Brian Tham

AI Research Student and Applied Artificial Intelligence undergraduate at Singapore Institute of Technology
Singapore

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I am Brian Tham, an Applied AI undergraduate at Singapore Institute of Technology, passionate about pushing the boundaries of AI research and its real-world applications. With a strong foundation in computer science and a keen interest in emerging technologies, I'm dedicated to developing innovative AI solutions to solve complex challenges.

Upcoming Internship

A*STAR Research Intern - Deep Learning for Image Super-resolution and Denoising
*Agency for Science, Technology and Research (A*STAR); Institute for Infocomm Research (I2R), Singapore*
A*STAR Research Internship Award (ARIA) **September 2025 - April 2026**

Education

Bachelor of Science with Honours in Applied Artificial Intelligence
Singapore Institute of Technology, Singapore **August 2023 - Present**

- GPA: **4.36/5.00**
- Relevant Coursework:
  - Machine Learning (**A+**)
  - Mathematics 1 & 2 (**A+**)
  - Data Structures and Algorithms (**A**)
  - Introduction to Computer Systems (**A**)
  - Programming Fundamentals (**A**)
  - Data Engineering and Visualization (**A**)
  - Ethics and Professional Conducts (**A**)
  - Computer Vision and Deep Learning (**A-**)

Diploma in Information Technology **April 2018 - April 2021**
Singapore Polytechnic, Singapore

- Relevant Coursework
  - Artificial Intelligence & Machine Learning (B+)

Research Interests

- **Quantum Computing and AI Integration:** Exploring how quantum computing can be leveraged to enhance artificial intelligence algorithms and applications. Investigating the potential for quantum machine learning and its implications for solving complex problems more efficiently.
- **Recommender Systems:** Studying advanced techniques in recommender systems to improve personalization and accuracy. Focusing on algorithms, user behaviour analysis, and the integration of AI to enhance recommendation quality.
- **Computer Vision:** Researching computer vision technologies for autonomous vehicles, including applications in the Autonomous Racing League and self-driving cars. Focusing on

improving object detection, navigation, and safety through advanced image processing and machine learning techniques.

- **Large Language Models:** Exploring advanced architectures and training methodologies for LLMs, with particular interest in improving model efficiency, reasoning capabilities, and real-world applications.
- **Graphics Processing Units (GPUs) and AI:** Investigating the role of GPUs in enhancing AI performance, with a specific interest in NVIDIA's DLSS (Deep Learning Super Sampling) and AMD's FSR (FidelityFX Super Resolution). Exploring how these technologies can be leveraged for real-time rendering and performance optimization in AI applications.
- **AI Model Protection and Security:** Analysing and mitigating vulnerabilities in deep learning models, and protection of model integrity.

Professional Experience

Research Student on AI Model Protection **September 2024 - December 2024**

Singapore Institute of Technology, Singapore

Working on AI model protection and vulnerability analysis.

- Researched on protecting deep neural networks against model extraction attacks, with a focus on improving security and robustness of AI models.
- Conducted comprehensive literature review analyzing current AI model protection techniques, focusing on model watermarking, adversarial robustness, and defense mechanisms against model extraction attacks. Primary areas included box-free model vulnerabilities and watermarking methodologies for neural networks.
- Implemented and evaluated a UNet model for brain MRI segmentation as a test case for model extraction vulnerability analysis.

Admin Support Assistant **October 2021 - August 2023**

Ministry of Defence of Singapore, Singapore

G1-Army, Requirement & Allocation branch

- Automated data processing & visualisation in PowerBI and Excel
- Maintained & updated VBA scripts for automated data cleaning
- Extraction and cleaning of data for analysis to draw insights

Digital Learning Intern **September 2020 - February 2021**

Lee Kong Chian School of Medicine, Novena, Singapore

Enhancing Medical Education Through Art, Design and Media

- Improved test scores by 20% on average through e-learning courseware
- Digitise reference materials to make it more accessible through the use of Google Sites
- Research relevant medical information and materials with stakeholders for creative work
- Create storyboards to better visualise and explain medical content
- Create 2D/3D illustrations and animation related to specific medical content
- Produce educational video lessons using Adobe Captivate
- Game design and development related to healthcare information

Research Experience

Projects

Profanity Detection - A robust multimodal system for detecting and rephrasing profanity

- **Multimodal Analysis:** Process both written text and spoken audio

- **Context-Aware Detection:** Goes beyond simple keyword matching
- **Automatic Content Refinement:** Intelligently rephrases content while preserving meaning
- **Audio Synthesis:** Converts rephrased content into high-quality spoken audio
- **Cloud Deployment:** Available as a hosted service on Hugging Face Spaces
- **Technologies:** OpenAI's Whisper, Microsoft's SpeechT5, PyTorch
- **Demo:** https://nightey3s-profanity-detection.hf.space
- **GitHub:** https://github.com/Nightey3s/profanity-detection

FoodVision - Deep Learning Food Detection System

- Developed a computer vision system using YOLOv8 for real-time food detection and classification
- Implemented detection capabilities for 55 different food classes, focusing on fruits and vegetables
- Created a web-based demo interface for real-time food detection from images
- **Technologies**: YOLOv8, PyTorch, Deep Learning
- **Demo**: https://nightey3s-foodvision.hf.space
- **GitHub:** https://github.com/Nightey3s/FoodVision

Speech Emotion Recognition using Wav2Vec2

- Implemented an emotion recognition system based on the paper "3-D Convolutional Recurrent Neural Networks With Attention Model for Speech Emotion Recognition"
- Developed capability to classify speech into four emotional categories: Neutral, Happy, Sad, and Angry
- Utilized pre-trained Wav2Vec2 model for enhanced speech processing
- **Technologies**: PyTorch, Wav2Vec2, Python, Deep Learning
- **GitHub**: https://github.com/Nightey3s/Speech-Emotion-Recognition-using-Wav2Vec2

Data Structures and Algorithms Project: Evaluation of AI Chatbots:

- Project Overview: Conducted an evaluative study of different AI chatbots, focusing on their ability to provide accurate, comprehensive, clear, and relevant responses to queries related to tree data structures.
- AI Chatbots Evaluated: Interacted with multiple AI chatbots, including OpenAI's ChatGPT, Microsoft's Bing Copilot, Google's Gemini, and Cohere’s Coral.
    - Evaluation Criteria:
        - Accuracy: Assessed the correctness of the information provided by the chatbots, including definitions, properties, and examples of tree data structures.
        - Completeness: Evaluated the extent to which the chatbots covered all essential aspects of the queries, such as advantages, disadvantages, and applications of trees.
        - Clarity: Analysed the clarity and readability of the responses, ensuring that the information was presented in a structured and understandable manner.
        - Relevance: Determined the relevance of the responses to the specific queries, focusing on the applicability and usefulness of the information provided.
    - Findings and Insights:
        - Identified strengths and weaknesses of each AI chatbot in providing detailed and accurate information on tree data structures.
        - Noted differences in the depth and breadth of responses, with some chatbots providing more comprehensive and insightful answers than others.

        - Highlighted the importance of prompt engineering in eliciting high-quality responses from AI chatbots.
    - Visualisations and Examples: Created visual aids to illustrate the structure and evaluation of responses from different chatbots. Used examples of chatbot interactions to demonstrate the evaluation criteria and findings.
    - Contributions: Conducted AI interactions, developed evaluation criteria, analysed chatbot responses, and created visual aids for the report. Collaborated with team members to ensure a thorough and systematic evaluation of AI chatbots.

Technical Skills

- **Programming**: Python, C#, R
- **Machine Learning**: PyTorch, TensorFlow, Scikit-learn, Keras
- **Data Analysis & Visualization:** Matplotlib, RStudio, PowerBI, VBA
- **Cloud Platforms:** Google Cloud Certified - Professional Machine Learning Engineer, HuggingFace ZeroGPU spaces
- **DevOps & Tools**: Docker, Git
- **Web Development**: HTML, CSS, JavaScript

Certifications

Google Professional Machine Learning Engineer **October 2024**
Google
https://www.credly.com/badges/bf7f4c60-a4dc-4db0-9cf0-f37726b29eb9/public_url

Google Business Intelligence **June 2024**
Coursera
https://www.coursera.org/account/accomplishments/specialization/QDJ3SZ7D845H

Google AI Essentials **May 2024**
Coursera
https://www.credly.com/badges/f4b926a0-bc21-49e5-88fe-60a35fc7dd60/linked_in_profile

AI4I® – Proficiency in AI **April 2024**
AI Singapore
https://learn.aisingapore.org/certificate-verification/81594611AA-733DC4A013-1277DD378/

Google IT Automation with Python **March 2024**
Coursera
https://www.coursera.org/account/accomplishments/specialization/P554SLPSE9GT

Applied Data Science Lab **February 2024**
WorldQuant University
https://www.credly.com/badges/49481ea5-769e-4817-861a-0456bc6d0d9f/linked_in_profile

Google Advanced Data Analytics **December 2023**
Coursera
https://www.coursera.org/account/accomplishments/professional-cert/E4LLEAE2UKVB

Google Data Analytics **November 2023**
Coursera
https://www.coursera.org/account/accomplishments/professional-cert/KYYJGTYFP2AM

AI4I® – Foundations in AI **August 2023**
AI Singapore
https://learn.aisingapore.org/certificate-verification/81537D3357-150EAFE85-1277DD378/