

Project title: Self-maintenance machine (SMM)

Supervisor (Cranfield): [Dr Zakwan Skaf \(z.skaf@cranfeild.ac.uk\)](mailto:z.skaf@cranfeild.ac.uk) – Lecturer in Diagnostics and Prognostics

Duration: 6 months -Full Time (possible extension to 9 months)

Stipend: £4500 [for current MSc students \(2 vacancies are available\)](#)

[Or £9000 for recent graduated MSc student \(1 vacancies is available\)](#)

Project type: Visiting student project

Reference code: IVHM_SMM_VS_2017_01

Applications [are invited](#) for a 6-month project at the Integrated Vehicle Health Management Centre (IVHM Centre) of Cranfield University. The IVHM Centre is a major collaborative venture at Cranfield University, started in 2008, with funding from the East of England Development Agency (EEDA); a consortium of core industrial partners, (Boeing, BAE Systems, Rolls-Royce, Meggitt, Thales, [MOD](#) and Alstom); and from EPSRC.

Project description

In an aerospace domain, the assurance of system's reliability is critical for the success of long flight mission. Therefore, in case of system defects, remote maintenance is highly needed for the process of faults' recovery as well as the success of the mission. Ignoring the capability of remote maintenance may lead to losing valuable measurement data [and/or](#) harming the components and instruments of the faulty system

In this research project, we are planning to design and build a subsystem/system which has the capability of self-reconfiguration on the level of functional architecture at runtime. For creating this capability, we need to design multiple configurations of a subsystem/system automatically adapting to defected subsystem/system. A transition from one configuration to another will be triggered when a fault detected and isolated. The process of triggering, determining, and deploying new reconfigurations will [be implemented](#) as a control loop. In other words, we are planning to develop an approach to identify and select an alternative subsystem/system configuration in case of faults

For the evaluation of our approach, we will build a demonstrator (test rig of a subsystem of a real-world aircraft) during the research project.

The main tasks of this research project are

Task Name
The current state of Self-Maintenance Machine (SMM)
Use case selection
Functional Redundancy Designer
Fault Diagnosis strategy
Repairing Strategies
Controller Design
Testing and Validation
Report and Presentation

- Skills:**
- Mechanical/ Aerospace/Control /Mechatronics engineering background
 - Matlab/Simulink.
 - Arduino programming is highly preferred

Start Date: ASAP (date negotiable)