

DEPARTMENT OF

Civil Engineering

土木工程系



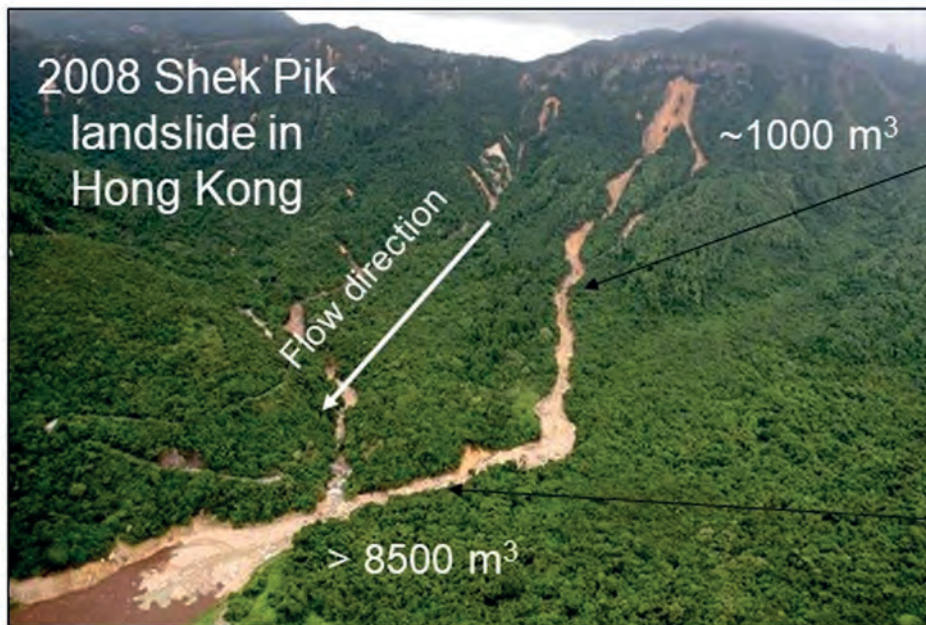
Newsletter

MARCH 2021 - AUGUST 2021



THE UNIVERSITY OF HONG KONG

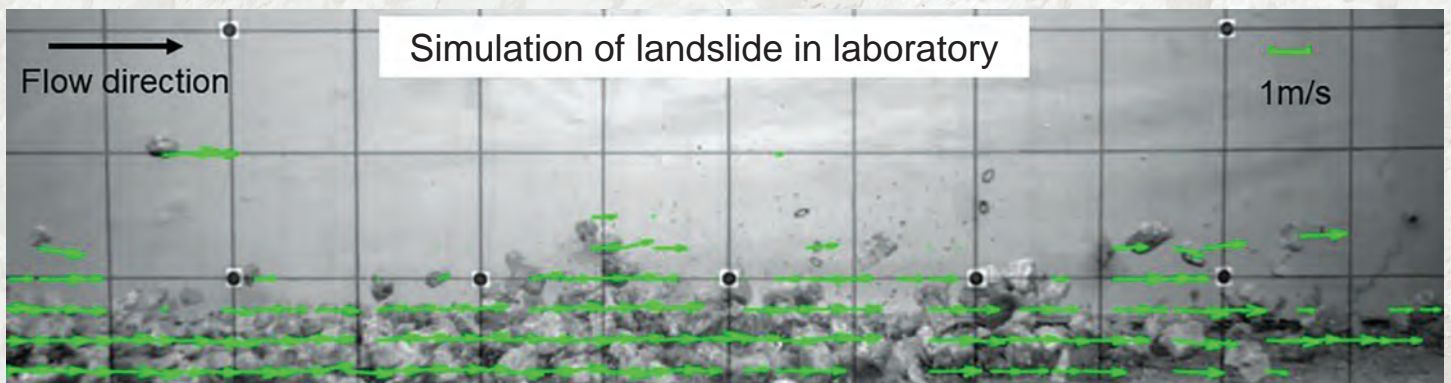
The Unsolved Puzzle of Landslide Growth and Boost



Eroded flow path



Deposits



Song, P., and Choi, C.E. (2021). Revealing the importance of capillary and collisional stresses on soil bed entrainment by debris flows. *Journal of Geophysical Research: Earth Surface*, 26(5): e2020JF005930.

Foreword



Since I took up headship in July 2017, the past four years have been quite challenging. From the social unrest in 2019 to the COVID-19 pandemic in 2020, there have been some serious disruptions to our teaching and research environment, but with challenges also come opportunities.

After almost two years of online teaching, we have finally resumed face-to-face teaching on campus from September 2021. It is refreshing to return to regular teaching and most pleasant to be able to see some faces instead of just watching a computer monitor.

Regarding the academic staff, a number of colleagues have retired or left recently, but we also have some new faces joining us. In early 2021, Dr. Joseph Cheung, Associate Professor in Structural Engineering joined our Department. His research interests include reliability and resilience of structural systems and structural health monitoring. In early October 2021, Dr. Jintao Ke, Assistant Professor in Transportation Engineering, also joined us. He researches into the area of machine learning and data mining for intelligent transportation systems. We also expect another new academic staff joining the Infrastructure Project Management group in the near future.

On the research side, I am sure all of you have read in the news that Professor T. Zhang has developed a sewage monitoring system for COVID-19. In this fight against the pandemic, we are pleased that our research and technology have also contributed to the protection of public health.

We have also been very successful in attracting large external funding in recent years. Since late 2016, we have been awarded two Theme-based Research Scheme Awards in the environmental engineering area worth over HK\$69.7M, three Collaborative Research Fund projects of HK\$14.18M, a Research Impact Fund project of HK\$14.3M and a Strategic Public Policy Funding Scheme project of HK\$4.1M.

Under the 2021 QS subject ranking for civil and structural engineering, our Department continues to be ranked 19. Although we always look at such ranking cautiously, this also serves as an impetus for us to continue to strive for improvements, to better serve our students, the civil engineering profession and our community.

Professor F.T.K. Au
Head of Department

Cover Story

The Unsolved Puzzle of Landslide Growth and Boost

The United Nations Office has initiated a global effort called the Sendai Framework for Disaster Risk Reduction 2015-2030 with the goal of ensuring that developmental gains are not threatened by climate-driven natural disasters, such as landslides.

In particular, flow-type landslides, which are mixtures of soil and water, can grow several orders in size by entraining the soil bed along the flow path. Entrainment in turn causes momentum boost, resulting in longer travel distances and higher destructive potential.

In 2019, landslides caused more than US\$4 billion in damage and 450 fatal landslide events killed more than 3,250 people globally. The Intergovernmental Panel on Climate Change of the United Nations (UN) expects an increase in extreme rainfall events, which will trigger more landslides. The UN also expects that by 2030, 60% of the global population will live in urban areas. In mountainous urban areas, people will encroach previously undeveloped hillsides and expose themselves to landslide risk. A recent example of the consequences of climate change and urbanization is the 2021 landslide in Atami City, Japan, which caused 20 fatalities.

Among the different types of landslides, debris flows are the most dangerous. These high-velocity mixtures of soil and water have buried entire settlements (e.g., 2008 debris flow in Zhouqu, China, caused about 1,000 fatalities). Predictions of the travel distances and deposition areas of these flows are crucial for safeguarding human lives and infrastructure. More importantly,

debris flows can grow several orders in size by entraining the soil bed along the flow path. Entrainment in turn causes momentum boost, resulting in longer travel distances and higher destructive potential.

Despite decades of research on landslides, scientists are still unable to reasonably predict the entrainment volume resulting from a landslide. The scientific challenges of understanding entrainment lie in the poor temporal predictability of natural landslide events, the scale dependent nature of the problem, and the heterogeneity of the complex flow and bed materials.

Recently, HKU researchers developed a new framework based on unsaturated soil mechanics and granular dynamics to predict the entrainment of the soil bed by landslides. The framework has been validated with experiments and field data. The framework is a step forward in revealing the mystery behind the mechanisms of landslide growth and boost. Only by reasonably predicting the entrainment volumes can we enhance vulnerability assessments in mountain regions around the world.

Departmental Events

Professional One-Day Short Course on Lateral Dynamic and Accidental Load on Structures: Collision, Seismic, Blast and Wind actions

The Professional One-Day Short Course on Lateral Dynamic and Accidental Load on Structures: Collision, Seismic, Blast and Wind actions organised by the department; supported by the Hong Kong Wind Engineering Society (HKWES) and American Society of Civil Engineers (ASCE) was successfully held in Nina Hotel Tsuen Wan West, Hong Kong on April 19, 2021 (Monday) under the scenario of Novel Coronavirus (COVID-19). It was a combination of online lectures delivered by Professor Nelson Lam of the Department of Infrastructure Engineering, The University of Melbourne, Australia and on-site lecture delivered by Dr. Kit-ming Lam, Adjunct Associate Professor of the Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology. Precautionary measures for COVID-19 were taken by the hotel during the event. 49 registered attendees from various government departments, consulting firms and construction companies were attracted to attend the course.



Professor Nelson Lam



Dr. K.M. Lam

Staff Awards/Activities/News

Staff Awards

Dr. C.E. Choi received the 2021 Bright Spark Lecture Award

from the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE).

This award was established in 2018 to promote young members of the ISSMGE to play a major role in major international and regional conferences. The award is given to promising young geotechnical engineers/academics under the age of 36. The selection is based on previous achievements and contributions to geotechnical engineering and vision in geotechnical research and practice. To date the award has been given to 20 young academics and engineers belonging to different member societies of the ISSMGE around the world.

Dr. Choi delivered a plenary lecture at the 41st Annual Seminar of the Geotechnical Division of the Hong Kong Institution of Engineers (HKIE) on May 18, 2021 in Hong Kong. The Annual Seminar was attended by more than 400 attendees. The plenary lecture was entitled, "Insights on Debris Flow Hazard Mitigation and Growth."

An extended version of this lecture was delivered online on July 8, 2021 where 390 local and 44 overseas registrations attended. The event was co-organised by the Geotechnical Division of HKIE, Hong Kong Geotechnical Society, Austrian Society for Geomechanics, the Australian Geotechnical Society, Malaysian Geotechnical Society (MGS), and the Geotechnical Society of Singapore.



Professor T.S.T. Ng (middle) and **Dr. Md. Uzzal Hossain** (right) of the Department of Civil Engineering have won The Hong Kong Institution of Engineers 2020/2021 Environmental Paper Award, Runner Up for their paper entitled “Strategies for sustainable management of plastic wastes in Hong Kong: evidence from lifecycle assessment”.



Professor C.Y. Tang received the **2021 CAPEES/ Nanova Frontier Research Award** in recognition of his distinguished research achievements in membrane technology and its applications for desalination and water reuse. This award is given annually by the Chinese-American Professors in Environmental Engineering and Science to recognize outstanding professors in environmental science and engineering, who have achieved recognized research leadership and pioneered an innovative research area.



Professor C.Y. Tang and research group members have won the following awards:

- Zhe Yang (Research Assistant Professor), Chuyang Tang, Best Poster Award, CAPEES Online Poster Competition, Chinese-American Professors in Environmental Engineering and Science, 2021;
- Junwei Zhang (undergraduate student), Yan Tung Lo (undergraduate student), Shenghua Zhou (PhD student), Li Long (PhD student), Hao Guo (Research Assistant Professor), Chuyang Tang, Third Prize, the 7th Hong Kong University Student Innovation and Entrepreneurship Competition, Hong Kong New Generation Cultural Association; and

- Chuyang Tang, Hao Guo (Research Assistant Professor), Junwei Zhang (undergraduate student), Yan Tung Lo (undergraduate student), Silver Medal, International Exhibition of Inventions Geneva Special Edition 2021.



Professor Jun Yang has been selected to deliver the Zeng Guoxi Lecture 2022 in recognition of his distinguished achievements in the field of geotechnical engineering. The named lecture series, established in 2007, is to mark the great contributions of the late Professor Zeng Guoxi, one of China’s pioneers in geotechnical research, education and practice, and the founding leader of the geotechnical program at Zhejiang University, who joined the university’s faculty shortly after his postgraduate studies at Northwestern University in the US in 1950. It is an honour for Professor Yang to be included into the list of Zeng Guoxi Lecturers which comprises prominent academics and researchers from around the world. Professor Yang joined the Department of Civil Engineering in 2003. He has published extensively in leading journals in his field and has been named by Clarivate Analytics among the world’s top 1% scholars by citations. In 2012, he was elected Fellow of the American Society of Civil Engineers (FASCE). He is also a Fellow of the Institution of Civil Engineers (FICE), UK and a Fellow of the Hong Kong Institution of Engineers (FHKIE). A dedicated and enthusiastic teacher, Professor Yang has trained many award-winning students at HKU, who now hold significant positions in industry, government, and academia.

Staff Activities

Dr. S.D.N. Lourenço

- delivered an online lecture entitled “Hydrophobized soils: fundamentals, challenges and opportunities” on April 21, 2021, invited and hosted by Beijing Jiaotong University and attended by 270 participants.

Professor C.Y. Tang

- delivered an online keynote speech on “intrinsic nanoscale structure of polyamide RO membranes and implications for water reuse” at the 5th National Conference on Water Treatment and Reclamation, April 16-18, 2021, Suzhou, China; and
- delivered an online keynote speech “nano-enhanced membranes for desalination and water reuse” at the World Nano Congress on Advanced Science and Technology, March 11, 2021, Tamil Nadu, India.

Staff News

Dr. Joseph S.H. Cheung joined the Department of Civil Engineering as an Associate Professor in January 2021. He was an Assistant Professor at the School of Civil and Environmental Engineering and concurrently affiliated with the Institute of Catastrophe Risk Management and Complexity Institute at Nanyang Technological University, Singapore. He was the leader of the research module on digital-twin enabled infrastructure resilience management in the Future Resilient Systems Programme at Singapore-ETH Centre. He obtained his Ph.D. degree in Civil Engineering from the California Institute of Technology (Caltech), Bachelor degree with first class honours in Civil and Structural Engineering and a minor in Mathematics, and Master degree in Civil Engineering from the Hong Kong University of Science and Technology. He worked as a postdoctoral fellow at the Institute for Computational Engineering and Sciences at the University of Texas at Austin where he was involved in a multidisciplinary research project with a focus on the problem of a NASA space vehicle entry into an atmosphere. He won the Inaugural Hojjat Adeli Award for Innovation in Computing from the journal Computer-Aided Civil and Infrastructure Engineering and the Best Paper Award of the 2013 IAENG International Conference on Scientific Computing. He was the recipient of Housner Fellowship and Harold Hellwig Fellowship, Hong Kong Jockey Club Scholarship and Hong Kong Institute of Engineers Scholarship. The tools developed from his research have been adopted by the Housing & Development Board (HDB) in Singapore for assessing the reliability and durability of a large number of reinforced concrete public housing buildings.



One of Dr. Cheung's main research areas covers the catastrophe risk, reliability and resilience of structural and infrastructure systems subjected to natural disasters, man-made hazards and climate change, including extreme and rare event simulation and performance-based engineering. He has also been working on structural and infrastructure health monitoring, intelligent structural, energy, infrastructure and cyber-physical systems, climate-change adaptable design, sustainable urban development, energy harvesting, advanced sensor technologies, artificial intelligence, machine learning, IoT, digital twin technology, complexity theory and systems. His fundamental and applied research often lies in stochastic dynamics, system identification, uncertainty quantification, Bayesian updating, and stochastic optimization for decision making, design and control. His research areas also include structural dynamics, earthquake engineering, wind engineering, offshore engineering, transition and turbulence modelling, chemical kinetics, combustion modelling, and fluid-soil-structure interaction.

Professor A.K.H. Kwan and **Professor S.H. Lo** retired on June 30, 2021.

Professor X.Y. Li and **Professor T. Zhang** have been conferred the title of Chair Professor with effect from July 1, 2021.

Professor S.C. Wong

- was appointed as Chairman of the Advisory Committee on Post-service Employment of Civil Servants, The Government of HKSAR, for two years with effect from September 1, 2021.
- was appointed as a member of the Land and Development Advisory Committee, and a member of its Planning Subcommittee, The Government of HKSAR, for three years with effect from July 1, 2021.
- was reappointed as a member of the Road Safety Research Committee, The Government of HKSAR, for two years with effect from June 1, 2021.
- was reappointed as a member of the Committee on Enhancement of Franchised Bus Safety, The Government of HKSAR, for two years with effect from March 14, 2021.
- served as Immediate Past Chairman of the Logistics and Transportation Division Committee of the Hong Kong Institution of Engineers for the term 2021-2022.
- was reappointed as Warden of the Hornell Hall for three years with effect from April 1, 2021.

Student Awards/Activities

The Shaking Table Competition 2021

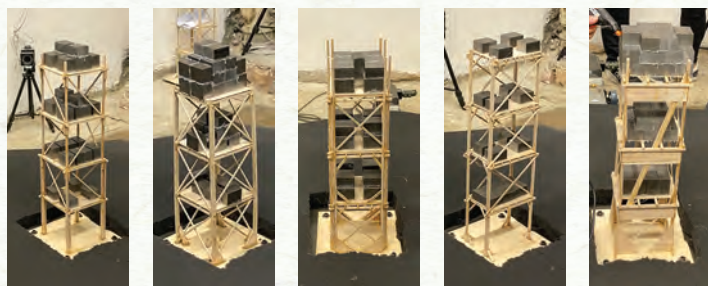
The first Shaking Table Competition organised by the Department of Civil Engineering was held on March 12, 2021. This competition aims to encourage students to utilise their engineering knowledge and creativity to design and build a small-scale physical model and the model would be tested under an earthquake load applied through the shaking table. Each team was given limited materials, mainly balsa wooden sticks and super glue, and time to construct a model according to the pre-announced specifications. They were also required to present their engineering justifications to the judging panel for consideration.

There were 5 teams participated in the competition this year. The model of the winning team (Team B) was able to support a loading of 18.4 kg under a uniaxial seismic load which was a 3 Hz sinusoidal wave of the amplitude of 20 mm. The net weight of the model was just 195 g. The winning team received a cash prize of HK\$1000 and a Certificate of Champion. This competition gave a chance for students to get together after two semesters of online learning and all

the participants had lots of fun.



The winning team (from left to right: Bao In Ping, Mak Kam Ho, Chan Lok Hin Samuel and Lam Cheuk Yin Bryan – BEng (CivE) II) and our judge, Professor Peter K.K. Lee.



Model of Team A Model of Team B Model of Team C Model of Team D Model of Team E



The winning team with their certificates of award.

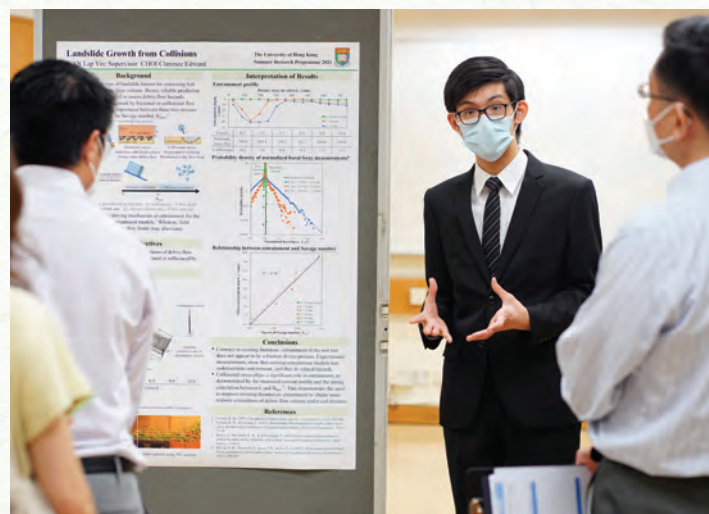
2021 HKU Summer Research Programme

Mr. Wilson Wan Lap Yin, a third year undergraduate students participated in the 2021 HKU Summer Research Programme. This is the first time that this programme was organized at HKU. The objectives of the programme are to attract research talent, strengthen HKU's ties with international research institutions, and foster interdisciplinary interaction. The program targets top UG and master students who are interested in pursuing research career at HKU. Competition to enroll in this program was fierce. A total of 174 first-class applicants were interviewed and only 38 applicants were selected. Wilson was among the elite batch of students selected for the program.

Wilson worked directly with Dr. Clarence Choi of the Department of Civil Engineering in the geohazards area. Wilson's project was on the investigation of landslide growth mechanisms. During the eight-week program, he conducted unique flume experiments in the departmental lab and interpreted his data to come up with a new paradigm of entrainment theory whereby collisions from large rocks are responsible for the growth of landslides. On top of his

research, he participated in workshops aimed at enhancing team building, presentation skills, research ethics, and technical writing.

At the completion of the summer programme, Wilson was one of only three engineering candidates and the only civil engineering one to receive an outstanding completion award from the president of HKU, Professor Zhang Xiang, which includes a conditional offer for the prestigious HKU Presidential PhD Scholar Programme. Wilson aims to continue his research in climate-driven landslide dynamics after completion of his final year of undergraduate studies.



Ph.D. Student Awards

Dr. Jinhyun Choo and his two Ph.D. students, Yidong Zhao and Fan Fei, won two student competitions at the 2021 Engineering Mechanics Institute (EMI) Conference – the American Society of Civil Engineers (ASCE) premiere annual mechanics conference. Yidong Zhao and Jinhyun Choo were awarded Winner for the best student poster competition by ASCE EMI Poromechanics committee, for their paper entitled "Stabilized Material Point Methods for Large Deformation in Fluid-infiltrated Porous Materials". Fan Fei and Jinhyun Choo awarded Runner Up for the best student paper competition

by the ASCE EMI Computational Mechanics Committee, for their paper entitled “Phase-field Modeling of Shear Fracture in Geomaterials”. Dr. Choo’s group was the only group winning multiple awards at the conference.



Mr. Yidong ZHAO (left), Dr. Jinhyun CHOO (middle), and Mr. Fan FEI (right) with the electronic award certificates.

Ms. Li Wang, PhD student co-supervised by Professor C.Y. Tang at HKU and Professor Zhongying Wang at Southern University of Science & Technology, received the Outstanding Presentation Award at Water Treatment Technology Innovation and Frontier Application Seminar & Young Scholars Forum, Chengdu, 2021.

Virtual HKU Three Minute Thesis (3MT) Competition 2021

Our Ph.D. student Ms. Lu Peng has won the Virtual HKU Three Minute Thesis (3MT) Competition 2021 which was held from April to June 2021. 188 PhD, MPhil and PD students participated in the competition by submitting their presentation videos.

The competition was keen and the students showed great enthusiasm when presenting their research in succinct and easily comprehensible language. The champion, 1st runner-up and 2nd runner-up were selected by the judging panel, while the winner of the Online People’s Choice Award was selected based on a novel approach – the candidate who received the most ‘Like’ votes on YouTube by the date of 7 June 2021 would be given the award.

Champion: Ms. Lu PENG,

PhD candidate in the Faculty of Engineering

Title: A Bubble within a Membrane, a Drop from the Ocean

@YouTube: <https://www.youtube.com/watch?v=YBtr7X-s5vM>

(Primary Supervisor: Professor Chuyang Tang)

“The Three Minute Thesis (3MT) Competition gave me a good opportunity to share my research with a general audience. Membrane-based desalination and water reuse have been playing a crucial role in addressing the worldwide

scarcity of freshwater. I am grateful to be one of the researchers who are pursuing potential break through on the efficiency of membrane-based water purification. I would like to express my gratitude to my supervisor, Professor C. Y. Tang. His guidance, support and encouragement made my research journey possible and enjoyable. I also appreciate the helps and love from my lab mates. It is my great fortune to be one of the group members in membEST,” remarked Ms Lu PENG after winning the competition.



Our three undergraduate students, Mr. Lee Wai Chung Jacky, Mr. Leung Jing Shang Gordon, Mr. Siu King Hay Kenny (CivE 4, 2020-21) and a surveying student, were honoured of their exemplary accomplishments at the HKU 24th Recognition Ceremony.



The ceremony was held on April 10, 2021 in the Rayson Huang Theatre with the support of the Deans, in celebrating their outstanding external achievements, and to inspire the university community to learn from their dedication.

Mr. Chan Lai Hei (CivE 3 2020-21) and Mr. Shum Hei Chun (CivE 2 2020-21) were awarded the Professor Y.K. Cheung Scholarship 2020-21.

Mr. Cheung Tsz Wang (CivE 3 2020-21) was awarded the Civil 77 Scholarship 2020-21.

Mr. Chu Tsz Wai (CivE 4 2020-21) was awarded the LPM Contractors Scholarship 2020.

Messrs Brighton Louis, Julian Edric, Kevin Daryl, Slamet Mikael Ken and Yung Hin Wang Anthony (CivE 3 2020-21) were awarded the First Runner-up of the ICE HKA G&S Communications Competition 2020-2021.

Ms. Ho Yuen Shun, Mr. Ng Cheuk Lun, Mr. Shum Tsz Long and Mr. Won Dzi Hei Isaac (CivE 2 2020-21) were awarded the Winner of the ICE HKA G&S Communications Competition 2020-2021.

Mr. Kam Chun Yu (CivE 2 2020-21) was awarded the Chun Wo Foundation Scholarship 2020-21 and the The HKU Civil Engineering Departmental Scholarship 2020-21.



Ms. Koon Chiu Yue (CivE 2 2020-21) was awarded the Best Presenter Award and the Winner of the ICE HKA G&S Communications Competition 2020-2021.

Messrs Lee Wai Chung, Leung Jing Shang Gordon and Zhang Junwei (CivE 4 2020-21) were awarded the Talent Development Scholarship 2020-21.



Mr. Leung Chun Hoi (CivE 2 2020-21) was awarded the Western Harbour Tunnel Scholarship and the Young Tsun Dart Scholarship 2020-21.

Ms. Levinna Natalia (June 2020 Grad) was awarded the Champion, AECOM Prize for Best Final Year Geotechnical Project 2020.

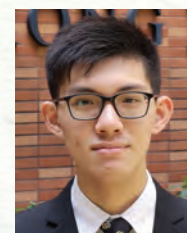
Mr. Li Chung Kin (June 2020 Grad) was awarded the AECOM Prize for Best Student of the Year 2020.

Ms. Li Ruoying (CivE 4 2020-21) was awarded the Hui Yin Hing Scholarship 2020-21.

Mr. Mang Chi Ho (CivE 4 2020-21) was awarded the Western Harbour Tunnel Scholarship (Renewal).

Mr. Ng Lok Hin (CivE 4 2020-21) and Mr. Wan Long Kin (CivE 2 2020-21) were awarded the Endeavour Merit Award under the HKSAR Government Scholarship Fund 2020-21.

Mr. Ngai Hei Brian (CivE 2 2020-21) and Mr. Tang Lik Yin (CivE 3 2020-21) were awarded the Young Tsun Dart Scholarship 2020-21.



Mr. Wan Lap Yin (CivE 3 2020-21) was awarded the HKU Engineering Alumni Association Scholarship 2020-21 and the Western Harbour Tunnel Scholarship (Renewal).



Ms. Zhang Hemiao (CivE 4 2020-21) was awarded the Hui Yin Hing Scholarship 2020-21 and the Mr. Armin and Mrs. Lillian Kitchell Scholarship (under the new award title of "HKU Foundation Scholarships for Outstanding Students").

Updates on Project Mingde

About Project Mingde

Project Mingde was established by the Department of Civil Engineering in 2004. It provides an open platform for nurturing our students to acquire not only hard skills, but also to possess soft skills, such as a sense of social responsibility, by participating in real-world on-going civil engineering projects in remote impoverished regions in China and other Asian countries. We have a slogan "We grow as we build" and that is the core value of Project Mingde. Project Mingde attracts not only Civil Engineering students, but also students from other disciplines and institutions to participate in this meaningful programme. We hope that students would have personal growth through this experiential learning opportunity and participation in various real-life projects; and also education in impoverished localities in China could be provided. For more information about Project Mingde, please visit our



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official website at <http://www.civil.hku.hk/mingde/>.

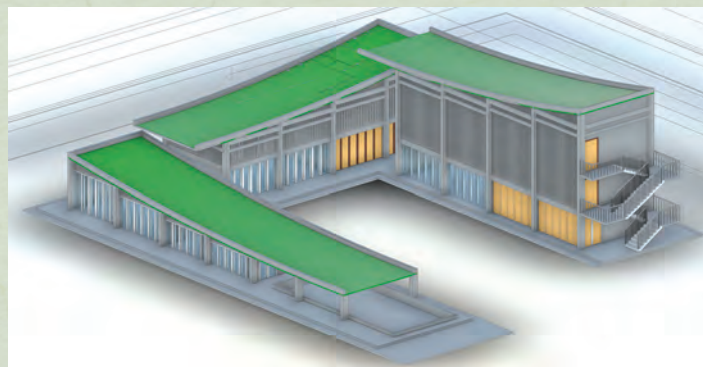
Alumni are welcome to join Project Mingde and if you are interested to be part of us, please contact Dr. C.P. Wong at cpwryan@hku.hk (for projects) or Dr. K.H. Law at adalaw@hku.hk (for communications).

Restoration and Expansion of Guigang Duling Primary School

14 students participated in the Summer Training Programme in July and August, and worked under Dr. C.P. Wong's supervision. They actively discussed with the Project Architect and the Contractor to finalize architectural and structural design drawings of the proposed Composite Building (with kindergarten for early childhood education and teacher dormitory), and to prepare the construction programme and contract documents.

With the contribution of the team's efforts, all the drawings were approved officially, the contract documents were signed among the stakeholders, and the consent to the commencement of building works was obtained. The construction will be commenced this October, Project Mingde will serve as the Project Manager supervising the construction works. In view of the latest COVID-19 travel restrictions, it is not practical for us visiting Guangxi in the near future. Therefore, the team proposed using 360 photos to be taken on site for virtual site inspections with technical support from the HKU TeLi (Technology-Enriched Learning Initiative) team.

According to the construction programme, the proposed Composite Building is anticipated to be completed by next September.



Developed 3D model of the proposed Composite Building.



Discussion with the HKU TeLi team to explore the possibility of using 360 photos for virtual site inspections.

Name of students participated in the Summer Training Programme:

CHAN Ping Hei, CHAN Yau Lam, CHAN Man Pong Ronald, FUNG Tai Man Derek, HO Wai Chun, HUI Ching Kit Jacky, LIU Siheng, CHAN Ka Chun, CHEUNG Ngo Long Hugh, CHEUNG Tin Yat Timothy, LAU Wun Chuen, TANG Hoi Ki, TSE Ka Kin Ken, NGAI Chun Hin Cory

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