

# Krirk Nirunwiroj

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## Education

### University of Wisconsin-Madison

Madison, WI

B.S. in Computer Science, Data Science, and Certificate in Mathematics

Sep 2020 - May 2024

(Graduated with **Distinction in the Major**)

GPA: 3.80/4.00

**Relevant Coursework:** Large Language Model in Practice, Artificial Intelligence, Classification and Regression Trees, Database Management Systems, Big Data Systems, Algorithms, Multivariable Calculus, Linear Algebra, Linear Optimization, Theory of Probability, Graphs and Networks

## Honors

**Dean's List**, College of Letters and Science at UW-Madison

2020 - 2023

**Full Scholarship**, The Ministry of Higher Education, Science, Research and Innovation of Thailand  
(Royal Thai Government Scholarship)

2019 - Present

## Research Experiences

### Research Assistant

Madison, WI

A research sub-group led by **Dr. Yun-Shiuan Chuang**, advised by **Professor Junjie Hu** and

Dec 2023 - Sep 2024

**Professor Timothy T. Rogers**, Knowledge and Concepts Lab, UW-Madison

- Studied human-like LLM agent construction by infusing topic-specific opinions based on belief networks.
- Conducted a factor analysis to identify the underlying belief network across 64 topics and 564 instances.
- Developed LangChain pipeline and a wrapper class for quantization and local loading of open-source models.
- Optimized large-scale experiments with HTC system, improving model performance and experiment efficiency.

### Data Analyst Research Intern

Madison, WI

[Epistemic Analytics Lab](#), Center for Research on Complex Thinking, Wisconsin Center for

Mar 2023 - May 2024

Education Research, UW-Madison, advised by **Professor David Williamson Shaffer**

- Implemented the data analysis pipeline of iPlan, a land-use management game, using Ordered Network Analysis (ONA) to study the strategic thinking of players, collaborating with multiple classes across the USA. [\[Repo\]](#) [\[Game\]](#)
- Engaged in QA testing, identified challenges, and proposed solutions for [Codey](#), an application for developing, validating, and implementing automated coding schemes.
- Collaborated with multiple external researchers on formatting data and using [ENA and ONA](#) in their projects.

### Student Researcher

Madison, WI

**TRASHBOT**, an automated trash collection drone project led by **Dr. Ryan Jacobs**,

Oct - Dec 2022

Informatics Skunkworks, Department of Material Science & Engineering, UW-Madison

- Trained and fine-tuned a YOLOv7 model with the TACO dataset to identify trash in 80 categories.
- Collaborated with the drone navigation team for real-time trash detection integration.

### Research Assistant

Nakhon Pathom, Thailand

**LAIGA**, a machine learning-based framework for assessing and identifying leaders in college students, advised by **Professor Suppawong Tuarob**, Mahidol University

Jun - Aug 2021

- Conducted an extensive literature review on 21st-century skills and leadership assessment.
- Automated correlation-based feature subset selection and model selection algorithms using Java with Weka API.
- Fine-tuned model parameters to optimize performance, ensuring the resulting model's accuracy.
- Achieved a 5.87% MAPE in leadership assessment and an 83.2% F1 score in leadership identification.

## Publications

Chuang, Y. S., Studdiford, Z.<sup>†</sup>, **Nirunwiroj, K.<sup>†</sup>**, Goyal, A., Frigo, V. V., Yang, S., Shah, D., Hu, J., & Rogers, T. T. (In press). Beyond demographics: Aligning role-playing LLM-based agents using human belief networks. **Findings of the Association for Computational Linguistics: EMNLP 2024**. arXiv:2406.17232.

<https://doi.org/10.48550/arXiv.2406.17232>

- Explores how integrating empirically derived human belief networks can significantly improve the alignment of role-playing LLM agents with human behavior beyond demographic information alone.

(<sup>†</sup> joint second author)

**Nirunwiroj, K.** (2023). Chitchat bots: A comparative study and behavioral analysis of large language models using epistemic network analysis. In G. Arastoopour Irgens & S. Knight (Eds.), *Fifth International Conference on Quantitative Ethnography: Conference Proceedings Supplement* (Vol. 8, pp. 154–157). Retrieved from [https://www.gesoc.org/images/pdf/ICQE23\\_Supplement\\_Proceedings.pdf#page=157](https://www.gesoc.org/images/pdf/ICQE23_Supplement_Proceedings.pdf#page=157)

- Used Epistemic Network Analysis (ENA) to conduct a comparative behavioral analysis between Bard AI and GPT3.5 with over 200 responses on 2 topics.

Pongpaichet, S., **Nirunwiroj, K.**, & Tuarob, S. (2022). Automatic assessment and identification of leadership in college students. *IEEE Access*, 10, 79041–79060. <https://doi.org/10.1109/access.2022.3193935>

- Presents an automated system for assessing and identifying leadership in college students using multiple machine learning techniques.

**Presentation**

**Nirunwiroj, K.**, “Chitchat Bots: A Comparative Study and Behavioral Analysis of Large Language Models Using Epistemic Network Analysis,” International Conference on Quantitative Ethnography 2023, *October 8-12, 2023, Melbourne, Australia*

**Work Experiences**

<b>CARIVA (Thailand) Co., LTD.</b>	Bangkok, Thailand
<i>AI Engineer Intern, PreceptorAI Team</i>	Jul 2024 - Present

- Developed LLM systems for generating differential diagnoses from patient cases.
- Conducted in-depth research on prompt optimization, ensemble learning, and reducing hallucinations.
- Proposed customized SAMMO and ensemble techniques, improving top-5 diagnostic accuracy by up to 7.14%.
- Integrated Prompt Flow into the pipeline, streamlining experimentation and accelerating product deployment.

<b>Phuket Wittayalai School</b>	Phuket, Thailand
<i>UX/UI Designer &amp; Full Stack Developer</i>	Aug 2024 - Present

- Developed a scalable course enrollment platform, supporting over 2,000 users with high uptime and efficiency.
- Designed and delivered a Figma prototype, securing approval from the curriculum committee.
- Architected the full-stack solution, implementing the front end with React and the back end with Node.js.

<b>Agoda Services Co., LTD.</b>	Bangkok, Thailand
<i>Software Engineer Intern, YCS Desktop team</i>	May - Aug 2022

- Boosted website efficiency by removing RUM and BoomerangJS and utilized Grafana for performance tracking.
- Fortified security by transitioning the C# codebase from REST to Gateway API.
- Modified database queries, tests, and codes in Scala and SQL, shifting from the main to a copied database.
- Updated payment method appearance using React, anticipating a 5% UPC payment option increase.

**Teaching Experiences**

<b>Student Assistant</b>	Madison, WI
<i>College Algebra (Precalculus), Department of Mathematics, UW-Madison</i>	Sep 2021 - May 2022

- Managed students' in-class questions and breakout discussion groups in a class of over 50 students.
- Hosted drop-in sessions in the Pre-Calculus Lab, providing support to fellow students.
- Collaborated with professors to address challenges, offering solutions and teaching approaches.

<b>Instructor</b>	Phuket, Thailand
<i>C++ Programming Workshop, Phuket Wittayalai School</i>	Oct 2017

- Delivered an intensive C++ programming lecture to 30 gifted-program middle school students.
- Offered after-class consultations, assisting with programming concepts and advising on educational pathways.

**Selected Projects**

<b>Oyasumi</b>	Madison, WI
<i>Team Lead, Android Developer; Team of 4</i> <a href="#">[Repo]</a>	Sep - Dec 2023

- Developed a sleeping diary app with features: dream notes, AI interpretation, and a sleep tracker.
- Designed user interfaces and created a prototype for the app proposal using Figma.
- Implemented the app in Android Studio using Java, integrating SQLite, GPT-3.5, and visualization libraries.
- Created a presentation poster and demonstration video, presenting the app to an audience of over 100 people.

## Agoda Travel Planner

Bangkok, Thailand

UX/UI Designer, Presenter; Team of 7

Jun - Aug 2022

- Secured **1st Runner-up** at Agoda Intern Pitch Competition 2022.
- Used Figma to design a new travel planner feature for the Agoda mobile application.
- Demonstrated and presented to over 100 interns, senior employees, and the executive board of Agoda.

## SixCents

Madison, WI

Full Stack Developer; Team of 4

Oct 2021 - Mar 2022

- Developed a deaf-blindness assistance app featuring Text-to-Braille, Image-to-Braille, and handwriting recognition
- Secured **1st place** at CheeseHacks 2021 hosted by UW-Madison with a ReactJS version. [[Repo](#)][[Present](#)]
- Submitted to the **Google Developer Student Club Solution Challenge 2022** with a Flutter version. [[Repo](#)][[Present](#)]
- Assumed a leadership role, providing direction for naming, graphics, demonstration, and presentation.
- Implemented vibration features and image recognition for the image-to-Braille feature using Heroku and Flask.

## Leadership and Involvement

### International Conference on Quantitative Ethnography 2023

Melbourne, Australia

Poster Presenter/Reviewer and Organizer Assistant

2023

- Anonymously reviewed research posters, maintaining high academic and presentation standards.
- Developed and designed instructional materials for ENA and ONA workshops.
- Managed bibliographic data for conference proceedings using Zotero.

### Epistemic Analytics Lab

Madison, WI

Data Analyst Research Intern and Outreach Member

2023 - 2024

- Reviewed prospective interns' profiles and interviewed candidates for internship positions.
- Improved guidelines for new interns, mentoring in data analysis techniques and lab technologies.
- Facilitated technical support and problem-solving in Codey and ONA workshops at the QE Summer Institute 2023, assisting over 20 international quantitative ethnography researchers.

### Thai Student Association at UW-Madison

Madison, WI

Vice President

2021 - 2022

- A key organizer of the Laos-Thai-Cambodian New Year event, drawing over 60 attendees in collaboration with APIDA, the Multicultural Student Center, and Thai instructors at UW-Madison.
- Oversaw 3 event planning committees, ensuring effective collaboration and event success.
- Enhanced and maintained the organization's online presence, including the website, social media, and store.
- Handled financial oversight, maintaining expenditure records in collaboration with the financial chair.

## Technical Skills

Languages: Python, R, SQL, AQL, C, C++, C#, Scala, Java, JavaScript, HTML, CSS, Dart, LaTeX

Frameworks & Platforms:

- **NLP/ML/Analytics:** Hugging Face, Transformers, LangChain, OpenAI, Vertex AI, Azure AI, MLflow, Prompt Flow, PyTorch, Scikit-learn, TensorFlow, NumPy, Pandas, Weka, Epistemic Network Analysis, Ordered Network Analysis
- **Web & App Development:** React, Node.js, Flutter, Flask, Android Studio, Postman, Dialogflow, Figma, Grafana
- **Cloud & DevOps:** Google Cloud Platform, Modal, Docker, Hadoop, Spark, Cassandra, Kafka, ArangoDB