

YIFAN XU

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EDUCATION

AUG 2023 - MAY 2027	RICE UNIVERSITY B.S. in OPERATIONS RESEARCH, B.A. in COMPUTER SCIENCE AND MATHEMATICS (GPA: 3.91/4.00) Relevant Coursework: <i>Convex Optimization, Distributed Optimization, Linear Programming, Probability Theory, Honors Statistics, Systems for Deep Learning, Algorithms and Data structures, Concurrent Program Design</i>
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PUBLICATIONS

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- [1] **Yifan Xu**, Carlos A. Taveras, Lydia Beaudrot, and César A. Uribe. Identifying common backbones of interactions underlying food webs via non-deterministic alignments. Accepted at the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2026)
 - [2] **Yifan Xu**, Carlos A. Taveras, Lydia Beaudrot, and César A. Uribe. Wasserstein motifs: Non-deterministic alignment of ecological networks. Accepted at Learning Meaningful Representations of Life (LMRL) Workshop at ICLR 2026. Manuscript submitted to ICML 2026
 - [3] **Yifan Xu**, Isabella Loaiza-Saa, and César A. Uribe. Enabling workforce intelligence through occupational taxonomy alignment. Accepted at the Eleventh Annual Conference on Network Science and Economics
 - [4] Sebin J. Gracy, **Yifan Xu**, Ji Liu, Tamer Başar, and César A. Uribe. Networked competitive bivirus sis model: Analysis of the discrete-time case. Submitted to IEEE Transactions on Signal and Information Processing over Networks
 - [5] **Yifan Xu** and Aung Aung Phyto Wai. Evaluation of steady-state visual evoked potentials (ssvep) stimuli design for visual field assessment. In *2022 International Conference on Cyberworlds (CW)*, pages 179–186, 2022

POSTERS & ORAL TALKS

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- *Wasserstein Motifs: Optimal Transport for Food Web Alignment*. Project presented at:
 - *Learning Meaningful Representations of Life (LMRL) Workshop at ICLR 2026*, Upcoming.
 - *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2026)*, Upcoming.
 - *Optimization and Learning in Complex Networks, 2026 INFORMS Optimization Society Conference*, Upcoming.
 - *Texas Colloquium on Distributed Learning*, May 2025. [Poster](#)
 - *Rice School of Engineering Undergraduate Research Symposium (2x)*, Feb 2025, Feb 2026. [Poster](#)
 - *Numerical Analysis of Discrete-time Networked Competitive Bivirus SIS Models*. Talk presented at the *Gulf Coast Undergraduate Research Symposium 2024*. [Slides](#)

SELECTED RESEARCH EXPERIENCES

OCT 2025 - PRESENT	RICE UNIVERSITY GPU-accelerated Bregman Douglas-Rachford Splitting for Discrete Optimal Transport <i>Undergraduate Researcher</i> Advisor : Shiqian Ma <ul style="list-style-type: none">• Developing a GPU-accelerated solver for large-scale Discrete Optimal Transport based on Bregman Douglas-Rachford Splitting, leveraging entropy/Bregman geometry to obtain numerically stable iterates.• Implementing and benchmarking a high-throughput JAX/CUDA pipeline to quantify accuracy-runtime tradeoffs against state-of-the-art GPU baselines.• Designing evaluation metrics aligned with KKT conditions and using them to diagnose failure modes and guide algorithmic fixes.
AUG 2025 - PRESENT	RICE UNIVERSITY & MIT SLOAN SCHOOL OF MANAGEMENT Enabling Workforce Intelligence through Occupational Taxonomy Alignment <i>Undergraduate Researcher</i> Advisors : César A. Uribe, Isabella Loaiza Saa <ul style="list-style-type: none">• Built a task meta-network from O*NET data (2017–2024) using embedding-based clustering and graph-lasso-estimated task dependencies.• Formulated occupational alignment as a Fused Gromov–Wasserstein problem integrating task semantics and network structure for soft, interpretable matching.• Scaled the approach to around 900K occupation pairs, achieving 80% agreement with official crosswalks while exposing task-driven sources of misalignment.
MAY 2024 - PRESENT	RICE UNIVERSITY & MICHIGAN STATE UNIVERSITY Wasserstein Motif: Optimal Transport for Ecological Network Alignment <i>Undergraduate Researcher</i> Advisors : César A. Uribe, Lydia Beaudrot <ul style="list-style-type: none">• Developed the first mathematically rigorous framework for ecological network alignment using network motifs and optimal transport.• Designed a provably convergent variant of the KL-BAPG algorithm with Dykstra projections to compute many-to-many correspondences.• Demonstrated a 158x computational speedup and superior ecological interpretability across 129 Sub-Saharan African food webs.

HONORS & AWARDS

- School of Engineering Outstanding Junior Award. Academic Year 2025-2026.
One of nine students nominated in the School of Engineering.
- Honorable Mention, *2026 Computing Research Association Outstanding Undergraduate Researcher*
Awarded to undergrads with outstanding research potential in an area of computing research in North America.
- *Cornell, Maryland, Max Planck Pre-Doctoral Research School*. April 2025.
- Runner up, Poster competition at *Rice School of Engineering Undergraduate Research Symposium* (\$ 1,000) Feb 2025.
- *Bishnoi SER Scholarship and CREST Scholarship* (\$ 3,000) Sept 2024.
Awarded to outstanding undergraduate researchers at Rice.
- *President's Honor Roll* Fall 2023, Fall 2024, Spring 2025.
Awarded to the top academically performing students at Rice.

SOFTWARE & PERSONAL PROJECTS

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| OCT 2025 -
PRESENT | Minute Mark: a Platformer about Going Fast <ul style="list-style-type: none">• Developed a high-speed 2D platformer game in Godot 4.5 featuring complex movement mechanics (variable jump height, coyote time, wall running, air dashing, ground slam) and combat systems (melee attacks, bullet parrying, kickable object interactions)• Designed, implemented and optimized a time-rewind mechanic for smooth 60 FPS gameplay: implemented efficient state history management with automatic cleanup, optimized path extraction using sorted times-tamp lookups, and hold-to-rewind functionality with slow-motion traceback animation. |
| OCT 2025 -
DEC 2025 | M3ssag1n8: a Web-based Messaging Application <ul style="list-style-type: none">• Built a real-time messaging web application using MVC architecture with TypeScript; implemented private workspaces/channels and SSE connections for real-time synchronization.• Architected the Model layer with AuthModel for authentication and DatabaseModel for CRUD operations; integrated SSE event handling for real-time updates.• Implemented concurrency management using a custom Limit<T> class with promise chaining to prevent race conditions in rapid post creation and reaction modifications. |
| AUG 2025 -
OCT 2025 | OwlDB: a Network Accessible NoSQL Document Database <ul style="list-style-type: none">• Built a Go REST API for a NoSQL JSON document store with schema validation, token-based authentication, and SSE subscriptions.• Wrote a skip-list implementation of database lookup for concurrency and efficiency.• Implemented atomic writes, command line configuration, slug logging, and graceful shutdown with tests. |

SERVICE & LEADERSHIP

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| JAN 2026 -
PRESENT | Optimization Mentor for DecisionLab
<i>The Official Student Chapter of INFORMS at Rice University</i> <ul style="list-style-type: none">• Mentored undergraduates on modelling the final exam scheduling problem at Rice using IPs and MIPs.• Served as a primary point of contact for a group of 5 students, providing guidance on objective design, constraints, and algorithmic choices throughout a 12-week applied OR program.• Created and delivered mini-lectures on LPs, IPs, and mathematical modeling. Slides |
| FEB 2025 | Workshop Creator & Instructor
<i>Google/Rice Data Science and Sustainability Program</i> <ul style="list-style-type: none">• Collaborated with a 4-person team to design and deliver a curriculum on data science applications in ecology and sustainability.• Taught community college students from Lone Star College, San Jacinto College, and Houston Community College through in-person interactive workshops and lectures.• Developed hands-on materials covering Python, data analysis, and ecological modeling. Colab |
| AUG 2024 -
DEC 2025 | Teaching Assistant Algorithms, Linear Algebra, and Proof Writing(2x)
<i>Rice Department of Computer Science and Department of Mathematics</i> <ul style="list-style-type: none">• Supported 50+ students weekly in linear algebra, proof writing, and algorithms through office hours and in-person personalized instruction.• Served as a bridge between students and faculty, advocating for student feedback and successfully convincing faculty to adjust course pacing to better meet learning needs.• Coordinated with fellow TAs and created homework rubrics for grading consistency as head TA. |

SKILLS

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| Languages: | Python, CUDA, C, Java, GDScript, R, MATLAB, Golang, JavaScript, Haskell |
| Packages: | PyTorch, NetworkX, JAX, Pandas, scikit-learn, NumPy, GurobiPy, PsychoPy, Matplotlib |
| Math: | Optimal Transport, Convex Optimization, Measure Theory, Spectral Graph Theory |
| Soft skills: | Multicultural teamwork, Cross-disciplinary cooperation, Public speaking, Technical communication |