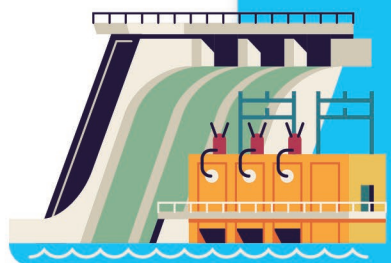
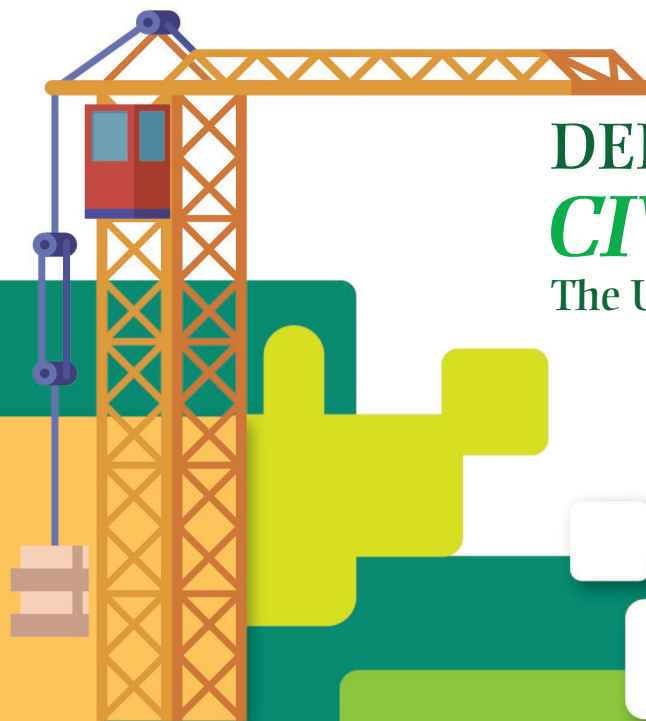




香港大學
土木工程系

DEPARTMENT OF
CIVIL ENGINEERING
The University of Hong Kong



01

HEAD'S MESSAGE

02~03

TEACHING & LEARNING

Undergraduate Programme ◀

Postgraduate Programmes ◀

04~05

RESEARCH ACTIVITIES

- › Structural Engineering
- › Geotechnical Engineering
- › Water and Environmental Engineering
- › Traffic and Transportation Engineering
- › Construction Engineering and Management

Contents

06~10

RECENT RESEARCH
PROJECTS

11~15

STUDENT ACTIVITIES

- › Civil Engineering Society
- › Experiential Learning – Project Mingde
- › Internship Programmes
- › Site Visits and Field Trips

16~17

STUDENT AWARDS

Head's Message



**PROFESSOR
F.T.K. AU**

Since the establishment of The University of Hong Kong and the Faculty of Engineering in 1912, the Department of Civil Engineering has nurtured many brilliant leaders in the civil engineering discipline and made significant contributions to the local and overseas communities. To embrace future challenges, the Department is always looking ahead to modernising its goals in education and research in order to keep abreast of the ever-changing demands of modern society.

The Department has developed a new and innovative 4-year curriculum to equip students with knowledge beyond traditional civil engineering subjects, for example the double degree in business and the minor programmes. In the 2018-19 academic year, a new BEng curriculum will be introduced for the common year one studies to strengthen the science and mathematics foundation of our students. New courses would be introduced to provide students with more in-depth knowledge in mechanics, dynamics and computer programming. Students will also have the opportunity to participate in a mini group project.

Since 2004, the Department has also established Project Mingde (明德工程), through which arrangements are made for our students to take up the design and construction of real-life projects in Mainland China, locally or overseas. To date, six projects have been successfully completed, including (1) Mingde Lou (明德樓), a primary school built in Guangxi Province (廣西省) in 2005; (2) Gewu Lou (格物樓), a dormitory for the Rongshui Vocational Training School (融水職業高中) in Guangxi completed in 2008; (3) Zhengdong Street Kindergarten (正東街幼兒園) in Chongzhou (崇州), Sichuan Province (四川省) completed in 2011; (4) a footbridge at Yingdong (英洞), Guangxi, completed in June 2013; (5) a cultural and community Centre at Dabao village (大保屯), Guangxi completed in 2015; and (6) JWDA Building (駿地樓), a teacher quarters at Daping (大平) Village Primary School, Guangxi completed in September 2017.

In summer of 2015 to 2017, our students also joined forces with

students from the Faculty of Social Sciences and participated in three service trips to Vietnam and helped to build sanitation facilities and two small libraries for rural schools. At present, Project Mingde is working on a new project to renovate Duling Primary School (獨嶺小學) in Guangxi.

Through Project Mingde, the educational goal of bringing real project into the classroom and vice versa, bringing the classroom into the project, is realized. The Department is very fortunate to have a group of dedicated volunteers and alumni to provide professional guidance and mentorship to our students for these projects. We would continue to look for meaningful and educational projects and opportunities for our students.

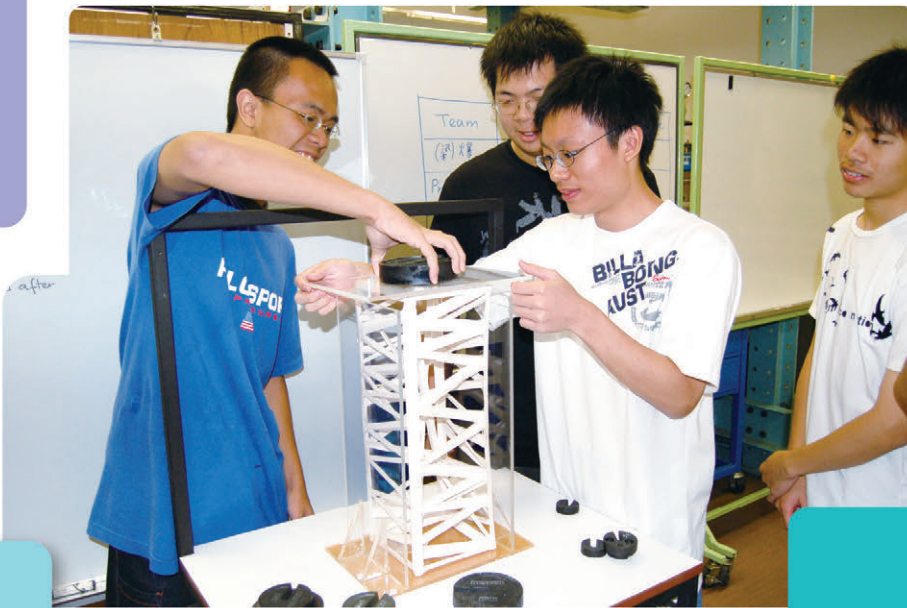
The Department has continuously attracted top students and earned a good reputation in both academia and industry. We ranked 11th globally under the QS University Subject Ranking 2018 in the subject area of Civil and Structural Engineering. With the continued growth in the local construction industry, there is a great demand for civil engineers. Moreover, there are many opportunities for young and enthusiastic civil engineers to participate in the infrastructure developments in China. The Department of Civil Engineering will continue to devote itself to improve our teaching, research, knowledge exchange and community service for the betterment of society.

March 2018

Teaching & Learning

UNDERGRADUATE PROGRAMME

In line with the changing roles of civil engineers, the undergraduate programme is now becoming more versatile. Besides the main stream civil engineering programme, students may also take a minor programme from a range of disciplines, such as Business, Finance or Economics. A double degree in BEng in Civil Engineering and Bachelor of Business Administration (BBA) is also available. All courses are fully accredited by The Hong Kong Institution of Engineers. At HKU, we emphasise on creative thinking and problem-solving skills, and our Department will continue with the fine tradition of nurturing the next generation of leaders in the civil engineering profession through our undergraduate programme.



POSTGRADUATE PROGRAMMES

Research Postgraduate (RPg) Programmes

The Department offers world-class research postgraduate (RPg) programmes for degrees of Master of Philosophy (MPhil) and Doctor of Philosophy (PhD). RPg studies are supervised by leading researchers in various areas of civil engineering, including environmental, geotechnical, structural, transportation engineering and infrastructure project management.

Taught Postgraduate (TPg) Programmes

Taught postgraduate programmes are offered for part-time/full-time study. The taught Master of Science in Engineering (MSc(Eng)) programmes provide advanced education in various fields to cater for the increasing demand for further specialisation in civil engineering. The MSc(Eng) degree programmes include:

- Environmental Engineering
- Geotechnical Engineering
- Infrastructure Project Management
- Structural Engineering
- Transportation Engineering



Research Activities

STRUCTURAL ENGINEERING

Computational mechanics; finite element and finite strip analysis; earthquake engineering; tall buildings; bridge engineering; concrete technology and reinforced concrete structures; fibre-reinforced polymer composites; steel structures and fire resistance of metal structures; concrete-filled composite structures; soil-structure interaction; computer-aided design/analysis; strengthening and repair of civil engineering infrastructure; RC structures under fire; semi-rigid joint connections.



*Stonecutters Bridge »
(Courtesy of Highways
Department)*



*« Resonant column testing system for soil
dynamics research*

GEOTECHNICAL ENGINEERING

Soil/structure interaction – foundation engineering, tunnelling, cavern engineering, monitoring; rock and slope engineering - landslide investigation, mitigation; ground improvement; geoenvironmental engineering; soil mechanics – micromechanics, unsaturated soils, soil particle wettability, soil dynamics and earthquake engineering; advanced testing – field testing, field studies, laboratory testing; numerical modelling of geomaterials – constitutive modelling, continuum modelling, discrete element modelling.

WATER AND ENVIRONMENTAL ENGINEERING



Environmental Analysis »

Hydrology; environmental hydraulics and fluid mechanics; water quality modeling; advanced water and wastewater treatment; environmental biotechnology; solid and hazardous waste management; material resources recovery; environmental impact assessment.

TRAFFIC AND TRANSPORTATION ENGINEERING

Bike sharing and network design; continuum modeling in transportation; dynamic traffic assignment; green and smart transportation; public transportation; road safety; taxi; traffic and pedestrian flows; traffic management and control; traffic signals; transportation demand modeling; transportation, land use and the environment; transportation logistics; transportation network design; transportation network reliability and resilience; transportation systems engineering.



« *The Hong Kong Transportation System*

CONSTRUCTION ENGINEERING AND MANAGEMENT

Smart, sustainable and resilient city; zero carbon building; life cycle assessment; building information modelling; infrastructure asset management; project delivery; construction productivity and performance; construction informatics; innovative construction technologies; off-site prefabrication and modular construction; lean construction.

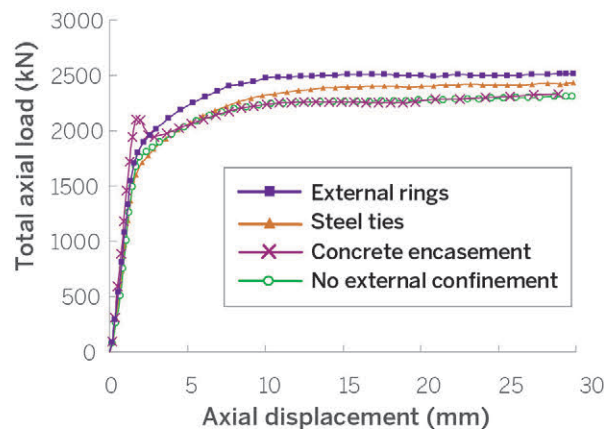
Brainstorming and refining » *R&D outputs with Industry*



Recent Research Projects

UNI-AXIAL BEHAVIOUR OF CONCRETE-FILLED-STEEL-TUBE (CFST) COLUMNS WITH EXTERNAL CONFINEMENT

A series of uni-axial compression tests have been increasingly adopted for construction of columns of tall buildings because of their improved strength, stiffness and ductility. It reduces the consumption of steel, cement and concrete, and thus contributes to a greener construction environment. However, one of the problems for CFST columns is that the confinement of steel tube is not fully effective during the initial elastic stage due to the different Poisson ratios of steel and concrete. To overcome the problem, different forms of external confinement, including steel rings and ties, to confine the steel tube as well as the concrete core that enables a perfect interface bonding, have been adopted. A series of uni-axial compression tests have been carried out in the Department of Civil Engineering since January 2011. It was found from the test results that the externally confined CFST columns had superior strength and stiffness when compared with the ordinary CFST columns without external confinement.

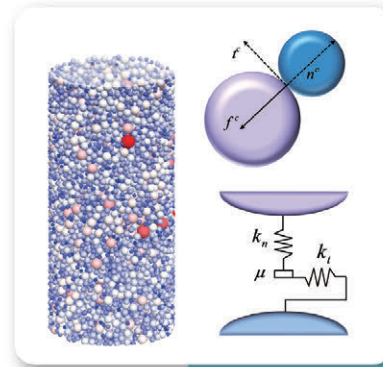




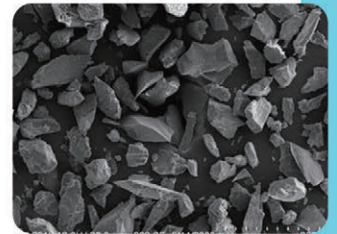
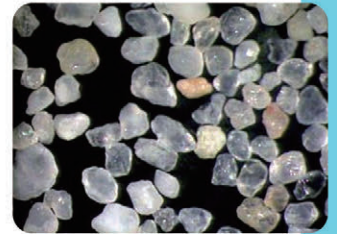
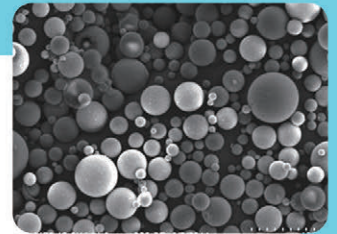
« Laboratory testing

TOWARDS A COMPREHENSIVE UNDERSTANDING OF GRANULAR SOIL BEHAVIOUR

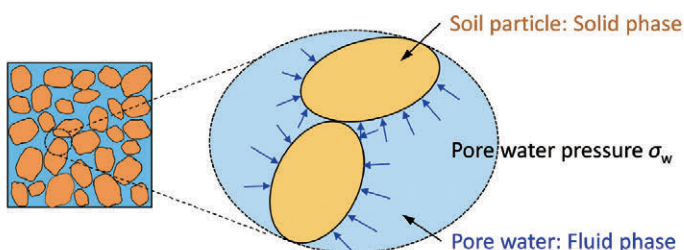
In many major geotechnical applications, such as the design and construction of hydraulic fills for artificial islands or dams and the installation of large foundations for offshore energy structures, geotechnical engineers and researchers have to deal with the complex behavior of granular soils (e.g. sand) under various loading conditions and to ensure that any failures of these engineering structures would not occur. This is a challenging task because soil is a natural rather than manufactured material and its overall behavior is influenced by many factors. A salient feature of granular soil, which is of scientific fascination, is that a mass of granular soil can exist over a range of densities at constant stress and the spectrum of states corresponds to a variety of responses, ranging from flow liquefaction failure (fluid-like behavior) to strain hardening (solid-like behavior). This complexity originates mainly from the particulate nature of soil, that is, the overall mechanical response of soil is highly dependent on the packing patterns (fabric) and interactions of the constituent soil particles. This long-term research uses experimental, theoretical and computational approaches to deepen our understanding of the diverse behaviors of granular soils. The findings and results will contribute to the development of more reliable and cost-effective geotechnical designs. A number of publications in the leading geotechnical engineering journals have been resulted from this research. The research has received support from the Research Grants Council of Hong Kong and the National Natural Science Foundation of China.



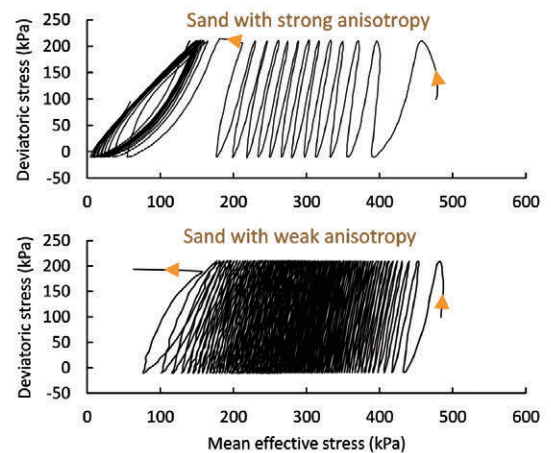
« Computational modeling



« Some of test materials



« Cyclic loading behavior of water-saturated sand



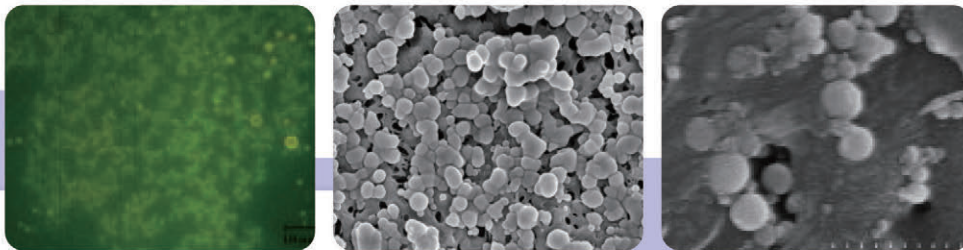
《 Membrane fabrication



DESIGN OF NEXT GENERATION ANTI-BIOFOULING MEMBRANE FOR WATER TREATMENT

The ability to control, manipulate, and design novel materials to remediate contaminated natural resources, while avoiding the release of environmental pollutants, will be a major challenge of the 21st century. Pollution of water resources is an emergent issue that is quickly widespread and the technological advancement in water reuse strategy is urgently needed. Therefore, the reliable and efficient membrane technology has become a legitimate alternative to both conventional water and wastewater treatment processes. However, biofouling on the membrane surface significantly reduce the treatment efficiency of membrane systems and is a key need for achieving the membrane technology breakthrough. An innovative surface modification technique with permanent impregnation of alumina nanomaterials into the membrane was invented by the research team in the department, and the new membrane has proven to effectively reduce the biological adhesion on the surface. This research work had successfully attracted the Innovation and Technology Fund from the government of HKSAR, and the result of technological invention was selected by the university to file as an U.S. patent.

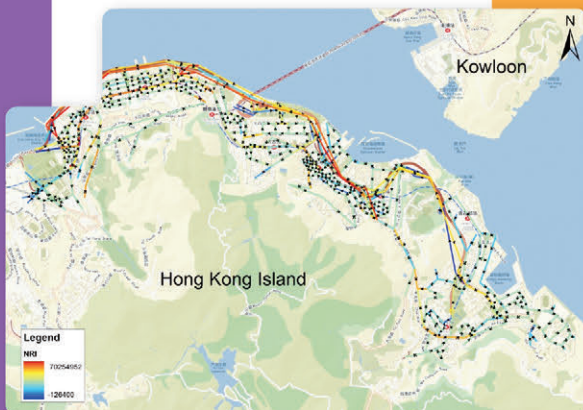
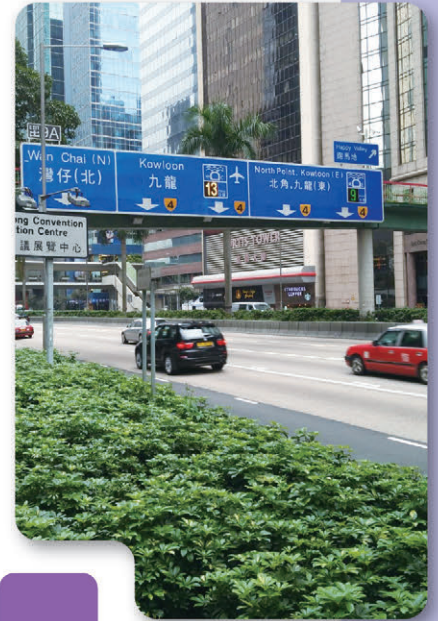
《 Membranes testing system



《 Alumina anchoring, surface modification, and bacteria adhesion reduction on membranes

A SOFTWARE TOOL WITH A STRATEGIC APPROACH FOR IDENTIFYING CRITICAL TRANSPORT INFRASTRUCTURES AND BUILDING RESILIENCE OF URBAN TRANSPORT SYSTEMS

Transport infrastructures often fail to ensure smooth and quick movements of goods and people due to man-made or natural disruptions, such as heavy rains, typhoons, train operation failures, and traffic accidents. This 2-year project, which was jointly funded by Arup China and the Innovation and Technology Commission, aims to develop a software tool to systematically identify the critical transport infrastructures under disruptions, determine the ranking of these infrastructures, the maximum impact of each infrastructure failure, and build resilience of urban transport systems cost-effectively. This tool is particularly suitable for the applications to Asian cities, such as Hong Kong, with multimodal and dense transport networks. Case studies of Eastern District in Hong Kong is carried out to illustrate the usage and functions of the tool, mitigate the potential impacts of the disruptions to the current transportation system, and give recommendations to improve this system. The project can help (1) improve the reliability of supply chain and other transport related services, (2) minimize the losses of Hong Kong economy and productivity, the business of private companies, and time of people due to disruptions, (3) minimize the reduction of mobility of goods and people during disruptions, as well as (4) effectively allocate the limited budget to build and maintain transport infrastructures.



The following figure illustrates the results for Eastern District in Hong Kong. NRI is the difference in total travel time of all flows in the entire network after and before the removal of the link concerned. The higher the value of NRI, the more the critical the link is. According to the figure, majority of links with high NRI values are located along on Island Eastern Corridor and King's Road, meaning that they are critical from the perspective of resilience. Measures should be set up to mitigate the impacts due to the complete blockage of these major sections.

Courtesy of AMS »

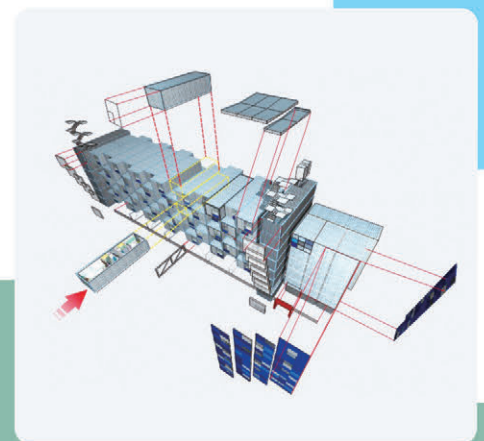
MODULAR INTEGRATED CONSTRUCTION FOR HIGH-RISE BUILDINGS

Modular Integrated Construction (MiC) is a game-changing innovation that fundamentally reshapes the design and building process and modernizes the construction industry by integrating the modularization theory and various technologies. The MiC approach has been explored to enhance the productivity, competitiveness and sustainability of the construction industry. In Hong Kong, the Government Policy Address 2017 proactively promotes the adoption of MiC. However, there are various technical and social challenges such as engineering complexity for high-rise and tall buildings, onerous design codes, geographical constraints and complex supply chains.



In addressing the challenges the Centre for Innovation in Construction and Infrastructure Development (CICID) conducts a number of studies carefully planned in a socio-technical systems manner. One of the studies is commissioned by the Development Bureau (DEVB) of the Government on the feasibilities of adopting MiC for high-rise buildings in Hong Kong. Identified are benefits in improved quality, safety, sustainability and cost-competitiveness, but also challenges in structural engineering and detailing, supply chain integration and red tape, providing an evidential base for strategy development. Other studies include, also commissioned by the DEVB, producing a paper to suggest probable policy directions on the development of MiC to the Government, supporting the organisation of a MiC international conference, and conducting detailed structural analysis of steel-framed MiC for up-to-40 storey buildings which addresses structural stability, seismic design and quality assurance.

Further studies include one funded by the Construction Industry Council on the identification, analysis and establishment of supply chains of MiC for Hong Kong, which delivers a smart-tech integrated platform for project delivery, and another commissioned by the Housing Authority on the viability of adopting MiC for public housing construction, which examines the benefits and challenges in terms of regulation, policy, technical, cost and productivity enhancement. CICID also provides academic advice for the pilot MiC project of constructing two towers of 1,228 student residential units for HKU at Wong Chuk Hang, which values over HK\$1 billion. The research findings contribute new knowledge of innovative construction and impactful engineering and development solutions for modern society.



« Courtesy of CIMC

Student Activities

CIVIL ENGINEERING SOCIETY

Civil Engineering Society, ENS, HKUSU is a student-run, academic-oriented organisation under the Department of Civil Engineering in HKU. It is the sole organisation of civil engineering programmes that represents students, and over 95% of full time undergraduates of the curriculum are a member of the Society. The objectives of the Society include serving the civil engineering students and facilitating communication between the Society and external bodies. Furthermore, the Society also aims at promoting civil engineering to the general public and to other students of The University of Hong Kong.



Since the establishment of the Civil Engineering Society in 2001, the Society has been organising activities with the objective of improving members' university life. For academic related activities, site and firm visits are held to bring members more practical knowledge, while career talks are organised to help them learn about the current working environment. Apart from that, to enrich members' social life, social and sports functions are organised, while welfare products and service are provided. Moreover, the Society aims at being the bridge between students and teaching staff. Other than communicating with and reflecting members' opinions to Department, Civil Annual Dinner is also held to facilitate communication between members and teaching staff.

While focusing on students, the Society works on promoting civil engineering to others as well. For instance, Orientation camp is organised annually to welcome fresh undergraduates on their journey to becoming a civil engineer. Academic forum is also arranged to encourage discussion among teaching staff, engineers in the industry and the general public regarding recent civil engineering projects.



EXPERIENTIAL LEARNING – PROJECT MINGDE

Project Mingde is a pioneer program of experiential learning to provide our students with the opportunity to apply and utilize their knowledge and skills gained in the classroom to hands-on multi-disciplinary Civil Engineering projects in the process of becoming competent and accountable engineers. Also through participation in real-life projects, students understand the needs of the society; learn how to communicate with different parties and to contribute to the society with their own efforts and expertise. This experience will not only fortify their confidence and interests in the Civil Engineering discipline but also give them a sense of satisfaction while caring for the society.

« *Students helped the local workers to build brick walls of the library*



Since 2003, over 500 university students, teaching staffs and alumni have deeply involved into six projects in Mainland China namely the Mingde Building, the Gewu Building, the Zhengdong Jie Kindergarten, the Chaoyang Bridge, the Mingde Pan Cultural and Community Centre, and the JWDA Building, as well as three projects in Vietnam namely the Sanitation Facilities at Tan Hung Secondary School, the Cuong Chinh Secondary School Library, and the Trung Dung Primary School Library.

Last summer, 7 Civil Engineering students, 10 Social Sciences students and 2 Comparative Literature students participated in one of our construction projects in Vietnam for 7 weeks. They supervised and helped the local contractor to build a national standard library for Trung Dung Primary School. The library is a typical Vietnamese-style one-storey building, which consists a library room (for about 45m²), and a computer room (for about 20m²). Other than the library construction, the students shared core living values with the local school children and conducted surveys about their reading habits, living environment, and potential hazards in households, etc. In this cross-disciplinary experiential learning programme, the students exchanged their skills and talents among themselves from different disciplines. They learnt the specific engineering knowledge as well as the social aspects of the construction work.



《 The new three-storey teacher quarters

JWDA Building (Daping Primary School Teacher Quarters) was completed and a handover ceremony was held on October 1, 2017. Throwback to April 2015, we received a request from the school to carry out a feasibility study for improving its learning and teaching environment. There are 9 teachers and 230 students in the school. As many students lived in villages which might be a few kilometers away from the school, there are strong demand for on-campus accommodation. Due to lack of spaces, teachers could only live with students in the two-storey student dormitory during teaching weeks and only 80 students could be accommodated. As such, a classroom in the teaching block, which did not have any water supply and sanitation facilities, was used as the boys' dormitory. To address the accommodation needs for both teachers and students, Project Mingde helped demolish the old kitchen in the teaching block and build a new three-storey building of teacher accommodation. After the construction, 10 teachers moved in the new teacher quarter whereas the existing student dormitory could accommodate 40 more students. The living environment and condition has been improved.



《 Teachers and students participated in this project attended the opening ceremony on 1 October

In addition, a 5-day 4-night summer camp was organised last summer on 11-15 June. 20 undergraduate students from various faculties (Engineering, Medicine, Science, Arts, Social Sciences and Education) joined the trip and visited Guangxi. They spent most of their time in Daping Primary School for voluntary teaching and providing health care services. It was an extraordinary experience for the participants to sleep at the school in a remote village without electricity at night and hot water supply, and now they have a better understanding on the poor living condition of local villagers in impoverished regions.



《 Participants and the local school children at Daping Primary School

《 Voluntary teaching at school about personal health and hygiene



INTERNSHIP PROGRAMMES

All civil engineering undergraduate students have to complete at least 4 weeks of internship and the Mandatory Basic Safety Training (MBST) course as part of the Bachelor of Engineering Civil Engineering degree programme. Most students would take their training in Hong Kong while some would go abroad. They usually work as engineers' assistants with consultants or contractor firms. In recent years, students have had some new training programmes held in the Mainland China, such as those in Beijing and at the Three Gorges and Jinsha River sites.

SITE VISITS AND FIELD TRIPS



《 Students visited the construction site of the Second Humen Bridge in Guangdong



《 Site visit to study large-diameter bored pile construction in Hong Kong



《 Students' field trip to the Three Gorges Dam in Yichang



《 Students' field trip to the ruins of 5.12 Sichuan Earthquake

Student Awards



《 Mr. Chai Tze Ho (4th from left)

Mr. Chai Tze Ho (2015 graduate) won the Emerging Engineers Award 2016 (First Prize) from the Institution of Civil Engineers Hong Kong Association Graduates and Students Division for his final-year project work on permeability of granular soils (supervisor: Dr. Jun Yang).

Miss Chan Wing Lam (CivE 4 2016-17) and **Mr. Li Hin Wai** (CivE 3 2016-17) were awarded the Young Tsun Dart Scholarship (Renewal in 2016-17).

Mr. Chan Pui Hei (CivE 3 2016-17), **Miss Chan Wing Lam** (CivE 4 2016-17), **Ms Cheung Chin** (CivE 2 2016-17), **Mr. Kot Yiu Kwan** (CivE 3 2016-17), **Mr. Lam To Lun Jeffrey** (CivE 2 2016-17), **Mr. Leung Shun Hei** (CivE 2 2016-17), **Mr. Ngai Kin Hang Andrew** (CivE 2 2016-17) and **Mr. Wong Tung Ngai** (CivE 3 2016-17) were awarded the YS and Christabel Lung Undergraduate Scholarship for Engineering Students (Renewal).



Mr. Lam Chun Tung (Grad June 2016) was awarded the HKIE Geotechnical Division Prize Competition on AECOM for Best Final Year Geotechnical Project 2016. His supervisor was Professor Z.Q. Yue.

《 Mr. Lam Chun Tung (right)

Mr. Lim Jia Le (CivE 3 2017-18) was awarded the CMA and Donors Scholarship 2017-18.

Mr. Liu Yingxiao and **Mr. Wong Ho Ching** (Civ4 2016-17) were awarded the Hui Yin Hing Scholarship 2016-17.

Mr. Mak Chung Man (June 2016 Grad) was awarded the Wing Lung Bank Ltd Prize in Civil Engineering 2015-16 and the HKIE Geotechnical Division Prize on AECOM Prize for Best Student of the Year 2016.

Mr. Ng Tsz Wai Jason (CivE 2 2016-17) was awarded the HKIE Scholarship. Mr. Ng (CivE 3 2016-17) was also awarded the Edward Keller Achievement Award in Civil Engineering 2015-16 and the Ho Lu Kwong Prize in Civil Engineering 2015-16.

« *Mr. Ng Tsz Wai Jason (right)*



« *Mr. Tse Chit Hei Jordan (right)*

Mr. Tse Chit Hei Jordan (CivE 2 2017-18) was awarded the HKIE Scholarship 2017-18.

Mr. Wong Tung Ngai (CivE 4 2017-18) was awarded the HK Cheng Prize in Civil Engineering 2016-17.



DEPARTMENT OF CIVIL ENGINEERING

6/F, Haking Wong Building, The University of Hong Kong
Pokfulam Road, Hong Kong

Tel: (852) 2859 8024

Fax: (852) 2559 5337

Email: civdept@hku.hk

Home page: <http://www.civil.hku.hk/>

UNDERGRADUATE PROGRAMME

**BEng (CivE) –
Professor K. Shih**

Tel: 2859 1973

Email: kshih@hku.hk



POSTGRADUATE PROGRAMME

Taught Postgraduate Programme (MSc) – Dr. J. Chen

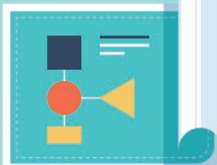
Tel: 2859 2646

Email: jichen@hku.hk

Research Postgraduate Programme (MPhil/PhD) – Dr. J. Yang

Tel: 2241 5273

Email: junyang@hku.hk



UNDERGRADUATE ADMISSIONS

Dr. W.Y. Szeto

Tel: 2857 8552

Email: ceszeto@hku.hk

Dr. T.F.M. Chui

Tel: 2219 4687

Email: maychui@hku.hk

