

Call for 2017 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 6-8 weeks during June 1 to Aug 31. Applicants should read the requirements of each research topic carefully, prepare related documents (such as application form, transcript, research plan, certificate of language proficiency, recommendation letter, etc.), and send the ZIP-compressed file (containing PDF files) to Mrs. Yvonne Wu (admuwu@ccu.edu.tw). The title of the e-mail please be marked with "Application of CCU summer intern". All the intern research topics and their requirements are listed below.
3. **Requirement:** The applicants should be graduate or senior undergraduate students. Students who will be graduated in this June/July/August 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 June 1 at earliest and end on Aug. 31 at latest.
5. **Scholarship:** research topics are offered in two types: (A) scholarship and (B) self-supported. Each applicant can have at most 5 priorities about the preferred research topics (A and/or B types). For type-A, the accepted applicant will be offered with a scholarship of maximum NTD\$24,000 to cover the flight fare (maximum NTD10,000), living expense (NTD1,500 for one week; maximum NTD12,000), and transportation in Taiwan (maximum NTD2,000). Accepted applicants will also be offered with free on-campus accommodations (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 for 2 months. For your reference, in 2016, only 9 students were accepted with scholarship among 28 applicants.
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.
7. **Important dates:** The deadline for application is **March 31, 2017**. Note that this is a hard deadline since our schedule is very tight. Applications with missing documents will be ignored without further review. The review result will be

announced by **April 10, 2017** and notification of acceptance/declination will be sent to each applicant individually.

Intern Research Topics

Number: P1	
Project Title	Estimation of front vehicle distance based on single camera for ADAS applications
Description of the research (within 300 words)	This research is to explore the image processing algorithm to estimate the distance of the front vehicle based on a single CCD camera which is installed near the rearview mirror of the car. This estimation is important for ACC (Adaptive Cruise Control) function in ADAS systems (Advanced Driver Assistance Systems). In this summer intern, you will learn how to write C/C++ programs and develop algorithms to achieve the above purpose.
Mentor in CCU	Prof. Wen-Nung Lie Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. ieewnl@ccu.edu.tw http://www.dsp.ee.ccu.edu.tw/wnlie.html
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input type="checkbox"/> A: Scholarship <input checked="" type="checkbox"/> B: Self-supported

Number: P2	
Project title :	Human pose estimation based on multi-view images by using deep learning approach
Description of the research (within 300 words)	This research is to estimate human pose (in terms of a human's 3D skeleton model) from multi-view silhouette images. Our approach will be based on machine learning techniques such as SVM or CNN (deep learning). This technique is useful in video surveillance system used to monitor human's action or detect anomaly events (such as falling down of elder persons). The intern student is expected to have some preliminary knowledge on NN (neural network) and be skilled in C/C++ programming. He/She will learn how to apply state-of-the-art deep learning techniques (e.g., CNN, RNN) 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 http://www.dsp.ee.ccu.edu.tw/wnlie.html
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship <input type="checkbox"/> B: Self-supported

Number: P3	
Project title :	Advanced Wireless Sensing Radar Systems for Biomedical and Localization Applications
Description of the research (within 300 words)	<p>This research focuses on the development of sensing radars for various applications. The goal is to enhance those radars' performance from approaches of hardware design and new algorithm development. Several sensing radars have been successfully developed by our group during the past years. The applications include human vital-sign and motion detection, birds' wing beat frequency detection, indoor wireless positioning, and precise surgical tool tracking.</p> <p>The prospective interns will involve various tasks, depending their skills, interest and study objective:</p> <ul style="list-style-type: none"> • Antenna and antenna array design • Microwave and millimeter-wave circuit integration • System integration • Microprocessors, programming in C, or LabView
Mentor in CCU	Name: Prof. Sheng-Fuh Chang Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. E-mail: ieesfc@gmail.com Web: https://sites.google.com/a/ee.ccu.edu.tw/wireless-communication-lab/
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship <input checked="" type="checkbox"/> B: Self-supported

Number: P4	
Project Title	Modelling and control for PMSG-based wind generator systems
Description of the research (within 300 words)	Modern wind farms are mostly equipped with variable speed wind turbines (VSWT). Permanent Magnet Synchronous Generator (PMSG) is a common type of generator that has been used in industry. This project will summarize the technological evolution and corresponding papers for PMSG first; then this project will study the structure and common control technologies of PMSG. Additionally, this study will also utilize the power system analysis software PSCAD or Simulink to implement the coordinate transformations, dynamic model of generator, wind turbine model, direct torque control, vector control, space vector pulse width modulation (SVPWM), as well as phase-locked loop(PLL) technologies, and finally integrated into a complete PMSG- based wind power generation system.
Mentor in CCU	Associate Prof. Yuan-Kang Wu Dept. of Electrical Engineering, National Chung Cheng University, Taiwan, ROC. allenwu@ccu.edu.tw https://sites.google.com/site/ccureslab/
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P5	
Project Title	Development of direct borohydride/peroxide fuel cells (DBPFC)
Description of the research (within 300 words)	<p>A direct borohydride/peroxide fuel cell operates with liquid fuel and oxidant, which reduces to challenges of hydrogen and oxygen storage. A DBPFC can be employed for the power source of unmanned under water vehicles. In this project, students will study the effect of operating parameters on the performance of a DBPFC, including catalyst loading, concentrations of anolyte and catholyte, current density, and flow rates of fuel and oxidant.</p> <p>Tasks and requirements:</p> <ol style="list-style-type: none"> (1) Understanding basic principles of fuel cells. (2) Familiar with Matlab and Labview (3) Measuring performance under various operating conditions (4) Reviewing journal papers and writing experimental report
Mentor in CCU	<p>Prof. Yong-Song Chen Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imeysc@ccu.edu.tw https://sites.google.com/site/ccumefuelcell/</p>
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship (2) <input checked="" type="checkbox"/> B: Self-supported (2)

Number: P6	
Project Title	Development on the aptamer-based microfluidic system for fast detection of circulating tumor cells utilizing electrical impedance sensing
Description of the research (within 300 words)	This topic is to develop the hardware and software systems and devices for rapid diagnosis of circulating tumor cells (CTCs). We will develop an aptamer-based technology of microfluidic sensor capable to fast detect circulating tumor cells in whole blood for cancer diagnosis. We will design microstructures in the microfluidic channel for mixing the whole blood sample with lysing buffer in the upstream region to lyse the blood cells. Then, cancer cells will be captured on the aptamer-modified surface via the dielectrophoretic effect in the downstream region while the electric field is applied. The interns will work on the development of impedance sensing techniques.
Mentor in CCU	Prof. Chun-Ping Jen Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imecpj@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship (2) <input type="checkbox"/> B: Self-supported

Number: P7	
Project Title	Development on the aptamer-based microfluidic chips for dielectrophoretic capture of circulating tumor cells
Description of the research (within 300 words)	Aptamers are single-stranded DNA oligonucleotides, and they are more stable than the protein antibodies, due to the unique conformation have high selectivity to their targets while they are easy to modify with any labels and chemical groups. Due to the high selectivity and stability of aptamers, their use as an affinity sorbent for circulating tumor cells (CTCs) in microfluidic devices allows detecting circulating cells in a few ml of blood. Some unique properties of the aptamers make them more preferable in comparison with protein antibodies for CTCs sorption. In our project, we will develop an aptamer-based technology of microfluidic sensor capable to fast detect circulating tumor cells in whole blood for cancer diagnosis. We will design microstructures in the microfluidic channel for mixing the whole blood sample with lysing buffer in the upstream region to lyse the blood cells. Then, cancer cells will be captured on the aptamer-modified surface via the dielectrophoretic effect in the downstream region while the electric field is applied. The interns will focus on the chip design and finding aptamers for cancer identification.
Mentor in CCU	Prof. Chun-Ping Jen Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imecpj@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship (2) <input type="checkbox"/> B: Self-supported

Number: P8	
Project Title	Friction stir welding (FSW) of aluminum alloys.
Description of the research (within 300 words)	Tasks and requirements: 1. Conducting friction stir welding on aluminum plates 2. Preparation of tensile test and microstructure specimens 3. Conducting materials testing on FSW-joints 4. Basic knowledge and experience on operating machine tools 5. Basic knowledge on Strength of Materials and materials testing
Mentor in CCU	Prof. Jong-Ning Aoh Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imejna@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P9	
Project Title	Automatic Control/ Control of a dual-arm robot
Description of the research (within 300 words)	
Mentor in CCU	Prof. Shyh-Leh Chen Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imeslc@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P10	
Project Title	Tribology/ Influences of Misalignment on the Preload Force of Ball Screws
Description of the research (within 300 words)	Tasks and responsibilities of the student: 1)Basic knowledge about ball screws. 2)Knowledge about the design of the machine and how machine tools work like. 3)Basic knowledge about measuring with strain gauges and setup the amplifier. 4)Evaluate measured data with MS Excel. 5)Analytical thinking
Mentor in CCU	Prof. Yeau-Ren Jeng Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imeyrj@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P11	
Project Title	Fatigue analyses of friction stir processed AA6061/SiC composites
Description of the research (within 300 words)	In this work, aluminum matrix composite (AMC) will be generated at the butt weld nugget of AA6061 by inserting SiC particles into matrix using friction stir processing (FSP). Flat tensile test specimens of friction stir processed (FSPed) AA6061/SiC composites will be made along the weld. Both quasi-static tensile tests and fatigue tests will be conducted. Optical microscope (OM) and scanning electron microscope (SEM) will be used to examine the microstructures and fatigue cracks of tested specimens. The micro-hardness distributions of FSPed AA6061/SiC composites will be obtained using a Vickers hardness tester.
Mentor in CCU	Associate Prof. Pai-Chen Lin Dept. of Mechanical Engineering, National Chung Cheng University, Taiwan, ROC. imepcl@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input checked="" type="checkbox"/> Third/forth-year undergraduate senior student <input type="checkbox"/> Both
Intern period	Any 6-8 weeks between Jun 1 and Aug 31
Category	<input type="checkbox"/> A: Scholarship <input checked="" type="checkbox"/> B: Self-supported (2)

Number: P12	
Project Title	Image classification and recognition based on deep learning
Description of the research (within 300 words)	This project is related to image classification or recognition based on deep learning techniques. Images of a specific domain may be chosen, and deep learning techniques should be applied to learn image representation as well as doing classification/recognition. In this summer intern, you will learn the concept of deep learning and image processing. You are requested to write programs and develop algorithms to achieve the above purpose.
Mentor in CCU	Prof. Wei-Ta Chu Department of Computer Science and Information Engineering, National Chung Cheng University, Taiwan wtchu@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P13	
Project Title	Computation of Multi-rule Trip planning queries
Description of the research (within 300 words)	This research is to explore the classical algorithm for the traveling salesman problem and to extend the algorithm to solve the multi-rule trip planning queries. The intern needs to do the following tasks: (1) develop a crawler to collect point of interests as the popular places to visit; (2) design an algorithm to compute an itinerary for a user given his/her personal constraints; (3) design an interface to receive the user inputs and to show the results. In this summer internship, you will learn how to use Java, or C/C++ programs to implement the above-mentioned algorithms.
Mentor in CCU	Prof. Yu-Ling Hsueh Dept. of Computer Science, National Chung Cheng University, Taiwan, ROC. hsueh@cs.ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P14	
Project Title	Stereoregularity control in polymer syntheses
Description of the research (within 300 words)	Stereoregularity control is an important issue in polymer syntheses as stereoregularity (tacticity or chirality) in polymer architecture offers elevated physical properties (higher melting points and stronger mechanical strength in tactic polymers; and unique optical properties in chiral polymers) and unique applications that may found important industrial applications. In our prior studies we demonstrated that the self-assembly of stereoregular block polymers led to the generation of unique nanopatterns which were drastically different from the block copolymers with non-stereoregular skeleton (<i>Macromolecules</i> , 2013 , <i>46</i> , 3005-3014; <i>Angew. Chem. Int. Ed.</i> , 2015 , <i>23</i> , 14313–14316). The current project will aim to the syntheses and self-assembly studies of new stereoregular polymer and block copolymers)
Mentor in CCU	Prof. Jing Cherng Tsai Dept. of Chemical Engineering, National Chung Cheng University, Taiwan, ROC. E-mail: chmjct@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship (for graduate students) <input checked="" type="checkbox"/> B: Self-supported

Number: P15	
Project Title	Study on the over-expression of proteins in Escherichia coli
Description of the research (within 300 words)	This research is to discover the 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	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship <input checked="" type="checkbox"/> B: Self-supported

Number: P16	
Project Title	Design of a Wireless Embedded System for Internet-of-Thing application
Description of the research (within 300 words)	This project is aimed at design an Internet-of-Thing application based on microprocessor system with wireless communication capability. Microprocessor is a fundamental component in electric products as well as the core of the embedded system. This project introduces the design of microprocessor, how it collects data from outside components and controls peripheral devices, how to communicate with other devices wirelessly.
Mentor in CCU	Name: Huang-Chen Lee Dept. of Communications Engineering, National Chung Cheng University, Taiwan, ROC. E-mail: huclee@ccu.edu.tw Web: http://www.neatlab.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input checked="" type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported

Number: P17	
Project Title	Optoelectronic Properties of Multilayer Stacking Cadmium Sulfide-Graphene Composite Material
Description of the research (within 300 words)	Graphene is a suitable material in the application of photodetectors for its high carrier mobility and broad wavelength absorption ability. However, its optical transmittance and the carrier recombination speed is extremely high after illumination, resulting in poor photoresponse. In this study, the visible-light photoresponse of graphene is enhanced by growing cadmium sulfide (CdS) through Successive Ionic Layer Adsorption and Reaction (SILAR) method on graphene.
Mentor in CCU	Prof. Chu-Chi Ting Dept. Opto-Mechatronics National Chung Cheng University, Taiwan, ROC. ccting@ccu.edu.tw
Expected student level	<input type="checkbox"/> First-year graduate student <input type="checkbox"/> Third/forth-year undergraduate senior student <input checked="" type="checkbox"/> Both
Intern period	Any 6-8 weeks between June 1 and Aug. 31
Category	<input type="checkbox"/> A: Scholarship
	<input checked="" type="checkbox"/> B: Self-supported