

connected
everything.



Machine learning processes for adaptive 3D printing of Biocomposites with industrial robots

Project Team:



Federico Rossi is an Associate Professor of digital manufacturing and robotics. In 2014 developed the Digital Architecture and Robotics Lab (DARLAB) to explore the changes for architectural production with the introduction of robotics. PI in UKMSN+ research project to define a digital novel of a robotic additive manufacturing process for recycled polymer construction materials. Federico will bring his expertise in computational design and innovative manufacturing processes and robotics to the present proposal.



Dr Finian McCann is Associate Professor of Structural Engineering with the School of the Built Environment and Architecture at London South Bank University. a background in steel structures, his current research interests include 3D-printed structural components, glass-polymer structural composites, metallic foams, structural fire safety and structural timber technologies. Finian will bring his expertise in structural analysis and material testing characterization.



Dr Luis Santos (ECR) is a Senior Lecturer in Structural Engineering at London South Bank University. He is now interested in parametric design, topology optimisation and machine learning always using Abaqus and Python. As an Early Career Researcher, this will be Luis' first grant, paving the way to future grants. Luis will lend his expertise in artificial intelligence in the context of digital workflows, topology optimisation and finite element analysis.



Daniele Ferrentino (ECR) is a research associate fixed term at the Digital Architecture and Robotic Lab. Daniele accomplished a bachelor's and master's degree, respectively in Industrial and Product Design and focusing on advanced geometry for additive manufacturing - DfAM -. As an early career researcher, Daniele will play a key role to bring innovation and introduce a digital workflow for robotic manufacturing.



Engineering and
Physical Sciences
Research Council

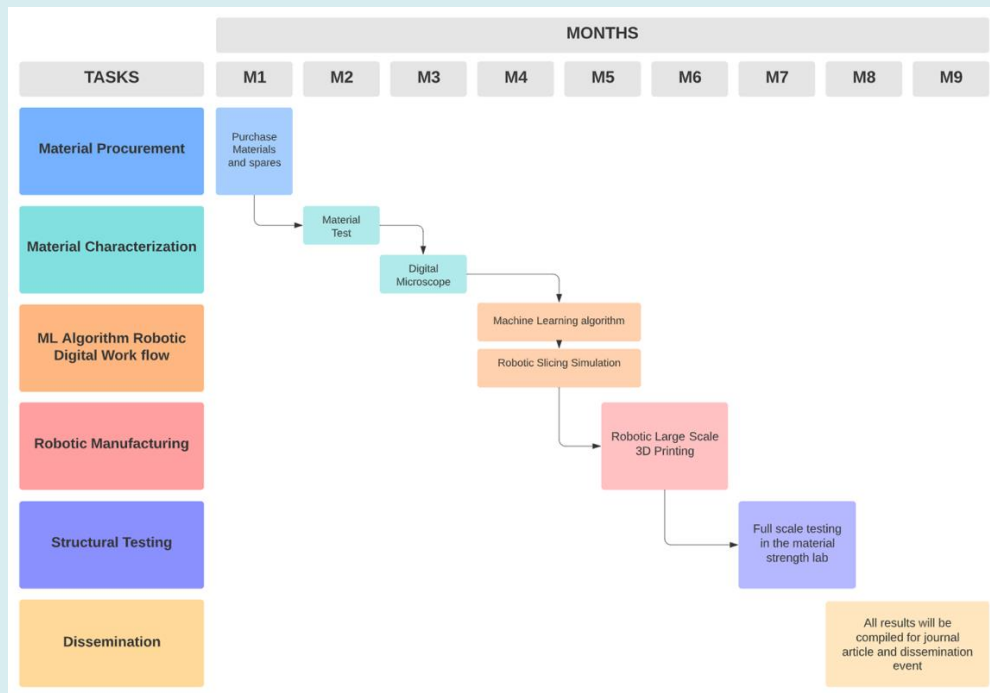
connected everything.



Industry Partners:



The project team and timeframe:



What does the project demonstrate?

The project novel is to prototype a large-scale building component with Additive Manufacturing (AM) robotic process using biopolymers. The pivot point of the research is to establish a Machine Learning (ML) algorithm and workflow to predict/optimize/speed up the printing process using a dataset of information (fiber direction, material defects, temperature, extrusion speed, path planning) and output autonomously optimized solutions for the AM process. With the support of industry partners, we will integrate a fully hybrid manufacturing process depositing the material where needed and machining it to achieve industry tolerance standards.

connected everything.



Additional information regarding project and key highlights wanting to address.

The project seeks to define new agile methods of production using additive manufacturing with biopolymers for structural components reducing the manufacturing process, validating digital the parts and reducing the amount of material used. The project will be the develop a digital workflow for the custom mass production of parts, the proposal will be invaluable towards providing real-world verification of the practical feasibility of this technology and proving that 3D-printed polymers can achieve useful load resistances for structural design. The future of industrial workers will be based on digitized construction systems, and 3DP processes combined with the advantages of sustainability and seamless integration with existing computational workflows

