

## **CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT**

### **The susceptibility of Structural Engineering to automation and its potential implications for the future of the profession**

The digitalisation of production processes is driving a new era of industrialisation, widely termed the Fourth Industrial Revolution: The age of Artificial Intelligence (AI), where cyber-physical systems connect the physical, digital and biological worlds. Coincidentally the United Kingdom (UK) construction industry and associated professions are facing increasingly unsustainable fee levels, flat-lining productivity, poor quality outcomes, stagnant wages and a shortage of skills, all of which are likely to be exacerbated as the UK prepares to exit the European Union.

Considering this new era of industrialisation, this study aims to assess the potential for automation in Structural Engineering and the opportunities this might create to help address some of these industry-wide problems. Whilst it is generally recognized that innovation in AI and automation technologies will inevitably change the way tasks are undertaken, the types of technology are difficult to predict. For this reason, the study considers possible scenarios of low, moderate or high adoption of such technologies and assesses the profession's susceptibility to automation within each of these scenarios.

A convergent parallel mixed-methods research approach has been selected to inform the study. This comprised a sample of thirty UK based structural engineers completing a survey which recorded their hourly activities over a two-week period. This was required to identify the relative apportionment of time required to undertake the tasks which constitute the profession. In parallel, a series of semi-structured interviews was conducted to elicit the opinion of industry and technology experts on current and future trends for the adoption of automation technologies. This was further supported by a desktop review of AI and automation adoption within other industries. These results were subsequently combined and analysed to ascertain the profession's automation potential.

The results of the assessment showed that between 21% and 66% of the tasks within the profession are susceptible to automation dependent on the various scenarios of adoption of AI and automation technologies. The implications for the future of Structural Engineering in the UK, resulting from this increased opportunity to automate, however is not redundancy but reskilling with greater specialisation; creating new multidisciplinary roles to maximise our uniquely 'human' characteristics, focusing on higher value, non-routine tasks. These tasks will typically require cognitive and affective/ moral capability and would result in innovation, better team work, improved leadership, enhanced learning and well-being. These new roles will provide integrated services, delivered through new business models which allow humans to prioritise the importance of client care and delivering quality outcomes, thus helping to address some of the problems associated with the industry.

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