



PolyU-NAMI 3D Concrete
Robotic Printing Research Centre
理大納米3D混凝土打印研究中心

RCC3D Forum 2024

FREE!

Pioneering 3D Printing in Hong Kong's Construction Industry

The PolyU-NAMI 3D Concrete Robotic Printing Research Centre (RCC3D) brings together local and overseas leaders from academia, research institutes, and industry to present the state of the art in concrete printing technology and its applications. This forum will present innovative, low-carbon concrete printing materials that promise to enhance buildability, sustainability, and the circular economy. It will also showcase real-life concrete printing applications, from free-form style outdoor furniture and landscape planters to structural components and artificial coral reefs, all within the Hong Kong context. Attendees will explore the latest advancements in 3D printing technology and examine case studies demonstrating successful implementations. Join us to be at the forefront of shaping the next generation of construction in Hong Kong.



Dr. Hongjian Du

Senior Lecturer,
Department of Civil &
Environmental Engineering,
National University of
Singapore



Dr. Shipeng Zheng

Assistant Professor,
Department of Civil &
Environmental
Engineering, PolyU



Mr. Eric Chen

Senior Engineer,
Nano and Advanced
Materials Institute



Dr. Jacky Chung

Senior Engineering Manager,
Industrial Centre,
PolyU

28 Oct 2024 (Monday)

2 - 5 pm

**Room W311, Block W,
The Hong Kong
Polytechnic University
(PolyU)**



REGISTER

NOW

Keynote Presentation:

- Recent Development of 3D Concrete Printing in Singapore
by *Dr. Hongjian Du*

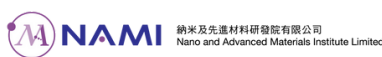
Technology Presentations:

- Low-Carbon 3D Concrete Printing Technologies
by *Dr. Shipeng Zheng*
- Applications of NAMI Sustainable Concrete for 3D Printing
by *Mr. Eric Chen*
- From Theory to Practice:
The Advancement of Concrete Printing at PolyU
by *Dr. Jacky Chung*

Panel Discussion

Lab Visits

Organizers



Supporting Organizations





Pioneering 3D Printing in Hong Kong's Construction Industry



Dr. Hongjian Du

Senior Lecturer,
Department of Civil &
Environmental Engineering,
NUS

Dr. Hongjian DU is the Senior Lecturer at the Department of Civil and Environmental Engineering, National University of Singapore. A recognized expert in concrete materials and structures, his work focuses on low-carbon construction materials and 3D concrete printing for sustainable urban development. Dr. Du's research has significantly influenced both local industries and the global research community. His accolades include being listed among the Top 2% Scientists by Stanford University, receiving the Outstanding Paper Award from RILEM Journal of Materials and Structures in 2022, and earning the Excellence Award from the Singapore Concrete Institute the same year.

Recent Development of 3D Concrete Printing in Singapore

In nations with constrained labour forces like Singapore, improving construction productivity is crucial. 3D concrete printing has emerged as a transformative technology, offering significant advantages in reducing manpower and material waste. This presentation explores the latest developments in 3D concrete printing within Singapore, spanning both architectural and non-structural applications. The discussion will extend to the presenter's own research, particularly in applying 3D printing for coastal biodiversity protection, and ongoing collaborations with Singaporean construction firms to explore its structural potential, particularly within the precast industry.



Dr. Shipeng Zheng

Assistant Professor,
Department of Civil &
Environmental
Engineering, PolyU

Dr. Shipeng ZHANG is the Assistant Professor in the Department of Civil and Environmental Engineering at the Hong Kong Polytechnic University, concurrently holding the position of Deputy Director of the PolyU-NAMI 3D Concrete Robotic Printing Research Centre. He received his Bachelor of Science degree in Civil Engineering from the University of Minnesota, followed by his Master of Engineering and Ph.D. in Civil Engineering from McGill University. Dr. Zhang is dedicated to addressing pressing environmental challenges through the advancement of sustainable construction materials and technologies. His research interests encompass low-carbon 3D concrete printing, concrete carbonation technology, and sustainable cementitious materials.

Low-Carbon 3D Concrete Printing Technologies

In response to labor shortages, an aging workforce, construction waste generation, and low productivity, the construction industry is increasingly transitioning towards digitalization, with 3D concrete printing (3DCP) emerging as a promising solution. Unlike conventional methods, 3DCP utilizes digital controls to extrude concrete layer by layer, eliminating the need for formwork and significantly reducing construction time, costs, and waste. However, this process demands more precise control over the rheological properties of concrete, often necessitating mixes with excessive cement, which conflicts with sustainability goals due to the high carbon footprint of Ordinary Portland Cement (OPC).



Pioneering 3D Printing in Hong Kong's Construction Industry



Mr. Eric Chen

Senior Engineer,
Nano and Advanced
Materials Institute

Mr. Xianrui Chen (Eric) is working as a Senior Engineer at Nano and Advanced Materials Institute (NAMI). He has over 10 years of applied research experience in construction and building materials, mainly focusing on 3D concrete printing, foamed concrete, geopolymer, backfill material, sound insulation material, etc. During his work at NAMI, Mr. Chen has overseen more than 10 projects, securing a total funding amount of over 35 million HKD as a project coordinator. Mr. Chen has developed low carbon concrete for 3D printing, fire-resistant lightweight geopolymers block and self-compacting backfill materials. In particular, the self-compacting backfill material technology has been successfully commercialized and transferred to the industry,

Applications of NAMI Sustainable Concrete for 3D Printing

This presentation will spotlight the pioneering utilization of sustainable concrete materials within the realm of 3D printing technology at NAMI. This innovative fusion of eco-friendly materials and cutting-edge printing techniques aims to provide an alternative solution to construction industry partners in Hong Kong and beyond. The presentation will be structured into three key sections: firstly, it will showcase the latest development of 3D concrete printing at NAMI; secondly, it will highlight pilot-scale concrete printing prototypes and their practical applications with governmental departments and private developers; and finally, it will unveil NAMI's comprehensive 3D concrete roadmap and future strategic directions.



Dr. Jacky Chung

Senior Engineering Manager,
Industrial Centre,
PolyU

Dr. Chung is the Leader of the Building Service, Safety and Construction Stream in the Industrial Centre of the Hong Kong Polytechnic University. He is an expert in construction 3D printing who organized the world's first International Construction 3D Printing in Singapore and established the Construction 3D Printing Laboratory and Programme in Singapore NUS in 2018. Dr. Chung had been appointed as the Technical Committee Member of the China National Innovating Institute of Additive Manufacturing (NIAM) in 2017 and the Advisor on Construction 3D printing to Oman Diwan of Royal Court in 2018. Dr. Chung received 11 research and teaching awards, and produced more than 82 research publications in leading academic journals and international conferences.

From Theory to Practice: The Advancement of Concrete Printing at PolyU

This presentation delves into the transformative journey of concrete printing technology at the Hong Kong Polytechnic University (PolyU), from its theoretical underpinnings to its practical deployments. It highlights PolyU's pioneering role in advancing concrete printing technology, discussing both the historical development and the latest innovations in low-carbon materials with real-life applications. The seminar showcases how these technologies have not only transitioned from the lab to real-world applications but also how they are integrated into PolyU's academic curricula and professional training programs. Furthermore, it explores the future directions of concrete printing, including the integration of artificial intelligence (AI) and topology optimization, emphasizing their potential to revolutionize the concept of construction structural design.