

CLP Internship Programme 2021

Project Outline - Technology Research

Project Code	TR_SAND_01	
Project Detail	Internship Category	Sandwich
	Internship Period	June 2021 to June 2022
	Preferred Discipline	First Preference: Mechanical Engineering Other Preference: Electrical Engineering
	Project Name	Development of Critical Pumps Condition Monitoring in D1 Combined Cycle Gas Turbine Power Plant
	Business Objective(s)	<ul style="list-style-type: none"> The objective of this project is to develop a real time monitoring system with automatic weekly report and advanced pattern recognition technology based on different critical parameters pump and motor bearing temperature, vibration and motor current in D1 CCGT unit. The strong analytical skill, statistical knowledge and good knowledge of computer software would be applied on this project. The basic operation of the CCGT unit will be fully understood with applying thermodynamic engineering and mechanical engineering knowledge on this project.
Project Description	<ul style="list-style-type: none"> There are many pumps and motors in the D1 Combined Cycle Gas Turbine unit of Black Point Power Station are critical to the reliability operation of the generation unit. These pumps and motors are including condensate extraction pumps (CEP), intermediate pressure/high pressure feedwater pumps (IP/HP FP), circulating water pumps (Circ. CWP), service cooling water booster pumps (SCWBP), closed cooling water pumps (Closed CWP), demineralized water distribution water pumps (DWP), and their motors. To better have a real time monitoring system for O&M personnel to keep track on the current status of critical pumps and motors and forecast the pre-developed equipment failures, it is necessary to comprehensively review the operating data of these pumps and motors and make use of these data to build conditional monitoring models in order to provide early alerts of premature failures and therefore, it enhances the operating reliability of D unit. 	
Project Deliverable	<ul style="list-style-type: none"> Develop a real time monitoring system in EtaPRO by making use of.D1 operating data. 	

		<ul style="list-style-type: none"> • Modify or create new model in EtaPRO to have prediction and alerts in critical parameters such as pump and motor bearing temperature, vibration and motor current for pumps and motors in D1 • Provide alerts automatically before the failure occurs • Create automatic weekly report
	Required Skills	<ul style="list-style-type: none"> • Strong analytical skill, statistical knowledge and good knowledge of computer software
	Learning	<ul style="list-style-type: none"> • Good opportunity to understand the operation & maintenance of gas-fired power plant • Be able to apply the mechanical knowledge and thermodynamics theory on the real industrial practice • Train up candidate's analytical and problem solving skills

CLP Internship Programme 2021

Project Outline - Technology Research

Project Code	TR_SAND_02	
Project Detail	Internship Category	Sandwich
	Internship Period	June 2021 to May 2022
	Preferred Discipline	First Preference: Electronic Engineering Other Preference: Electrical Engineering, Computer Science
	Project Name	EV Charger Protocol Translator
	Business Objective(s)	<ul style="list-style-type: none"> To develop a tool for EV charging protocol translation (including: OCPP1.5-2.0, Echonet lite, Modbus, etc.) To enable connection of different EV charging protocols between chargers and management system
	Project Description	<ul style="list-style-type: none"> CLP provides EV charging service since 2009. There are lots of EV chargers available on the market but usually difficult to connect EV chargers from different suppliers to a common platform. A protocol translator allows various type of chargers in different protocol to connect to the same platform which allow flexibility on procuring EV chargers on the market.
	Project Deliverable	<ul style="list-style-type: none"> Interim presentation for development progress update (6th-month) Protocol Translator Tool developed and tested on current platform and chargers (11th-month) Final presentation to manager (12th-month)
	Required Skills	<ul style="list-style-type: none"> Knowledge in PC applications, computer programming, website & server Knowledge of EV and Charging Technology is preferable Customer-oriented, self-motivated, good team player, analytical and able to work under pressure and tight schedule Strong sense of responsibility with good interpersonal and communication skills Proficiency in both spoken and written Chinese and English
Learning	<ul style="list-style-type: none"> Understand charging network of CLP Power Familiarize the latest technology on EV market and EV charging business To acquire in-depth knowledge on EV, charging network, management system 	

		<ul style="list-style-type: none">• To enrich the exposure in the negotiation, project management and analytical thinking
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CLP Internship Programme 2021

Project Outline - Technology Research

Project Code	TR_SAND_03	
Project Detail	Internship Category	Sandwich
	Internship Period	June 2021 to May 2022
	Preferred Discipline	First Preference: Computer Engineering Other Preference: Information System
	Project Name	Cloud Technology Analyst
	Business Objective(s)	<ul style="list-style-type: none"> To cultivate critical thinking, technical skills and innovative mindset; and mentor workforce for future business needs
	Project Description	<ul style="list-style-type: none"> Study and document the technical architecture of the various cloud environment components Study and document DevOps processes and checkpoints Document disaster recovery processes and practices to ensure the cloud environment can manage crisis situations Using scripts or appropriate Cloud native tools to automate manual tasks Provide technical writing skills for different applications and systems Support on security assessment services and established practices and processes to manage improvements and breaches Utilize appropriate tools to research, model, define, develop and document systems and interfaces
	Project Deliverable	<ul style="list-style-type: none"> Cloud artifact architecture documentation Technology and operation processes documentation Prototypes of new services or products
	Required Skills	<ul style="list-style-type: none"> Able to use diagrams (such as UML diagrams) to describe reality and requirements Experience in interfacing, system migration, solution architecture design work is highly desired Software development skills - python, nodeJS preferred
	Learning	<ul style="list-style-type: none"> Public cloud computing technology Microservice architecture Cloud native and serverless architecture DevOps process and tool chain

CLP Internship Programme 2021

Project Outline - Technology Research

Project Code	TR_SUM_01	
Project Detail	Internship Category	Summer
	Internship Period	June 2021 to August 2021
	Preferred Discipline	First Preference: AI or engineering background Other Preference: N/A
	Project Name	Energy Education Projects for Youth
	Business Objective(s)	<ul style="list-style-type: none"> To bring new ideas from young people with aspiration and capability To get short-term support and free up colleagues for strategic thinking and project planning
	Project Description	<ul style="list-style-type: none"> Assist in programme design and implementation of CLP's community programmes, such as Engineer in School Prepare research work for community relations activities Provide support in stakeholder engagement events and other cross-team functions
	Project Deliverable	<ul style="list-style-type: none"> Research for meetings, activities and topical issues. Participation in the development and implementation of youth programmes Support for cooperate functions and event logistics
	Required Skills	<ul style="list-style-type: none"> Good interpersonal and communications skills Proficiency in Chinese and English languages Knowledge on STEM education would be an added advantage
Learning	<ul style="list-style-type: none"> Acquire knowledge in corporate and community communications Gain experience and practical skills in project management Learn to be as a good team member with people at different levels in the organization 	

CLP Internship Programme 2021

Project Outline - Technology Research

Project Code	TR_SUM_02	
Project Detail	Internship Category	Summer
	Internship Period	June 2021 to August 2021
	Preferred Discipline	First Preference: Electrical engineering or related disciplines Other Preference: Science
	Project Name	In-depth Technology Research for Energy Sector
	Business Objective(s)	<ul style="list-style-type: none"> • CLP Research Institute provides primary research on emerging technology trends and capabilities related to generation, transmission and distribution, energy storage, retail applications, future energy systems, as well as resources and materials innovation. • CLP Research Institute regularly tracks different technologies that will impact the future of energy sector and shares trends insights with internal and external stakeholders.
	Project Description	<ul style="list-style-type: none"> • The primary responsibility of this role is to conduct in-depth research on the latest technology and emerging trends, market news and energy policies. • Research topics may include Micro-grid, DC grid, System/Component Maintenance, Advanced Infrastructure etc.
	Project Deliverable	<ul style="list-style-type: none"> • Perform literature review through desktop research on current technology status and emerging trends • Deliver detailed research papers and analysis on specific technologies • Assist in sharing trends and insights with CLP colleagues through seminars and internal digital portal
	Required Skills	<ul style="list-style-type: none"> • Good technology knowledge in the energy field • Ability to understand, summarise and communicate research works to general audiences in a timely manner • Excellent communication and writing skills
Learning	<ul style="list-style-type: none"> • Gain technology and research experiences in the energy sector • Enhance communication and writing skills • Strengthen information management and knowledge sharing skills • Develop critical thinking and articulate mindset 	

CLP Internship Programme 2021

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Project Code	TR_SUM_03	
Project Detail	Internship Category	Summer
	Internship Period	July 2021 to September 2021
	Preferred Discipline	First Preference: COMPUTER SCIENCE Other Preference: MATHEMATICS
	Project Name	Short term load forecast
	Business Objective(s)	<ul style="list-style-type: none"> • Conduct Peak Demand Forecast for the next day • Conduct Peak Demand Time Forecast for the next day • Conduct Peak Demand Pattern Forecast for the next day
	Project Description	<ul style="list-style-type: none"> • Improve the Daily and Weekly Peak Demand calculations • Better planning for future events • Facilitate plant scheduling
	Project Deliverable	<ul style="list-style-type: none"> • Monthly MAPE of peak demand (the 1st prediction) should be less than 2% for 1 year. (Average of absolute values of daily error) • Monthly MAPE of peak time (the 1st prediction) should be less than 2%. (Average of absolute values of daily error); Correct estimation means actual peak time is within half an hour before and after the estimated peak time. E.g. Estimation peak time is on 19:15 but the actual peak time is 19:35, the daily absolute error = $\text{abs}[(79-78)/96] = 1.04\%..$) • The 1st prediction should be available on or before 15:00 hrs every day with time interval.
	Required Skills	<ul style="list-style-type: none"> • Programming: Python or R • SQL • Power BI
	Learning	<ul style="list-style-type: none"> • Machine learning • Deep Learning • Statistics