SCHOOL *of* ENGINEERING

PhD thesis title: Development of 4D printed actuators with integrated temperature-controlled triggering system for defence applications

Funding: DSTL- Ministry of Defence -UK

University: The University of Edinburgh (UK) and at ESTACA (France)

Project description

The interest in additive manufacturing is currently growing exponentially in industry. It has strong potential to conceive offbeat 4D printed smart devices with the outstanding capacity to change their shape and mechanical properties under the right external stimuli, however, further research is needed to fully understand the limits of the technology and establish a steady field for its implementation. Special attention has been recently given to self-bending actuators, which can be triggered by external heat, however, further development is required to control the thermal gradients along large components and provide a reliable behaviour for defence applications.

The aim of this project is to develop 4D printed self-bending actuators with an integrated temperature-controlled triggering system able to operate under extreme loading conditions such as impact. The developed actuators will incorporate an electrical circuit able to control the thermal gradients along large components by joule effect. Self-bending actuators will be manufactured as hinges in flat layered configurations that can be deployed afterwards with the change in electrical current. Optimisation of 3D printed patterns will be carried out by numerical simulation and the most promising configurations will be manufactured and subjected to low velocity impact tests to ensure the reliability under extreme loading conditions.

Eligibility

To be eligible to apply the candidate should be a UK/French citizen and have achieved a 2:1 undergraduate degree in Engineering (or equivalent). The grant will cover tuition fees and stipend over the 3 years duration of the PhD with starting stipend of £16500.

For further information on entry requirements and language requirements, please visit: https://www.ed.ac.uk/studying/postgraduate/degrees/index.php?r=site/view&edition=2019&id=947

Application procedure

When applying please ensure all required documents are attached:

- All degree certificates and transcripts
- Detailed CV
- Details of 1 academic referee

Informal inquiries can be made to:

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- thuy-quynh.truong-hoang@estaca.fr

with a copy of your curriculum vitae and cover letter.