

# Nuowen Kan

Ph.D. student, SJTU

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## Education

- Ph.D. Student **Shanghai Jiao Tong University, Shanghai, China, Sep, 2020 - Jun, 2024 (expected).**  
**Research Focus:** Multimedia Communication & Reinforcement Learning & Stochastic Optimal Control.  
**Advisor:** Prof. [Junni Zou](#), Assoc. Prof. [Chenglin Li](#) and Prof. [Hongkai Xiong](#)
- MEng **Shanghai Jiao Tong University, Shanghai, China, Sep, 2017 - Mar, 2020.**  
**Research Focus:** Rate Adaptation for 360-degree Video Streaming.  
**Advisor:** Prof. [Hongkai Xiong](#)
- BEng **College of Engineering of Information and Electronic, Nanjing University of Aeronautic and Astronautic, Nanjing, China, Sep, 2013 - Jun, 2017.**

## Research interest

The application of deep reinforcement learning in video compression and transmission  
Reinforcement learning and stochastic optimal control  
Network oriented image/video processing and communication

## Publication

### Conference papers:

- NOSSDAV 2021 **Nuowen Kan**, Chenglin Li, Caiyi Yang, Wenrui Dai, Junni Zou, Hongkai Xiong: Uncertainty-Aware Robust Adaptive Video Streaming with Bayesian Neural Network and Model Predictive Control, in *Proc. of ACM Workshop on Network and Operating System Support for Digital Audio and Video*, September 2021.
- ICASSP 2019 **Nuowen Kan**, Junni Zou, Kexin Tang, Chenglin Li, Ning Liu, Hongkai Xiong: Deep Reinforcement Learning-based Rate Adaptation for Adaptive 360-degree Video Streaming, in *Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing*, May 2019.
- ICIP 2019 **Nuowen Kan**, Chengming Liu, Junni Zou, Chenglin Li, Hongkai Xiong: A Server-side Optimized Hybrid Multicast-Unicast Strategy for Multi-User Adaptive 360-Degree Video Streaming, in *IEEE International Conference on Image Processing*, September 2019.
- ICIP 2018 Chengming Liu, **Nuowen Kan**, Junni Zou, Qin Yang, Hongkai Xiong: Server-side Rate Adaptation for Multi-User 360-Degree Video Streaming, in *IEEE International Conference on Image Processing*, September 2018.

### Journal papers:

- TCSVT 2021 **Nuowen Kan**, Junni Zou, Chenglin Li, Wenrui Dai, Hongkai Xiong: RAPT360: Reinforcement Learning-based Rate Adaptation for 360° Video Streaming with Adaptive Prediction and Tiling, *IEEE Transactions on Circuits and Systems for Video Technology*, accepted.
- TCSVT 2020 Kexin Tang, **Nuowen Kan**, Junni Zou, Chenglin Li, Xiao Fu, Mingyi Hong, Hongkai Xiong: Multi-user Adaptive Video Delivery over Wireless Networks: A Physical Layer Resource-Aware Deep Reinforcement Learning Approach, *IEEE Transactions on Circuits and Systems for Video Technology*, 2020.

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## Research Experience

- Jul. 2017 - Present **Research Assistant**, *Institute of Media, Information, and Network (M.I.N)*, Department of Electronic Engineering, Shanghai Jiao Tong University.
- Participated in the State Key Program of National Natural Science Foundation of China (Grant No. 61972256): Spherical convolutional network-based adaptive transmission for immersive video streaming.
  - Improving the users quality of experience (QoE) for adaptive 360-degree video streaming under the limited and time-varying network conditions: Formulated the QoE optimization problem, learned an optimal policy for bitrate selection by DRL, and evaluated the proposed algorithm with extensive simulation experiments with Python code and Pytorch framework.
  - The study of generalization and sample efficiency issues in reinforcement learning with the PAC-Bayesian theory and model predictive control.
  - RL-based rate control for deep video compression: Studied the theory and practically implemented the code of DNN-based video compression model.
  - The survey and study of the differentiable optimal control: Studied the theory of koopman operator and differentiable model predictive control.
- Nov. 2014 - Jun. 2017 **Research Assistant**, *Advisor: Prof. [Weiqiang Liu](#)*, College of Electronic and Information Engineering, Nanjing University of Aeronautic and Astronautic.
- The implementation of LZ4, a lossless compression algorithm, on FPGA for accelerating the speed of encoding. The simulation was implemented on Xilinx Kintex-7 FPGA with Verilog code.
  - Research of the encryption and decryption circuit using physical unclonable function (PUF). The system was designed and implemented on FPGA using the SRAM-based PUF.

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## Honors and Awards

**The SMICS MengNing Scholarship, 2019.**

**Second Class, Graduate Student Fellowship of SJTU, Fall 2017 - Spring 2020.**

**First Prize, Electronic Circuit Design Competition of NUAA, 2016.**

**First Prize, University Student FPGA Application System Design Invitational Competition of Jiangsu Province, 2015.**

**National Encouragement Scholarship, 2015.**

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## Skill

Outstanding mathematical analyzing and modeling ability

Strong modeling and programming skills in Python, Pytorch and MATLAB

Effective technical writing in English and fluent oral English for academic communication