**3D Printing of Electronics and Displays onto Existing Automotive Components and Structures**

**PhD**

**Funding:** £17,057 per year, for 3 years (Home/EU student)

**Supervisors:** Dr Gregory Gibbons and Dr Vannessa Goodship

**Start Date:** October 2016 or earlier

**Project overview**

This exciting project, supported by Jaguar Land Rover (JLR), will investigate the application of 3D Printing technologies for the printing / deposition of electronics onto existing car components and structures.

Over the last two decades it has been proven that lightweight and flexible printed electronics can be created using traditional printing techniques. However these are yet to be proven within the automotive domain. Moreover traditional engagement with suppliers tells us that their expertise only lies with manufacturing a particular part or parts; they cannot produce printed electronics as a part of an existing part.

**Aim and objectives**

To investigate the direct printing of electronics onto pre-existing automotive components and to assess their quality and compliance with Jaguar Land Rover standards, and long-term performance and failure modes under end-use conditions.

**Key objectives:**

- Evaluate techniques compatible with printing onto complex 3D surfaces (various materials - plastics, rubber, paint, etc. in different areas and parts - not integrated or already integrated into car). Down-select technique(s) for further evaluation, and listing of the challenges in such a methodology to enable printing and manufacturing. This will comprise a comprehensive literature survey and systematic set of scoping experiments.
- Investigate printing techniques on to already made 3D objects with various substrates etc. This will require a comprehensive experimental design to evaluate different printed materials and substrates using the down-selected printing method(s). Some modification of the existing printing technologies may be necessary to enable printing onto complex surfaces. A proof of concept on three different applications, A-surface, body part exterior, body part interior will be developed and used for performance analysis.
- Assessment of the compliance to quality reproduction and JLR design that is achievable and study performance in comparison with JLR in car electronics standards and GRADE reviews.
- Study of quality of printing and life expectancy in automotive domain including a detailed Failure mode study (FMEA).

**Outcomes**

- A substantive contribution to knowledge that will focus on the following:
  - Understanding the most appropriate printing technology, processing conditions and materials for the direct printing of electronics onto existing 3D automotive structures.
  - The technical limitations of the printing method and those of the deposited electronics, including the quality obtainable.
  - The performance of the printed electronics against that of JLR standards and the long-term failure modes and effects operating.
- A working prototype of a printed display, lighting or functional electronics on three different applications: A-surface, Body part exterior, Body part interior.
- A PhD thesis into 3D printing techniques for existing parts or integrated car automotive domain; containing challenges, materials, process, equipment design, manufacturing direction, failure modes and recommendations.

**Eligibility and funding**
Due to the source of funding, only UK or EU nationals are eligible for this position. Candidates should possess a 1st or 2.1 degree in a relevant subject (Mechanical Engineering, Manufacturing Engineering, Materials, Physics).

To apply please complete an [online enquiry form](#) enclosing your CV.