

A robot arm for 3D construction printing

Introduction

Picture a world where buildings and infrastructure are created automatically in a matter of hours, thanks to a digital and sustainable fabrication process. While this might seem like a distant dream, the advent of 3D construction printing is poised to make it a reality in the near future. The research outlined hereinafter focuses on realizing this vision.

Support from COWIfonden

COWIfonden has provided funding to purchase a robotic arm that will facilitate 3D construction printing. The robot arm is planned to substitute our previous robot arm, which unfortunately ceased to function. A robot arm is vital for our 3D construction printing activities at DTU, and it will come to immediate use.

Research at DTU

The robot arm will be used in 2 ongoing and 1 planned PhD project:

- In a PhD project between DTU and Eindhoven University of Technology (TU/e), where the aim is to develop process models for 3D concrete printing to optimize structures from a sustainability point of view (i.e., minimize energy consumption during production, as well as minimize material and cement usage. The latter constitutes approximately 8% of anthropogenic CO₂ emissions).
- In a double PhD degree between DTU and Norwegian University of Science and Technology (NTNU), where the objective is to investigate the possibility of using manufactured sand in 3D concrete printing. This is important given the depletion of natural sand resources in various regions around the world.
- In a planned PhD project, where the goal is to 3D print structures with earth materials without any cementitious binder. This comes with formidable challenges, from mastering material consistency to ensuring structural integrity in diverse external surroundings. Yet, its potential to revolutionize sustainable construction and create intricate, eco-friendly structures is profoundly intriguing.

We are confident that the completion of the outlined research will represent a landmark achievement that will shape the next frontier – not only in the field of 3D construction printing – but also in the building industry as an entirety.