NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

Joint PhD Program Description

The description for the Joint PhD program will be posted online as a sub-page to Joint PhD Programmes | Graduate College | NTU Singapore.

Name of Partner University	Indian Institute of Technology, Madras
Country	India
Year of JPP Establishment	2018
Program	☒ Joint Degree ☐ Joint Supervision
Description of the Program (150-250 words)	The Joint PhD programmes are conducted on a full-time basis. Students in the programmes are registered at both NTU and the partner university. Upon successful completion of the programme, NTU and the partner university will jointly confer the PhD degree.
Disciplines	• Science • Engineering • Management • Computing • Social Sciences
PMC Names and Emails	NTU: • Assoc Prof Sunil Chandrakant Joshi (mscjoshi@ntu.edu.sg) • Assoc Prof Yusuf Ali (yusuf.ali@ntu.edu.sg) IITM: • Prof Raghunathan Rengasamy (deange@iitm.ac.in) • Prof Mahesh Panchagnula (mvp@iitm.ac.in)

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Joint Projects

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

1. Adaptation of Audio-LLM in under-resourced multi-lingual setting

Date Posted	24 March 2025	
Home University	Nanyang Technological University	
Partner University	Indian Institute of Technology, Madras	
Supervisors	**Home**	**Partner**
Name	Prof Chng Eng Siong	Prof S. Umesh
School	College of Computing and Data Science	Department of Electrical Engineering
Email	aseschng@ntu.edu.sg	umeshs@ee.iitm.ac.in
Website	https://dr.ntu.edu.sg/cris/rp/rp00098	https://www.ee.iitm.ac.in/~umeshs/
Project Description (200-300 words)	This PhD proposal explores the application of Audio Language Models (LLMs) for under-resourced languages. The use of LLMs and transformer architecture in Automatic Speech Recognition (ASR) technology has achieved remarkable progress and performance, especially for widely-spoken languages with extensive linguistic data. However, the Word Error Rate (WER) performance for less common or under-resourced languages remains poor. In this proposal, we aim to improve Audio LLMs to recognize under-resourced languages by: 1. Developing robust semantic representations using neural audio codecs. 2. Developing novel adaptation methods to integrate these codec representations into LLMs. 3. Lastly, to generate semantic representations from generated text to enable speechless training. Recent works have shown that speechless training has achieved good results with recent advances in Text-to-Speech (TTS) and voice conversion technologies. The PhD Student will have the unique opportunity to collaborate with the AI-SG Sea-LION team (https://sea-lion.ai/) on enhancing their Audio-LLM, directly contributing to improve the performance for under-resourced languages like Indonesian, Vietnamese, and Tagalog, and making a real-world impact.	

Program/Center Website(s)	https://dr.ntu.edu.sg/cris/rp/rp00098 https://aisingapore.org/aiproducts/speech-lab/
Additional Information (e.g., files with project details)	

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

2. Chiral Ion Pair Catalysts with Organometallic Anions

Date Posted	10 June 2024	
Home University	Nanyang Technological University	
Partner University	Indian Institute of Technology, Madras	
Supervisors	**Home**	**Partner**
Name	Tan Choon Hong	Govindasamy Sekar
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Website	https://tanchoonhong.wixsite.com/tchlab/about	https://chem.iitm.ac.in/faculty/sekar/
Project Description (200-300 words)	The project aims to investigate the ion pair catalysts derived from chiral cations such as pentanidium and bisguanidiniums. They will be paired with transition metals containing anionic ligands. Enantioselective reactions using these catalysts will be investigated. At NTU, the student will prepare the pentanidium and bisguanidinium catalyst and attempt to pair them with transition metal anions. The student will also survey possible reactions to investigate. At IITM, the student will study enantioselective reactions using the ion pair catalysts developed in NTU. The student will also attempt to use the catalyst to make valuable active pharmaceutical intermediates.	
Program/Center Website(s)	NA	
Additional Information (e.g., files with project details)	NA	

3. Hardware-Efficient Deep Learning based Visual SLAM for UAVs

Date Posted	14 April 2023	
Home University	Nanyang Technological University	
Partner University	Indian Institute of Technology, Madras	
Supervisors	**Home**	**Partner**
Name	Lam Siew Kei	Krishnamurthy Sridharan
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Website	https://siewkeilam.github.io/ei-research-group/index.htmls	https://www.ee.iitm.ac.in/sridhara/
Project Description (200-300 words)	Unmanned Aerial Vehicles (UAVs) are expected to play a significant role in surveillance, mapping, and monitoring weather and traffic conditions. Simultaneous Localization and Mapping (SLAM) is an essential technology used by UAVs to jointly perform localization and mapping especially in environments where GPS or GNSS are not available or are unreliable. Visual SLAM (vSLAM) has gained wide popularity with the advances in AI methods. However, existing embedded computing platforms, e.g., CPU and GPU, are unable to meet the real-time requirement especially when deep learning methods are infused into the vSLAM pipeline. In addition, existing AI based visual SLAM algorithms are not well suited for long-term (lifelong) operations where the scenes change over time. The research will first explore new hardware-efficient AI based vSLAM algorithms for UAVs that can continuously acquire new knowledge in a self (semi)-supervised manner to enable the UAV to learn unfamiliar objects and new environmental conditions different from the ones present during training. An FPGA design methodology will be developed to optimize latency and energy consumption of the AI based vSLAM algorithm, while meeting the accuracy requirements of the UAV scenario. It is envisioned that the proposed methodology can synthesize FPGA efficient implementations of lifelong SLAM algorithms for UAVs operating under challenging scenarios.	
Program/Center Website(s)	https://www.ntu.edu.sg/hesl	
Additional Information (e.g., files with project details)	NA	