-Stage Anomaly Detection". *arXiv*, 2021.

2. **Yunfei Liu**, Yu Li, Shaodi You, Feng Lu. "Semantic Guided Single Image Reflection Removal". *arXiv*, 2020.

3. Mingjie Xu, Haofei Wang, **Yunfei Liu**, Feng Lu. "Vulnerability of Appearance-based Gaze Estimation". *arXiv*, 2021.

**(CONTRIBUTION AUTHOR)**

1. Huangyue Yu, Minjie Cai, **Yunfei Liu**, Feng Lu. "First- And Third-person Video Co-analysis By Learning Spatial-temporal Joint Attention". *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2020.

2. Zhimin Wang, Yuxin Zhao, **Yunfei Liu**, Feng Lu. "Edge-Guided Near-Eye Image Analysis for Head Mounted Displays". *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 2021, [**Oral**].

3. Yiwei Bao, Yihua Cheng, **Yunfei Liu**, Feng Lu. "Adaptive Feature Fusion Network for Gaze Tracking in Mobile Tablets". *International Conference on Pattern Recognition (ICPR)*, 2020.

4. Huangyue Yu, Minjie Cai, **Yunfei Liu**, Feng Lu. "What I See Is What You See: Joint Attention Learning for First and Third Person Video Co-analysis". *ACM International Conference on Multimedia (ACM MM)*, 2019.

**PATENTS**

1. Feng Lu, **Yunfei Liu**. "基于离群点引导的视线估计跨场景适配方法和装置". WZ2110320CN, 2021.

2. Feng Lu, **Yunfei Liu**. "基于零样本学习的图像异常检测方法". WZ2010881CN, 2021.

3. Feng Lu, **Yunfei Liu**. "一种基于内容风格分离的无监督图像到图像翻译方法". WZ2010880CN, 2021.

TALKS

- TBD.

TECHNICAL
SKILLS

- *Programming Languages*: C/C++, Python, Qt, Java, Javascript, HTML, C#.

- *Technical Softwares*: MATLAB, OpenCV, PyTorch, TensorFlow, Inventor, AutoCAD.

REFERENCES

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