

To News Editors
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A research team from CUHK Faculty of Engineering and Chun Wo jointly develop cable-driven robot for high-rise building facades

With Hong Kong's construction industry plagued by manpower shortages over the past few years, safety has never been more important. As a first, a research team led by **Professor Darwin Lau Tat Ming**, Associate Professor in the Department of Mechanical and Automation Engineering at The Chinese University of Hong Kong (CUHK)'s Faculty of Engineering, has developed a cable-driven robot which accurately mimics human movement to clean building windows and paint facades. The system is expected to replace human wiper and roller-based window cleaning and facade painting works at high-rise buildings, helping to relieve the industry's labour shortages, reducing occupational hazards.

Gondola systems are commonly used to carry workers to clean windows and paint the facades of high-rise buildings. However, the dangerous, harsh working conditions, particularly the effects of heat, wind and rain, extended working hours and high cost of insurance result in a lack of skilled workers and high labour costs. To address this problem, Professor Lau's team has developed a cable-driven robot system that alleviates the dependence on labour. The movement of the robot and its platform can be programmed to clean windows or paint automatically. The system is also unique in that it combines the dexterity of robot arms with the cable-driven robot's ability to work at large scales and perform complex movements. The system can also operate on surfaces that are not completely flat, making it more widely applicable.

With funding support by the Innovation and Technology Fund and Chun Wo Construction Holdings Company Limited (Chun Wo), a robotic system has been set up outside a building on the CUHK campus to study its applicability in a real-world environment. Chun Wo has already applied for a patent and intends to use it on construction sites after conducting further research. The company has also provided data to train the robot's gestures so it cleans windows like a human worker.

Professor Darwin Lau Tat Ming remarked, "With the increasing demands on housing and an ageing workforce, the development of building construction and maintenance robotics technology potentially represents a game-changer both for construction workers as well as industry and the wider community. With the use of the system, workers will no longer be exposed to high-risk environments or work in mid-air, helping to reduce accidents. This is an exciting university-industry collaboration that has received generous support from government and Chun Wo, and we believe this novel technology will deliver exciting benefits."

Sr Stephen Lee Ka-lun, Chairman of Chun Wo Construction Holdings Company Limited, said, "Chun Wo has been actively cooperating with various universities and R&D companies to develop various technologies to improve the operational effectiveness and efficiency in the construction industry. The cable-driven robot jointly developed with CUHK not only solves the labour shortage problem but also reduces the risks faced by frontline workers working at heights and is expected

to achieve the goal of zero accidents. Chun Wo is glad to cooperate with the industry or other stakeholders in the market in any way to share the achievements of our innovation & technology projects.”



Photo1: (From Left) Sr Stephen Lee Ka-lun, Chairman, Chun Wo Construction Holdings Company Limited, Professor Darwin Lau Tat Ming, Associate Professor, CUHK Department of Mechanical and Automation.



Photo2: The cable-driven robotic system has been set up outside a building on the CUHK campus to test and demonstrate it.



Photo3: The cable-driven robot can mimic human movement to clean building windows and paint facades. The system is expected to replace human wiper and roller-based window cleaning and facade painting works at high-rise buildings, helping to relieve the industry's labour shortages. The photo shows the demonstration of window cleaning.

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Appendix

About CUHK Faculty of Engineering

Founded in 1963, CUHK is a forward-looking comprehensive research university. The Faculty of Engineering, established in 1991, offers undergraduate and postgraduate programmes through its six departments: Biomedical Engineering, Computer Science and Engineering, Electronic Engineering, Information Engineering, Mechanical and Automation Engineering, and Systems Engineering and Engineering Management. The Faculty of Engineering employs world-class professors from prestigious universities who possess extensive teaching experience and outstanding research track records. It is also equipped with state-of-the-art facilities to support teaching and research activities. The Faculty's mission is to train future leaders in engineering, to pursue knowledge at the frontier of modern technology, and to apply advanced technology to meet societal and human needs. For more information about the Faculty, please visit: www.erg.cuhk.edu.hk.

About Chun Wo Construction Holdings Company Limited

Founded in 1968, Chun Wo Construction Holdings Company Limited (“Chun Wo”) is the core member of Asia Allied Infrastructure Holdings Limited. Chun Wo is principally engaged in the core construction and property development businesses with the professional capability to undertake large-scale integrated construction projects. Recent large-scale infrastructure projects in Hong Kong have been or are involved, the Central-Wanchai Bypass, the Liantang/Heung Yuen Wai Boundary infrastructure facilities, the Hong Kong-Zhuhai-Macao Bridge Passenger Clearance Building, the Guangzhou-Shenzhen-Hong Kong Express Rail Link (Hong Kong section) and MTR Shatin to Central Link, etc.

Chun Wo founded Inno@ChunWo in 2016 and has actively collaborated with universities and technology companies to develop a series of innovative construction technologies that will increase efficiency and productivity in the construction industry. The hard work was rewarded with the successful development of the patented “wall connection technology” applicable to concrete “Modular Integrated Construction” systems (“Concrete MiC”) and Rapid Repairing Mortar Materials (R2M2) that improve the maintenance efficiency of ageing buildings, etc. Chun Wo is undergoing digital transformation, transforming construction sites into “Smart Sites” and exploring construction mechanization to improve construction quality, safety and efficiency.

For more information about Chun Wo, please visit: www.chunwo.com