EPSRC DTP PhD Research Project

Project Title: Process Optimisation for Sustainable 3D Printing Concrete

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Location: Harrison Building, Streatham campus

PhD Programme: PhD in Engineering

Project Description:

The application of 3D printing in construction is transforming traditional building practices, offering opportunities for material efficiency, design innovation, and waste reduction. However, to fully realize the potential of sustainable 3D printed concrete (3DPC), it is essential to optimize the printing parameters and print path strategies to minimize environmental impact and maximize structural performance.

This research project focuses on optimizing key printing parameters such as layer height, extrusion speed, and printing speed to enhance the sustainability of the 3DPC process. By fine-tuning these parameters, the project aims to reduce energy consumption, material waste, and overall production time while maintaining or improving the mechanical properties of the printed structures.

Additionally, the research will explore advanced print path optimization techniques, including the development of algorithms that adapt the print path based on structural requirements, material flow characteristics, and geometric complexity. This approach will ensure efficient material deposition, reduce the need for support structures, and minimize printing errors, contributing to the overall sustainability of the construction process.

The study will employ both experimental and computational methods to evaluate the impact of different parameter settings and print path strategies on the environmental footprint and performance of 3D printed concrete. By integrating sustainable practices into the core of the 3DPC process, this research aims to provide a blueprint for greener construction methods that align with the industry's shift towards more sustainable and resilient building practices.

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