Royal Academy of Engineering

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PROFILE
Distinguished International Associate

Thematic area: Smart manufacturing

Project title: Strengthening collaboration in the area of smart manufacturing (Industry 4.0)

Strategic goals: To build a sustainable global network of researchers and practising engineers to contribute to the inclusive economy through the advancement of Industry 4.0.

Background: My Bachelor of Engineering and PhD were both in the field of mechanical engineering, while my master's focused on industrial engineering and management. I was an assistant professor of mechanical engineering for six years, before becoming an associate professor in the same discipline in 2017 and a professor in 2021. Working with a variety of industries through my Industry Academia Consortium for Smart Manufacturing has provided me with first-hand knowledge of the challenges that small and medium-sized enterprises (SMEs) face when adopting and implementing new digitalisation solutions.

Previous Academy involvement: I was a keynote speaker for an introductory course on cyber physical production systems (CPS), run through the DIA programme in 2021. I am also a current and previous award holder through IAPP in the fields of digitisation and advanced manufacturing respectively.

About my project

Objectives: The manufacturing sector is witnessing a global paradigm shift known as Industry 4.0, or the fourth industrial revolution. This centres on technologies pertaining to digitisation, data analytics, artificial intelligence/machine learning, and the Internet of Things. My activities aim to overcome SMEs' barriers to adopting smart manufacturing by creating awareness of such technologies and imparting necessary skills to enhance smart manufacturing capabilities. Advanced economies are already reaping the benefits of implementing these technologies in terms of increased competitiveness, sustainability and reliability, but this is not the case in other nations.

Activities proposed under this programme will directly benefit industries as they address their need to enhance knowledge and skills in smart manufacturing. The overall objective is to strengthen the collaboration network – designing an industry-driven course on smart manufacturing and conducting two skill-enhancement programmes for practising engineers and engineering students.

On the UK side... This project aims to widen the ongoing India–UK research collaboration network for smart manufacturing. I started collaborating with the Institute for Manufacturing at the University of Cambridge in 2016, as part of the Royal Academy of Engineering Higher Education Partnership, and this collaborative project was shortlisted for the 2017 Newton Prize. I am still collaborating with staff at Cambridge, designing and conducting basic smart manufacturing course training, and my ongoing collaboration with my UK academic partners further encouraged me to apply for this programme.

Project output: A least three Indian and three global academic members, and at least four industry partners, will be included in an ongoing consortium. This will require interactions with industry and academic members, designing and conducting an industry-driven course for around 100 participants. A skills development

programme aimed at around 40 practising engineers and students will have nine speakers involved. There will be hands-on training using virtual reality technology, and an extension of the network by interacting with more academic and industrial members.

Many of the activities mentioned in my DIA programme are aligned with the initiatives of a project under the Indian Government's National Mission in Interdisciplinary Cyber Physical Systems. I'm sure this programme will offer me more opportunity to highlight the outcomes of the DIA at much larger scale.

Anticipated outcomes and impact: Development and implementation of Industry 4.0 requires expertise across disciplines like electronics, mechatronics and IT. Moreover, such a development requires involvement from both academia and industry, and my project aims to create a sustainable platform to support such development.

An industry-driven course can be offered routinely beyond the project duration, becoming a sustainable activity that provides a platform for basic knowledge dissemination in smart manufacturing. Similar activities may be started by various collaborators around the globe, helping the adoption rate of Industry 4.0. There will be global visibility for ongoing India–UK collaboration, making the consortium a global platform for researchers and practising engineers contributing towards the advancement of smart manufacturing in their respective countries.

Final thoughts on the Distinguished International Associates programme: I was recently promoted to full professor at my institute, and I am sure the recognition received through the DIA programme must have played an important role in this career progression. This project will help me to identify key areas for designing and offering knowledge and skills-enhancement courses in this area.

About the Distinguished International Associates Programme

The Distinguished International Associates Programme is an award scheme for international engineers working across all sectors, who are at the cutting edge of engineering research or innovation.

Awardees are offered a grant to amplify the impact of an existing collaboration with the UK in an area that aligns with the Academy's new strategic priority themes.

The programme aims to develop a broad international network of excellent diverse engineers across countries and disciplines, with research and innovation links to the UK, to work alongside the Academy to enhance progress towards achieving its goals for an inclusive economy and sustainable society.