



Dr Rafael Morales-Viviescas

Industrial Fellowships Scheme

Dr Rafael Morales-Viviescas, a lecturer in the Department of Engineering at the University of Leicester, held a Royal Academy of Engineering Industrial Fellowship between 2014 and 2015. This supported a collaboration with Leonardo, a global leader in aerospace innovation, to develop helicopter performance improvement technologies.



“My Industrial Fellowship enabled me to become immersed in industry. This led to our research progressing at a faster rate and opened the door to exploring other exciting ideas.”

RESEARCH

Dr Morales-Viviescas’ research applies expertise in control theory to a variety of technologies in the helicopter industry. This involves combining engineering with computational mathematics to develop and improve rotorcraft technologies. This results in design improvements that can lead to better airworthiness, enhanced flight comfort, energy savings and reductions in maintenance costs.

A specific research interest for Dr Morales-Viviescas is the development of active blade technologies that can improve vibration reduction in helicopters. This involves work on computational algorithms that use feedback to establish mechanisms of control. It was one of several projects that he collaborated on at Leonardo.

“By immersing myself full time at Leonardo, I had more frequent interaction with engineers and the research progressed at a faster rate,” explains Dr Morales-Viviescas. “I also became aware of industrial priorities and other practical aspects, which opened the door to explore other exciting research ideas.”

IMPACT

By applying his knowledge in control theory, Dr Morales-Viviescas was able to support the improvement of existing control algorithms for vibration reduction. Significantly, he was also instrumental in implementing new algorithms to enhance helicopter performance. His skills in this area complemented those of other engineers at Leonardo and the Fellowship has strengthened his collaboration with industry.

“The work has generated several ideas for future research and plans to submit research

proposals linked to this scheme are already underway,” he says.

Dr Morales-Viviescas also hopes that this experience might influence future developments to the aerospace curriculum at the University of Leicester. In the meantime, the real-world design solutions he developed at Leonardo have been incorporated into his teaching on the topic of dynamics.

“My experience has been of great value when motivating undergraduate students to the subject of vibration reduction and making them aware of industrial priorities in this area.”

PROFESSIONAL DEVELOPMENT

The secondment at Leonardo has helped to improve both the application and visibility of Dr Morales-Viviescas’ research. It led to new research ideas that have been published in top rotorcraft conferences and some that are being reviewed by high-impact journals. He also supervises PhD students on related areas of research. Some aspects of these projects have potential for industrial application and they are being keenly followed by colleagues and engineers at Leonardo.

ROYAL ACADEMY OF ENGINEERING INDUSTRIAL FELLOWSHIP SCHEME

The Industrial Fellowship scheme provides an invaluable opportunity for early- to mid-career academics to undertake a collaborative research project in an industrial environment. The scheme aims to strengthen the strategic relationship between the university and the industry host by providing an opportunity to establish or enhance collaborative research between the two parties and enhance the quality of teaching.