# Runlong Zhou (周润龙)

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Paul G. Allen School of Computer Science & Engineering, University of Washington, Seattle, Washington, U.S.A.
zhourunlongvector@gmail.com, vectorzh@cs.washington.edu
https://github.com/zhourunlong


## Research Interests

- Emphasis on reinforcement learning theory
- Applied machine learning and reinforcement learning

## Education

- **University of Washington**
  *PhD, Paul G. Allen School of Computer Science & Engineering, advised by Simon S. Du* — Seattle, USA
  2022.9 - Now (Est. 2027.8)
- **Tsinghua University**
  *BEng, Special Pilot CS Class (Yaoclass), Institute for Interdisciplinary Information Sciences (IIIS)* — Beijing, China
  *GPA: 3.84 (overall) / 3.89 (major) over scale 4.0, Rank: 16 / 54* — 2018.8 - 2022.6

## Academic Experience

- **University of Washington**
  *Research intern with Simon S. Du* — Virtual
  2020.9 - 2022.9
- **Facebook AI Research**
  *Research intern with Alessandro Lazaric and Matteo Pirotta* — Virtual
  2021.3 - 2021.5

## Publications

* denotes equal contribution or alphabetical ordering.

1. **Stochastic Shortest Path: Minimax, Parameter-Free and Towards Horizon-Free Regret** [Link]
   Jean Tarbouriech*, **Runlong Zhou***, Simon S. Du, Matteo Pirotta, Michal Valko, Alessandro Lazaric
   *NeurIPS 2021* — Spotlight, 3% acceptance rate
   *We propose an algorithm (EB-SSP) for SSP problems, which is the first to achieve minimax optimal regret while being parameter-free.*
2. **Variance-Dependent and Horizon-Free Reinforcement Learning for Latent Markov Decision Processes** [Link]
   **Runlong Zhou**, Ruosong Wang, Simon S. Du
   *ICML 2023* — Poster
   *We provide an algorithm framework for Latent MDPs (with context in hindsight), achieving the first horizon-free minimax regret. We complement the study by giving a novel regret lower bound for LMDPs using the symmetrization technique.*
3. **Sharp Variance-Dependent Bounds in Reinforcement Learning: Best of Both Worlds in Stochastic and Deterministic Environments** [Link]
   **Runlong Zhou**, Zihan Zhang, Simon S. Du
   *ICML 2023* — Poster
   *We provide a systematic study of variance-dependent regret bounds of model-based and model-free reinforcement learning for tabular MDPs. The proposed model-based algorithm is both optimal for stochastic and deterministic MDPs.*

## Preprints

* denotes equal contribution or alphabetical ordering.

1. **Understanding Curriculum Learning in Policy Optimization for Solving Combinatorial Optimization Problems** [Link]
   **Runlong Zhou**, Yuandong Tian, Yi Wu, Simon S. Du
   *We formulate of canonical online Combinatorial Optimization problems as Latent MDPs and give convergence guarantee of Natural Policy Gradient on LMDPs. We show effectiveness of Curriculum Learning through the perspective of relative conditional number.*

## Awards, Grants & Honors

- **Undergraduate:**

| | |
|---|---|
| IIIS Outstanding Graduate | 2022 |
| The 2021 China Collegiate Programming Contest, Guilin Site (Gold Medal) | 2021 |
| IIIS Research Innovation Scholarship | 2021 |
| IIIS Academic Performance Scholarship | 2021 |
| Tsinghua University Air Rifle Competition (First Place) | 2021 |
| The 2019 ACM-ICPC Asia Regional Contest, Xuzhou Site (Gold Medal) | 2019 |
| The 2018 ACM-ICPC Asia Regional Contest, Beijing Site (Gold Medal) | 2018 |

- **Secondary school:**

| | |
|---|---|
| The 34th National Olympiad in Informatics (Silver Medal) | 2017 |
| China Team Selection Competition 2017 (Gold Medal) | 2017 |
| The 2016 ACM-ICPC Asia CHINA-Final Contest (Gold Medal) | 2016 |
| The 2016 China Collegiate Programming Contest Finals (Silver Medal) | 2016 |
| The 33rd National Olympiad in Informatics (Silver Medal) | 2016 |

## Past Projects

If hyperlink not applicable, please refer to my GitHub page.

1. **RhythmicSpeechSongAligner** [Link]
   **Runlong Zhou***, Zhui Zhu*
   *Multimedia Computing course project* python
   *Create visually-rhythmic videos by matching each lyric with a video clip which has similar semantic meaning*
2. **GodScanner** [Link]
   Rui Shen*, Heyang Zhao*, **Runlong Zhou***
   *Deep Learning course project* python
   *Transfer a photo of file into its scanned style (flatten, shadow and watermark removal)*
3. **Ray Tracing Renderer** [Link]
   **Runlong Zhou**
   *Advanced Computer Graphics course project* C++
   *Optimized path tracing framework supporting Mitsuba configurations, many textures and sampling methods*
4. **Texas Hold'em Agent** [Link]
   **Runlong Zhou**
   *Game Theory course project* C++
   *A smart Texas hold'em agent*
5. **IconAdapter** [Link]
   Kailu Wu*, **Runlong Zhou***
   *Machine Learning course project* python
   *Transfer icon styles to match mobile UI themes*

## Miscellanea

- **Professional skills:** Algorithm design, Data structures, Deep (Reinforcement) learning
- **Programming skills:** C++ / C, python , LaTeX, **CUDA** , **Java**™ , MATLAB®
- **Hobbies:** Air rifle / pistol shooting, Archery
- **Service:** Teaching Olympiad in Informatics to secondary school students between 2018 and 2021. Reviewer of ICML 2022, NeurIPS 2022.