Position and Vibration Control of Flexible String-Like Elements in Space Using Wave-Based Control Technique

Code: 21/41

Company: Teesside University

Location: Middlesbrough, UK (Virtual/ Remote Working)

Company Description:

Teesside University (TU) with close to 2400 staff and 20000 students on its two campus locations of Middlesbrough and Darlington has a long history of working with industry including SME, multinational companies, Public sector, and NGOs in the UK, and abroad. One of the key University priorities is research application and impact regionally and with industry partners. TU's staff and students are encouraged to work across both traditional discipline and subject boundaries; this multifaceted approach provides the innovation needed to help address some of the biggest national and global 'Grand Challenges' that face society including the need for Sustainable Environments and a Digital and Creative Economy.

Project Description:

- Develop mathematical modelling of a typical mechanical flexible element such as a chain or cable using lumped mass models interconnected with elastic joints, to study its kinematic/dynamic behaviour.
- Explore the addition of an external mass at the end of the string's model representing the payload that could be debris collected or equipment replaced, or an attachment point on a space structure.
- Implement an algorithm of wave-based control (WBC) approach using Simulink and programming in MATLAB and adapt its essential control elements to suppress the unwanted oscillation of the elastic elements without the use of extra measuring sensor along the string or the need to identify the changes in the dynamics of the model or modelling uncertainties which are all the superior aspects of the approach compared with the similar applicable methods.

Applicant Specification:

We are looking for a final-year undergraduate or postgraduate student who likes problem solving, and who can manage complexity to develop lean and quick solutions in a logical process. The candidate's background could be in any of the following disciplines: Mechatronics Engineering, Mechanical Engineering, Robotics and Automation, Electrical Engineering, and Aerospace Engineering.

Minimum Requirements:

- Academic knowledge on Dynamics and Control Theories
- Expertise on MATLAB programming and SIMULINK
- Self-starter attitude and initiative
- Excellent communications skills both written and verbal
- Fluent in English, verbal and written
- Access to an on-line working environment and reliable internet connectivity

Preferred Additional Requirements:

- Knowledge on mechanical vibration and flexible robotics
- Industrial experience in developing control models and algorithms using SIMULINK
- A friendly, enthusiastic, and determined individual willing to work hard and find ways of overcoming difficulties.

Further details:

Please note that the candidate will be expected to work mainly remotely and should be comfortable and confident working independently. The supervisory meeting will be held regularly via MS Teams or Zoom apps as the project progresses.

8 weeks minimum fixed term contract to be agreed with successful candidate. Virtual Induction Event to be held on 21 June 2021. Ideally to complete before the start of the next academic year. Salary is £1,500 per calendar month gross.

Closing Date for Applications: 5pm Monday 7 June

Applications should be made through the online form on the Satellite Applications Catapult website before the closing date.

https://sa.catapult.org.uk/work-with-us/space-placements-industry-spin/

Please note that elements of the form left incomplete will be deemed to render the application ineligible. They will be checked for eligibility and forwarded to the employer. Email applications made to the Satellite Applications Catapult, UK Space Agency, or host organisations will not be processed.