Call for 2020 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 international universities.

2. **Plan**: CoE of CCU would provide opportunities of summer internship for students for at least 7 weeks during Mar. 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) at the following e-mail address: coleng_dia@ccu.edu.tw.
   The title of the e-mail please be marked with "Application for 2020 CCU summer intern". All the intern research topics and their requirements are listed below.

   The online application form is at https://forms.gle/SYVV1Rx8xxHB9hFw7

3. **Requirement**: The applicants should be graduate or at-least grade-3 undergraduate students. Students who will be graduated before July 2020 will not be accepted.

4. **Intern period**: The summer break for CCU is from middle June to middle September. However, considering the different summer break of the partner universities and the vacancy of the student dormitory, the intern period will start from March1at the earliest and end on Aug. 31at the 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, he/she should pay for the fees of electricity and internet him/herself). 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 with 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, 2019**. 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, 2019** and notification of acceptance/declination will be sent to each applicant individually.

Intern Research Topics

Number	P1
Project title：	Nanotechnology on batteries and supercapacitor
Description of the research (within 300 words)	Synthesis of carbon-based nanomaterials for the use of battery specially, lithium ion battery, metal air battery or supercapcitor. Students are required for the experiments of the material synthesis, characterization and battery applications.
Mentor in CCU	Prof. Yuan-Yao Li Dept. of Chemical Engineering, National Chung Cheng University, Taiwan. (chmyyl@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 8 weeks
Category	☐ A: Scholarship ■ B: Self-supported

Number	P2
Project title：	Study on the topics of biochemical engineering and biomedical sciences
Description of the research (within 300 words)	This project aims to recruit undergraduate and postgraduate students from the universities in South and Southeast Asian countries to CCU laboratories for technical training and short-team research. Topics of research cover biochemical engineering (applied microbiology, enzyme engineering, protein expression and large-scale production), systems biology, metabolic network simulation, cancer epigenomics, and neurodegenerative diseases. Each student can choose one of those topics and work on a laboratory in either the Department of Chemical Engineering or the Department of Biomedical Sciences.
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 and CMOS RFIC
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. Another topic " CMOS RFIC" is provided for the students interested at the RF intergarted circuit design.
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 8 weeks between March 1 and Aug. 31
Category	■ A: Scholarship ■ B: Self-supported

Number	P4
Project title：	Implementation of evaluation scenario in 5G/B5G communication of IMT-2020
Description of the research (within 300 words)	This project is to build topologies and derive environmental channel conditions in several generally accepted scenarios which contain focused 5G/B5G challenges in the IMT-2020, such as very high data rate, high reliability, low latency and very dense crowds. These scenarios include indoor offices, dense urban environment, and urban macro base stations. In this intern, you will learn performance evaluation and visualization of future 5G/B5G communication systems in IMT-2020.
Mentor in CCU	Prof. Jen-Yi Pan Dept. of Communications Engineering, National Chung Cheng University, Taiwan, ROC. (e-mail: jypan@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	P5
Project title：	Visual and skeleton-based action recognition based on deep learning approach
Description of the research (within 300 words)	This research is to recognize human's action (stand, walk, run, fall-down, talking, etc.) from the single-view video or skeleton data. Our approach will be based on machine learning techniques such as CNN, RNN, or LSTM (deep learning). This technique is useful in video surveillance or health care center to monitor 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++ or 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
Intern period	At least **8 weeks** between March 1 and Aug. 31
Category	■ A: Scholarship **(partial, 50%~100%)** ■ B: Self-supported

Number	P6
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 12 weeks between March 1 and Aug. 1
Category	■ A: Scholarship ■ B: Self-supported

Number	P7
Project title：	Saliency-driven Tone Mapping for HDR Image Display Using Deep Learning
Description of the research (within 300 words)	This research is about the tone mapping (TM) technique. To enable the display of HDR image on the conventional device, TM technique is needed. TM techniques will preserve the details of the HDR image as much as possible while allowing pleasing visual experience. To better retain the details of the HDR image, a saliency driven TM is investigated in this research. In addition, the derived TM model is generated based on a deep learning architecture.
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 12 weeks between March 1 and Aug. 1
Category	■ A: Scholarship ■ B: Self-supported

Number	P8
Project title：	Important Issues for Renewable Generation Integration into Power Systems
Description of the research (within 300 words)	This research is to understand important issues for the impact of high penetration of renewable generation integration on power system operations and the corresponding strategies to reduce the risks, such as renewable power forecasting, inertia control, power system modeling, energy storage system, generating unit scheduling, and power system stability.
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 12 weeks between March1 and Aug. 31
Category	■ A:Scholarship ■ B: Self-supported

Number	P9
Project title：	Thermal characterization for atmospheric-pressure microsecond pulsed helium discharges
Description of the research (within 300 words)	Atmospheric-pressure helium plasmas have been developed extensively in the last two decades for various biomedical applications such as wound healing, cancer treatment, and sterilization due to the efficient generation of reactive species. Discharge temperature is one of the major concerns for applications with discharge treating human tissues. This project will conduct thermal analysis for an atmospheric-pressure microsecond pulsed helium discharges including experimental measurements and numerical simulations. The temperature distribution of the reactor surface will be measured via the the rotational spectra (i.e., N_2(C→B)) collected by the spectrometer. A computational fluid dynamic (CFD) model will be built with the heating source evaluated by the plasma fluid model to simulate the temperature distribution within the reactor. The simulated results will be validated and the plasma heating mechanisms will be studied.
Mentor in CCU	Prof. Kun-Mo Lin Dept. of Mechanical Engineering National Chung Cheng University, Taiwan, ROC. (e-mail: imekml@ccu.edu.tw)
Expected student level	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both
Intern period	At least 2 months between March 1 and Aug. 31
Category	■ A: Scholarship ■ B: Self-supported

Number	P10
Project title：	Study on the effect of operating conditions on the performance of an open cathode fuel cell
Description of the research (within 300 words)	The performance of the fuel cell with an open cathode is affected by the supplied gas properties, such as flow rate, temperature, and humidity. Students need to understand the principle of fuel cells and factors that influence of fuel cell. In this research, student will conduct experiments to investigate the performance of a fuel cell under various operating conditions.
Mentor in CCU	Prof. Yong-Song Chen Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. (e-mail: 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 August 31
Category	■ A: Scholarship ■ B: Self-supported

Number	P11
Project title：	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	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both Note: students who will graduate in 2020 will not be considered
Intern period	At least 3 months between **JUNE 20** and Aug. 31
Category	■ A: Scholarship ■ B:Self-supported

Number	P12
Project title：	Bobbin Friction Stir Welding process development
Description of the research (within 300 words)	This work focuses on a development of a solid state welding process with self-supporting stir tool. 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	☐ Post-graduate student ☐ Third/forth-year undergraduate senior student ■ Both Note: students who will graduate in 2020 will not be considered
Intern period	At least 3 months between **JUNE 20** and Aug. 31
Category	■ A: Scholarship ■ B:Self-supported

Number	P13
Project title：	Interdisciplinary opto-mechanical integration
Description of the research (within 300 words)	Our research is mainly for cross-domain integration research, such as integration of semiconductor solar photovoltaic components and single-cell biochips, to achieve self-powered biochips, integration of various micro-nano process technologies such as laser interference lithography, anodized aluminum, nano Imprinting technology on solar cells, light-emitting diode components and the development of novel optical analysis techniques on two-dimensional materials, in the study of cross-domain integration, the study of basic physical mechanisms is very important, such as electronic hole pairs The relationship between transmission and the polarity of cancer cells, the mechanism of the surface microstructure of the surface for the generation of surface plasma waves, and the interaction between the atomic layer and the atomic layer in two-dimensional materials. These basic mechanisms involve physics, chemistry, materials, optics and other related fields. Interactions, and there are still many unclear issues on the subject of these studies. If you can further solve these mysteries, you can make a considerable contribution to both basic science and engineering.
Mentor in CCU	Prof. Hsiang-Chen Wang Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. (hcwang@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 August 31
Category	■ A: Scholarship ■ B:Self-supported