

TECHNICAL SKILLS

- **Programming Languages:** Python (Pandas, Matplotlib, Numpy, Scikit-learn, Pytorch), C/C++ (STL, Libtorch, OpenMP), Shell scripting, React Native, PHP.
- **Toolkits:** kaldi-asr, wenet-e2e, huggingface-transformer, git.
- **Skills:** Automatic Speech Recognition (ASR), Natural Language Processing (NLP), Data Analytics, Machine Learning and Software Engineering.

EXPERIENCE

Senior Research Engineer

Institute for Infocomm Research (I2R) - A\*STAR

February 2020 - Present

- Automatic Speech Recognition (ASR)*
- Trained and maintained Multilingual South East Asia ASR engines and language models, reduced the WERs by 10% compared to the baseline models.
  - Finetuned and adapted entity localization ASR engines into domain-specific services, including Legal, Aviation Control, and Education. Featured project: Intelligent Court Transcription System - [External-URL](#).
  - Analyzed and benchmarked the quality of audio and text data, handled the data preprocessing, augmentation, and engineering pipeline.

- Natural Language Processing (NLP) - Speech and Audio Analytics*
- Trained and deployed the ECAPA-TDNN deep learning model for a speaker diarization inference service, achieved a 5% decrease in EER compared to the baseline X-Vectors model.
  - Trained and deployed U-net speech enhancement model for Satellite-based VHF communication, improved the AUC by 3% compared to the baseline RNN model.
  - Contributed to internal tools and APIs, including Transformer-based Sentiment Analysis, Embedded Sound Classification, Vietnamese-voiced FAQ LLM-based chatbot, etc.

Researcher

Satellite Research Centre

August 2016 - August 2018

- Implemented a novel Star Tracking Algorithm onto a Programmable System-on-a-chip for mini satellites.
- Optimized the pattern recognition algorithm runtime, improved the accuracy by 5% on average.
- Designed a tree-based pattern searching algorithm that enhanced runtime processing by 25%.

PROJECTS

VLSP 2023 Challenge - ASR

- VLSP 2023 Vietnamese ASR is a challenge subtrack that requires participating teams to tackle an ASR problem in the Vietnamese language, with the constraint of noisy and limited-size datasets. My contributions to the team include:
- Leading the team to address the ASR combined with Emotion Classification problem.
  - Designing and implementing an end-to-end solution for training and adapting ASR models with small datasets.
  - *Challenge Description:* <https://vlsp.org.vn/vlsp2023/eval/asr>

Vessenger AI

- Vessenger AI is a web-based application that assists clients in managing meeting minutes. Its functions include recording, transcribing, translating, and diarizing speakers in a multilingual, team-based meeting scenario. My responsibilities include:
- Deployed the Speaker Diarization Inference API.
  - Maintained the interfacing and preprocessing backend services.
  - *Demo Application URL:* <https://devaliasr.kkode.com/home/beta7>

WER-in-CPP

- WER-in-CPP is my personal open-source program that computes and represents ASR Word-Error-Rate metrics in the text-based format.
- Developed and implemented algorithms based on the Minimum-Edit-Distance Dynamic Programming problem.
  - Designed the text-based visualization and added features for statistical analysis.
  - *Source code:* [github.com/dangkheadl/WER-in-cpp](https://github.com/dangkheadl/WER-in-cpp)

ACHIEVEMENTS & PUBLICATIONS

ICASSP 2024 Publication - In Review

- Published as the first author of "Acoustic Scattering AI for Noninvasive Object Classifications: A Case Study on Hair Assessment".
- Conducted a study on hair-on-head style classification. The paper explores various deep learning approaches, including self-supervised learning, vector embedding, large model adaptation and finetuning.
- *Publication:* [External-URL](#).

AI Singapore - Trusted Media Challenge 2021

- Participated in the audio-visual fake media detection challenge, a competition hosted by AI Singapore and sponsored by Singapore Press Holdings Ltd., with prize money of up to SGD 700,000.
- Led the aasrali team and contributed the main engineering work, competing against 474 other teams.
- Ranked 6th on the final stage leaderboard - Top 1% teams - Final Round Leaderboard: [External-URL](#).

Google Code Jam 2018

- Competed individually in the problem-solving contest organized annually by Google, with over 27,000 competitors.
- Advanced to round 2 - Top 10% candidates.

EDUCATION

Master of Engineering

Nanyang Technological University, Singapore

August 2015 - August 2018

- School of Electrical and Electronics Engineering - Research.
- THESIS TITLE: Implementation of An Autonomous Star Recognition Algorithm using Hardware-Software Co-Processing Approach.
- *Source code:* [github.com/dangkheadl/Master-Thesis-Star-Tracking-System](https://github.com/dangkheadl/Master-Thesis-Star-Tracking-System)
- *Publication:* [doi.org/10.32657/10220/48371](https://doi.org/10.32657/10220/48371)





Bachelor of Engineering

Vietnam National University - HCMUT

August 2010 - April 2015

- Major: Electrical and Electronics Engineering, Minor: Automation System Design. Second Upper Honour
- THESIS TITLE: Applying of Fuzzy Logic Algorithm on Legged Locomotion Robot.

CERTIFICATIONS

- COURSERA - GENERATIVE AI WITH LARGE LANGUAGE MODELS 
- COURSERA - MACHINE LEARNING SPECIALIZATION 
- COURSERA - DATA STRUCTURES AND ALGORITHMS SPECIALIZATION 
- COURSERA - DISCRETE OPTIMIZATION 
- UDACITY - MACHINE LEARNING ENGINEER NANODEGREE 