SUMMATION PROGRAMME RUN 11 PROJECTS

The Summation Programme is an apprenticeship programme that places top talent into high-potential Deep Tech projects in the fields of Artificial Intelligence, Biotechnology, Cybersecurity, IoT, Robotics, Quantum Computing and more. Check out our latest list of projects below, and head over to "Talent Programmes" on our STARS platform to apply for the programme now**!**

ARTIFICIAL INTELLIGENCE (AI)

Org Name	**Accredify**
Org Description	Headquartered in Singapore, Accredify is the leading service provider for organisations to create and issue verifiable documents. All digital documents issued by Accredify's cloud-based system are tamper-proof and traceable back to the source. With a presence in more than nine markets serving 900 clients globally, documents issued by Accredify have been verified close to 7 million times. Accredify's first vertical was the higher education sector, assisting Asia's top universities and adult learning institutions in creating and issuing digital graduation certificates and transcripts.
Project Name	**ACC1: Augmenting AI Recommender System for L&D Platform via Implicit/Explicit feedback & User Profile**
Project Category	Artificial Intelligence; Machine Learning; Natural Language Processing
Project Description	In a world of rapid advancement and ever-shifting industry trends, continuous education and training are crucial for sustained employability. Accredify is developing a solution that can utilise technology to help corporates track the learning performance of their employees and devise necessary training interventions. This project aims to provide a platform for our education customers to deliver a better (Learning & Development) L&D-as-a-Service experience to corporates. The platform will map courses to competency frameworks, assist corporates in identifying relevant courses for their learning & development needs and provide actionable insights with post-course evaluation. The project aims to tackle critical learners' pain points by identifying relevant courses and visualising how the additional knowledge or skills translate to improved performance. Talents will work on post-commercialisation enhancements to the product, using implicit/explicit feedback and the user's profile to bring about more relevant recommendations.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Talents will work within a scrum team and report to the data science lead (the mentor). Talents will also collaborate with the frontend and backend team members to push the developed data product into production.

	Scope of work: Under the guidance of the mentor, Talents will work on different areas such as: ● Develop the various functions and services within the data pipeline in the AWS environment. ● Identify key variables within the database that can improve machine learning models. ● Identify publicly available information that can improve the machine learning models and acquire this information using automated tools. ● Develop machine learning models, including identifying suitable and appropriate libraries and packages to deliver improved results. ● Set up the databases and schemas to store key data inputs and results of the machine learning models. To ensure ease of querying by other team functions, including the FE and BE team members. Responsibilities and Deliverables: ● Talents will be responsible for scope of work above and a timely delivery of key deliverables. ● Key deliverables include, but not limited to, the following: ● Fully functioning data pipeline set up on AWS. ● Fully functioning machine learning model, with automated updating of key outputs as input data gets updated. ● Fully automated updating of input data (where applicable). ● Fully functioning databases that are appropriately indexed to ensure optimal query and update speeds. ● Proper documentation of work done and codebase passed all CI tests and pushed onto Github.
Requirements	● Strong in Data Analytics, Machine Learning framework such as Spark, Tensorflow, Sci-kit Learn, Natural Language Processing (NLP), Python ● Familiar with data engineering, data mining, data modelling, data visualisation, and web scraping will be a plus ● Skills to be learnt include Agile methodologies, CI/CD, data analytics, data engineering

Org Name	**Affable**
Org Description	Affable.AI is a Singapore based Deep Tech company building tech solutions to help marketers manage their social media influencer campaigns. Backed by marquee investors, Affable has grown tremendously in the last 3 years and is looking for Data Scientists and Software Engineers to join their core team!
Project Name	**AFF1: Deep Learning for Social Media Marketing Platform**
Project Category	Artificial Intelligence; Computer Vision; Deep Learning; Machine Learning; Natural Language Processing (NLP)
Education Level	Diploma; Bachelors
Project Description	Social media is ubiquitous and ever-evolving. Billions of people consume content on platforms like Instagram, TikTok, Twitter every day. Behind this enormous amount of data is a wealth of information about the world and its people, waiting to be unlocked. Affable uses Deep Learning to analyse social media content at scale. They have analysed over 2 billion+ posts and 500 million+ public accounts via cutting edge NLP and Computer Vision models. To unlock the world's social media data is the mission of Affable, and the startup is looking for an apprentice to join them in that mission. This project is about researching, training and deploying new machine learning models to glean more insights from our dataset. This includes: 1. Location prediction of social media users via deep learning 2. Gender prediction of social media users via deep learning 3. Identification of same user across different social media platforms
Roles and Responsibilities	• Research on the latest approaches and methods including Deep Learning-based language and Computer Vision models • Build robust datasets and feature engineering/data wrangling • Train and optimise Deep Learning models • Productionise Machine Learning models for scale (up to 15 million requests a day)
Requirements	• Strong skills in Python and Machine Learning framework such as Spark, Tensorflow, Sci-kit Learn, Deep Learning • Good to have experience in Deep Learning and Computer Vision • Skills to be learnt include Agile methodologies, backend development, data mining, and data engineering

Org Name	**AI Palette**
Org Description	AI Palette is helping FMCG companies to create winning products. Every company is trying to create the 'next coke' or 'next oreo' but struggling to do that today due to a lack of information and insights. With AI Palette's cognitive AI engine powered by companies' brand personality, they can now able to slice and dice market insights to create winning products that match consumer needs.
Project Name	**AIP1: Analyse Consumer Conversations for Recommendations in FMCG Sector**
Project Category	Artificial Intelligence; Machine Learning; Natural Language Processing (NLP)
Education Level	Diploma, Bachelors
Project Description	The objective of this project is to understand the consumer sentiment for a given topic in the FMCG sector and generate engagement materials (ads, product concepts, etc.) to increase consumer engagement for a given topic. In order to identify a consumer conversation precisely, they need to understand the semantics in the conversation, detect entities and topics, and understand the sentiment of those topics. Once these are being identified, they need to create conversation materials such as ads, tag lines, product concepts that are closer to the consumer conversations. They need to do this at scale to keep up with the fast-changing consumer world today. This will be challenging because of the multiple languages spoken in different regions.
Roles and Responsibilities	• Research on state-of-the-art NLP models (NER) particular to F&B sector • Collect and analyse relevant open data sources • Work with external labelling agency to get the right training data • Build and validate NLP models (for English and Chinese) together with marketing and business team • Deploy validated models on AWS platform together with DevOps team
Requirements	• Strong in Python, NLP, and Machine Learning frameworks • Good to have knowledge of Flask framework and Docker • Other skills to pick up include text mining and deployment

Org Name	**Ailytics**
Org Description	Ailytics leverages video analytics to enhance safety and maximise productivity in the construction industry by providing actionable insights that enable users to make better-informed decisions for their operations.
Project Name	**AIL1: Monitoring of construction productivity through video analytics**
Project Category	Artificial Intelligence; Machine Learning; Computer Vision; Deep Learning
Education Level	Master's, PhD
Project Description	The project will develop productivity-driven insights for the construction site team through deep-learning computer vision techniques. CCTVs are present at almost all construction sites and are mainly used for manual progress monitoring or reviewing past footage if something goes wrong. The information will be tracked through the existing CCTVs at the sites to give the project team meaningful insights and knowledge to understand progress and identify potential risks early on. It is still a massive challenge for companies to understand their progress on a macro level as it is hard to make sense of all the information from so many different subcontractors. This results in a lack of visibility of issues on-site that can cause delays in concreting works due to the underutilisation of the assets.
Roles and Responsibilities	• Develop cutting-edge industry-leading solutions by leveraging our patented 2D to 3D technology and combining that with state-of-the-art research to build valuable products for our customers. • Work on computer vision-based productivity use cases such as asset tracking, progress classification, floor cycle times, material handling and vehicle utilisation. • Develop, train, maintain and deploy AI models.

	● Optimise existing AI models and code for performance and accuracy improvements ● Work closely with internal or external stakeholders on technical recommendations and proposals. ● Create scalable data and AI pipeline for fast benchmarking and quick turnaround for POCs ● Design and write highly scalable, testable code.
Requirements	● Strong in Python, Deep Learning, AWS, Machine Learning Framework, Computer Science ● Good to have experience in Autodesk CAD/CAM, Backend development, CI/CD, DevOps

Org Name	**Aison**

Org Description	Aison is a fast-paced AI designer company that builds state-of-the-art AI solutions and automation systems. We develop AI solutions ranging from aircraft and vehicles to building defect detection and "live" sites for human activity recognition (HAR). We focus on the logistic, estate management and defence sectors.
Project Name	**AIS1: Computer Vision in Built Environment**
Project Category	Artificial Intelligence; Deep Learning; Machine Learning
Education Level	Master's, PhD
Project Description	The project attempts to build state-of-the-art AI solutions and automation systems for the built environment. The candidate will work alongside under guidance of a chief scientist to develop AI solutions in a few "live" sites for human activity recognition (HAR). We are looking for talent to speed up the development of appropriate AI models for more accurate defects and HAR with F1 recall >90%. We are looking for ML engineers with a systematic mindset, willing to work at length to create solutions that never existed before.
Roles and Responsibilities	• Develop ML solution to recognise human behaviour and/or facade defects in building management to improve building and vendor activities management with a.i. • Develop ML solutions under the guidance of Chief Scientist • Train state-of-the-art Machine/Deep Learning Networks; • Build training pipelines and real-time inference run-times such as Tensorflow, CUDA, PyTorch, Python, C++, etc.; • Write algorithms and integrate code and ML model; • Feedback to the lab team to get ML models for desired performance. • Prepare documentation of the entire process, publications to reputable conferences and journals, and patent filing; • Perform real-time tests and complete missions on time.
Requirements	• Strong in Python, Deep Learning, Numpy, OpenCV • Good to have experience in Github, Reinforcement Learning, UI Design, CUDA, Cloud Computing

Org Name	**Curium**
Org Description	Curium is the leading developer of automated calibration technologies that will make sensors ultra-reliable and dependable in any situation and environment. Our Self-Calibration service for Autonomous Vehicles (AVs) includes Static and Continuous Dynamic Calibration (CDC) to ensure safety on the road and peace of mind at all times. Curium's technology is equally applicable in the IoT / Industry 4.0 space where we have active collaborations with engineering partners in Europe.
Project Name	**CUR1: Development of Advanced Calibration Systems for Autonomous Vehicles**
Project Category	Artificial Intelligence; Blockchain; Computer Vision; Machine Learning; Robotics/Autonomous Systems
Education Level	Master's, PhD
Project Description	Curium drives several technologies capable of performing rapid and automatic calibration of sensors in fully automated systems such as autonomous vehicles. Currently, Curium is deploying increasingly advanced technologies into vehicles that are creeping up the level of autonomy from Level 2 to Level 4. This project aims to enhance these current systems and elevate these manufacturers to deploy Level 5 autonomous vehicles. The current problem is that sensors can become miscalibrated for any number of environmental reasons. With these sensors providing erroneous reading, the decision-making algorithms will make incorrect decisions leading to injury or death to vehicle owners, occupants, or pedestrians. By monitoring and automatically calibrating the sensors in real-time, we can improve uptime and reduce the likelihood of miscalibrations leading to a dangerous situation. The apprentice will work with the Curium Development Team to develop novel techniques to measure, monitor, and adjust sensor data in near real-time for Automotive use-cases. The challenges are to problem-solve the issues related to modelling 3D environments in a highly efficient manner to leverage the limited computational resources that are typically embedded into onboard vehicle systems. 3D environments will be modelled primarily using Inertial Measurement Units (IMUs), LIDAR, RADAR, and

	Camera sensors and deployed on computational platforms such as (but not limited to) the NVIDIA platform.
Roles and Responsibilities	• Perform research in the subject area - specifically 3D modelling and real-time systems design • Computer Vision and AI using advanced Solid-State LIDAR, Radar, and Camera sensors • Develop software prototypes and algorithms for IoT systems using these sensors. Efficient embedded software design is required. • Develop code to monitor, calibrate and report on these sensors • Investigate blockchain protocols applications
Requirements	• Strong in C, C++, Python, Machine Learning Framework • Good to have experience in Computer Vision, Github, IoT • Skills to be learnt include Blockchain, Cloud computing, Computer Vision, Embedded Systems, CI/CD

Org Name	**Eureka Robotics**
Org Description	Eureka Robotics delivers robotic solutions and software to automate tasks requiring high accuracy and agility. Eureka Robotics prides itself on helping clients achieve vastly improved productivity, lower costs, and better safety. Common uses include precision-handling, assembly, inspection, drilling, and many other domains.
Project Name	**EUR1: Deep Learning & Computer Vision for Robotics**

Project Category	Artificial Intelligence; Machine Learning; Computer Vision; Deep Learning; Robotics/Autonomous Systems
Education Level	Masters, PhD
Project Description	In this project, the apprentice will be part of the core development team and will focus on the algorithmic design, development and deployment of 2D/3D Computer Vision applications based on classical methods as well as Deep Learning. The apprentice will work on projects at various stages including development and implementation of future robotic perception capabilities, as well as troubleshooting and improvement of robotic perception pipelines in systems currently deployed at project site (80% onsite required).
Roles and Responsibilities	The apprentice will largely be involved in the development of methods and tools for: ● data collection ● data annotation ● training of DNNs ● testing of computer vision pipeline ● deployment of computer vision pipeline for various computer vision tasks required by High-Accuracy High-Agility robotics, such as ○ scene segmentation ○ workpiece recognition ○ workpiece localisation ● analyse and evaluate state-of-the-art algorithms related to detection and pose estimation in order to strengthen Eureka Robotics' core vision capabilities, and implement or enhance them in a production environment.
Requirements	● Proficient in Python, Computer Vision, Machine Learning Framework ● Good to have experience in Docker, AWS, Algorithms Backend Development and C++

Org Name	FathomX
	FathomX is a Digital Health AI spin-off company from the National University of Singapore and the National University Health System. It is the brainchild of Dr Mikael Hartman (Breast Cancer Surgeon at NUH) and Dr Feng Meng Ling (Assistant Professor at the Saw Swee Hock School of Public Health). Our

	flagship product, FxMammo, is an AI Assistant that significantly improves the screening procedure for mammograms by reducing the false positive rates by as much as 67% and enhancing the clinical workflow by reducing the time taken to assess and the number of radiologists required per screen. Our algorithm was based on over 3 years of research at NUS, and we have recently published in the prestigious AAAI Workshop and Jama Open Network Journal. We are also a portfolio company of the MedTech JUMPStart Program. We also work closely with global solutions provider HP Enterprise to develop a range of technologies in the field of medical imaging as well as DxD Hub (A subsidiary of A*Star Technologies Singapore) to get regulatory approval and set up quality assurance protocols
Project Name	**FAX1: AI for Medical Imaging in Breast Cancer Screening (AI Research)**
Project Category	Machine Learning Engineer
Education Level	Diploma, Bachelors
Project Description	Breast cancer is the most commonly occurring cancer among women in Singapore. Early Screening and detection are crucial for helping to detect these cancers at the early stage, where the survival rate is significantly higher. However, current screening procedures have some deficiencies, including about 15-20% of cases being false recalls which leads to unnecessary anxiety and 10% of cases being false negatives resulting in missed interval cancers and opportunity for early diagnostics and treatment. In addition, the existing screening procedure requires 2 readers in a double-blind reading setting and takes a significant amount of time. Solution: FxMammo and FxTomo are AI Assistants that help to significantly increase the accuracy of breast cancer screening. They reduce false positive rates, missed interval cancers and also enhance the screening procedure by cutting down the time taken by helping radiologists to make better judgement and increasing the capacity of radiologists to handle more work.
Roles and Responsibilities	• Work with Chief Technology Officer, Principal Software Engineer and Research Fellow to develop AI Medical Imaging products, algorithms and systems • Apply and develop machine learning and AI technologies to solve healthcare challenges raised by customers and collaborators

	• Handle healthcare data in compliance with industry standards which include managing, extracting and pre-processing data • Work with various collaborators, including data providers, annotation partners, healthcare institutions and customers, to manage resources related to AI Development.
Requirements	• Knowledge and experience in statistical analysis or machine learning • Programing language: Python or R or C++ Skills that are a plus: • Experience with the PL-SQL/Trans-SQL • Knowledge and experience in GPU-based computation • Strong in Mathematics • Strong foundations in machine learning

Org Name	Jenga Solutions
Org Description	Based in Singapore, Jenga Solutions is the parent company for SpaceChain. SpaceChain established the first satellite platform to provide secure custody, transact digital assets, deploy smart contracts, and facilitate Decentralized Finance Infrastructure ("DFI") on space nodes. SpaceChain aims to bring advanced security and global access, integrating software defined payloads to progress blockchain applications in orbit. SpaceChain currently has live network nodes operating on satellites and aboard the International Space Station (ISS). SpaceChain has demonstrated commercial and deployment success for delivering space missions and is now ready to capture high growth and high value.
Project Name	**JEN1: Machine Learning on Earth Observation**

Project Category	Artificial Intelligence; Computer Vision; Deep Learning; Machine Learning
Education Level	Master's, PhD
Project Description	The project is within SpaceChain's Decentralised Satellite Application (DSA) platform, focusing on satellite applications and satellite services crowdsourcing. The target is to improve the accuracy of various machine learning models that the team has previously developed for analysing earth observation data. The models include land classification and object detection. Once the collaborative environment of the DSA is constructed, the DSA platform will transform into an open-source project led by SpaceChain and contributed by developers. So further development includes model deployment and endpoint construction.
Roles and Responsibilities	● Work with the data science team to develop, evaluate and optimise various computer vision and deep learning models for earth observation data. ● Explore and analyse unstructured data like images through image processing. ● After optimisation, deploy developed computer vision models on cloud service platforms such as AWS.
Requirements	● Proficient in Python, Computer Vision, Machine Learning Framework ● Good to have experience in Docker, AWS, and C++

Org Name	**Konigle**
Org Description	Konigle helps small business owners make better-operating decisions. It provides the most straightforward user experience for small business owners to harness their unstructured and silo-ed data to make real-time data-driven decisions.
Project Name	**KON1: Apollo – Data Science for eCommerce Intelligence Engine**
Project Category	Machine Learning; Natural Language Processing; Deep Learning
Education Level	Master's, PhD

Project Description	We are a fast-growing company, and we believe that the sustainable way to keep this growth is by educating online sellers via various digital content and free-to-use tools. At Konigle, we simplify the process of running an e-commerce store for the sellers and defining how to run and grow a store profitably. We are doing this by creating various productivity tools, automation and shortcuts for multiple e-commerce platforms, store builders, and many more. Apollo is an eCommerce intelligence engine developed by the Konigle core team. It is the brain on which all of Konigle's intelligence decisions are made for our customers. Now, this is used by over 1,000+ customers in over 60+ countries. We're constantly adding capabilities to the brain. This involves coming up with insights such as forecasts, suggestions, reporting and many other functionalities. We want mentees to experience this firsthand, understand the system, and start adding functionality to it.
Roles and Responsibilities	● Craft optimal data processing architecture and systems for new data and ETL pipelines. ● Design, build, and maintain efficient and reliable data pipelines to move and transform data (both large and small amounts). ● Get involved in a project's technical design. ● Benchmark different solutions and analyse the performance of various approaches. ● Drive internal process improvements and automate data quality and SLA management manual processes. ● Work closely with other engineers to support the deployment and release of new projects/integrations. ● Participate in the team's weekly meetings and brainstorming and attend daily stand-ups.
Requirements	● Proficient in Deep Learning, Machine Learning Framework, Python, Statistics, Numpy ● Good to have experience in Computer Vision, Data Mining, Data Engineering, Django, Pandas

Org Name	**Konigle**
Project Name	**KON2: Apollo – Machine Learning for eCommerce Intelligence Engine**
Project Category	Machine Learning; Natural Language Processing; Deep Learning
Education Level	Master's, PhD
Project Description	We are a fast-growing company, and we believe that the sustainable way to keep this growth is by educating online sellers via various digital content and free-to-use tools. At Konigle, we simplify the process of running an e-commerce store for the sellers and defining how to run and grow a store profitably. We are doing this by creating a suite of various productivity tools, automation and shortcuts for multiple e-commerce platforms, store builders, and many more.

	Apollo is an eCommerce intelligence engine developed by the Konigle core team. It is the brain on which all of Konigle's intelligence decisions are made for our customers. Now, this is used by over 1,000+ customers in over 60+ countries. We're constantly adding capabilities to the brain. This involves coming up with insights such as forecasts, suggestions, reporting and many other functionalities. We want mentees to experience this firsthand, understand the system, and start adding functionality to it.
Roles and Responsibilities	● End-to-end involvement on projects from requirement gathering, designing, and developing machine learning models in Natural Language Processing (NLP) to deployment on Cloud. ● Collaborate with cross-functional teams such as Product Managers, Data Engineers, and Web Developers to develop and enhance existing and new models for the current existing Platform. ● Define, understand, and test opportunities and levers to improve the product and drive roadmaps through your insights and recommendations. ● Continues improvement through iterative model enhancement.
Requirements	● Proficient in Deep Learning, Machine Learning Framework, Pandas, Statistics, Numpy ● Good to have experience in Computer Vision, Data Engineering, Django, Natural Language Processing

Org Name	**Lauretta.io**
Org Description	Lauretta.io is an AI system that leverages state-of-the-art Deep Learning and Computer Vision technology to address the next-generation needs of smart buildings and spaces. Soft targets such as sporting events, public gatherings and schools have been identified as possible targets for attacks on public psychology. However, many of these locations are challenging regarding resourcing, lighting, occlusions and poor camera placements. Recently, Lauretta has been tasked to offer capabilities to secure Singapore and US soft targets.
Project Name	**KNO1: Action Recognition to Secure Soft Targets**
Project Category	Artificial Intelligence; Computer Vision; Machine Learning
Project Description	To understand the narrative of what a person might be doing in a physical space, they utilise RE-ID systems integrated into an end-to-end action capture system to leverage video images for pattern-of-life analysis and full body image capture. The data

	collected will be processed to identify shopper demographics and intentions using graph analytics, behaviour capture and reinforcement learning-based demographic classification-based scoring. The apprentice will be working on building Deep Learning pipelines, analytical capabilities and machine learning models to run across these datasets for clients like the Singapore and US governments.
Education Level	Diploma, Bachelors
Roles and Responsibilities	● Apprentice will be tasked with studying domain adaptation and context awareness techniques in computer vision that can be deployed on available camera videos. ● Develop and apply image processing, video analytics and deep learning techniques as required to analyse data and extract useful information on static or streaming data. ● Extract and modify computer vision algorithms to adapt different scenes and scenarios by modifying parameters and training adaptive data. ● Work closely with AI and software engineering leads to create algorithms suitable for mass deployment and may collaborate on future models.
Requirements	● Good understanding of Computer Vision, Python Programming and Deep Learning ● Good to have knowledge in Go, High Performance Computing, Computer Science, Evolutionary Algorithms, Machine Learning frameworks such as Spark, Tensorflow, Sci-Kit Learn ● Other skills to learn include Domain Adaptation and Generative Adversarial Networks

Org Name	**Lalia**
Org Description	Lalia's Natural Language Processing - based AI solution is targeted at educating the current workforce and future generations of countries where English is not a first language, to serve as a conduit to global markets.

	Where some countries lack the financial resources to develop the necessary infrastructure for language acquisition, these countries instead heavily rely on technological solutions that are devoid of cultural understanding of users.
Project Name	**LAL1: Natural Language Processing-Based AI Solution for Learning English**
Project Category	Artificial Intelligence; Deep Learning; Machine Learning; Natural Language Processing
Project Description	This project is established to develop AI/NLP language learning solutions that are modified to enhance the learning experience of users from a particular cultural context. Lalia has already begun collecting data from various markets and it will be used in this project by the apprentice to support the team in refining models and systems. The focus of the project would be to build systems and models that allow Lalia to provide instantaneous, high-quality feedback in a way most suited and understood by the targeted learner's cultural context.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: Lalia is currently working on developing high potential value AI solutions in the domain of natural language processing. ● A functional role in data science and machine learning, ● Designing and developing high potential AI solutions using AI tools and machine learning frameworks such as PyTorch and NLP-related libraries (e.g., Huggingface and SpaCy) for value and scaling. Responsibilities and Deliverables: ● Perform research and testing to develop or customize machine learning algorithms; conduct model training and evaluation as needed; integrate, test, tune and monitor the solutions developed ● Build tools for data collection and data labelling ● Work with CTO to develop tools to create training validation, and testing datasets relevant to the project
Requirements	● Strong in Knowledge on Natural Language Processing (NLP), NLP toolkits (Spacy, Standford NLP, UIMA, NLTK), Computer Science, Data Engineering, Python, Streamlit and Azure. ● Familiar with AWS, Deep Learning, Web Scraping, Typescript and React.js will be a plus ● Skills to be learnt Computer Vision and Image Processing.

Org Name	**Medios Technologies**
Org Description	Medio Technologies build Artificial Intelligence-powered, portable retinal cameras that every medical practitioner can afford and use. Remidio, their parent company, is a fast-growing medical device startup designing smartphone-based low-cost retinal cameras. They train Deep Neural Networks to detect retinal complications from captured images, which they then deploy on the camera itself.
Project Name	**MED1: Deep Learning on Retinal Images**
Project Category	Artificial Intelligence; Computer Vision; Deep Learning; MedTech
Education Level	Diploma, Bachelors
Project Description	Everyday around the world people go blind from not having access to an eye specialist. Their technology brings eye screening to primary care, a paradigm shift needed to end preventable blindness. Using their AI technology, all doctors are empowered to grade fundus images and detect diabetic retinopathy, even without a specialist. The apprentice will own a Deep Learning project from beginning to end. He/She will be responsible for defining an implementation strategy after the literature review, implementing the strategy in consultation with medical consultants and assisting in the deployment and validation of the solution.

Roles and Responsibilities	• Screening solution starting from literature review to customer deployment • Inspect and curate a dataset for training of a deep neural network • Design a Deep Learning-based algorithm to detect a specific eye condition • Perform hyper-parameter search to improve algorithm accuracy • Assess readiness for deployment
Requirements	• Strong in Python, Machine Learning framework, Deep Learning • Good to have knowledge in Computer Vision • Skills to be learnt include Computer Vision, Data Analytics, Data Modelling, Deep Learning, and Image Processing

Org Name	**Microsec**
Org Description	At MicroSec, they are building next-gen secured IoT solutions. They are securing tiny devices by providing them with the capability to have tiny certificates and transport/application layer security. They have optimised the mechanism of signature verification and key exchange to allow fast and energy-efficient cryptographic operations.
Project Name	**MIC1: Federated learning based anomaly detection for IoT devices**
Project Category	Cybersecurity; IoT; Machine Learning
Education Level	Diploma, Bachelors
Project Description	MicroSec empowers organisations to take control over their environment through our unique approach of Security by Design at the Edge for IoT, IIoT and OT devices and networks. This is done by proactively preventing attacks from the inside-out, stopping zero-day attacks on devices, preventing device and network intrusions, creating chains of trust between devices, and reducing your operational risks and costs starting from the device to the cloud. MicroSec provides enterprise-grade PKI (Public Key Infrastructure) solutions to IoT devices. We also use our patented microcerts instead of traditional X509 certificates which are more

	amenable to being transported over low bandwidth protocols like BLE, NB-IoT etc. However, some users may not be satisfied with this level of security with concerns about the power of quantum computing algorithms. In this case, one would need to rely on PQC (post-quantum cryptography) based techniques for key establishment and QKD (quantum key distribution) based techniques for key distribution. The challenge in applying PQC algorithms in the IoT space is not limited to considering space and time requirements. Key and ciphertext sizes must be kept within limits to effectively transport them via low bandwidth communication protocols like LoRaWAN, BLE, and NB-IoT. The objective is to arrive at and implement a cryptographic scheme that has a reduction to a known NP-hard mathematical problem that is not solvable in polynomial time using any known quantum algorithms which are comparable to current ECC implementations on 32-bit ARM processors in terms of speed, memory requirements and code size with keys and ciphertext which can be effectively transported over low bandwidth protocols like LoRaWAN, Bluetooth, and NB-IoT.
Roles and Responsibilities	● Design federated learning algorithms for constrained IoT Devices ● Applicants will be well versed in developing, enhancing, automating, and managing analytics models for edge anomaly detection. ● Successful candidates will run the analytics models into the production environment with static and distributed databases and explore and evaluate new digital tools and techniques to improve the product's operational capabilities. ● They will also provide engineering support for key testing activities, including support for laboratory and field testing activities. ● The candidate will work in a field that's essential to rapidly grow smart cities and the digital transformation of our world. ● They will be part of an agile team spanning embedded, frontend and backend systems and get opportunities to learn beyond their knowledge base. ● The candidate will get to work on the state-of-the-art exploits on systems and how to prevent them.

Requirements	● Experience in Python, C, Unix/Linux with experience in machine learning/data processing libraries, including Tensorflow(lite), Keras, Numpy, Pandas, and Scikit-2. Learn as well as machine learning algorithms/techniques including PCA, SVM, DBSCAN, HMM, CNN, LSTM, TDA ● Should have designed and built at least one system from the ground up and made it into an application ● Should also have experience in building APIs and using it for application integration along with Visualisation tools using a Python-based production environment ● Comfortable in a Linux environment. ● Experience in Embedded development is a plus. ● Good-to-Have Skills: ○ Python Web Frameworks (Django, Flask) ○ DevOps ○ MQTT or other message broker ○ IoT communication protocols such as BLE, LoRa, ZigBee and others ○ Unit testing and integration testing

Org Name	**Microsec**
Project Name	**MIC2: Post-Quantum Cryptography in IoT Public Key Infrastructure**
Project Category	Cybersecurity; IoT; Machine Learning
Education Level	Diploma, Bachelors
Project Description	MicroSec empowers organisations to take control over their environment through our unique approach of Security by Design at the Edge for IoT, IIoT and OT devices and networks, from proactively preventing attacks from the inside-out, stopping zero-day attacks on devices, preventing device and network intrusions, creating chains of trust between devices, and reducing your operational risks and costs starting from the device to the cloud. MicroSec provides enterprise-grade PKI (Public Key Infrastructure) solutions to IoT devices. We also use our patented microcerts instead of traditional X509 certificates which are more amenable to being transported over low bandwidth protocols like BLE, NB-IoT etc. However, some users may not be satisfied with this level of security with concerns about the power of quantum computing algorithms. In this case, one would need to rely on PQC (post-quantum cryptography) based techniques for key establishment and QKD (quantum key distribution) based techniques for key distribution.

	The challenge in the application of PQC algorithms in the IoT space is not only the consideration of space and time requirements but also ensuring that the key and ciphertext sizes are kept within limits such that they can be effectively transported via low bandwidth communication protocols like LoRaWAN, BLE, and NB-IoT. The objective then is to arrive at and implement a cryptographic scheme that has a reduction to a known NP-hard mathematical problem that is not solvable in polynomial time using any known quantum algorithms which are comparable to current ECC implementations on 32-bit ARM processors in terms of speed, memory requirements and code size with keys and ciphertext which can be effectively transported over low bandwidth protocols like LoRaWAN, Bluetooth, and NB-IoT.
Roles and Responsibilities	The candidate will be working in a field that's essential to rapidly growing smart cities and the digital transformation of our world. The candidate will get to learn about how state of the art PQC algorithms work and how to implement them on resource-constrained devices. ● Explore, learn about, and compare and contrast the merits of different post-quantum cryptography algorithms for key establishment and digital signature signing purposes with a particular focus on embedded systems ● Applicants will gain a strong foundation in various key mathematical concepts and algorithm techniques as well as be able to sharpen and enhance their already spectacular C programming abilities ● They will also provide engineering support for key testing activities, including support for laboratory and field-testing activities. ● The candidate will be working in a field that's essential to rapidly growing smart cities and the digital transformation of our world. ● The candidate will get to learn about how the state-of-the-art PQC algorithms and how to implement them in a resource-constrained environment.
Requirements	● Some exposure to Math topics, including but not limited to topics such as Galois theory, group theory, functional analysis, abstract harmonic analysis, algebraic number theory, and algebraic geometry ● Comfortable in a Linux environment ● Experience in C programming language is plus ● Experience in embedded development is plus

Org Name	**Polybee**
Org Description	Pollination plays a massive role in global food security. Polybee is building autonomous solutions for pollination in those sectors of agriculture where natural pollinators cannot be used, and the only other way is to do it by hand. Their technology digitises the process of pollination and boosts yields with greater control. They achieve this using cutting-edge algorithms in Computer Vision, Deep Learning, and automation of drones.
Project Name	**POL1: Autonomous Crop Monitoring**
Project Category	Artificial Intelligence; Computer Vision; Machine Learning; Robotics/Autonomous Systems
Education Level	Diploma, Bachelors
Project Description	Polybee is building autonomous drone solutions for pollination in indoor greenhouse farming. We have developed a novel patent-pending method of pollination with drones called Aerodynamically Controlled Pollination. This is a bio-inspired approach; the turbulent wake of drones is optimized to vibrate the flowers at just the right frequencies, much like the bumblebees when they buzz-pollinate. With this method, we can pollinate tomatoes, pepper, eggplant, and strawberries: the biggest crops in the greenhouse sector. Our core pillars of technology are automation of micro-drones, computer vision for perception and analytics, and a software platform for deployment and visualization. In this project, you will be involved in development

	of computer vision pipelines to do crop measurements and liaise with our robotics and horticulture teams. As a computer vision intern at Polybee, you will be working on developing and deploying deep learning and image processing pipelines for high throughput phenotyping. You will be using data from a multitude of sensors (stereo-camera/NIR/thermal/climate) to derive valuable insights on plant morphology, plant health and detect stress, diseases, etc. This involves translating cutting-edge research into cost-effective, scalable industry solutions. If working on interesting real-world problems in a fast-paced multi-disciplinary team excites you, Polybee wants to hear from you!
Roles and Responsibilities	● Training and evaluating deep learning models (detection/segmentation) ● Developing image processing solutions for plant measurements (called phenotyping) so that it meets the accuracy and throughput required by industry standards. ● Optimize and deploy these models on edge using embedded systems on the drone. ● Work in tandem with other subteams at Polybee in developing and testing hardware and software closely related to the functioning of our micro-drones.
Requirements	● Proficiency in C++, Computer Vision, Image processing, Machine Learning Framework, Deep Learning ● Good to have experience in 3D printing, OpenCV, SLAM, ROS, Numpy ● Skills to be learnt include Computer Vision, Deep Learning, and hands on robotics experience

Org Name	**Polymerize**
Org Description	Polymerize provides an AI-powered Material informatics software platform for the polymer companies to accelerate the material/product development process that will cut down development time by 1/3rd and can lead to savings up to 40% on the R&D costs. Our software platform equips R&D with Powerful data management with multi-location collaboration, sharing, and updating at ease. The power to search any data point within a

	second, indexed in real-time as data gets generated/updated. In addition, we formulate a recommendation engine to predict properties, ingredients and processing conditions built on proprietary ML algorithms combined with deep domain knowledge. And statistical features like the Design of Experiments to better prepare for new product development. And workflow management for a granular level tracking and managing entire R&D Ops.
Project Name	**PLM1: AI & Machine Learning for Novel Materials R&D Cloud-Based Platform**
Project Category	Artificial Intelligence; Machine Learning
Education Level	Diploma, Bachelors
Project Description	With the current process of polymer development, development scientists draw on their material knowledge to formulate new compound recipes, mix small batches on trial and test and then repeat the loop until the desired material properties are achieved, resulting in countless development hours. Complex recipes can take more than a year to develop. Polymerize enables R&D scientists to reduce the trial & error in formulation development with a complete product lifecycle management software that will allow companies to efficiently access/share data and maintain formulation workflow orders, applications recommendations, reporting and analytics. The MLOps role is a challenging, steep, and hands-on role for individuals ready to take full responsibility for the AI/ML applications within the Polymerize platform. The goal is to ensure the platform runs seamlessly with maximum automation and minimum supervision. We plan to achieve this by building a highly scalable, consistent, and seamless workflow with strong technical expertise, the latest technologies and state-of-the-art algorithms for ML and AI. We work as a closely knit team with no hierarchy and a constant push for ownership and customer-centric delivery of responsibilities. This role is also about having a lot of fun brainstorming, sometimes profoundly enlightening discussions on common industry problems, technology limitations, domain-specific roadblocks, and applications of AI. We strongly vouch for flexibility, deep work, and a balance of learning something you don't know while teaching something you know for the team's collective growth.

Roles and Responsibilities	● Design and implement APIs for serving Machine Learning models and business logic ● Implement pipelines for data ingestion, validation/cleaning, storage, and wrangling in MongoDB ● Automate MLOps and backend processes using third-party tools ● Develop and automate internal workflows to allow seamless data access to Data Scientists and Research Scientists
Requirements	● Proficiency in Data Analytics, Machine Learning Framework such as (Spark, TensorFlow and Sci-Kit Learn) and Material Science, ● Strong in Programming Languages: Python, Bash, YAML 1. Web Framework: FastAPI (preferred) or Flask, Websockets 2. ML Tools: NumPy, Pandas, SciKit-Learn 3. Databases: NoSQL (MongoDB preferred), Redis 4. Version Control: Git 5. Databases: MongoDB, Redis 6. Cloud: AWS Ecosystem 7. Deployment Tools: Docker, GitHub Actions, Kubernetes ● Hands-on experience in design and implementation of APIs and hands-on experience in development, training, and deployment of ML models will be a plus ● Familiar with knowledge of micro-service architectures with containerization, load balancers, web servers, application servers and databases. ● Skills to be learnt include Machine Learning Models and Cloud deployment

Org Name	**Portcast**
Org Description	Our mission is to transform international supply chains to be more resilient by helping logistics companies realise the full potential of their data. We cater to both shipping lines and cargo airlines. This covers 90% of the world trade volume that travels via ocean and 35% of world trade value that travels via air. We use proprietary machine learning algorithms and real-time external market data (such as economic indices, marine weather, satellite-based data, etc.). Predict how much cargo will be shipped and when it will arrive and deliver actionable insights. We are excited to be a fast-growing team of software engineers, data scientists and industry experts. Based out of Singapore, we've been building together since 2018 and are backed by some leading investors, including Wavemaker Partners, Entrepreneur First, SGInnovate and Investigate VC.
Project Name	**POR1: Data Science for Predictive Supply Chains [Predictive ETA]**
Project Category	Machine Learning; Artificial Intelligence
Education Level	Diploma; Bachelors
Project Description	Ocean transportation data is segregated across multiple sources like ocean carriers, satellite, ports, etc. In order to reach exceptional data quality, Portcast has set up processes to deep dive into completeness, correctness and accuracy of the data at each step of the ocean movement. The Data Science trainee will work with cross-functional teams (data science, software development and business) to identify areas where model features can be improved to deliver better accuracy and granularity in the event of contingencies.
Roles and Responsibilities	• Identify new derived features based on speed on the ground, trajectory prediction, vessels metadata etc. • Compare prototypes of new models with different cross-validation accuracy scores. • Anomaly detection is based on vessel behaviour and other port, route-based features. • Explore AIS (Automatic Identification Systems) data with millions of geolocation records and vessel metadata. • Compiling data stories on how predictions can help answer business questions.

Requirements	• Strong in Python, Machine Learning Framework and Query Language. • Good to have experience in Data Visualisation and Statistics. • Skills to be learnt include Data Analytics, Data Visualisation, Product Development, Machine Learning Framework, Query Language.

Org Name	**Precision Medical/ PreciX**
Org Description	Movement is Life. How well we move directly influences our overall health. Leading an active life is a vital part of our well-being. PreciX's mission is to help humans move better by offering innovative solutions for assessing, diagnosing and treating musculoskeletal disorders.
Project Name	**PRE1: ACL Injury Diagnosis and Tracking Rehabilitation**
Project Category	Artificial Intelligence; Machine Learning; MedTech
Education Level	Masters, PhD
Project Description	PreciX is a MedTech startup focused on developing a novel wearable device for the knee joint. This device aims to provide a range of biomechanical measurements, by leveraging a modular and scalable multi-sensor platform. The clinician will use these measurements to accurately assess the functional performance of the knee joint during natural dynamic movement, thereby enabling a range of clinical applications such as screening, diagnosis support, and recovery tracking.

	The project will focus on biomechanical analysis for clinical applications, more precisely on the evaluation of the knee joint movement for a better understanding and diagnosis of knee joint injuries and pathologies. The main purpose of this study is to develop algorithms to analyse altered movement patterns in ACL injured patients.
Roles and Responsibilities	● Conduct literature review on existing Machine Learning techniques used to analyse kinematics data of knee joints ● Develop AI/ML algorithms to identify key biomarkers for diagnosis and rehabilitation tracking of ACL patients ● Develop AI/ML solutions, model training, model optimisation, and manage technical integrations ● Build and maintain production ML infrastructure to be resilient, secure, and high performance ● Enhance data collection procedures to include information that is relevant for building analytic systems ● Ensure the technical documentation for regulatory compliance
Requirements	● Proficient in Machine Learning framework such as Spark, Tensorflow, Sci-kit Learn and Python ● Strong in Java, Matlab, Python and Query Languages (SQL, MySQL, PostgreSQL) ● Experience in C++ and data analytics are plus points ● Additional skills to be learnt include IoT, product development and Time Series Database

Org Name	Precision Medical / PreciX
Org Description	Precix is a MedTech startup that is focused on developing a novel wearable device for the knee joint. This device aims to provide a range of biomechanical measurements, by leveraging a modular and scalable multi-sensor platform. These measurements will be used by the clinician to assess the functional performance of the knee joint accurately during natural dynamic movement, thereby enabling a range of clinical applications such as screening, diagnosis support, and recovery tracking.

Project Name	**PRE2: Knee Osteoarthritis Diagnosis and Progression Prediction**
Project Category	Machine Learning; Artificial Intelligence; MedTech;
Project Description	This project will focus on biomechanical analysis for clinical applications, more precisely on the evaluation of the knee joint movement for a better understanding and diagnosis of knee joint injuries and pathologies. GATOR by PreciX is used to collect 3D Knee kinematics data during various movement activities by patients. This time series data is multidimensional and complex which demands use of ML based techniques for analysis. The main purpose of this study is to develop algorithms to analyse altered movement patterns in knee osteoarthritis (OA) patients. Understanding kinematic patterns in patients with functional impairments will help early diagnosis of OA and develop treatment options. This will include identifying distinguishing features in the clinically referred movement exercises performed by the subjects and successful training machine learning models for diagnosis. Precix has a library of biomechanics datasets with different movement profiles to be used during the project.
Education Level	Diploma, Bachelors
Roles and Responsibilities	• Conduct literature review on existing Machine Learning techniques used to analyse kinematics data of knee joints. • Development of machine learning and AI algorithms to identify key biomarkers for diagnosis and rehabilitation of OA patients. • Developing AI/machine learning solutions, model training, model optimization, and managing technical integrations. • Build and maintain production ML infrastructure to be resilient, secure, and high performance. • Enhancing data collection procedures to include information that is relevant for building analytic systems. • Ensure the technical documentation for regulatory compliance.
Requirements	• Strong in Java, Machine learning framework such as (Spark, TensorFlow, Sci-kit Learn), Python and Query Language (SQL, MySQL, PostgreSQL) • Familiar in C++ and Data Analytics. • Skills to be learnt include IoT, Product Development and Time Series Database

Org Name	**Resync**
Org Description	Resync is an AI-driven energy cloud for distributed energy resources like solar and electric vehicles. They optimise them and improve energy efficiency, using real-time control and Machine Learning algorithms.
Project Name	**RES2: Improving forecast, distinguish, and optimization of electrical demand using ML and modelling**
Project Category	Artificial Intelligence; Machine Learning
Education Level	Master's or PhD Level
Project Description	Many of our clients deal with facility management and energy efficiency issues. Understanding and controlling electrical demand improves energy efficiency and helps user save money on their product. With multiple energy resources such as solar, energy storage, electric vehicles, HVAC, other controllable loads etc. The operation of these energy assets is based on accurate forecasting of generation and consumption patterns and heuristic optimization of the energy assets. These optimization results are sent to the real-time controller to take necessary actions and provided as insights on the portal for the users.
Roles and Responsibilities	• Improve and train different forecasting models • Improve and implement various heuristic optimization algorithms for improving real-time control • Develop computer vision algorithms to capture and analyze satellite data to improve forecasting algorithm
Requirements	• Strong in Python programming, Machine Learning Framework • Good to have knowledge in Power and Energy Systems and experience in Query Language (SQL, MySQL, PostgreSQL)

	● Skills to be learnt include Agile methodologies, Time series database, Time series forecasting, and knowledge on Power and Energy Systems

Org Name	**SEPPURE**
Org Description	SEPPURE is a Climate-tech company developing novel membrane materials and membrane processes for more sustainable chemical separations without the use of heat. SEPPURE is disrupting the energy-intensive chemical separation processes, such as distillation and evaporation, by introducing novel chemical-resistant nanofiltration membranes. With up to 15% of the world's total energy spent on industrial-scale chemical separations, SEPPURE aims to reduce CO2 emissions by 500 million tonnes by 2030.

Project Name	**SPR1: Machine Learning for Chemical-Resistant Nanofiltration Membranes**
Project Category	Machine Learning; Data Analytics
Education Level	Diploma, Bachelors
Project Description	The apprentice will architect a new data system from the ground up, from establishing a data pipeline to building statistical and predictive models to process polymer research and operations data. Leveraging data science tools and machine learning frameworks, the apprentice will add significant value to their membrane and digital solution products by enabling both internal users and customers to monitor performance, extract operational insights, and enhance overall production yield and quality.
Roles and Responsibilities	• Setting up of data infrastructures, including developing and maintaining databases. • Identifying and extracting relevant structured and unstructured data from multiple sources. • Developing and implementing data workflows, including collection, processing, cleansing, and verifying data. • Analysing data for trends and patterns and generating information and insights. • Building and using predictive models and machine learning frameworks to aid technology development and process design. • Use strong business acumen, as well as an ability to communicate findings, and mine vast amounts of data for useful insight. • Preparing reports and presentations to communicate important information and insights.
Requirement	• Proficient in Python and Query Language (SQL, MySQL, PostgreSQL) • Strong in data analytics, data visualisation, frontend development, web scraping and Machine Learning framework such as Spark, Tensorflow, Sci-kit Learn • Experience in backend development, business analytics and data modelling • Familiar with Agile methodologies, AWS, chemical engineering and communication

Org Name	**Seventh Sense Artificial Intelligence**
Org Description	Seventh Sense is an Edge-AI startup democratising AI. At Seventh Sense, we are solving the problem of running computationally intensive deep learning (AI) without needing costly GPUs or Cloud. We enable GPU-class machine vision performance on commoditised hardware such as ubiquitous CPUs, mCPUs, embedded systems, and compute-constrained devices. This technology enables us to build products which help make our world safer. Our Face Recognition engine accuracy is ranked amongst the top in NIST, LFW, IJB-C, and other benchmarks. Co-founders have 2-decades of experience each and have a track record, including successful exits – McAfee/Intel acquired one, and the second was registered on a Stock Exchange. We are backed by well-known US-based VC investors and recognised local investors, such as CapVista (the strategic

	investment arm of Singapore's Defense, Science and Technology Agency within the Ministry of Defense).
Project Name	**SEV1: Computer Vision for Low-power Low-compute Devices**
Project Category	Artificial Intelligence; Computer Vision
Education Level	Diploma, Bachelors
Project Description	Seventh Sense builds essential technology and products to bring ultra-efficient AI computer vision to the edge. We believe that billions of sensors, i.e. edge devices, such as cameras, etc. expected to come online in the coming decade. There is a compelling need for these devices to see, listen, reason, and predict without constant connectivity to the cloud or servers (i.e. Edge-Based AI). At Seventh Sense, we are solving the problem of running computationally intensive deep learning (AI) without needing expensive GPUs. We enable GPU-class machine vision performance on commoditised hardware such as ubiquitous CPUs, mCPUs, embedded systems, and compute-constrained devices. Our product focus is twofold – provide API/SDK product for developers and companies building their bespoke solutions, and ii) build our own software-first surveillance and security solutions. Aside from building the core technology, we are focused on using our technology to build products for the defence, security, and surveillance industry. We develop customised facial recognition algorithms depending on the hardware, including low-power low compute hardware. The project aims to design, develop and customise the computer vision model so that it can be used on specific hardware, which will then be commercialised. The apprentice will work closely with the AI engineers to develop the optimum model for the hardware.
Roles and Responsibilities	• Design, develop, customise and train Computer Vision AI models for low-power and low-compute devices. • Involve in the data strategy process to ensure that there is no bias in the algorithm and to increase its accuracy. • Test and deploy the AI models on the state-of-the-art chipset. • Utilise Seventh Sense's in-house supercomputers to train the AI models.

Requirement	• Strong in Deep Learning, Python, Image processing and Computer Vision • Good to have experience in Pytorch, C and C++

Org Name	**Tigtag.io**
Org Description	Tictag is a one-stop source for data from Asia that has built an innovative, gamified, mobile-first platform for companies to harness crowdsourcing to collect, annotate and manage valuable image, text or audio data. The focus of the company is to offer unmatched accuracy rates for data collection and annotation, so that client companies get the best quality ground truth for their models, with an emphasis on speed and scalability. These companies investing in data, AI, and machine learning, can expect to develop much better models with Tictag's Truetag system, with up to 99.97% accuracy.
Project Name	**TTG1: Automatic Snapping Bounding Polygons for Computer Vision**
Project Category	Artificial Intelligence; Computer Vision; Deep Learning

Project Description	Tigtag's mobile application supports drawing squares and polygons around objects in images to label them. There is a current challenge to do polygonal bounding boxes when points are added one at a time around the border of the object. In this project, apprentices will explore developing a new feature where the user highlights a square area around an object, and a resulting polygon around the object is automatically generated with points on the image. This will require an object detection algorithm to be built with points plotted with high level of accuracy around the object. This feature will be game changing for the company as we are a mobile first company with no other players in the market is currently doing this to achieve economy of scale for drawing polygonal bounding box to power computer vision projects.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: Under the guidance of the mentor, Talents will work on developing new feature using computer vision and deep learning frameworks. Responsibilities and Deliverables: ● Explore the algorithms that can achieve such a result ● Work on the implementation of said algorithms ● Test and iterate on the algorithm ● Integrate with mobile UI ● Productive Auto Polygonal Bounding Feature
Requirements	● Strong in Machine Learning framework such as Spark, TensorFlow, Sci-kit Learn and Python ● Familiar with Backend Development, Computer Vision, Image Processing and OpenCV will be a plus ● Skills to be learnt Computer Vision and Image Processing.

Org Name	**US2.ai**
Org Description	US2.ai is automating the fight against heart diseases, the world's number one killer. The company uses Machine Learning to democratise echo reading and disease prediction, enabling everyone to take control of their heart health.
Project Name	**EKO1: Deep Learning on Echocardiograms**
Project Category	Artificial Intelligence; BioTech; Deep Learning; Machine Learning; MedTech
Education Level	Diploma, Bachelors
Project Description	Echocardiography (ultrasound of the heart) is the first test of choice for Cardiologists since, compared to other imaging methods, as it is less expensive, more mobile, non-invasive, and radiation-free. However, the image quality is lower than other techniques like MRIs and CT scans. US2.ai is trying to bridge the gap by developing software to bring AI-enhanced imaging resources to everyone. The project consists of developing AI tools to democratise echo, the most commonly used tool for detecting heart risk.
Roles and Responsibilities	• Be familiar with various data systems • Support and participate in Machine Learning trials • Assist with the View Classification and Annotation pipeline • Actively participate in the development and design of CNNs for the prediction and classification of particular cardiac diseases from the ECGs • Carry out a CNN regression model for the prediction of invasively measured left ventricular pressures and comparing against Ground Truths • Improve the quality of ECG videos through image enhancement, CNNs and GANs
Requirements	• Strong in C, C++, Java, Javascript, Query Language and Machine Learning frameworks • Good to have experience in NLP and data visualisation • Potential added exposure to Deep Learning

BIOTECH / MEDTECH

Org Name	**Allozymes**
Org Description	Allozymes is a platform company that integrates and accelerates the sophisticated steps of the enzyme development process. Their platform dramatically reduces the development time and cost by 10 folds, and increases the chance of success for enzyme engineering by 200 folds, with no waste over the development process. They revolutionise how industries use enzymes to generate chemicals and natural products. They are enablers for breakthrough developments for sustainable manufacturing of ingredients for pharmaceuticals, food and beverage, cosmetics, and chemicals.
Project Name	**ALZ1: High-throughput DNA Sequencing for enzyme engineering**
Project Category	BioTech
Education Level	Diploma, Bachelor's
Project Description	At Allozymes, we require the ability to read DNA molecules that are much larger than 150-250 bp (the range of short-read sequencing method), to allow us to analyse the distribution of mutations during the enzyme or strain engineering processes. This helps us to detect the mutants that provide better performance of an enzyme than the original and enables us to reproduce it. Although we have established some in-house sequencing capabilities for the sequencing of bulk selected droplets to accelerate our developments for enzyme and strain engineering, more work is required for the development of selected droplets sequencing in a plate-based format. The current project aims to utilize Nanopore technologies and a liquid handler to sequence the selected droplets that are separated individually into each well. By the use of a liquid handler, we can automate the tedious process of extracting and amplification the DNA, before combing the samples for Nanopore sequencing preparation, to allow us to fine-tune the enzyme and its engineering process. In addition, Allozymes is using a proprietary droplet microfluidic system for enzyme engineering and subsequently, the DNA molecule is present in tiny amounts which further optimization is required to employ these sequencing technologies. In this project, the apprentice will be extracting and preparing the samples for sequencing. The apprentice would be tasked to extract and handle multiple DNA samples, maintain the quality of the samples, and prepare the samples for sequencing. The apprentice will also be working with a liquid handler to streamline

	the sequencing process of processing hundreds of samples at a given time. This project will require collaboration with other scientists and engineers in the company. The outcome of the project will enhance the performance of the Allozymes proprietary enzyme engineering platform.
Roles and Responsibilities	1. To familiarise with basic molecular biological experiments and library preparation for Nanopore sequencing. ● The apprentice would be able to perform the basic molecular biological experiments and to prepare samples for sequencing independently. 2. Development of a cost-effective method for Nanopore sequencing. ● This objective requires the apprentice to develop a system that utilises dual barcodes to allow the identifications of multiple samples (100 or more) mixed in a sequencing run. There will be a need to evaluate the accuracy of the demultiplexing of each barcode. 3. Combination of automation and Nanopore sequencing preparation. ● To prepare multiple samples (>100) effectivity, we are planning to replace the repetitive manual task with a liquid handler. The apprentice needs to adapt the workflow developed in objectives 1 and 2, to work with the liquid handler in our company.
Requirements	● Proficient in Molecular Work ● Good to have knowledge on Python ● Other skills to be learnt include DNA Sequencing library preparation and automation with liquid handler

Org Name	**Allozymes**
Project Name	**ALZ2: Strain Optimisation for Production of High-Value Compound**
Project Category	BioTech

Education Level	Masters, PhD
Project Description	Carotenes are long-chain hydrocarbon molecules commonly found in the pigments of plants. These molecules play an important role in the life chain, such as photosynthesis. Phytoene performs the role of UV protection, antioxidants, and anti-inflammatory, and the cosmetic industry has started benefiting from it in its skin care products. However, producing it from natural sources is resource intensive and costly and it takes 10,000kg of tomato skin to extract about 3kg of phytoene. Additionally, customer behaviour has significantly changed, and they demand ingredients from natural sources, which makes chemical synthesis approach less attractive for the cosmetic companies. Therefore, there is a need for biosynthesis of phytoene and similar compounds. In this project, the apprentice will employ enzyme and strain characterisation and optimisation techniques to identify suitable enzymes and improve the bioprocess yield. The apprentice will need to conduct screening and characterisation of enzymes, improve the yield of production and optimise the bioprocess conditions.
Roles and Responsibilities	● Construction of >10 recombinant bacteria or yeast for the production of phytoene. Firstly, the apprentice will need to construct recombinant strains for the production of phytoene by expressing the target enzymes. The performance of the constructed strains will be compared and efficient strains will be selected for further improvements. ● Improvement of phytoene production by pathway optimisation to achieve >500 mg/L of phytoene. The production pathway and central metabolism will be balanced to direct energy and carbon flux for increased production of phytoene. ● The growth conditions of the engineered strain will be optimised in flask and bioreactor scale to develop bioprocess that can produce >1 g/L phytoene.
Requirements	● Strong in biocatalysis, enzyme assays, microbial strain engineering, synthetic biology, yeast engineering ● Good to have knowledge on Protein Expression, metabolic engineering ● Skills to be learnt include strain optimisation and enzyme screening

Org Name	**Allozymes**

Org Description	Allozymes is a platform company that integrates and accelerates the sophisticated steps of the enzyme development process. Their platform dramatically reduces the development time and cost by 10 folds and increases the chance of success for enzyme engineering by 200 folds, with no waste over the development process. They revolutionise how industries use enzymes to generate chemicals and natural products. They are enablers for breakthrough developments for sustainable manufacturing of ingredients for pharmaceuticals, food and beverage, cosmetics, and chemicals.
Project Name	**ALZ3: Implementing Machine Learning guided approaches for data-drive enzyme evolution**
Project Category	Biotech; Machine Learning; Artificial Intelligence; Deep Learning
Education Level	Master's, Phd
Project Description	Allozymes focus is on the rapid evolution of optimised enzymes with improved performance, revolutionising the way industries manufacture complex natural products. The company's proprietary platform enables us to rapidly screen through thousands of enzyme variants for specific substrate activities, generating both genomic and analytical data. This data is large and requires us to establish efficient workflows for its management and usage. As a first step, Allozymes built a cloud-based data system that integrates into our current experimental data management system and allows streamlining data storage and analysis. For the next step in this process, this data system will be used to analyse and build workflows for data processing, data analysis and to perform predictions using artificial intelligence approaches, such as Machine Learning and Deep Learning. In this project, the apprentice will work on the development, implementation and deployment of artificial intelligence solutions aiming at improving Allozymes' current enzyme evolution platform. The apprentice will be trained to process and analyse data, implement machine learning algorithms, and deploy machine learning pipelines using real genomic and experimental data. This project will require collaboration with the scientists and engineers in the company to achieve the proposed goals. The outcome of the project will enhance the performance of the

	Allozymes proprietary platform for engineering enzymes and microorganisms.
Roles and Responsibilities	1. To improve Allozymes' genomic and experimental workflows by delivering a working pipeline for generating predictive models and insights on target enzymes. 2. The focus will be to contribute for the development and improvement of AI solutions, taking advantage of the existing in-house data generation capabilities. An automated pipeline integrated on our cloud system and established using MLOps principles will also be implemented, being capable to outputting machine learning models and predictions upon the generation of new datasets, creating valuable information from data.
Requirements	● Proficient in Data engineering, Deep Learning, Machine learning framework such as (SPark, TensorFlow, Sci-kit Learn), Python and AWS ● Good to have knowledge in CI/CD, Cloud, Computer Science, data mining, data analytics, Git, ORM, PostgreSQL and Torch ● Other skills to be learnt include Agile Methodologies, cloud computing and communication skills.

Org Name	**Ants Innovate**
Org Description	With no alternative meat products offering the complete meat-eating experience on the market, Ants Innovate was founded in 2020 to bring affordable, high-quality alternative meats to consumers through research and innovation. The mission is to create real meat without harm to animals and the environment. To achieve this goal, the company views every team member, even the management, as equal, individual 'ants' innovating and working together towards the common goal of growing the alternative meat industry.

	Just like an ant colony, Ants Innovate aims to be a long-lasting key player in the sustainable meat production industry, making strong advances with innovation at our core.
Project Name	**ANT1: Develop Textured Plant-Based Prototypes to Replicate Conventional Meats**
Project Category	Biotech
Project Description	Current industry of Cultivated meats is mostly built on the concept of a hybrid between cell mass and plant-based scaffolds. Ants Innovate approaches this with a two-prong approach of extracting the unique meaty flavour of cells and developing textured plant-based formulations This project looks at the design of the textured plant-based formulations and the optimization of the incorporation of the cell products to create a prototype that replicates the taste, appearance and mouthfeel of conventional meat.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To formulate the plant-based scaffold and design the prototype of the plant scaffold Responsibilities and Deliverables: ● Successfully create plant-based scaffold with similar texture properties ● Successfully optimize the incorporation of cell products into plant scaffold ● Successfully create prototype that will be evaluated by sensory evaluations ● Formulate SOP for Product development and Scale Up ● Conducting Research on plant scaffold and cell products ● Performing literature review and designing experimental plans ● Data collection and presentation as well as recording project details ● Conducting sensory evaluations and preparing samples for testing ● Working with collaborators and supporting the overall product development ● General Kitchen and Lab maintenance ● Ad hoc Duties to support company's commercialization efforts.
Requirements	● Strong in process design, product development, molecular cell biology, hypothesis driven research, food science, project management and product formulation.

	● Familiar with Mammalian cell culture, protein engineering, texture analysis, and material science. ● Skills to be learnt include teamwork, experimental design, sample processing, leadership, and communication skills.

Org Name	**Ants Innovate**
Org Description	With no alternative meat products offering the complete meat-eating experience on the market, Ants Innovate was founded in 2020 to bring affordable, high-quality alternative meats to consumers through research and innovation. The mission is to create real meat without harm to animals and the environment. To achieve this goal, the company views every team member, even the management, as equal, individual 'ants'

	innovating and working together towards the common goal of growing the alternative meat industry. Just like an ant colony, Ants Innovate aims to be a long-lasting key player in the sustainable meat production industry, making strong advances with innovation at our core.
Project Name	**ANT2: Create Realistic Alternative Meats Through Protein Engineering**
Project Category	Biotech; Engineering
Project Description	Current industry of Cultivated meats is mostly built on the concept of a hybrid between cell mass and plant-based scaffolds. Ants Innovate approaches this with a two-prong approach of extracting the unique meaty flavour of cells and developing textured plant-based formulations This project looks at the design of protein structuring and oil-based solids to create a prototype that replicates the appearance and mouthfeel of a conventional meat cut.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To engineer the textured proteins and solid-state oil prototypes Responsibilities and Deliverables: ● Successfully create textured proteins with similar texture properties to meat fibers ● Successfully create solid state oils with similar texture properties to animal fat ● Successfully create prototype that will be evaluated by sensory evaluations ● Develop potential appearance control for the prototypes ● Conducting Research on protein engineering and emulsification ● Performing literature review and designing experimental plans ● Data collection and presentation as well as recording project details ● Conducting sensory evaluations and preparing samples for testing ● Working with collaborators and supporting the overall product development ● General Lab maintenance ● Ad hoc Duties to support company's commercialization efforts
Requirements	● Strong in process design, product development, protein engineering, cell biology, hypothesis driven research and project management.

	• Familiar with Mammalian cell culture, food science and texture analysis. • Skills to be learnt include teamwork, equipment operation, leadership, and communication skills.

Org Name	**Cellivate Technologies**
Org Description	Cellivate Technologies is a spin-off from the National University of Singapore. They are a deep-tech startup, with proprietary platform technologies/products that enable cellular meat companies to accelerate the growth of cells. As their platform is also translatable to other cell culture applications, they have early customers in the biotech and the stem cell fields.
Project Name	**CEL1: Revolutionising Clean Meat: Developing Novel Biomaterials and Bioprocesses**
Project Category	Biotech
Education Level	Bachelors
Project Description	Cellular agriculture has been one the important innovations in clean meat revolution and is one of the fastest growing sectors in biotechnology. Scaling up cells from tissue biopsies to 2D and 3D cultures for producing meat a.k.a. cultured meat is not so effective due to multiple factors. Culturing cells efficiently from tissue biopsies, lack of cost effective edible microcarriers for scaling up to produce cultured meat in the bioreactor has not been addressed to its entirety by cell based meat manufacturers. Cellivate Technologies addresses these gaps through the use of proprietary coating (ProCyte) on 2D surfaces as well as 3D edible microcarriers for producing cell-based meat products. Their ProCyte surfaces increase yield 2x to 4x and edible microcarrier prototypes have been well received by their customers. Apprentice will support their ongoing developments on novel edible microcarriers and the scaling up of Cellivate's proprietary coatings on cell culture plastic wares.
Roles and Responsibilities	• Develop/scale-up edible microcarriers • Validate microcarriers using cell culture • Evaluate the Microcarriers for industry accepted quality standards • Preparation of standard operating procedures
Requirements	• Knowledge in Material science, product development and project management • Experience in biology, cell culture, product development, project management, and aerogel will be a plus

Org Name	CellVec
Org Description	CellVec was first conceived as the cell and gene therapy division of Stem Med, a joint venture between the TalkMed Group and Stemcord Pte Ltd. Stem Med's focus lies in the development of an adult stem cell bank for advanced therapeutic use. In August 2018, CellVec was spun-off from Stem Med to further their dedication to bringing gene therapy to patients-in-need. Their proprietary platform technology enables efficient production of high titer regulatory compliant viral vector products under good manufacturing practice (GMP) conditions. CellVec's R&D platform technologies covers gene transfer system design, up/downstream process development and cellular transduction technologies.
Project Name	**CEV1: Functional evaluation of a novel allogeneic platform**
Project Category	Biotech
Education Level	Masters; PhD
Project Description	Immune cells derived from the patient are isolated (Autologous Cells) have been genetically engineered and re-infused to patients with promising immunotherapies outcome. However, patient-derived cells are normally accompanied by a certain extent of functional impairment, senescence or exhaustion from prior treatment that led to a reduction in the potency of the products. We are developing differentiated, off-the-shelf CAR-T cell therapies, derived from healthy donor T cells (Allogeneic Cells). These genetically modified cells could serve patients immediately, and enable an overall efficient manufacturing process leading to reduction in cost of goods. The key challenges faced in the development and generation of allogeneic CAR-products is the eliciting the graft-versus-host disease (GVHD) and allo-rejection in addition to durability of the products. The aim of this project is to address the above issues in CAR-T cell design and manufacturing. Specifically, we will explore various sources of immune cells including healthy donor derived Peripheral blood mononuclear cells, Cord blood mononuclear cells, Natural killer cells or Gamma-delta T cells, as well as different strategies that could potentially enhance the overall efficiencies of the allogeneic cellular platform.

Roles and Responsibilities	● The apprentice will be required to perform standard tissue culture techniques, biochemical and molecular biology assays such as RNA extraction, real-time PCR, ELISA, western blotting etc. as well as immunological assays and animal work as seen appropriate. ● The apprentice will be responsible to assist with scientific literature searches or relevant information, design and execute experiments, data analysis, risk assessment, S/he will participate in presentations/meetings and share common lab duties, assist with ordering reagents and other common lab duties.
Requirements	● Some biology background and wet-lab experiences would be ideal for this project ● Strong skills in Data Analytics, Data mining, Product Development, Product Management and Requirements Writing

Org Name	NDR Medical
Org Description	NDR Medical Technology Pte. Ltd develops surgical robotics known as Automated Needle Targeting (ANT) to assist surgeons during minimally invasive surgery. Driven by Artificial Intelligence and Medical Image Processing to automate the needle targeting procedure resulting in an overall improvement to the clinical outcome, reduces radiation exposure and overall operation time. ANT will ensure surgeons of all experiences to be able to perform complex and high-risk surgery with ease.
Project Name	NDR1: Hardware Robotics Design Project
Project Category	Artificial Intelligence; MedTech
Education Level	Bachelors, Masters, PhD
Project Description	For the project, we aim to design and develop a 6 degrees of freedom motor controlled robotic system for X-ray and CT image-guided systems. We will first determine the parameters for the robotic application, then design the robotic mechanism, develop. In the robotics design phase, it involves using 3D modelling software for conceptual and detailed design of robot components and motion control. For this project attachment, the selected candidate will get the opportunity to work with experienced mechanical engineers, software engineers and AI experts during the system integration.

Roles and Responsibilities	● Conduct research and determine the ideal robotic system to implement for medical robot application to targeted medical procedure ● Conceptualise robotic system and design precision components for assembly. ● Implement software that will control robots and apply machine learning techniques. ● iv. Work with mechanical engineers to enhance the design and operation of the medical robot
Requirements	● Strong in CAD and Solidworks ● Talent must be proficient in 3D Printing and Electronics system design ● Some basic knowledge in Finite Element Analysis (FEA), Python & ROS ● Good to have knowledge & technical skill in Hardware Design

Org Name	**Peptobiotics**
Org Description	Peptobiotics develops recombinant livestock and aquaculture feed additives as replacements for antibiotics and hormones. As many countries phase-in bans of these substances there is a fast-growing demand for alternatives. The company aims to be the leader in developing solutions for the agrifeed industry by leveraging our expertise in synthetic biology to create an antibiotic-free agricultural system.
Project Name	**PEP1: Strain Engineering to Develop High Productivity Microbial Cell Factory**
Project Category	Biotech;
Project Description	Intensive farming and unregulated usage of antibiotics in agriculture has led to development of antibiotic resistance that spilled over to human population, creating healthcare burden worldwide. Peptobiotics has identified this issue and aims to develop recombinant livestock feed additives as replacements for agricultural antibiotics and hormones. Peptobiotics is a seed funded startup that is currently in the stage of scaling up our production based on promising antibiotic alternatives that we have discovered. In this project, the apprentice will apply their synthetic biology and molecular biology knowledge to engineer our Anti-Microbial Peptide (AMP) producing strains to reach higher productivity.
Education Level	Diploma, Bachelors
Roles and Responsibilities	• Molecular cloning to generate strains of interest (PCR, RT-PCR, microbial transformation, SDS-PAGE). • Engineer strain to increase production titer. • Functional assays such as enzymatic digestion to assess different properties of antimicrobial compounds. • Screening of variants to obtain high yield mutants. • Small scale fermentation.

	● Protein production and purification.
Requirements	● Strong in Molecular and Synthetic Biology ● Familiar in PCR and Microbiology would be a plus. ● Skills to be learnt Project Management, Critical Thinking and Agritech ● Training will be provided in experimental design, molecular cloning, and microbiology.

Org Name	**Umami Meats**
Org Description	Umami Meats, is pioneering cultivated, 'not caught' seafood by developing the operating system for producing delicious, nutritious, and affordable cultivated fish.

	The company is dedicated to regenerating our oceans and our planet by enabling consumers to have their fish and eat it too, starting with IUCN Red Listed species that are difficult to farm and that are being driven extinct by human consumption. Umami Meats is currently developing a production platform that will commercialize through strategic partnerships with traditional seafood companies and food producers, enabling them to produce cultivated fish at scale at price parity, facilitating a stable, resilient, local supply of seafood free from mercury, antibiotics, microplastics, and ocean pollutants.
Project Name	**UMM1: Optimisation of Bioprocess Parameters for Culturing Fish Cells on Plant Based Scaffolds**
Project Category	Biotech;
Project Description	High cost of production is one of the key bottlenecks in the cultivated meat industry. This project aims to address this problem through identifying suitable easily accessible and affordable plant-based scaffolds, recognizing scale-up parameters using an inexpensive mini bio-reactor and optimizing media feeding strategy. Key areas within project include characterisation of the mini bioreactor process parameters, screening multiple plant scaffolds for use as inexpensive easily available scaffolds for long term culturing of fish cells; Culturing of fish cells in scaffolds for long term in custom made mini bioreactors and reducing cost of scaffolds for long term fish cell culturing Other areas of focus include protecting shear sensitive cells from hydrodynamic shear by employing 3D scaffolds for cell proliferation and shear protection; also, bio-process scale up through characterisation and operation of an inexpensive mini bio-reactor and achieving cost reduction through optimisation of media feed strategy
Education Level	Master's, PhD Level
Roles and Responsibilities	Scope of work: ● Maintain cells in culture, including passaging, routine media exchange, harvest, and sampling ● Work within the bioprocess engineering team on process development and/or optimisation of a scale-up process ● Support bioprocess laboratory operation i.e., suspension/adherent cell culture, bioreactor operation and small-scale experiments to support process setup and other day to day lab activities. ● Support conceptualisation and implementation of lab experiments with team

	Responsibilities and Deliverables: ● Identify at least 2 scaffolds from commonly available plant-based products (e.g., vegetables, fruits, leaves, etc.) for long term culturing of fish cells and 3D matrix development ● Characterise and successfully run a mini bioreactor and optimise the process parameters for cell proliferation ● Plan and execute experiments ● Write scientific and technical reports and maintain records ● Follow protocols and batch records and provide technical input ● Follow health and safety procedures and implement paperwork as required ● Coordinate maintenance of equipment and lab facilities with team ● Ability to work independently as well as in a team ● Demonstrate initiative and pro-active approach
Requirements	● Strong in Statistics, Cell Culture and Data Collection/Analysis (e.g., MATLAB, Python), Microsoft Office, Data Visualisation and literature reviewing ● Familiar in working with bioreactors and fermenters would be a plus. ● Skills to be learnt Data Visualisation, Statistics and Data Analytics.

BLOCKCHAIN

CLEANTECH / NANOTECH

Org Name	KrossLinker

Org Description	KrossLinker applies material chemistry to innovate and develop aerogel - a thermal insulation material for various applications such as cold-chain bio-pharmaceutical packaging. With their transformative platform technology for fabrication, aerogels can now be produced 3X faster than traditional methods — with the lowest level of energy consumption and reduced carbon footprint.
Project Name	**KRO1: Development of Aerogel Formulation for EV Battery Application**
Project Category	Chemistry; Chemical Engineering, NanoTech; Material Science; CleanTech
Education Level	Masters, PhD
Project Description	Aerogel materials can deliver thermal insulation performance several times better than conventional materials. Despite their great potential, slow commercialisation of aerogels can be traced to their expensive and energy-intensive manufacturing process, inherent dust and fragility challenges. KrossLinker's patented aerogel technology addresses the above challenges with a breakthrough fabrication process and proprietary green formulation to produce high-performance, robust, lightweight, thinner and cost-competitive aerogel insulation material. This project involves applying material chemistry knowledge to design and develop new aerogel formulations and optimise their proprietary fabrication process for commercial thermal insulation applications in EV and high-temperature applications. This project would play an essential milestone in the formulation and fabrication of this advanced material.
Roles and Responsibilities	● Review literature papers/patents to brainstorm new ideas with founders and product development team. ● Liaise with suppliers to source and evaluate raw materials for the formulation. ● Design and develop aerogel formulations with Krosslinker's proprietary process technology for commercial application. ● Perform material characterisation studies such as thermal conductivity and mechanical property analysis tests. ● Assist in optimisation of aerogel fabrication methods and development of products for customer pilot trials.

	● Work closely with business team to implement customers feedback and improve existing aerogel products to achieve customer specifications. ● Prepare progress updates and presentations.
Requirements	● Strong in material science, project management, materials engineering, product development. ● Good to have experience in design of experiments, formulation, product development, battery materials, familiarisation with industry standards. ● Potential added exposure include Sol Gel Synthesis, product property optimisation.

Org Name	**Nanolumi**
Org Description	Nanolumi is a lab-to-market technology & business accelerator leveraging the power of chemistry to create advanced luminescent materials that optimise light efficiently through light and energy conversion. The company focuses on providing high quality perovskite products that enable the purest, brightest and widest range of colours in LCD, MiniLED and OLED displays while maintaining high energy efficiency. Nanolumi's flagship product, Chameleon® G Film, is the industry's first green perovskite colour enhancement film enabling displays of all screen sizes with excellent colour purity, high dynamic range (HDR) brightness, power efficiency, and unprecedented wide colour gamut of up to 90% Rec. 2020, 100% DCI-P3, 100% Adobe RGB; Transforming screen time into an enjoyable and immersive experience for work and play.
Project Name	**NAN1: Reyal Anticounterfeit Solution**
Project Category	Anticounterfeit; Nanotech; Computer Vision; Machine Learning
Education Level	Masters, PhD

Project Description	Reyal™ is a new, cloud-based, multi-layer solution with the technology and tools for companies to connect every physical product with a unique digital identity for secure product authentication & counterfeit protection. The Reyal™ solution combines the company's multi-disciplinary knowledge in advanced material science, photonics and electronics, as well as marketing. With the solution expansion and product development, the authentication process and system need to be upgraded continuously, with the help of advanced signature materials development, deep learning, AI-based detection and analysis mechanism, data mining from the cloud database, pattern recognition and analysis through new methodology development (multispectral imaging, analysis software, and hardware integration, etc.). A key area of the project would be to develop a new generation solution, such as but not limited to, unique anti counterfeit signature materials, AI-based detection and analysis mechanism, as well as a B2C user-friendly AI-based hardware/software (smartphone version reader/applications) which allows readout and analysis of unique and sophisticated spectral signature and/or images, or combination of any those technologies. At the same time, within the Reyal broad project scope, a secondary task will be to improve and expand the Reyal cloud database in features, such as interface, dashboard, auto-monitoring, data auto-processing and reporting.
Roles and Responsibilities	● Closely work with the project team to understand the current Reyal solution, particularly the existing software solution package and the cloud database working flow, and capture new requirements, gaps and expectation from external and internal customers, hence to establish the baseline to further improve the solution. ● Formulate and propose focused improvement solution framework on the new generation of anticounterfeit signature, detection mechanism, as well as the readout solution, for example but not limited to, deep learning, pattern recognition, and AI mechanism, or any those technologies combination introduction. ● Design and conduct the proof-of-concept modeling or/and testing for the proposed solution. ● Develop a prototype package (multispectral imaging technique, software and/or hardware package) with the

	help of external resources in advanced materials, AI and deep learning. ● Improve and realise the new generation of the Reyal solution (signature materials, detection and analysis mechanism, software, hardware or any of the combinations). ● As a secondary task, improve and optimise the Reyal cloud database in features, such as interface, dashboard, auto-monitoring, data auto-processing and reporting. ● With the key project development, other responsibilities may be rescoped or assigned by the management based on the project needs and voice of the market. ● Additional expectation, to help in engineering database development and improvement.
Requirements	● Strong in Chemistry, Material Science, Functional Programming, Machine Learning, Database and Query Languages. ● Good to have experience in Product development, Data mining, Algorithms. ● Skills to be learnt include product design, feature design, project management, and data analytics.

Org Name	**Nanolumi**
Org Description	Nanolumi is a lab-to-market technology & business accelerator leveraging the power of chemistry to create advanced luminescent materials that optimise light efficiently through light and energy conversion. The company focuses on providing high quality perovskite products that enable the purest, brightest and widest range of colours in LCD, MiniLED and OLED displays while maintaining high energy efficiency. Nanolumi's flagship product, Chameleon® G Film, is the industry's first green perovskite colour enhancement film enabling displays of all screen sizes with excellent colour purity, high dynamic range (HDR) brightness, power efficiency, and unprecedented wide colour gamut of up to 90% Rec. 2020, 100% DCI-P3, 100% Adobe RGB; Transforming screen time into an enjoyable and immersive experience for work and play.
Project Name	**NAN2: Development and Testing of Advance Luminescence Materials for Live Cells Imaging**
Project Category	Biotech: Nanotech
Project Description	With the expansion of Nanolumi's technology portfolio in lipid encapsulated fluorescence nano particles, the team aims to venture into offering novel imaging solutions to life sciences applications. In this project, team members would be developing and evaluating the suitability of the new class of novel lipid encapsulated fluorescence nanoparticles in its key performance metrics against commercial products. As well as develop strong use cases for advance imaging techniques like Fluorescence lifetime imaging (FLIM) and two photon imaging. Also, new surface functionality would be explored for the nanoparticles and evaluation of the materials with live cells required.
Education Level	Masters, PhD
Roles and Responsibilities	• Apply a broad spectrum of basic molecular and cell biological techniques, including fluorescence microscopy, flow cytometry analyses, and immunofluorescence assays. • Take ownership of routine cell line maintenance and tissue culture facility day-to-day operations, including sample preparations for imaging-related studies. The establishment and characterization of 3D cellular models (e.g., organoids) will become critical for future evaluations. • Plan and execute product validation experiments and develop application protocols to map out properties of novel fluorescence dyes for cellular imaging and analysis. • Provide application support to customers and collaboration partners for novel fluorescence dye products and fluorescence immuno-assays in cutting-edge biological research applications.

	● Conduct routine QA/QC on product performance with good documentation practice ● Collaborate with academic and commercial partners for product development works related to peptides, antibodies or nucleic acids conjugation and complementary methods.
Requirements	● Strong in Cell Culturing, Biochemistry, 3D Cell Culture and Flow Cytometry ● Good to have experience in chemical engineering ● Skills to be learnt include advance bio imaging microscopy

Org Name	**Phaos Technology**

Org Description	Phaos Technology is an advanced optics startup based in Singapore. The company believes that optical-related technology is the key to improving the future, hence their company focuses on research and development of advanced optical-related technologies, and making them accessible to the mass market. The company strives to make nanoscopes at a fraction of the cost of expensive microscopes, using advanced technology.
Project Name	**PHA1: Product and Sphere Research & Development**
Project Category	Nanotech
Education Level	Diploma, Bachelors
Project Description	Leading the advanced optical industry, Phaos' optical Microsphere Nanoscopy (ONM) technology has achieved a breakthrough in optical and electron microscopy. The resolution of an optical imaging system has a principal limitation to resolving two adjacent objects due to the physics of diffraction. With the control of light's wavelength and assistance by the microsphere, OMN can resolve target features down to 137 nm, which is way below the physical diffraction limit of 200 nm under visible light. This is made possible using simulation software, DOE (diffractive optical element), and the optical system's physical design. This project is a conception and design of microsphere assist Microscopic products that is able to resolve two adjacent objects up to the size of 50nm using simulation software, DOE and physical design of the optical system.
Roles and Responsibilities	● Design and development evolved around the mechanical component of the microscopy. There might be some electromechanical to be implemented for the purpose to motorise the mechanical component. Therefore, Mechanical student with a background in Mechatronics or electronics are preferred. Else pure Mechanical students are also welcome. ● Involved in research in the microsphere. Microsphere is a small glass lens used in-between the microscope and the samples which helps to enhance the magnification and improves the overall resolution of the microscope. Research in the microsphere involved the study of the material, design and modification of the microsphere to produce the required images. ● Involved in mechanical design and / or electromechanical design using solid works and / or AutoCad. Microscopy components consist of a few mechanical components including gear system, slider, rotary system…The

	movement of the mechanical component comes in 2 form, either manual movement or motorised movement. Talent will be involved in redesigning the mechanical system or even upgrading some of the systems to motorise system. ● Project Management Skill. Soft skills in communication between team members and external parties. Managing project schedule, costing and resources requirements. Talent will be exposed to projects that require him to exercise and put his knowledge in project management into.
Requirements	● Proficient in SolidWorks and Zemax ● Strong in Physics ● Talent with good knowledge in Design using Solid Works are preferred. ● Good to have knowledge on AutoCAD, Lumerical FDTD Simulation Software ● Additional skills to be learnt include hardware design and C++

Org Name	**SunGreenH2**

Org Description	SunGreenH2 is transforming green hydrogen production by building the world's highest performance electrolysers using their platform technology to incorporate proprietary advanced nanostructured materials into electrolyser components. SunGreenH2 manufactures core components for electrolyser cells, stacks and systems, enabling our customers to produce affordable green hydrogen. Electrolysers made with our materials increase production and decrease energy consumption without using expensive platinum group metal.
Project Name	**SUG1: Material Engineering for Green Hydrogen Production**
Project Category	Nanotech; Cleantech
Education Level	Diploma, Bachelors
Project Description	SunGreenH2 manufactures core components for electrolyser cells, stacks and systems, enabling our customers to produce affordable green hydrogen. We use our platform technology to incorporate proprietary advanced nanostructured materials into electrolyser components. Electrolysers made with our components dramatically increase production and decrease energy consumption with 30x reduction in the use of expensive platinum group metals. Our novel, breakthrough technology results from over 10 years of cutting-edge research and innovation in electrochemistry and nanotechnology for renewable energy generation. We have a vision for zero carbon, low-cost, green hydrogen available globally at scale.
Roles and Responsibilities	• Development (including literature review and reporting), fabrication, material testing, electrochemical testing of energy materials. • Develop and optimise our electrodes. • Selective etching by using the chemical and electrochemical methods. • Electrochemical testing of the electrodes. • Sample preparation by using the following methods; electrochemical deposition and sol-gel. • Surface characterisation including AFM and SEM. • Characterisation of the materials including the Raman, XRD, XPS, and SIMS analysis.
Requirements	• Prior experience in the field of materials preparation, testing and characterisation. • Strong in Material Science and Materials Engineering. • Knowledge in Potentiostat and Galvanostat

Org Name	**Xinterra**
Org Description	With rising CO2 levels leading the planet to a climate crisis, there is an urgent need to both minimise CO2 output, as well as increase the sequestration of atmospheric CO2. Xinterra is using its platform, the Xinterra Design Factory™ (XDF) to radically accelerate the creation of new materials that would aid in capturing CO2. The XDF comprises of a unique combination of machine learning, high throughput experimentation and deep domain expertise in materials science.
Project Name	**XTA1: Innovation of Materials for Carbon Capture using High Throughput Experimentation and Machine Learning**
Project Category	Machine Learning; Nanotech; Robotics/Autonomous Systems
Project Description	This project touches on three key themes - The first is the design of high throughput synthesis and testing capabilities to prepare and evaluate new materials. This will involve the fabrication and assembly of our tools as well as the integration onto our IoT platform by developing the control software. The second is performing the experiments using the high throughput experimentation through a proper design of experiment, to generate high quality experimental data. The third, will be to manage that data, including the proper visualization, curation and archival of data. The entire experimentation workflow will be driven by machine learning where new experimental conditions will be suggested by a machine learning algorithm that is trained on existing experimental data.
Education Level	Diploma, Bachelors
Roles and Responsibilities	• Perform literature surveys to understand and translate the state of the art in carbon capture materials towards actionable technical plans • Executing experimental workflows, including the design of experiments, performing synthesis and formulation experiments with both traditional and high throughput instruments, as well as the high throughput characterization of new materials. • Refining and upgrading the present high throughput experimentation workflow through functionality building (mechatronics), software development, and or translation of methodology. • Managing/developing software and data flow between the experimentation and machine learning teams

	● Performing machine learning in the experimental loop
Requirements	● Strong in Material Science, Statistics, Data analytics and Python and Materials engineering ● Familiar with Data Visualisation, Data engineering, Machine learning framework such as (Spark, Tensorflow, Sci-kit Learn) and Rapid Prototyping ● Skills to be learnt include Materials engineering, Material science, Data Visualisation, Data Analytics, Data engineering, Machine learning framework such as (Spark, Tensorflow, Sci-kit Learn) and Rapid Prototyping

IoT

Org Name	**Ackcio**
Org Description	Ackcio builds reliable wireless monitoring solutions for industrial monitoring applications (Construction, Mining, Energy, Weather, etc). Their first suite of products, called Ackcio Beam, is an end-to-end solution that automates monitoring geotechnical and structural sensors in challenging environments like construction sites and mines. We do real-time wireless monitoring for Geotechnical and Structural health applications.
Project Name	**ACK1: Structural Health Analytics (IoT)**
Project Category	IoT
Education Level	Diploma, Bachelors
Project Description	Structural Health Monitoring (SHM) refers to the process of systematically analysing the data from existing infrastructures like skyscrapers and bridges, and extracting useful information on how they age. Such information enables predictive maintenance of critical infrastructures. The apprentice will work closely with the Embedded and Hardware team, to develop and improve the current radio-frequency (RF) communication protocols and applications. They should take the initiative to see the product through the entire lifecycle from proof-of-concept to design and production.
Roles and Responsibilities	• Get a thorough understanding of low-power IoT stacks like TSCH and 6LOWPAN. • Contribute to the IoT networking protocols for long-term real-world deployments. • Explore and thoroughly understand different Radio Frequency technologies, tools, and solutions in the market. • Improve the existing radio physical layer settings to optimise: communication range, regulatory compliance and interference resilience. • Dig deep into low-level driver development to integrate numerous IoT sensors (I2C, SPI, RS485, RS232, etc.).
Requirements	• Strong in Python programming, C, C++, IoT. • Good to have familiarity with Agile Methodologies, Algorithms, Automated Testing, Git, Signal Processing. • Skills to be learnt include Algorithms, IoT and Wireless Networking.

Org Name	**Ackcio**
Project Name	**ACK2: Embedded systems design/development (IOT)**
Project Category	IoT, Computer Hardware Engineering
Education Level	Diploma, Bachelors

Project Description	Structural Health Monitoring (SHM) refers to the process of systematically analysing the data from existing infrastructures like skyscrapers and bridges, and extracting useful information on how they age. Such information enables predictive maintenance of critical infrastructures. We are seeking an enthusiastic individual to contribute to our SHM development efforts. The apprentice will provide Research & Development assistance for the 4th Generation series of Ackcio products.
Roles and Responsibilities	● Prototyping electronics subsystems like: ADC sensing, High-efficiency low voltage power control and monitoring, communication module design/integration (NB-IoT, LPWAN, 2.4G, 4G, WiFi, BLE, NFC). ● Design/Prototype of mainboard architecture involving FPGA integration with ARM-based MCU / RPi. ● Search for industrial product testing procedures and liaise with applicable certification laboratories in implementing testing protocols. ● Device benchmark testing. ● Schematics/PCB level design files. ● Search material, presentation slides or documentation of relevant test procedures or test methodologies.
Requirements	● Strong in Altium, Circuit simulation, FGPA, Hardware Design, IoT ● Good to have familiarity with C, Verilog/VHDL ● Skills to be learnt include Agile methodologies, Hardware Design, IoT

Org Name	**DiMuto**
Org Description	DiMuto provides agrifood companies with data they can see and trust, down to every single product of every trade, where they can easily see all that is happening for every trade transaction in an organized manner, on one single platform. DiMuto simplifies every step of global trade – from produce, trade to market, we provide sales, marketing, operations, financing and insurance tools so businesses can trade better. Equipped with a data-backed growth roadmap, companies can

	now navigate the complex global trade landscape with ease and focus on what matters - growing a thriving international business. With Visible Trade, DiMuto powers companies and the world forward with confidence. With a global presence since 2019, DiMuto has successfully tracked and traced over millions of pieces in produce and millions in dollars of trade value on our platform. We work with a global portfolio of clients in over eight countries and five continents.
Project Name	**DMT1: Enhancing Digitization Features of DiMuto DACKY with AI & IoT**
Project Category	Computer Hardware Engineering; IoT;Artificial Intelligence
Project Description	DiMuto is a rising Agri Fintech company based in Singapore. We simplify every step of global AgriFood trade. From produce, to trade, to market, our AgriFood Trade Solutions help growers, exporters, and importers to trade efficiently with better visibility and finance. One of the key parts of their solution is a Digitization Device (DACKY). The team is looking for someone to assist in helping to improve and refine the devices design, and manufacturing process, and also work together with the technical team to deploy AI to read real-time images on DACKY devices at our customer sites - basically how we can take better pictures, add just-in-time printing capabilities, deploy AI, deploy computer vision etc. The company is looking to make the DACKY more multi-purpose according to our various customer requirements so that it can better suit the operational demands and environment.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To support a unique opportunity to help transform food supply chains into a more sustainable, efficient, and data-driven global food system. Responsibilities and Deliverables: ● Design, execute and monitor key digitalization projects and work closely with global suppliers and manufacturing partners to ensure essential responsibilities are realized ● Work with Head of Digitization and AI Engineer team to improve on our existing Digitization devices - how to scale Product Quality AI. ● Assist on refinement of generation of digital identity labels for global customers. ● Identify, develop, and deploy Best Practices and Standard Operation Procedures for hardware management processes
Requirements	● Strong in Electronic System Design, Mechanical Engineering, Hardware Design, and IoT

	• Familiar with C++ and Python • Skills to be learnt include account management, negotiation, product development, product management, project management and communication skills.

Org Name	**Phaos Technology**
Project Name	**PHA2: IOT & AI Development for Future Microscopy**
Project Category	IoT, Artificial Intelligence, Computer Vision, Deep Learning, Machine Learning
Education Level	Diploma, Bachelors

Project Description	As most of the microscopes are standalone machines and used by an operator in an offline condition, this project requires the microscopy to be connected online live and be operated remotely. The remote access and control can be through web pages or AR/VR systems. The talent will be involved in the IoT development of microscopy. The objective is to build up the IoT ego system to prepare the microscopy for future Metaverse applications. It is not common in the industry to connect the microscopy or remotely access it through the internet. The challenge in synchronising the operation of the scope without crashing into the sample is one big challenge. One key function of microscopy is acquiring images. This is very time-consuming, from image acquisition to the analysis of the images. We have already automated the process of image acquisition. But there are still many improvements in image processing, analysis, and decision-making. Therefore, deep learning, pattern matching, and AI will help reduce the processing time by cutting down the manual work. The challenge is to build a system that allows us to speed up the image processing and deep learning to speed up the process between different types of samples.
Roles and Responsibilities	● Talent will be involved in the IoT development of microscopy. The objective is to build up the IoT ego system to get the microscopy ready for future Metaverse applications involving remote access through web pages or AR/VR. ● Understand the basic image recognition, image processing and pattern matching concepts. ● Be involved in image acquiring to processing, deep learning, and eventually building the function into the AI for pattern matching, image recognition, and measurement. ● Integrate pattern matching into the application process and machine control. ● Work out the program for pattern matching in identifying different types of defects and features for measurement and quantification. ● Work out program for deep learning and AI to improve the efficiency and accuracy of measurement. ● Work closely with in-house engineer and supplier to compile and commercialise the system with remote access features for the microscopy. ● Talent will be exposed to project management skills in delivering small-scale projects.

Requirements	• Proficient in C++, IoT, Python • Good to have knowledge on C# • Additional skills to be learnt include C#, C++, and IoT

Org Name	**Resync**
Org Description	Resync is an AI-driven energy cloud for distributed energy resources like solar and electric vehicles. They optimise them and improve energy efficiency, using real-time control and Machine Learning algorithms.
Project Name	**RES1: Enhancing IoT Device Firmware and Hardware for Efficient Operation**
Project Category	IoT; Artificial Intelligence
Education Level	Diploma, Bachelors

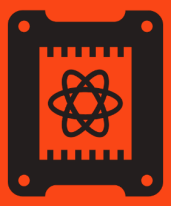
Project Description	A big part of Resync's solution is real-time control enabled by on-ground devices and IoT gateways which communicate encrypted data to multiple gateways via the cloud and other energy assets. Security protocols are essential on the devices and on the cloud architecture to prevent any security breaches. The apprentice will be developing and optimising the hardware and firmware specifications of the Resync device. The talent will work with mentors on developing and improving the product by designing the firmware and exploring various communication protocols such as Modbus, LoRA, Zigbee etc.
Roles and Responsibilities	• Identify areas of enhancement for cybersecurity and network protocol • Improve and develop firmware for various device level integration • Design and optimise hardware development
Requirements	• Strong in C, C++ • Good knowledge of Python programming, Query language • Good to have understanding of Angular, d3.js, DevOps, Docker, IoT

Org Name	**WaveScan Technologies**
Org Description	WaveScan specialises in the R&D, manufacturing, and commercialisation of radar imaging technology for non-destructive testing (NDT) applications. The end-to-end scanner technology includes proprietary hardware integrated onto automation platforms, advanced signal processing and filtering algorithms, and proprietary visualisation software. They are test-bedding their technology with multiple infrastructure stakeholders such as HDB, JTC, and private residential developers in Singapore. They are also scaling up to overseas markets in Japan, the U.K. and Europe.
Project Name	**WAV1: Radio Frequency Signal Processing Algorithm Development for WaveScan's Scanning Technology**

Project Category	IoT; Computer Hardware Engineering
Education Level	Master, PhD
Project Description	WaveScan constantly advances its technology with its expert team of scientists and engineers at WaveScan and A*STAR. As their technology advances, they deal with a wide array of composite and building materials that require robust signal post-processing and filtering algorithms to ensure the 3D holographic image produced has high resolution and is accurate and precise. As they aim to integrate the scanner onto platforms with large amounts of jitter, such as drones, their signal processing algorithms are key to ensuring the image is clean and precise.
Roles and Responsibilities	● Work on WaveScan's end-to-end proprietary scanner systems for data collection, testing and visualisation using signal processing algorithms. ● Perform specific testing for use cases and advance their signal processing algorithms for performance optimisation. ● Implement new signal processing algorithms using state-of-the-art scientific techniques recently published in journals/scientific publications. ● Conversion of MATLAB codes to Python and integration into WaveScan's existing algorithms for new features.
Requirements	● Strong in C, C++ and Python. ● Experience in MATLAB is a plus point. ● Good to have experience in ARM microcontroller embedded development, CST, HFSS, RF Design/Testing and understanding of traditional radar applications and signal processing techniques.

Org Name	**WaveScan Technologies**
Project Name	**WAV2: System Integration of WaveScan's Scanners onto Robotic Platforms**
Project Category	Robotics; Computer Hardware Engineering
Education Level	Diploma, Bachelors
Project Description	WaveScan specialises in the R&D, manufacturing, and commercialisation of radar imaging technology for non-destructive testing (NDT) applications. System integration is key to their solution, allowing customers to quickly deploy their technology through full-scale automation for their diverse inspection needs. Some automation platforms their scanners work with include robotic arms, robotic crawlers, stationary mounting platforms, UGVs and drones.

	They are test-bedding their technology with multiple infrastructure stakeholders such as HDB, JTC, and private residential developers in Singapore. They are also scaling up overseas markets in Japan, the U.K. and Europe.
Roles and Responsibilities	● Integrate, control, and programme sensors, actuators, with robotic arms, AGV, and construction equipment for indoor and outdoor environments. ● Integration of low-level robot software modules including embedded systems, sensors, motors, and controllers. ● Designing and implementation of high-level cross-platform system communications (wired/wireless). ● Evaluate and improve the hardware via lab and field experiments. ● Product integration, debugging, configuring, and testing. ● Documentation of technical reports, program codes, and product manuals. ● Implementation of scanner systems for lab testing on mock-ups and on-site testing.
Requirements	● Strong in C, C++ and Python ● Knowledge in industrial robot controller and integration, PLC programming, CAD (Solidworks, CATIA, etc), design for manufacturing, fabrication using 3D printing, microcontroller programming, embedded system programming, network protocols for communications such as peer-to-peer WiFi and Bluetooth, wired communication protocols such as SPI, I2C, UART, CSI and LVDI



QUANTUM TECHNOLOGY

Org Name	Atomionics

Org Description	Atomionics is a startup building quantum sensors for Navigation and Resource Exploration. Their core technology, cold atom interferometry, allows us to measure the forces acting on atoms precisely. It allows highly accurate sensors to build a complete underground map to pinpoint underground structures such as tunnels and bunkers. It can also predict earthquakes, provide precise navigation, and build a universal positioning system that works underground, underwater, and even in space.
Project Name	**ATO1: Gravimeter Product Development**
Project Category	Dynamics; Fluids; Heat Transfer; Mechanical Engineering
Education Level	Diploma, Bachelors
Project Description	Atomionics is working on quantum sensors, based on cold atom interferometry, where atoms are cooled down to almost absolute zero using lasers. At such cold temperatures, these atoms start behaving like waves, which allows us to measure the forces acting on them precisely. This opens up a wide range of applications including, but not limited to, paving a path in the energy transition to zero-carbon, exponentially improving the performance of inertial navigation systems, and transforming the global positioning system. At Atomionics, you will get the chance to prototype, test, refine, finalise, and produce your designs toward making our devices compact and robust for field deployment with the only constraints being power and your imagination. Our gravimeter comprises hundreds of components, including a titanium vacuum chamber, optical laser systems, and actuating mechanisms. This is combined with exotic materials, micron-scale tolerances, and complex assemblies. The project involves the continued mechanical engineering development of our machine, and its subsystems, to improve performance, reliability, quality, and reduce assembly costs through creative design and application of engineering principles.
Roles and Responsibilities	● Develop individual subsystems and work with vendors and manufacturing partners to have the parts fabricated. ● Assembly and testing of mechanical subsystems and integration into the overall machine. ● Key deliverables will include development of subsystems for the next iteration of the gravimeter on our path toward volume production. ● Particular knowledge areas of thermodynamics, material science, FEA, mechanisms, engineering drawings, and

	electronic control will be precious.
Requirements	• Strong in AutodeskCAD, manufacturing, fabrication • Good to have experience in thermodynamics, material science, and FEA (Finite Element Analysis)

Org Name	**Atomionics**
Project Name	**ATO2: PCB Design and Miniaturisation**

Project Category	Quantum Technology
Education Level	Diploma, Bachelors
Project Description	Atomionics works on quantum sensors based on cold atom interferometry, where atoms are cooled down to almost absolute zero using lasers. At such cold temperatures, these atoms start behaving like waves, which allows us to measure the forces acting on them precisely. This opens up a wide range of applications including, but not limited to, paving a path in the energy transition to zero-carbon, exponentially improving the performance of inertial navigation systems, and transforming the global positioning system. At Atomionics, you will get the chance to prototype, test, refine, finalise, and produce your designs toward making our devices compact and robust for field deployment. The only constraints are power and your imagination. Our gravimeter has an electronics system comprising dozens of custom design PCBs used for everything, from power distribution, power sequencing, data signal processing, waveform generators, and filtering to radio frequency devices to control quantum components. This project is to develop and refine these PCBs to improve performance and reduce complexity, size, and cost.
Roles and Responsibilities	• Working with PCB fabrication vendors and assembly PCBs with SMT components. • Detailed testing plans and testing will be required to demonstrate the board requirements are met. • Key deliverables will include the design, development, and testing of key components that will be used in the gravimeter for client projects.
Requirements	• Proficient in PCB Design, Schematics, Electronics System design. • Good to have experience in Fabrication, Assembly, PCBs with SMT components.

Org Name	**Atomionics**
Project Name	**ATO3: Miniaturised Cold Atom Trap for Interferometry**

Project Category	Quantum Technology
Education Level	Masters, PhD
Project Description	Atomionics is working on quantum sensors, based on cold atom interferometry, where atoms are cooled down to almost absolute zero using lasers. At such cold temperatures, these atoms start behaving like waves, which allows us to measure the forces acting on them precisely. This opens up a wide range of applications including, but not limited to, paving a path in the energy transition to zero-carbon, exponentially improving the performance of inertial navigation systems, and transforming the global positioning system. At Atomionics, you will get the chance to prototype, test, refine, finalise, and produce your designs toward making our devices compact and robust for field deployment with the only constraints being power and your imagination. The project objective is to optimise SWaP (size, weight, and power) for a cold atom trap for atom interferometry application. The successful candidates will work with other senior physicists and mechanical engineers at Atomionics to design and build a miniaturised version of a magneto-optical trap (MOT), which can cool down atoms to micro-Kelvin temperature, taking into account required optical beam access for measurement. Design optimisation efforts will focus on the process of laser cooling of atoms, magnetic field calculations for an optimal trap configuration with anti-Helmholtz coils, and optical beam configuration for the measurement of gravity using atom interferometry in an ultra-high vacuum chamber.
Roles and Responsibilities	● Responsibilities include design, assembly, and testing of laser optics breadboards as well as testing and tuning of the cold atom MOT to improve performance and resolution. ● Key deliverables will include the development of miniaturised optics breadboards and performance gains leading to an order-of-magnitude improvement in gravity field strength measurement sensitivity of our gravimeter.
Requirements	● Strong in Atomic Physics, Cold Atom Physics, Physics, Quantum Mechanics. ● Good to have experience in Electronic System Design, Quantum Optics. ● Skills to be learnt are Atom interferometry and Laser cooling and trapping of atoms.

Org Name	**Atomionics**
Project Name	**ATO4: Firmware Development for DDS & FPGA Devices**
Project Category	Quantum Technology
Education Level	Masters, PhD
Project Description	Atomionics is working on quantum sensors, based on cold atom interferometry, where atoms are cooled down to almost absolute zero using lasers. At Atomionics, you will get the chance to prototype, test, refine, finalise, and produce your designs toward making our devices compact and robust for field deployment with the only constraints being power and your imagination. As part of the laser optical system of the quantum sensor, a DDS (Direct Digital Synthesis) is used as a waveform generator to control phase and frequency of the signal waves. This is controlled by an FPGA and requires firmware to be written in VHDL.
Roles and Responsibilities	• Perform device system design and handle waveform signals. • Integration with the system software and electronics to enable accurate triggering, debugging, and data acquisition. • Key deliverables will include the development of a DDS + FPGA system that can replace the requirement of a waveform generator - enabling the miniaturisation of the electronics system design.
Requirements	• Strong in FPGA, Verilog/VHDL, Communication protocols. • Good to have experience in DDS, Oscilloscopes and Data acquisition. • Skills to be learnt are Atom interferometry and Laser cooling and trapping of atoms.

Org Name	**Entropica Labs**

Org Description	Entropica is a Singapore-based startup that originated from Singapore's Centre for Quantum Technologies (NUS). They are passionate about problem-solving and creating algorithms, software tools, methods and models to make Quantum computers useful. The current focus of Entropica is Quantum Optimisation, Machine Learning, and supporting enterprise customers to understand and integrate Quantum computing.
Project Name	**ENT1: Applied Mathematics with Quantum Computing**
Project Category	Quantum Technology
Education Level	Master, PhD
Project Description	The apprentice will learn and develop Quantum Computing approaches to real-world discrete optimisation problems. The main goal of the project is to bridge the gap between the most prevalent techniques in Optimisation, Machine Learning and near-term Quantum Computing. The apprentice will be contributing to Entropica Labs' core software technology and participating in customer projects. You will analyse models and suggest implementations on Quantum computers while benchmarking the performances using standard and proprietary datasets. You will also get the opportunity to work directly with our customers, assisting them with testing and implementing optimisation workflows.
Roles and Responsibilities	• Code and implement classical and Quantum Optimisation algorithms on a range of computing technologies. • Benchmark different hardware platforms and algorithms for Combinatorial Optimisation. • Analyse and present results to customers, partners and team colleagues. • Reviewing scientific literature and presenting complex ideas to the team. • Maintain good software and programming practices.
Requirements	• Strong in Python, Quantum Computing, Algorithms, Heuristic Optimisation, Physics. • Good to have experience in Computer Science, Quantum. Information Theory, High Performance Computing.

Org Name	**Entropica Labs**
Project Name	**ENT2: Numerics, Optimisation and Machine Learning Methods**
Project Category	Machine Learning; Deep Learning; Quantum Technolgy
Education Level	Masters, PhD

Project Description	The apprentice will be developing numerical methods for Machine Learning and Optimisation Theory to enhance the current capabilities in Quantum Computing and contribute to Entropica Labs' core software technology and participate in customer projects. The main goal of this project is to test advanced methods for Machine Learning to optimise Quantum computers' performances and benchmark Entropica's Optimisation Solvers by running benchmarking experiments using advanced annealing-based solvers.
Roles and Responsibilities	• Code and implement Machine Learning and Optimisation algorithms on a range of computing technologies. • Benchmark different hardware platforms and algorithms for Combinatorial Optimisation. • Review scientific literature and presenting complex ideas to the team. • Maintain good software and programming practices. • Potentially, contributing to scientific publications, patents and whitepapers.
Requirements	• Strong in Python Programming, Quantum Computing, Physics, Algorithms. • Good to have experience in Cloud computing, Quantum Information Theory, Reinforcement Learning.

Org Name	**SpeQtral**
Org Description	SpeQtral has recently kicked off the development of their pathfinder satellite Quantum Key Distribution (QKD) mission. In the next 3 years, SpeQtral will bring their quantum payload to full maturity and launch it on-board a dedicated spacecraft to perform space-to-ground quantum communication demonstrations.
Project Name	**SPQ1: Quantum Communications Technologies R&D**
Project Category	Quantum Technology; Cybersecurity

Education Level	Master, PhD
Project Description	To launch a constellation of satellites to enable worldwide entanglement distribution, serving as the communication backbone for the quantum internet. The apprentice will be supporting the R&D of space-based Quantum Entanglement instrumentation at SpeQtral, including entanglement generation onboard a nanosatellite and optimising quantum instrumentation. This can cover both hardware and software development efforts.
Roles and Responsibilities	• Design a prototype for Quantum Communications based on R&D output. • Investigate and implement error correction protocols in QKD software stack. • Design, integrate and test an opto-mechanical component or subsystem in SpeQtral's space instrument. • Be familiar with the basics of experimental Quantum optics for entanglement generation to drive opto-electronic devices such as lasers, single-photon avalanche photodiodes or liquid crystal polarisation rotators.
Requirements	• Strong in physics. • Good to have experience with FPGA. • Good to have knowledge of Altium, C,C++, circuit simulation.

Org Name	SpeQtral
Project Name	**SPQ2: Satellites for Quantum Communication R&D**
Project Category	Quantum Technology; Cybersecurity
Education Level	Master, PhD

Project Description	To launch a constellation of satellites to enable worldwide entanglement distribution, serving as the communication backbone for the quantum internet. The apprentice will be supporting the R&D of space-based Quantum Entanglement instrumentation at SpeQtral, including entanglement generation onboard a nanosatellite and optimising quantum instrumentation. This can cover both hardware and software development efforts.
Roles and Responsibilities	Some or all of the following may be applicable: ● Familiarisation with the basic process by which satellite system are developed. ● Familiarisation with spacecraft technologies for optical communication satellites. ● Familiarisation with SpeQtral's satellite mission development activities. ● Operate a satellite in Space and perform quantum entanglement experiments. ● Derive technical requirements for a spacecraft sub-system, generate system concepts and perform trade-off studies. ● Deliver detailed documentation on their progress throughout the project.
Requirements	● Strong in Python ● Good to have experience with C++, Cybersecurity, Electronics system design, Matlab, Mechanical Design

Org Name	SpeQtral
Project Name	**SPQ3: Quantum Entanglement Software R&D**
Project Category	Quantum Technology
Education Level	Master, PhD

Project Description	SpeQtral are commercialising quantum communications to prepare the world for the quantum future. Think quantum space lasers, entanglement and military level secure communications. As part of our mission to transform the world's networks we plan to launch a constellation of satellites to enable world-wide entanglement distribution. The earliest application of this is highly secure delivery of encryption keys to facilitate secret communications. The delivery of secret keys via quantum entanglement (or quantum key distribution, QKD) originates at a physical level, where light particles travel from one location to another and are detected by extremely sensitive detectors. However, once the light particles are exchanged and detected by the communicating parties, the extraction of the information that makes up the secret key is entirely reliant on software methods. In the QKD field, the necessary software to deliver the secret keys is known as the QKD software stack. From signal processing challenges (i.e. detection of correlation peaks in high-loss environments) to optimisation of security (i.e. implementation of error correction codes or privacy amplification) the QKD stack presents several challenges that need to be addressed in order to bring entanglement-based QKD from academic levels to commercial maturity.
Roles and Responsibilities	● Familiarise himself/herself with the basics on software tools. ● Implement a quantum key distribution environment, analyse performance parameters and optimise individual tasks throughout the QKD stack. ● Deliver detailed documentation on his/her progress throughout the project.
Requirements	● Strong in Quantum Information Theory. ● Good to have experience with C, C++, Java, Python, Query Language.

ROBOTICS

Org Name	**Augmentus**
Org Description	Augmentus is an AI-robot programming platform used by the world's leading robotics and advanced manufacturing companies. They offer a no-code and fully-integrated programming software that enables anyone, even those with no robotic experience, to program dynamic industrial robots in minutes. Their proprietary technology incorporates an intuitive graphical interface on an iPad that eliminates the need for coding and CAD files in robot teaching. Users simply plot robot waypoints or select a library of templates, and the software will generate the optimised robot paths while checking for singularity, reachability and collision avoidance.
Project Name	**AUM1: Fully-integrated and Offline Robot Simulator for AI-Robot Programming**
Project Category	Artificial Intelligence; IoT; Robotics
Education Level	Diploma, Bachelors
Project Description	Robot development is currently a fragmented and difficult process. This is particularly the case for dynamic automation development where AI and computer vision systems have to be integrated. The apprentice will be a part of Augmentus's technical team responsible for developing a fully integrated and offline robot simulation environment that allows users to program industrial robotic systems in minutes instead of months. The apprentice will also develop robot programming features that are important for robotic development across various industrial applications.
Roles and Responsibilities	• Solve scientific and technical challenges related to how robots perceive and manipulate tasks suited to real-world applications • Develop software components for interacting with various robots and end-effectors • Participate in the whole development cycle including design, development, and deployment for offline robot simulation environment • Tune the architecture for quality, including reliability, maintainability and scalability • Ensure seamless integration of various technologies (robotics & AI) into mobile device
Requirements	• Competent in C#, Machine learning frameworks, robotic software

	• Experience with Nvidia, Unity3D is a bonus • Opportunity to gain hands on robotics experience and deep learning skills

Org Name	**Fabrica Robotics**
Org Description	Fabrica supports the automation of tile grouting where the robot can grout tile gaps and clean off excess grout including the edges autonomously in any given space with the goal of boosting productivity. Human intervention is only needed to reload the grout and water. Fabrica uses Deep Learning Models with Computer Vision and LIDAR merged with SLAM developed on a Robot Operating System.
Project Name	**FAB1: Automatic Tile Grouting Robots to Boost Construction Productivity**
Project Category	Artificial Intelligence; Robotics/Autonomous Systems; IoT
Project Description	In this project, the apprentice will be part of the core development team focused on deploying our autonomous grouting robots in big spaces like shopping malls or airports. The work will build on top of the single-robot logic used for grouting apartments. The apprentice can expect to work on a subset of creating new simulation scenarios, making GPU accelerated simulations, developing distributed organization logic, ROS2 or Arduino code, figuring out user-robot interactions, enhancing deep computer vision models with newly collected data including deployment. There will be an opportunity to take ownership of work and be involved in testing the contributions on construction sites.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To support the end-to-end development cycle and create reproducible testing methodology and evaluate metrics on the hardware whilst being in-charge of the robots on the construction site. Responsibilities and Deliverables: • Simulation development

	● Writing new ROS2 logic ● Testing algorithms in simulations ● Statistical approach to testing ● Deployment in real world ● Ensuring seamless integration of various technologies ● Training DL CV models with collected data on server ● Deploying deep learning on accelerated hardware ● Utilising RaspPi and Arduino ● Achieving high-level view for ease of testing and reliability
Requirements	● Strong in Python and Robotic Software, Algorithms, Docker, and ROS ● Familiar with Computer Vision, Git, SLAM, Gazebo, DevOps, C++, and Distributed systems. Hands on Robotics experience will be a plus ● Skills to be learnt include hands on robotics experience, Agile Methodologies, Git, Gazebo, Algorithms, ROS and Linux.

Org Name	**Polybee**
Org Description	Pollination plays a massive role in global food security. Polybee is building autonomous solutions for pollination in those sectors of agriculture where natural pollinators cannot be used, and the only other way is to do it by hand. Their technology digitises the process of pollination and boosts yields with greater control. They achieve this using cutting-edge algorithms in Computer Vision, Deep Learning, and automation of drones.
Project Name	**POL2: Autonomous Navigation and Perception with Micro-drone for Pollination in Greenhouses**
Project Category	Robotics/Autonomous Systems
Education Level	Diploma, Bachelors
Project Description	In this project, you will be involved in deploying autonomous micro-drones in greenhouses, and liaise with the computer vision and software teams. As an aerial robotics apprentice at Polybee, you will find yourself in various dynamic and high-impact situations; one day you could be writing software to make a micro-drone fly itself to a flower and perform pollination, on another day you might be developing a mobile app to help their users interact with their robotic bees. You will have the opportunity to take ownership of your work and be involved in deploying your own contributions at their customers' sites.
Roles and Responsibilities	• Build the core autonomous navigation stack for micro-drones considering the resource constrained embedded systems that operate on such drones owing to their small size and low weight. • Reduce the computational load of the motion planning algorithms while still maintaining a high degree of environmental awareness. • Conceive, develop and test novel UAV prototypes by employing different methods of environmental interaction in various agriculture-based scenarios. • Design and create cost-effective and scalable UAVs.

	● Add more perception abilities using the onboard sensors in order to make the drones truly "autonomous". ● Perform quality control and implement integration tests. ● Work in tandem with other subteams at Polybee to develop and test hardware and software related to the functioning of micro-drones.
Requirements	You are expected to possess at least a subset of the following skills: ● Strong software development skills in C/C++ and Python. ● Strong knowledge of ROS, Gazebo, OpenCV. ● Coursework or knowledge of UAVs / aerial robotics, control theory, localisation, motion planning and navigation, computer vision. ● Knowledge and prior experience in parallel programming. ● Prior experience building robots, preferably UAVs, including hardware and electrical design. ● Strong knowledge of microcontrollers, PCB design, and embedded Linux. Good-to-have skills: ● Image processing: feature extraction, object detection and tracking. ● CAD (preferably SolidWorks). ● PCB Design. ● Machine learning, Deep learning. ● ROS-integrated Android/iOS/Web development experience.

Org Name	**RoPlus**

Org Description	RoPlus provides intelligent soft gripping solutions to automate production and packaging lines. With the capabilities to customise the finger actuator design with 3D-printing technology, we deliver optimised, safe and compliant gripping solution to the end-user. In addition, our unique reconfigurable gripper base can provide various grip poses to handle different items according to our in-house object detection model using deep-learning algorithm.
Project Name	**ROP1: Computer Vision and Motion Planning for Soft Robotic Catering**
Project Category	Robotics/Autonomous Systems; Computer Vision
Education Level	Master's, PhD
Project Description	RoPlus aims to help local companies automate their production lines for more innovative and faster production processes by providing automated gripping solutions with computer visioning. For the past three years, our R&D team has been focusing on developing soft grippers, exploring various automated solutions for production lines or retail distribution centres, and integrating computer vision in pick and place tasks. Our research experience in robotics and computer vision allows us to provide feasible and effective solutions for automation challenges in different industries. RoPlus provides intelligent reconfigurable gripping solutions to increase packaging efficiency. Our technology is expected to impact a range of industries, including but not limited to food assembly, vertical farming and fast-moving consumer goods packaging. Currently, we are expanding our team for our product launch. The robotics engineer is responsible for the evaluation of our gripper products with industrial partners, conducting durability tests to come to our product specifications, and supporting product developments for customisation projects at RoPlus. This individual should have experience in using open-source object detection algorithms or ROS motion planning API, and in dealing with industrial robotics systems. Fresh graduates with robotics experience are welcome to apply for the role as well.
Roles and Responsibilities	• Work with our technical lead to design and customise new robotic end effectors (hardware). • Evaluate existing gripping solutions and analyse those patents. • Conduct stress test analysis for product specification.

	• Work on the motion planning of robotic arm using ROS/other commercial software and able to integrate with computer vision system. • Industrial automation implementation and system integration, including but not limited to working with industrial partners/clients to fully integrate RoPlus system.
Requirements	• Proficient in Autodesk CAD/CAM, Mechanical Design, PCB design, Product development, Python. • Good to have experience in Computer Vision, Deep Learning, FEA, IoT, Robotic Software. • Skills to be learnt include 3D printing Electronics system design. • Potential to gain hands on robotics experience and learn about robotic software.

Org Name	**RoPlus**
Project Name	**ROP2: Optimisation of 3D printing in robotic production**
Project Category	Robotics/Autonomous Systems

Education Level	Diploma, Bachelor's
Project Description	RoPlus aims to help local companies automate their production lines for more innovative and faster production processes by providing automated gripping solutions with computer visioning. For the past three years, our R&D team has been focusing on developing soft grippers, exploring various automated solutions for production lines or retail distribution centres, and integrating computer vision in pick and place tasks. Our research experience in robotics and computer vision allows us to provide feasible and effective solutions for automation challenges in different industries. RoPlus provides intelligent reconfigurable gripping solutions to increase packaging efficiency. Our technology is expected to impact a range of industries, including but not limited to food assembly, vertical farming and fast-moving consumer goods packaging. Currently, we are expanding our team for our product launch. The apprentice will be a part of RoPlus's technical team responsible for developing standard protocols for validating product characters and providing proposals on higher repeatability results and quality management. In the end, we aim to have the apprentice monitoring our product performance prior to the official delivery to the client or to the next stage of integration.
Roles and Responsibilities	● Work with our technical lead to optimise 3D printing production protocols. ● Evaluate internal standardised products and quantify their performance. ● Conduct stress test analysis for product specification. ● Industrial automation implementation and on-site troubleshooting of failed production.
Requirements	● Proficient in 3D Printing, FEA, G-code, PCB Design. ● Good to have experience in Docker, ROS, C++, GitHub.

Org Name	**Venti Technologies**

Org Description	Venti is the global leader in the AV logistics hubs market. Founded in 2018 with technology developed in MIT professor Rus' lab, Venti develops, sells, and deploys software systems for driverless vehicles in ports, factories, warehouses, and communities. Venti gives customers a clear value proposition: Removing drivers saves multiple driver-shift costs, increases vehicle utilisation by 15%+, and significantly improves safety.
Project Name	**VEN1: Autonomous Prime Mover for Ports**
Project Category	Artificial Intelligence; Computer Vision; Deep Learning; Robotics/Autonomous Systems; Machine Learning
Education Level	Masters, PhD
Project Description	We are looking for the best of the best who are truly passionate about advancing our technology and want to change the world. Venti is developing self-driving container trucks, aka Autonomous Prime Movers (APMs) to move shipping containers between cranes within the PSA Singapore port. The project aims to alleviate the strains in supply chain by addressing manpower shortages and further improving operational efficiencies. The port offers unique challenges for deployment of self-driving vehicles such as high environment change (variable stock of stacked shipping containers, moving cranes), high occlusions from large actors and structures, all weather operational demands, tight positional tolerances for interfacing with cranes, interfacing with port specific infrastructure, specialised port traffic patterns with corresponding traffic rules, and control of long articulated vehicles (truck with trailer) under variable loading up to a maximum of 65 metric tonnes. Other problems are common to urban traffic scenarios, such mixed traffic (human and robot) driver navigation of intersections and lane changes with travelling speeds of up to 40 kph, which demands APM perception range of 150m. The project is in collaboration with PSA Corporation Singapore. The target is to deploy autonomous prime movers in the port to move the containers from one place to another within the port. The autonomous prime movers are to follow all the operation rules and conditions in the port and need to merge with manual driving prime movers at the same time. The travelling speed needs to be at 40km/h with a perception distance to reach 150m. At the same time, the autonomous prime movers need to interface with the different kinds of cranes and other port specific equipment.

Roles and Responsibilities	Scope of work: ● Develop camera based traffic light detection software package. Deliverables: ● A software package that is able to detect the traffic light and output the correct light status. ● The detection distance should be > 50m. ● Detection rate should be > 95%. ● The system needs to work robustly under raining and night. ● The frame rate should > 15 frame per second. ● The GPU memory usage should be < 1.0G.
Requirements	● Strong in C, C++, Machine Learning Framework, Python. ● Good to have experience in Autodesk CAD/CAM, Backend development, CUDA, Git, Image processing. ● Skills to be learnt include C++ and ROS.

Org Name	**Vilota**
Org Description	Vilota is a deep technology company building 3D vision-based sensing solutions for advanced robotics and automation. The aim is to enable robots to navigate in busy environments safely and responsively, eliminating blind spots with Vilota's patent-pending edge processing technology for 3D vision. Vilota's technology could also be used to enable smart cameras to perform cost-effective digitisation and optimisation of business processes, such as surveillance, logistics and retail. The company is a young startup on the lookout for highly motivated individuals seeking to make an impact on the future of automation
Project Name	**VIL1: 3D Occupancy Perception with Multiple Cameras**
Project Category	Artificial Intelligence; Robotics/Autonomous Systems; Computer Vision; Deep Learning

Project Description	3D occupancy perception, also known as stereo depth perception, is a fundamental building block of spatial perception. The underlying principle is called triangulation, i.e., finding matched points between two adjacent overlapping images captured by a stereo camera, and calculating the disparities between the matched points to derive depth information. This project is established for a key purpose of driving products that will democratise spatial perception of future autonomous and tele-operated robotic systems. Vilota specialises in vision perception solutions for mobile robots to achieve autonomous navigating capabilities in GPS-denied environments. The target and emphasis is to grow a suite of vision sensors and further develop an advanced vision perception software stack. By using state-of-the-art dense depth estimation methods, the primary aim of this project is to use vision-based perception to produce images of significantly higher resolution in comparison to competing technologies using multiple cameras.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To support Vilota in an existing proof-of-concept (POC) project that aims to optimise stereo vision depth perception, in areas of accuracy, reliability and efficiency for various use cases Responsibilities and Deliverables: ● Work on close-up sensing on robotic arms requiring millimetre-level accuracy ● Autonomous System to be able to navigate large open areas with common obstacles such as tree branches and overhead power lines and indoor venues typically equipped with walls, doors, and windows ● Hands-on programming in Linux environment ● Experiment and engineer multiple new approaches in 3D occupancy perception, under the guidance of the CTO whose key area of expertise is in research and engineering for drones and autonomous vehicles. ● Apply image processing techniques, deep learning concepts and programming knowledge to assist the team in driving products under 3D occupancy perception
Requirements	● Strong in Linux and C++ ● Familiar with Computer Vision, CUDA, Git, PCB design, ● ROS and SLAM ● Skills to be learnt include teamwork and equipment operation and communication skills.

Org Name	**Vilota**
Org Description	Vilota is a deep technology company building 3D vision-based sensing solutions for advanced robotics and automation. The aim is to enable robots to navigate in busy environments safely and responsively, eliminating blind spots with Vilota's patent-pending edge processing technology for 3D vision. Vilota's technology could also be used to enable smart cameras to perform cost-effective digitisation and optimisation of business processes, such as surveillance, logistics and retail. The company is a young startup on the lookout for highly motivated individuals seeking to make an impact on the future of automation
Project Name	**VIL2: 3D Real-time Semantic Understanding and Detection**
Project Category	Artificial Intelligence; Robotics/Autonomous Systems; Computer Vision; Deep Learning
Project Description	Robotics visual perception can generate two important types of information - geometry and semantics. The former has been well developed by several major players in the market, while the latter poses a higher technical barrier and therefore has become the focus of this job position. This project is established for a key purpose of driving products that will democratise spatial perception of future autonomous and tele-operated robotic systems. Vilota specialises in vision perception solutions for mobile robots to achieve autonomous navigating capabilities in GPS-denied environments. The target and emphasis are to grow a suite of vision sensors and further develop an advanced vision perception software stack. To achieve scalable autonomous applications, we currently develop a set of algorithms to recognize navigational-related features (like road signs and markings) common obstacles (like windows, doors, trees, and other mobile robots), and to further reason about the interrelationships of the objects in an image. In this project, candidate will build upon the existing deep-learning frameworks currently being used by the industry.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To support Vilota's existing proof-of-concept (POC) projects, to mainly enhance capabilities in sign recognition, through the fusing and filtering of detected objects using 3D occupancy data and eventually generating real-time 3D semantic understanding of the environment around the robot.

	Responsibilities and Deliverables: ● Deploying the algorithm on to real hardware and working with technology vendors to find the best technology-product fit, under the guidance of our CTO whose key area of expertise is in research and engineering for drones and autonomous vehicles. ● Explore with popular object detection approaches, deep learning frameworks (e.g., PyTorch) ● Use knowledge in common filtering and signal processing concepts to assist the team in generating real-time 3D semantic understanding and detection for the project
Requirements	● Strong in Linux and C++ ● Familiar with Computer Vision, CUDA, Git, PCB design, ● ROS and SLAM ● Skills to be learnt include teamwork and equipment operation and communication skills.

Org Name	**Vilota**
Org Description	Vilota is a deep technology company building 3D vision-based sensing solutions for advanced robotics and automation. The aim is to enable robots to navigate in busy environments safely and responsively, eliminating blind spots with Vilota's patent-pending edge processing technology for 3D vision. Vilota's technology could also be used to enable smart cameras to perform cost-effective digitisation and optimisation of business processes, such as surveillance, logistics and retail. The company is a young startup on the lookout for highly motivated individuals seeking to make an impact on the future of automation
Project Name	**VIL3: Visual Inertial Localisation in Densely Vegetated Areas**

Project Category	Artificial Intelligence; Robotics/Autonomous Systems; Computer Vision; Deep Learning
Project Description	Visual inertial odometry is an uprising approach for robotics localisation as an alternative to the more mature and conventional LiDAR-based localisation. Inevitably, a shortcoming of vision perception is that it has a shorter perception than LiDAR's, making it often less reliable in vast areas. However, visual perception still appeals to a large audience of technical users because of image sequences contain huge amount of information which have many other potential uses. This project is established for a specialised field that focuses on vision perception solutions for mobile robots to achieve autonomous navigation capabilities in GPS-denied environments. The target and emphasis are to grow a suite of lightweight vision sensors and further develop an advanced vision perception software stack. Hence, in this project, the team's primary aim is to fuse object instance detection results with the vision-based odometry to achieve optimal localisation with little or no drift in commercial settings.
Education Level	Diploma, Bachelors
Roles and Responsibilities	Scope of work: To support Vilota in an existing proof-of-concept (POC) project that aims to enhance the reliability and operability in the current visual inertial localisation technology for unmapped densely vegetated areas. Responsibilities and Deliverables: ● Understanding and applying in camera projection model, Multiview geometry and camera/laser ● Hands-on programming in Linux environment ● Use of sensors like cameras and laser ● Working with Simultaneous Localization and Mapping (SLAM) or Visual Inertial Odometry (VIO) framework and apply programming knowledge to assist the team in developing the software stack
Requirements	● Strong in Linux and C++ ● Familiar with Computer Vision, CUDA, Git, PCB design, ● ROS and SLAM ● Skills to be learnt include teamwork and equipment operation and communication skills.

Org Name	**Transcelestial Technologies**
Org Description	Transcelestial is building the future of Internet Distribution. The ultimate goal is to build a space laser network to deliver a step-change in internet connectivity globally. This will be the fastest way to bring the rest of the world up on the bandwidth and connectivity curve. Right now, we are using the same technology on the ground as “wireless fibre optics” in a product called CENTAURI. CENTAURI is our mass-produced network device which leverages our proprietary Wireless Laser Communication Technology to create a wireless distribution network between buildings, traditional cell towers, street-level poles and other physical infrastructure. It is the size of a shoe box, weighing less than 3kg and capable of delivering true fibre-like speeds to customers at a fraction of the cost of traditional fibre. There are two versions of devices available - 1 Gbps Full Duplex (4G & Enterprise ready) and 10 Gbps Full Duplex (5G-ready).
Project Name	**TRN1: Advanced control for free-space optics communication**
Project Category	Robotics/Autonomous Systems; Computer Hardware Engineering
Education Level	Masters, PhD
Project Description	Today, most countries worldwide lack access to the internet and the resources to do business, exchange ideas and learn. At Transcelestial, we are building a space laser communication network to deliver the future of Internet Distribution worldwide. This will be the fastest way to bring the rest of the world up on the bandwidth and connectivity curve. Laser-based communication technology has the potential to provide power-efficient communication with very high bandwidth. These benefits are achieved by utilising the communication laser's narrow beam divergence. However, as uninterrupted direct line of sight pointing is required for effective transmission, the very narrow beams pose a technical challenge due to the need for extreme pointing accuracy. The requirements for the pointing, acquisition and tracking subsystem are major limiting factors in designing laser-based communication systems (both in terrestrial and space applications). This project focuses on developing advanced control and signals processing techniques for applications such as satellite laser-based communication that are required to quickly establish communication with different ground terminals or even other satellites in orbit.

Roles and Responsibilities	● Gain understating of laser-based communication systems, focusing on precision pointing control. ● Research available literature to understand the state-of-the-art. ● Contribute to design discussions regarding systems architecture. ● Understand the existing control and signal processing method in the company's commercial products and seek possible improvement. ● Gain practical experiences such as prototyping, testing, implementation and data collection. ● Improve the testing environment for verification and validation of developed improvement. ● The project aims to improve pointing methods, including a demonstration on a prototype. ● Apprentice will work with senior engineers to translate the outcome into commercial value.
Requirements	● Strong in Computer Science. ● Good to have experience in Algorithms, Computer Vision, Electronics System Design, FPGA, Hands on robotics experience.