Call for 2019 CCU Summer Internship

(Graduate/Under-G)

College of Engineering, National Chung Cheng University (CCU), Taiwan

1. **Goal**: The goal of this summer internship is to fulfill the collaborations between CoE/CCU and other overseas universities.

2. **Plan**: CoE of CCU would provide opportunities of summer intern for students for at least 7 weeks during March 1 to Aug. 31 (for more than 3 months, it is not limited by the above period). Applicants should read the requirements of each research topic carefully, finish the online application form, prepare related documents (such as transcript, research plan, certificate of language proficiency, recommendation letter, etc.), and send the ZIP-compressed file (containing PDF files) to our DIA (Division of International Affairs) in the following e-mail address:

   coleng_dia@ccu.edu.tw

   The title of the e-mail please be marked with "Application of 2019 CCU summer intern". All the intern research topics and their requirements are listed below. The online application form is at https://goo.gl/forms/nsScS63IqEkglHls1

3. **Requirement**: The applicants should be graduate or at-least grade-3 undergraduate students. Students who will be graduated before July, 2019 will not be accepted.

4. **Intern period**: The summer break for CCU is from middle June to middle Sept. However, considering the different summer break of the partner universities and the vacancy of student dormitory, the intern period will start from March1at earliest and end on Aug. 31at latest.

5. **Scholarship**: research topics are offered in two types: (A) scholarship and (B) self-supported. Each applicant can have at most 6 priorities about the preferred research topics, e.g., (P9B, P11A, P10A, P8A, P8B, P4B). For type-A, the accepted applicant will be offered with a scholarship covering the flight fare (maximum NTD10,000), living expense (NTD1,500 for one week), and free on-campus accommodation (however, you should pay the fees of electricity and internet yourself). For type-B students, we will arrange on-campus accommodations for them and the fee is about NTD4000~5000 for 2 months.

6. **Review**: The review of application is based on the following criteria: (1) GPA, (2)

prior technical experience, (3) future research plan, and (4) language proficiency. Essentially, for type-B students, the acceptance threshold will be lower. **For type-A students, we prefer to accept students of higher GPA, experienced, and longer intern period (e.g., at least 3 months, depending on respective advisor).**

7. **Important dates**: The deadline for application is **Nov. 30, 2018**. Note that this is a hard deadline since our schedule is tight. Applications with missing documents will be ignored without further review. The review result will be announced around **Dec. 12, 2018** and notification of acceptance/declination will be sent to each applicant individually.

Intern Research Topics

Number	P1
Project title：	Platform development of genome-scale metabolic network models and its optimal drug discovery
Description of the research (within 300 words)	This project is developed an algorithm of computational intelligence to infer oncogenes and to discover drug targets for various tissue specific cells, such as glial cell, pancreatic cell, urothelial cell, etc. In this inter, you will learn how to reconstruct a genome-scale metabolic model for each tissue specific cell and use our developed programs to infer oncogenes and to discover drug targets. You will also learn how to use biological databases converting the computational data to be biological meaningful results.
Mentor in CCU	Prof. Feng-Sheng Wang Dept. of Chemical Engineering, National Chung Cheng University, Taiwan. (chmfsw@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/**forth-year** undergraduate senior student ■ Both
Intern period	At least 3 months between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P2
Project title：	Study on the over-expression and production of proteins using recombinant Escherichia coli
Description of the research (within 300 words)	This research is to discover the high-cell-density cultivation of recombinant cells and mechanism of inclusion bodies formation in Escherichia coli over-expressing recombinant proteins. Therapeutic proteins and enzymatic proteins for biochemical production will selected as the targets. In this summer intern, you will learn how to construct the vectors for the over-expression of these proteins.
Mentor in CCU	Prof. Wen-Chien Lee Dept. of Chemical Engineering, National Chung Cheng University, Taiwan, ROC. (chmwcl@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student

	■ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P3
Project title：	Artificial-Intelligence Impulse Radar Signal Analysis
Description of the research (within 300 words)	This research is focused on ground penetrating system by impulse radar system with deep learning algorithm. It not only handles with hardware, but also integrates with the knowledge of signal analysis. The students who are familiar one of the skills such as matlab programming or instrument data extraction tool are preferred.
Mentor in CCU	Associate Prof. Janne-Wha Wu Dept. of Communications Engineering, National Chung Cheng University, Taiwan, ROC. (jwwu@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P4
Project title：	Small Object Detection
Description of the research (within 300 words)	This research is to explore the deep learning method to detect the small object in the image. The small object detection is important for several applications such as remote object avoidance of ADAS systems; which can help to avoid the obstacle from the long distance; or small object detection in the aerial image, which is used for the surveillance purpose. In this summer intern, you will learn: - How to read a research paper, organize the main idea, and prepare the presentation. - How to implement your ideas in the programing language. - How to cooperate in the teamwork. - Advanced techniques in Image Processing, Computer Vision and Machine Learning.
Mentor in CCU	Prof. Ching-Chun Huang Dept. of Electrical Engineering,

	National Chung Cheng University, Taiwan, ROC. (chingchun.huang6@gmail.com)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P5
Project title：	Content-aware 360 degree video coding
Description of the research (within 300 words)	This research is about the 360 degree video coding system. Capturing the scene and representing it with efficient panoramic images will be first addressed. Then a saliency video is generated and served as a guidance for efficient 360 degree video coding to offer high quality video. In this summer internship, the intern not only learn C/C++ programs to implement the proposed techniques, related deep learning platform is also accessed.
Mentor in CCU	Prof. Jui-Chiu Chiang Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (rachel@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 8 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P6
Project title：	The structure design of modern generators and motors
Description of the research (within 300 words)	This research is to design the structure of modern generators and motors using Finite Element Method (FEM) and electromagnetic method. The candidates need some background and experience for FEM or motor design. Additionally, the candidates must have good capability on English reading and writing.

Mentor in CCU	Prof. Yuan-Kang Wu Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (allenwu@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 8 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P7
Project title：	Renewable Energy Forecasting
Description of the research (within 300 words)	This research is to forecast renewable power generation. The candidates need some backgrounds on time series, statistics, AI technique and Matlab programming. Additionally, the candidates must have good capability on English reading and writing.
Mentor in CCU	Prof. Yuan-Kang Wu Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (allenwu@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 8 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P8
Project title：	Machine Learning for VLSI Design Automation
Description of the research (within 300 words)	The project is to explore modern machine techniques for Electronic Design Automation (EDA), specifically for VLSI chip design. The candidates will study and present recent published papers in the EDA field, proposed new methods to solve existing or new VLSI design problems, and implement the methods with C/C++ or Python programming languages.
Mentor in CCU	Prof. Mark Po-Hung Lin Dept. of Electrical Engineering,

	National Chung Cheng University, Taiwan, ROC. (marklin@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	About 3 months
Category	■ A: Scholarship
	■ B: Self-supported

Number	P9
Project title：	Video-based augmented reality (AR) system for gaming
Description of the research (within 300 words)	This research is to explore the design of a video-based AR/VR system for young people's gaming. In this system, a camera, a display, and a computing device (PC or notebook computer) are used to achieve the purpose. The young guy stand on a ground without anything. However, they can see a virtual carpet around their feet on the display so that they can walk, jump, or dance on the carpet in a pattern instructed by the computer tutor. This activity is interesting and helpful to exercise. This system will never require a physical carpet, thus significantly saving the system cost and space requirement. You are requested to design the image/video processing techniques so that an AR system is achieved. Skills in C/C++ programming are required.
Mentor in CCU	Prof. Wen-Nung Lie Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (ieewnl@ccu.edu.tw)
Expected student level	☐ Post-graduate student ■ Third/forth-year undergraduate senior student ☐ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	☐ A: Scholarship
	■ B: Self-supported

Number	P10
Project title：	Activity recognition based on low-resolution Near Infrared imager and deep learning approach
Description of the research (within 300 words)	This research is to recognize human's action (stand, walk, run, fall-down) from multiple low-resolution near infrared imager. Our approach will be based on machine learning techniques such as CNN or RNN (deep learning). This technique is useful in video

	surveillance or health care system to monitor elder persons' daily life. The intern student is expected to have some preliminary knowledge on NN (neural network) or deep learning and skilled in C/C++ and Python programming. He/She will learn how to apply state-of-the-art deep learning techniques to solve the indicated problems.
Mentor in CCU	Prof. Wen-Nung Lie Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (ieewnl@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both (with high GPA for UG students)
Intern period	At least 10 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	☐ B: Self-supported

Number	P11
Project title：	Design of intelligent vision system for eye-in-hand robot arms
Description of the research (within 300 words)	This research is to design an intelligent vision system for robot arms. The camera is installed on the robot arm, so called eye-in-hand. You can design an image processing system to drive the robot arm to see, recognize, pick, and place the objects from anywhere to everywhere. This vision system will be a key technology for Industry 4.0. In this summer intern, you will learn how to write C/C++ programs for image processing/pattern recognition, and learn how to control the robot arm. Hopefully, you can learn how to use deep learning techniques for object recognition.
Mentor in CCU	Prof. Wen-Nung Lie Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (ieewnl@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 8 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P12
Project title：	Influence of Lubrication, Preloading and Thermal Expansion for Ball Screw

Description of the research (within 3000 words)	Research Field
	Tribology, Nanomechanics, Nanotechnology, Surface Texture, Characterization, Fabrication and Performance,
	Research Description
	The student participating in this project will analyze the relationship among lubrication, preloading and thermal expansion of the ball screw moving system. Our research team has built two ball screw test system to simulate and monitor the ball screw moving behavior, lubrication condition, temperature rise, friction force, wear condition, preloading force etc. Over the course of the project, the student will acquire a detailed knowledge of ball screw principle and relationship between lubrication, friction force and temperature rise. Besides ball screw study, our other research projects involve high speed ball bearing and lubrication system, contact mechanics of rough surfaces in tribology, deposition of diamond-like carbon coatings, nanomechanics, biomedical materials mechanics and chemical mechanical polishing/planarization.
Mentor in CCU	Prof. Yeau-Ren Jeng Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (imeyrj@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	☐ B: Self-supported

Number	P13
Project title：	Thermal analysis of an atmospheric-pressure helium dielectric barrier discharge reactor
Description of the research (within 300 words)	Atmospheric-pressure helium dielectric barrier discharges are essential plasma sources for medical applications such as wound healing and cancer treatment. This project will conduct measurements of reactor temperature and rotational temperature of the discharge by the infrared thermometer and the spectrometer, respectively. The mechanisms of gas heating will be explored by numerical simulations using plasma fluid model solving species continuity equations and gas flow model considering conjugate heat transfer within the reactor. The simulated

	temperature will be compared with the measured reactor temperature to validate the model. You will learn how to conduct the thermal analysis including measurements/simulations and the fundamental basics of plasma reactor.
Mentor in CCU	Assistant Prof. Kun-Mo Lin Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (imekml@ccu.edu.tw/kmlin.tw@gmail.com)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P14
Project title：	Characterization of ozone in atmospheric-pressure helium dielectric-barrier discharges
Description of the research (within 300 words)	Atmospheric-pressure helium dielectric barrier discharges are essential plasma sources for medical applications such as wound healing and cancer treatment. This project will measure ozone densities in the reactor under various operating conditions by using ultraviolet absorption spectroscopy (UVAS). The mechanisms of ozone generation will be explored by numerical simulations using plasma fluid model solving species continuity equations, electron energy density equation, and the Poisson equation. The simulated results will be validated by measurements. You will learn how to conduct the optical measurements for determining ozone densities and the fundamental basics of plasma reactor.
Mentor in CCU	Assistant Prof. Kun-Mo Lin Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. (imekml@ccu.edu.tw/kmlin.tw@gmail.com)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported

Number	P15
Project title：	Friction Stir Welding and Friction Stir Additive

	Manufacturing (FSAM) Process
Description of the research (within 300 words)	This work focuses on a development of a solid state welding and additive manufacturing technique by applying the friction stir welding to 3D solid state friction stir additive manufacturing (FSAM) to attain microstructure refinement and structural integrity and efficiency. The scope of this work for the summer interns includes equipment modification, innovative jig & fixture design, new tool design for lap stir joint of stacked layers of sheet metal combination, setup of parameter-windows, microstructure study and materials test.
Mentor in CCU	Prof. Jong-Ning Aoh Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. (imejna@ccu.edu.tw)
Expected student level	☐ First-year graduate student ☐ Third/forth-year undergraduate senior student ■ Both Note that: students who will graduate in June/July, 2019 will not be accepted
Intern period	At least 7 weeks between March 1 and Aug. 31
Category	■A:Scholarship
	■B:Self-supported

Number	P16
Project title：	Effect of operating conditions on the performance of an all-vanadium redox flow battery
Description of the research (within 300 words)	The performance of the VRFB is influenced by operating conditions, such as electrolyte concentration and electrolyte flow rate. Students will conduct experiments to investigate the effect of operating conditions on the performance of the VRFB and determine a suitable operating strategy.
Mentor in CCU	Prof. Yong-Song Chen Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. (imeysc@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 8 weeks between March 1 and Aug. 31
Category	■ A: Scholarship
	■ B: Self-supported