NANYANG
research programme

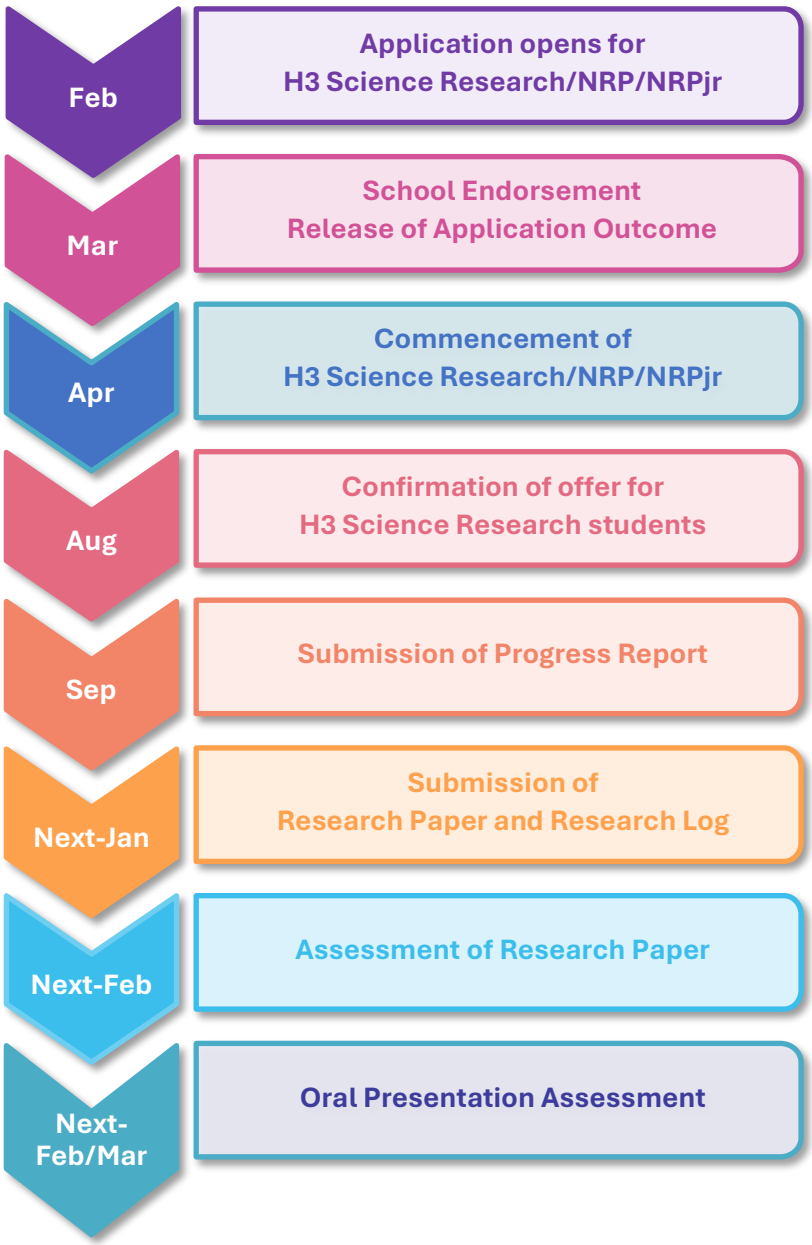
NRP 2026
Project Synopses

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

Nanyang Research Programme (NRP) is an enrichment programme offered to JC1 and Year 5 students. It seeks to offer students with a keen interest in and aptitude for research the opportunity to engage in the process of intellectual inquiry by undertaking projects in a real research environment under the supervision of NTU faculty and researchers.

NRP Student Participants will undertake eight months of research activities from April to December, either individually or as a pair, culminating in the submission of a Research Paper in January of the following year and an Oral Presentation Assessment in late February/early March.



NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

Category	Project Code	Project Title
ENGINEERING & TECHNOLOGY	CCDS01	Detection of Handwritten Mathematical Expressions via Deep Learning Approaches
	CCDS02	Image Understanding via Semantic Segmentation
	CCDS03	Deep learning based mental health/status interpretation
	CCEB01	Biosensors for the Detection of Molecular and Cellular Targets
	CCEB02	Evaluating Single-Use Technologies in Upstream Processes of Biopharmaceutical Manufacturing
	CCEB03	Evaluating Single-Use Technologies for Downstream Processes of Biopharmaceutical Manufacturing
	CCEB04	Process Simulation
	CEE01	Wind propulsion sail for shipping decarbonisation
	CEE02	Machine Learning of Ground Movement due to Tunnelling Operations
	CEE04	Exploring How Clay Behaves: From Tiny Particles to Real-World Engineering
	EEE01	Research and development of spectrum-adaptive light
	EEE02	Studies of Gallium Nitride (GaN) based High Electron Mobility Transistors (HEMTs)
	EEE03	Application of deep learning algorithm for orthogonal frequency-division multiplexing systems
	EEE04	Deep learning based algorithm for frequency estimation from noisy signals
	EEE05	Performance study of DVB-T2 system using common simulation platform (CSP)
	EEE06	Performance study of rotated quadrature amplitude modulation (QAM) signals over fading channels
	MAE01*	Geothermal Energy for Singapore
	MAE02	Exploring Airfoil Designs: How Vortex Cavities Improve Flight

* Project can be offered as H3 Science Research or NRP Enrichment

Category	Project Code	Project Title
ENGINEERING & TECHNOLOGY	NIE05	Designing an Artificial Intelligence and / or Robotics System for Potential Real-World Applications
	NIE11*	A Visual Analytics Platform for Classroom Observation leveraging student emotions
	NIE12*	Optimising Emotion Taxonomies for Emotion Recognition Methods in Education Contexts.
	NIE13*	LLM-Driven Question Scaffolding for Comprehensive Learning
	SPMS02*	Autonomous Navigation Using LiDAR and Machine Learning on a Low-Cost ARM Microcontroller Platform

Category	Project Code	Project Title
SCIENCES	CCEB05	Development of new programmable RNA editing tools
	CCEB06	Development of new technologies for precision genome engineering
	MAE03	A Fast Way to Compute Matrix Multiplication
	MAE04	Representation Theory in Physics, Chemistry, and Biology
	MAE05	A Fast Curve Fitting Method
	NIE02	Effect of energy gel on physiological measures during high-intensity anaerobic sprint test
	NIE08	Formulating insect-based food suitable for 3D Food Printing
	SBS01	De novo design/engineering of an (template-less) RNA polymerase
	SPMS01*	Building a Minimal Micromagnetic Solver: From LLG Physics to Numerical Implementation
	SPMS03	Magnonic Devices
	SPMS04	Nanolithography based on scanning probes
	SPMS05	Optical Lithography

* Project can be offered as H3 Science Research or NRP Enrichment

Category	Project Code	Project Title
BUSINESS, HUMANITIES, ARTS, & SOCIAL SCIENCES	CEE03	Ship risk prediction in port state control inspection
	CRADLE01	Organisational Success Through Workplace Learning: Unveiling Its Value and Dynamics in SMEs
	NIE01	Topics in Singapore English
	NIE03	Developing ChatGPT-enabled Chatbot to support students' open inquiry in learning K-12 mathematics
	NIE04	Developing ChatGPT-enabled Chatbot to support students in solving domain-general problems
	NIE06	Exploring the Role that Game-Based Worlds and Immersive Environments Potentially Play in Learning
	NIE07	Sense of Food Resiliency among Secondary/JC students in Singapore
	NIE09	Literary Theory and Modern Poetry
	NIE10	The Fading Siren: How We Forget Past Weather Extremes
	SoH01	A Sociolinguistic Investigation of French, German, Italian and Spanish in Singapore Shop Signs
	SoH02	Singapore Comparative Literature (I)
	SSS01	Inflation Dynamics in Singapore
	SSS02	Conceptions of World Order in East Asia
	SSS03	Assessing Social Attributes of Faces

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **College of Computing and Data Science**

Project Code	CCDS01
Project Title	Detection of Handwritten Mathematical Expressions via Deep Learning Approaches
Description	Digitising handwritten mathematical expressions has increased in usage in education, engineering, and science. Engineers, researchers and students may need to write many sophisticated mathematical expressions in their reports, research papers, etc., in Word or LaTeX. However, it is not an easy job. Having touch-screen devices, they can easily write down those expressions but the recognition is a challenge. In this project, the student will study existing machine learning techniques of handwritten mathematical expression recognition. The student will propose an improvement or integrate the existing work into a system. The system will convert handwritten mathematical expressions into Latex format seamlessly. The work can be applied to an auto-assessment system for mathematics quizzes.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	• Good at Mathematics and have some basic programming background • Interested in AI and machine learning.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **College of Computing and Data Science**

Project Code	CCDS02
Project Title	Image Understanding via Semantic Segmentation
Description	Semantic segmentation is the task of classifying each pixel in an image into a predefined category, enabling machines to understand the context and content of a scene. With applications ranging from autonomous vehicles to medical imaging, mastering semantic segmentation is a key milestone in the development of intelligent systems. In this project, students will involve a thorough investigation into semantic segmentation, its applications, and hands-on experimentation.
Offered As	NRP Enrichment
Group Size	Pair
Specific Knowledge	Good at mathematics and having some knowledge in programming.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **College of Computing and Data Science**

Project Code	CCDS03
Project Title	Deep learning based mental health/status interpretation
Description	To recognise the mental health problems and provide good quality care, early recognition of mental health problems is a crucial stage before an individual suffers some serious consequences, such as depression or suicidal nature/tendency. At present, mental health assessment is performed by healthcare personnel or clinicians and diagnosed based on a person's answers to specific questionnaires formulated for the recognition of specific patterns of feelings or social interactions. There is a need for an automated and effective algorithm which can assess the social media interactions/messages to identify or interpret a person's mental health status. The aim is to develop an efficient algorithm which can assess the possible mental status of the person and predict/interpret the mental health issues that an individual might reach or develop.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Basic knowledge of Python programming or interested in learning Python.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY

School of Chemistry, Chemical Engineering and Biotechnology

Project Code	CCEB01
Project Title	Biosensors for the Detection of Molecular and Cellular Targets
Description	Increasing understanding of fundamental biology and pathology has identified a broad spectrum of molecular and cellular targets associated with different types of human diseases. There is intense research into the rapid and ultrasensitive detection of these biomarkers for early diagnosis of diseases and monitoring of therapeutic response. Recent developments in bionanotechnology have led to the growing use of functional nanoparticles with unique optical, electrical, magnetic, and catalytic properties for improved biomarker detection. The nanoparticles in combination with the detection platforms, such as lateral flow arrays, microarrays, and microfluidics, have promoted the performance and applicability of diagnosis technologies to a new level, opening new opportunities in major human diseases, ranging from infectious diseases caused by bacterial and viral pathogens to cancer, cardiovascular, neurodegenerative, and metabolic diseases. This project will offer opportunities in learning basic design principles of biosensors and developing a particular type of biosensor for a molecular or cellular target by designing specific sensing elements for target recognition, functional transducers for sensitive detection of targets of interest based on the detection of optical or spectroscopic signals on an in vitro diagnostic detection platform.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Basic understanding on properties of common chemicals.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY

School of Chemistry, Chemical Engineering and Biotechnology

Project Code	CCEB02
Project Title	Evaluating Single-Use Technologies in Upstream Processes of Biopharmaceutical Manufacturing
Description	Biopharmaceuticals or biologics represent a niche class of pharmaceuticals that can treat complex diseases that are not effectively treated by traditional small-molecule pharmaceuticals. Biologics are large molecular weight biomolecules produced by living cells (e.g., insulin, human growth hormone, enzymes), in contrast to small molecule pharmaceuticals produced by chemical synthesis (e.g., aspirin). Due to their biological origin, manufacturing of biologics is highly complex, requiring a large number of equipment that need to be in perfectly sterile conditions for each production run. This results in a very costly operation and a long production time. To expedite the manufacturing process, the researchers have explored the use of disposable plastic-made equipment in place of the traditional stainless steel equipment. This type of equipment is referred to in industry jargon as single-use technologies (SUT). The use of SUT has been explored in all aspects of biologics manufacturing from synthesis (e.g., plastic fermenter, plastic bioreactor) to purification (e.g., plastic filter, plastic chromatography flow path). Different types of polymer materials can be used to manufacture SUT. The suitability of each material depends on the intended application of SUT. For example, plastics suitable for a fermenter may not be suitable for centrifugation. In this project, you will evaluate the suitability of different types of plastics as SUT ingredient, its production process, and also its environmental impacts from its production stage to its disposal. The project focused on plastics suitable for upstream processes in biologics manufacturing (i.e., bioreactor, centrifugation). You will learn lifecycle assessment (LCA) software to evaluate the environmental impacts.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Keen interest in chemistry and chemical engineering.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY

School of Chemistry, Chemical Engineering and Biotechnology

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Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Keen interest in chemistry and chemical engineering.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY

School of Chemistry, Chemical Engineering and Biotechnology

Project Code	CCEB04
Project Title	Process Simulation
Description	Chemical engineering is not just about experiments, but also about playing with simulation software. In this project, we shall look into various parts of the chemical plant. We shall employ a modelling platform - a user-friendly and exciting tool - to simulate and understand the operation of different operations of chemical plants. The aim of this project is to give students a light appreciation of some core chemical engineering fundamentals with the aid of typically used simulation tools.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Students will be doing modelling.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Civil and Environmental Engineering**

Project Code	CEE01
Project Title	Wind propulsion sail for shipping decarbonisation
Description	The shipping industry is under immense pressure to decarbonise, and Wind-Assisted Propulsion Systems (WAPS), such as Flettner Rotors, are emerging as a key solution. However, their efficiency varies significantly depending on complex variables like vessel type, shipping routes, seasonal weather patterns, and economic factors. In this project, students will utilise the Flettner Rotor Savings Estimator (Lloyd's Register) to conduct a comprehensive study on the feasibility of wind propulsion. Students will begin by familiarising themselves with the tool to understand how Flettner Rotors function and their potential for energy savings. They will then design and simulate various shipping scenarios, such as Singapore-Rotterdam or Trans-Pacific routes, to construct a comprehensive dataset. Using this collected data, students will perform correlation analyses to identify key variables and visualise how efficiency fluctuates across different months and seasons. A significant portion of the research will focus on determining which major trade routes originating from Singapore are most suitable for Flettner Rotor deployment. As the simulation tool provides data on fuel savings in tonnage, students will expand their study into a techno-economic evaluation by researching current fuel prices and installation costs to calculate the payback period for shipowners.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	• Strong interest in Maritime Studies, Sustainability, and Decarbonisation. • Good at using Microsoft Excel (for data collection, visualisation, and economic analysis) is required. • Basic programming skills using Python are advantageous.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Civil and Environmental Engineering**

Project Code	CEE02
Project Title	Machine Learning of Ground Movement due to Tunnelling Operations
Description	Tunnelling has been a common construction technique to explore the underground space. However, the construction activities may induce ground disturbance that threatens the safety and serviceability of above-ground infrastructure. It is imperative to have a robust approach to predict tunnelling-induced ground movements. This project aims to develop machine learning methods to predict ground deformation due to tunnelling operations. Data collected from a real tunnel site will be processed and adopted to build a robust machine learning algorithm to estimate ground displacement. The results will provide an effective tool to evaluate tunnelling performance and provide valuable information for engineering risk assessment and management.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	The candidate is expected to have a strong background in mathematics and physics. In addition, the candidate should either possess prior programming experience or demonstrate a strong desire to learn programming languages (e.g., Python).

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Civil and Environmental Engineering**

Project Code	CEE04
Project Title	Exploring How Clay Behaves: From Tiny Particles to Real-World Engineering
Description	Clays and clay minerals are important materials in geotechnical engineering because they can hold water tightly, swell when wet, and act as natural barriers to groundwater flow. In this project, you will explore how the tiny building blocks of clay—nanometre-sized particles—change their structure and behaviour under different conditions. You will investigate how factors such as water chemistry (for example, salinity, pH, and the types of dissolved ions) and physical conditions (such as water content, dry density, temperature, and pressure) affect the arrangement of clay particles. You will also study how clay interacts with different natural and human-made materials, including organic matter, pollutants, heavy metals, and waste materials like fly ash. The nanoscale insights generated will help inform laboratory experiments and larger-scale simulations. Ultimately, this research contributes to developing more sustainable solutions in geotechnical engineering, such as improving waste containment systems, designing clay-based geopolymers, enhancing contaminant removal, understanding sediment transport, and supporting geo-energy applications.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	The student will need to use the free, open-access software LAMMPS. The fundamental knowledge of chemistry is required.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Electrical and Electronic Engineering**

Project Code	EEE01
Project Title	Research and development of spectrum-adaptive light
Description	Table lamps currently in the market could have warm or cold white light. Users will choose the one which is suitable for them. However, users typically do not know the scientific reasons for their choice. In fact, our eyes have evolved to adapt to sunlight, which changes from dawn to dusk with various light spectrums from warm to cool white light. The project will do research on the sunlight spectrum throughout the day and build a table lamp with a tunable spectrum that can change the spectrum according to the user's need or follow the sunlight so that users have a feeling of outdoor light. Students will not only learn about the sunlight spectrum but also control the light with a simple microcontroller (Arduino) and coding.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	NIL

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Electrical and Electronic Engineering**

Project Code	EEE02
Project Title	Studies of Gallium Nitride (GaN) based High Electron Mobility Transistors (HEMTs)
Description	Gallium Nitride (GaN) based High-Electron-Mobility Transistors (HEMTs) are very attractive for high-frequency and high-power device applications due to their inherent material properties, such as a wide band gap with high breakdown voltage and higher saturation velocity. Hence, these transistors are very promising for the important basic building blocks of many applications, such as wireless communications, satellite communications and sensors, etc. In this project, the student will learn the basic operation, characterisation techniques and analysis of GaN HEMTs.Hence, the student is required to perform and understand the various measurement techniques, such as a semiconductor parameter analyser and pulsed current-voltage system to characterise the fabricated GaN HEMTs. He/She will learn the various key device parameters of GaN HEMTs and optimise them for high-performance device applications.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Basic physics and mathematics. Some microelectronics/semiconductor physics knowledge will be helpful.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Electrical and Electronic Engineering**

Project Code	EEE03
Project Title	Application of deep learning algorithm for orthogonal frequency-division multiplexing systems
Description	Recently, orthogonal frequency-division multiplexing (OFDM) techniques have been widely used for wireless communication systems, including the fifth generation (5G) cellular system. To further improve the performance and robustness of the OFDM systems, deep learning based algorithms have been introduced. In this project, the student will study and design a deep learning based receiver for an OFDM system in an end-to-end approach. We will explore the advantage of the deep learning model to recover the distorted signal. Moreover, the channel state information will not be required as compared with the traditional method. MATLAB and Python simulations will be conducted to study the performance of the proposed system.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Preferably to have basic programming skills in MATLAB and Python, though it is not compulsory, as the student should be able to pick up the skills during the execution of the project.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Electrical and Electronic Engineering**

Project Code	EEE04
Project Title	Deep learning based algorithm for frequency estimation from noisy signals
Description	Estimation of the frequency of a noisy modulated signal has been one of the main challenges in the field of signal processing and communications. The objective of this project is to investigate the existing techniques for frequency estimation. Following that, a deep learning algorithm will be proposed to estimate the frequency of the modulated signal that is corrupted by Gaussian noise, with the advantages of having higher accuracy and faster estimation time. Comparisons between existing frequency estimation methods and the proposed deep learning-based method will be carried out. MATLAB or Python programming will be used to study the performance of the proposed scheme.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Preferably to have basic programming skills in MATLAB and Python, though it is not compulsory, as the student should be able to pick up the skills during the execution of the project.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Electrical and Electronic Engineering**

Project Code	EEE05
Project Title	Performance study of DVB-T2 system using common simulation platform (CSP)
Description	Recently, the Terrestrial Digital Video Broadcast (DVB-T2) system has been widely deployed worldwide. It has been officially adopted in Singapore as well. The DVB-T2 system can provide much better signal quality. The main focus of this project is on the decoding of the DVB-T2 signals under various channel conditions, such as additive white Gaussian noise (AWGN) and fading channels. The performance of the algorithms will be studied and verified through the readily available common simulation platform (CSP). MATLAB simulation will be conducted to study its performance under different scenarios of channel conditions.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Preferably to have basic programming skills in MATLAB, though it is not compulsory, as the student should be able to pick up the skill during the execution of the project.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Electrical and Electronic Engineering**

Project Code	EEE06
Project Title	Performance study of rotated quadrature amplitude modulation (QAM) signals over fading channels
Description	Recently, rotated quadrature amplitude modulation (QAM) has been widely used in practical wireless systems. One of the important applications is the digital video broadcasting system in Singapore. In this project, the objective is to study rotated QAM signals and simulate their bit-error rate (BER) performance over various fading channels. The performance of the algorithms will be analysed and verified through the commonly available simulation programs from the common simulation platform (CSP). MATLAB programming will be used for BER simulation.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Preferably to have basic programming skills in MATLAB, though it is not compulsory, as the student should be able to pick up the skill during the execution of the project.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Mechanical and Aerospace Engineering**

Project Code	MAE01
Project Title	Geothermal Energy for Singapore
Description	Geothermal energy is a low-carbon and weather-independent energy source that could complement solar and other renewables in Singapore. Recent deep boreholes have shown promising subsurface temperature gradients, but the realistic potential for power generation and district cooling in Singapore is still an open question. In this project, the student will investigate how geothermal energy could be used in Singapore for electricity generation and/or cooling. The work will start with a literature review on basic geothermal principles (heat transfer in the ground, geothermal gradients, geothermal power plants) and on current international case studies. The student will then analyse publicly available data for Singapore (e.g. temperature vs depth, rock properties, heat demand in buildings) to construct simple models of the subsurface temperature profile. Using these models, the student will: • estimate the thermal power that can be extracted from a simplified geothermal well configuration; • explore possible applications (electricity generation via a low-temperature Organic Rankine Cycle, direct-use district cooling, or hybrid systems); • perform basic performance calculations such as efficiency, capacity factor and expected CO_2 savings compared to conventional systems. The outcome of the project will be a research report and an oral presentation explaining the methodology, key assumptions, main results, and limitations. The project will expose the student to real-world energy transition challenges, quantitative analysis, and scientific communication.
Offered As	H3 Science Research / NRP Enrichment
Group Size	Individual
Specific Knowledge	Prerequisite knowledge and background: • Strong interest in energy, climate change and sustainability. • Good foundation in Mathematics (algebra, functions, basic calculus) and Physics (heat, temperature, energy). • It is preferable that the student is taking H2 Physics and H2 Mathematics (or equivalent), but highly motivated students from related backgrounds may also be considered.

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Skills the student should possess:

- Ability to read and summarise scientific/technical articles in English.
- Comfort with handling numerical data (tables, graphs) and using spreadsheets.
- Willingness to learn basic programming and to work independently with regular guidance.

Software / Programmes to be used:

- Microsoft Excel (or equivalent) for data organisation and simple calculations.
- MATLAB (provided through NTU network account) for basic modelling, plotting of temperature profiles, and simple parametric studies.
- Standard word processing and presentation software (e.g. MS Word, PowerPoint) for the research report and oral presentation.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Mechanical and Aerospace Engineering**

Project Code	MAE02
Project Title	Exploring Airfoil Designs: How Vortex Cavities Improve Flight
Description	Have you ever wondered how airplanes stay in the air? The secret lies in the shape of their wings, called airfoils. Airfoils guide air smoothly to create lift (the force that allows planes to fly). In this project, we'll explore a cool design feature called a vortex trapping cavity—a small groove that helps control airflow and reduce drag (air resistance). Using computer simulations, we'll model airfoils and observe how air flows around them. You'll get to see how traditional airfoils compare to cavity-enhanced designs in reducing drag and improving lift. By the end, you'll understand how small design changes can make a big difference in performance! In this project, you'll learn practical skills, like how engineers use advanced tools to design better planes. Best of all, it's designed to be hands-on and fun. This would hopefully be an exciting introduction to aerodynamics.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Recommended to read about the history of aerodynamics. A good book would be The Enigma of the Aerofoil: Rival Theories in Aerodynamics, 1909-1930 by David Bloor. Ansys will be used in this project. The student version of the software is available for free download.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **National Institute of Education**

Project Code	NIE05
Project Title	Designing an Artificial Intelligence and / or Robotics System for Potential Real-World Applications
Description	In this project, you will learn how to use open-source hardware (such as Arduino and Raspberry Pi), Artificial Intelligence (AI) computing platforms (such as NVIDIA Jetson) and sensors (such as cameras or microphones) to design and train an AI robot for a real-world application of your choice. You will be supported in your learning by a team of designers and developers who have extensive experience with open-source hardware and software.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Interest in maker culture, artificial intelligence and robotics is a plus. Experience with programming languages such as Python will be helpful, though not necessary.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **National Institute of Education**

Project Code	NIE11
Project Title	A Visual Analytics Platform for Classroom Observation leveraging student emotions
Description	This study develops an interactive visual analytics system designed to analyse and summarise student emotions derived from classroom videos. By leveraging emotion recognition algorithms, the platform translates complex machine learning output into intuitive, easy-to-read visualisations. A key focus of the project is UI/UX design, ensuring the tool is accessible to users without programming experience. Ultimately, this research aims to provide data-driven insights into student performance and guide professional development for teachers within the critical domain of Social-Emotional Learning.
Offered As	H3 Science Research / NRP Enrichment
Group Size	Individual
Specific Knowledge	Strong programming skills in JavaScript and Python. Experience in graphic design is preferable but not required.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **National Institute of Education**

Project Code	NIE12
Project Title	Optimising Emotion Taxonomies for Emotion Recognition Methods in Education Contexts.
Description	While prevalent machine learning datasets successfully classify facial expressions using multiclass systems — ranging from gradients (e.g., not engaged to highly engaged) to discrete affective states (e.g., confused, excited, bored, neutral) — their validity in real-world classrooms remains unverified. This study aims to bridge that gap by investigating existing emotion recognition frameworks and constructing a novel taxonomy tailored to educational settings. The research will evaluate different classification strategies — contrasting continuous vs. discrete, inclusive vs. mutually exclusive, and binary vs. multi-class systems — to identify the optimal granularity for machine learning models. Furthermore, the study investigates the human-computer interaction aspect: assessing how these taxonomic choices influence the cognition and decision-making of the end-users (teachers and administrators).
Offered As	H3 Science Research / NRP Enrichment
Group Size	Individual
Specific Knowledge	• Interests in cognitive science. • Comfort with reading (or learning to read) academic papers and conducting a literature review. • Programming skills (e.g., Python) might be required.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **National Institute of Education**

Project Code	NIE13
Project Title	LLM-Driven Question Scaffolding for Comprehensive Learning
Description	While existing educational question-answering systems provide individual support in online courses, they often miss a crucial step in education: guiding students to ask better questions. This is especially challenging when a subject contains many unstructured facts and learners struggle to build a complete knowledge map on their own. This study leverages the power of Large Language Models (LLMs) to improve the learning process. The system won't just answer questions; it will use those answers to inspire the student's next question, actively helping them structure the material. The ultimate goal is to guide students to generate their own comprehensive knowledge map, facilitating deeper learning. The technical work involves prompt engineering and the design of an intuitive software interface.
Offered As	H3 Science Research / NRP Enrichment
Group Size	Individual
Specific Knowledge	Strong programming skills in Python. Experience in prompt engineering is preferable but not required.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

ENGINEERING & TECHNOLOGY | **School of Physical and Mathematical Sciences**

Project Code	SPMS02
Project Title	Autonomous Navigation Using LiDAR and Machine Learning on a Low-Cost ARM Microcontroller Platform
Description	This project aims to design and implement an autonomous mobile robot that navigates indoor environments using a compact LiDAR sensor and a low-cost ARM microcontroller platform. The student will integrate LiDAR data acquisition, real-time obstacle detection, and basic machine-learning-based decision-making to enable the robot to move safely and intelligently through unfamiliar spaces. The project includes several key components: Hardware Integration – assembling a mobile robot chassis with motor drivers, a LiDAR module, and an ARM microcontroller board. Sensor Processing – acquiring and filtering LiDAR data to generate a local map or distance profile in real time. Navigation Logic – implementing algorithms for obstacle avoidance, path planning, or environmental mapping. Machine Learning Component – training and deploying a lightweight machine-learning model (e.g., decision tree, linear classifier, or small neural network) to interpret sensor patterns or optimise navigation behaviour. Autonomous Operation – demonstrating the robot performing stable, repeatable navigation without human intervention. The final outcome is a functioning prototype and a report documenting the design decisions, algorithms, performance, and limitations of the system.
Offered As	H3 Science Research / NRP Enrichment
Group Size	Individual
Specific Knowledge	• Basic programming in C or Python (variables, control flow, arrays, functions). • Familiarity with Arduino microcontroller platforms for embedded systems. • Basic electronics knowledge, including sensors, actuators, and motor drivers. • Comfort with algebra and basic geometry for interpreting LiDAR data and navigation. Optional: • Introductory understanding of machine-learning concepts. • Interest in robotics, embedded systems, and autonomous navigation. • Willingness to learn independently using both provided and external resources. • Comfortable working iteratively: prototyping, testing, debugging, and refining designs.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Chemistry, Chemical Engineering and Biotechnology**

Project Code	CCEB05
Project Title	Development of new programmable RNA editing tools
Description	The ability to engineer genomes, transcriptomes and living cells lends itself to many biomedical and biotechnological applications. In recent years, CRISPR-Cas has emerged as a powerful system for genome and transcriptome engineering. Briefly, a Cas enzyme is recruited to a target site by a programmable guide RNA. In so doing, it can also bring along an effector domain to modulate the target gene. Here, we are interested in developing new Cas13-based technologies to install A-to-I or C-to-U editing events in RNA transcripts. The tools developed may be used as a new therapeutic modality for well-defined genetic diseases and can also be utilised to study RNA editing in various biological contexts.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Knowledge of molecular biology and genetics, past research experience on biology- or biomedical engineering-related topics, and willingness to work hard.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Chemistry, Chemical Engineering and Biotechnology**

Project Code	CCEB06
Project Title	Development of new technologies for precision genome engineering
Description	An ability to introduce precise changes in the genome of a living cell lends itself to many biomedical and biotechnological applications. In recent years, CRISPR-Cas has emerged as a powerful system that enables us to engineer the genomes of plants and animals, including humans. However, the efficiency of precision genome engineering remains low in many human cell types. In this project, we will explore different strategies to enhance the ability of CRISPR-Cas to install any defined edit in the human genome. If successful, our work will bring CRISPR technologies one step closer to clinical reality as a new form of therapeutics.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Some knowledge of molecular biology and genetics, some research experience on a biology- or biomedical engineering-related project, and willingness to work hard.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Mechanical and Aerospace Engineering**

Project Code	MAE03
Project Title	A Fast Way to Compute Matrix Multiplication
Description	Matrix multiplication is a mathematical operation that takes a pair of matrices to generate a new matrix. Directly applying the mathematical definition of matrix multiplication gives an algorithm that takes nmp order of time to multiply an n × m matrix by an m × p matrix. The goal of this project is to develop a fast way to compute matrix multiplication.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Good at mathematics and Python programming.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Mechanical and Aerospace Engineering**

Project Code	MAE04
Project Title	Representation Theory in Physics, Chemistry, and Biology
Description	Physics, chemistry, and biology have a natural connection with representation theory, a branch of mathematics known as abstract algebra. Its goal is to represent physical, chemical, and biological elements in abstract algebraic structures as linear transformations on vector spaces, and to apply artificial intelligence techniques to study the properties of physical, chemical, and biological structures.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	NIL

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Mechanical and Aerospace Engineering**

Project Code	MAE05
Project Title	A Fast Curve Fitting Method
Description	Curve fitting is the process of constructing a function curve that best fits the existing data points. The scope of this project is to develop a fast curve-fitting method.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	NIL

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **National Institute of Education**

Project Code	NIE02
Project Title	Effect of energy gel on physiological measures during high-intensity anaerobic sprint test
Description	Carbohydrate supplements are known to improve endurance performance, but their benefits in short, high-intensity anaerobic activity remain unclear. This study aims to investigate the effects of energy gel on physiological measures during high-intensity anaerobic sprint tests.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	• Communication skills • Attention to details • Adhere to protocols and guidelines for safe procedures in the laboratory • Positive learning attitude and an open mind • Basic understanding of human anatomy, circulatory and respiratory systems, and the effect of exercise and training • Microsoft Word and Excel (not the online version)

Back to Project List

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NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **National Institute of Education**

Project Code	NIE08
Project Title	Formulating insect-based food suitable for 3D Food Printing
Description	This project focuses on developing innovative, nutritious, and sustainable food formulations using insect-derived ingredients that are compatible with 3D food printing technology. As global demand for environmentally friendly protein sources continues to rise, insects offer a highly sustainable alternative due to their low ecological footprint, high protein content, and efficient cultivation.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	• 3D printing • Food science

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Biological Sciences**

Project Code	SBS01
Project Title	De novo design/engineering of an (template-less) RNA polymerase
Description	Currently, long RNA molecules are produced in the laboratory using reverse transcriptase, which requires a DNA template. While short, single-stranded RNAs can be synthesised chemically, this approach is significantly more expensive. One of the most sought-after breakthroughs in biotechnology is a purely enzymatic method for generating RNA strands of varying lengths and sequences without relying on DNA templates. Our research group is actively developing and testing novel approaches to achieve this goal. We invite interested high school students to join us — whether by contributing ideas during brainstorming sessions or by participating directly in experiments aimed at optimising our strategies.
Offered As	NRP Enrichment
Group Size	Pair
Specific Knowledge	• Basic knowledge of Biology and Chemistry. • H2 Mathematics or equivalent. • Optional programming experience.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Physical and Mathematical Sciences**

Project Code	SPMS01
Project Title	Building a Minimal Micromagnetic Solver: From LLG Physics to Numerical Implementation
Description	This project develops a minimal but fully functional micromagnetic simulation solver based on the Landau–Lifshitz–Gilbert (LLG) equation. The student will implement a finite-difference discretisation of the magnetisation field on a regular grid and compute the effective magnetic field arising from exchange, anisotropy, and Zeeman interactions. Time evolution will be performed using explicit Runge-Kutta integration with automatic renormalisation. A key component of the work is the implementation of the magnetostatic (demagnetising) field using FFT-based convolution with a discretised demagnetising kernel. The student will benchmark the solver against simple analytical or semi-analytical cases, such as macrospin precession, spin-wave dispersion in thin films, and domain-wall equilibrium states. The final deliverables include a validated solver, documentation, and example simulations illustrating micromagnetic phenomena.
Offered As	H3 Science Research / NRP Enrichment
Group Size	Individual
Specific Knowledge	• Comfortable programming in C or Python, including fundamental concepts such as basic syntax, arrays, and data structures. • Competent in basic algebra and vector mathematics, with confidence in manipulating vector operations. • Genuine interest in magnetism and computational simulations, with curiosity to explore physical phenomena through code. • Willing and able to learn independently, using both provided materials and self-sourced references to deepen understanding.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Physical and Mathematical Sciences**

Project Code	SPMS03
Project Title	Magnonic Devices
Description	Magnonics is an interdisciplinary field delving into the intricacies of spin waves, holding significant promise for advanced wave-based computing. This project will involve the understanding of the dynamic behaviour of magnons via numerical modeling, micromagnetic simulation, and if time permits, some experimental validations.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Strong interest in physics and simulation.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Physical and Mathematical Sciences**

Project Code	SPMS04
Project Title	Nanolithography based on scanning probes
Description	In this project, the student will carry out lithography at sub-micrometer scale using NanoFrazor lithography. In this technique, a heated probe will sublimate a polymer to create patterns at the sub-100 nm level. The students will help to carry out pattern transfer from the resist pattern to the patterning of films below the pattern. The project will give the students a glimpse of the challenges in creating nanostructures.
Offered As	NRP Enrichment
Group Size	Pair
Specific Knowledge	Studying Chemistry or Physics at H2 level or equivalent. No special prerequisites.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

SCIENCES | **School of Physical and Mathematical Sciences**

Project Code	SPMS05
Project Title	Optical Lithography
Description	In this project, the student will carry out optical lithography to fabricate some devices. At first, the students will learn to use the KLayout software to design devices. Secondly, they will learn to use spin-coating. Thirdly, they will learn to use the direct laser writer for exposing samples. Then, they will learn to develop the sample. Having mastered these four skills related to optical lithography, they will perform various designs of devices.
Offered As	NRP Enrichment
Group Size	Pair
Specific Knowledge	A good aptitude to learn software is essential. No other forms of prior knowledge are required. The student may download KLayout and learn to use.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES

School of Civil and Environmental Engineering

Project Code	CEE03
Project Title	Ship risk prediction in port state control inspection
Description	Port state control (PSC) is the ship inspection conducted by port states on foreign visiting ships. It is regarded as an effective way to enhance maritime safety and reduce pollution from vessels to the marine environment. Due to the large number of foreign visiting ships, the scarce inspection resources, and the tight ship schedule, not every ship can be, and should be, inspected. Therefore, a critical step to improve the efficiency of PSC inspection is to identify ships with a higher risk effectively, and then inspect these identified high-risk ships. In this project, students are expected to scan related literature and databases to identify ship risk indicators and filter useful features for ship risk prediction; analyse why and how such features influence ship risk level; develop quantitative models (such as statistical models and/or machine learning models) to predict ship risk level; describe and explain the prediction results; propose ship inspection planning suggestions to the port and management suggestions to ship operators/owners.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	• A basic understanding of data analytics. • A basic understanding of Python programming. • A basic understanding of the maritime industry would be a plus.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES **CRADLE@NTU**

Project Code	CRADLE01
Project Title	Organisational Success Through Workplace Learning: Unveiling Its Value and Dynamics in SMEs
Description	Rapid technological advancements, evolving market dynamics, and geopolitical shifts are converging to create a turbulent work environment, placing immense pressure on individuals and organisations, particularly SMEs, to adapt and upskill. While workplace learning (WPL) offers a promising path forward, effective implementation is often hindered by challenges in securing buy-in from key stakeholders, and the absence of robust WPL strategies can stifle growth and even jeopardise survival. This critical need fuels our research. This study will delve into how WPL can empower individuals and organisations to not just survive but thrive amidst this constant change. The findings will provide significant, evidence-based insights for both policy and practice, informing decision-making and driving the development of effective WPL strategies that unlock the full potential of SMEs.
Offered As	NRP Enrichment
Group Size	Pair
Specific Knowledge	NIL

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **National Institute of Education**

Project Code	NIE01
Project Title	Topics in Singapore English
Description	For this project, we will work on natural language data from Colloquial Singapore English (otherwise known as Singlish). Data will either be collected through elicitation/production tasks, designed experiments, or from existing corpora/data sets. Singapore English is a contact variety of English with several unique features. The specific aspect of Singapore English, as well as how the data is analysed, will depend on the linguistic subfield of your choice: syntax (structure), semantics/pragmatics (meaning), or phonology/phonetics (sound). I am fine with adopting whatever linguistic framework you prefer to use.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	• Native speaker of Singapore English, or have easy access to one. • Good intuition, interest and curiosity in the way language is produced and processed.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **National Institute of Education**

Project Code	NIE03
Project Title	Developing ChatGPT-enabled Chatbot to support students' open inquiry in learning K-12 mathematics
Description	Computer-based systems have been enhancing educational instruction for decades. With the rapid advancements in Artificial Intelligence (AI), particularly in the realm of Generative AI (GenAI), we are poised to revolutionise learning experiences. GenAI's capability to engage in natural language conversations and adapt its responses to individual learners offers significant potential for personalised education. While GenAI has been effectively utilised in fields such as medicine and biomedical science, its application in primary-level mathematics education remains limited. We invite you to join us in this project focused on developing a ChatGPT-enabled chatbot designed to teach primary-level mathematics within an open inquiry learning framework. This project offers a unique opportunity to explore the integration of advanced technology in educational settings and contribute to innovative teaching methods.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	• Interest in the field of generative artificial intelligence • Basic programming background • Interested in AI and machine learning • Requires knowledge of prompt engineering

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **National Institute of Education**

Project Code	NIE04
Project Title	Developing ChatGPT-enabled Chatbot to support students in solving domain-general problems
Description	Computer-based systems have been enhancing problem solving for decades. With the rapid advancements in Artificial Intelligence (AI), particularly in the realm of Generative AI (GenAI), we are poised to redesign the problem-solving support with human-AI augmentation. GenAI's capability to engage in natural language conversations and adapt its responses to individual learners offers significant potential for personalised learning and performance in problem solving. While GenAI has been effectively utilised in fields such as medicine and biomedical science, human-GenAI collaboration in problem solving that optimises learning and problem-solving performance is still limited. We invite you to join us in this project focused on developing a ChatGPT-enabled chatbot designed to enable human-GenAI collaboration in domain-general problem solving. This project offers a unique opportunity to explore the integration of advanced technology in educational settings and contribute to innovative human-GenAI collaboration.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	• Interest in the field of generative artificial intelligence • Basic programming background • Interested in AI and machine learning • Requires knowledge of prompt engineering

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **National Institute of Education**

Project Code	NIE06
Project Title	Exploring the Role that Game-Based Worlds and Immersive Environments Potentially Play in Learning
Description	Since 2009, lesson units have been carried out in a number of schools with the aim of developing an understanding about how game-based worlds and immersive environments can be leveraged for learning; these lesson units have been used in a variety of subjects, such as Geography, Literature, and Design & Technology. If you are interested in thinking about such worlds and environments, and/or about maker culture and open-source hardware/software, with a view to designing more authentic learning experiences, we welcome your participation in this project, which is likely to be sufficiently flexible to support your own particular areas of interest. You will be working as part of a team of designers and software developers as we help build teacher-capacity in curriculum and pedagogy.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	A healthy interest in collaborative learning. Interest in maker culture, game design, and learning through games is a plus.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **National Institute of Education**

Project Code	NIE07
Project Title	Sense of Food Resiliency among Secondary/JC students in Singapore
Description	The COVID-19 pandemic caused many unplanned disruptions of varying magnitudes worldwide. With the growing global population reaching an estimated 9 billion in 2050, inflation in food costs and decreased food supplies contribute to the decline and urgency in tackling food security. In Singapore, 90 percent of our food supplies are imported. The government's Food Resilience (FR) mitigation measures included stockpiling, diversification of food sources and providing funds to support and boost production supplies by local high-tech farmers at the national level. However, in communities and households, Household FR is defined as a household's ability to withstand stresses in disruptions in food availability, often caused by multiple factors such as sudden reductions in food supplies, surges in food prices or massive food contamination. Recent spates of panic buying to stock up both essential and non-essential supplies, which led to empty supermarket shelves, are telltale indicators of low household FR, which underpinned an insufficient comprehension about the mitigation efforts to assure and prevent panic, massive hoarding. Leveraging on the current situation, it is important to initiate a national initiative to educate and promote greater awareness towards building household FR as a means to cope with such an unplanned crisis and declining food supplies. The aim of this project is to measure the level of awareness and preparedness of teenagers in Singapore in handling potential food crises.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	NIL

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **National Institute of Education**

Project Code	NIE09
Project Title	Literary Theory and Modern Poetry
Description	Literary theory represents a prescient and exciting framework through which to explore modern themes and ideas that poets reflect in their work. This research project aims to explore the pertinence of philosophical constructs to modern poetry (from 1900 to the present day). The student will choose a school /branch of literary and critical theory (structuralism, poststructuralism, psychoanalysis, etc.) and employ its methods to analyse and understand the work of a modern or contemporary poet. This project will provide the student with the opportunity to engage in interdisciplinary work, as we will engage in both theoretical exploration and the close analysis of poetry and poetic movements in the 20th and 21st centuries.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	A strong background in Literature at the junior college/IP level is required.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES **National Institute of Education**

Project Code	NIE10
Project Title	The Fading Siren: How We Forget Past Weather Extremes
Description	This Singapore-based project will map the unique "Memory-Fear Attenuation Curve" within our local context. We aim to understand how personal recollection of recent weather extremes—from intense heatwaves and urban flash floods to extended monsoon rains—fades over time, and how this erosion impacts daily sustainable behaviour and support for climate policies. We will conduct a longitudinal panel study with a diverse cross-section of Singapore residents, surveying them at strategic intervals following local climate events. Using behavioural science frameworks, we will track the decay of emotional salience, risk perception, and the intention to maintain carbon-reduction practices (e.g., energy use, transport choices). Complementary focus groups will explore the narratives Singaporeans use to rationalise this "forgetting." The findings will provide a Singapore-specific model of post-extreme engagement decay. We will deliver a strategic report to government agencies, grassroots organisations, and communications teams, offering data-driven interventions designed for our cultural context. Our goal is to recommend how to anchor climate vigilance in Singapore's social fabric—turning the transient fear of a flood or heatwave into the persistent, collective urgency needed to achieve our national Net Zero ambition and build a genuinely resilient society.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	NIL

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES **School of Humanities**

Project Code	SoH01
Project Title	A Sociolinguistic Investigation of French, German, Italian and Spanish in Singapore Shop Signs
Description	This study is the first step in investigating the recurrent forms and patterns of French, German, Italian and Spanish as used in commercial shop signs across different business sectors in Singapore. It seeks to uncover the motivations behind the use of French, German, Italian and Spanish here via surveys. Apart from the four official languages and their various spoken dialects, Singapore is host to a variety of other minority languages (Gordon 2005). French, German, Italian and Spanish are other cases in point. Apart from its economic value, the popularity of French, German, Italian and Spanish seems to be due to its positive associations with high culture, haute couture and elegant lifestyle. These associations appear to be increasingly exploited in commercial signs across the island.
Offered As	NRP Enrichment
Group Size	Pair
Specific Knowledge	Interest in European languages.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES **School of Humanities**

Project Code	SoH02
Project Title	Singapore Comparative Literature (I)
Description	Students will undertake a comparative analysis of two Singapore literary works, one written in English and one in Chinese. Students can also compare English and Malay-language works if there are English or Chinese translations of the latter (this is for the tutor's perusal).
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Adequate reading competence in English and L2 (Chinese or Malay).

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **School of Social Sciences**

Project Code	SSS01
Project Title	Inflation Dynamics in Singapore
Description	This project introduces students to the use of real-world data to study inflation dynamics in Singapore. Students will examine how the prices of everyday goods and services change over time and explore differences across categories such as food, transport, and housing-related costs. They will learn how to organise and interpret price data, construct simple visualisations, and identify patterns that help explain past inflation movements. The project also discusses how households form expectations about future inflation and why these expectations may differ from actual trends. Through this work, students will gain a foundational understanding of data analysis, economic behaviour, and the factors that shape Singapore's inflation environment.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Students should have a basic foundation in economics and an interest in understanding how markets work. Prior experience with data analysis is recommended, including familiarity with Excel or similar software for organising and visualising data.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES **School of Social Sciences**

Project Code	SSS02
Project Title	Conceptions of World Order in East Asia
Description	This project examines the diverse conceptions of international order in East Asia as understood by political elites both historically and contemporaneously. It explores how these conceptions differ from traditional Western perspectives, often rooted in the Westphalian system of sovereign states. Through a critical analysis of existing literature, this research aims to identify key themes and debates within East Asian international relations scholarship while adding to discussions on non-Western ideas of order. Particular focus will be paid to Chinese and Japanese conceptions of international order.
Offered As	NRP Enrichment
Group Size	Individual
Specific Knowledge	Strong reading and writing skills, keen interest in Chinese history and politics. Strong Chinese language competencies. Clear communication and the ability to work independently under ambiguity.

Back to Project List

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NANYANG research programme

BUSINESS, HUMANITIES, ARTS & SOCIAL SCIENCES | **School of Social Sciences**

Project Code	SSS03
Project Title	Assessing Social Attributes of Faces
Description	We tend to make inferences about a person's traits or attributes based on the appearance of the face. For example, we judge trustworthiness, attractiveness, dominance or threats based on the face images, though the accuracy of such judgments is under debate. It has been shown that our judgment of trustworthiness can be built within the first 100 ms after seeing the face. There have been extensive studies evaluating such social dimensions of faces. However, there are still open questions remaining to be answered. For example, what are the most important factors in assessing facial attributes? Are there associations among these different attributes? How does the previous exposure to faces of similar or different attributes affect our judgment of subsequently presented faces? Does a happy face appear more trustworthy than a neutral or sad face? We will use online surveys and/or psychophysical experiments to address these questions.
Offered As	NRP Enrichment
Group Size	Individual / Pair
Specific Knowledge	Good at math and writing in English.

Back to Project List