



Hamilton Institute

Autonomous Systems, Uncertainty and Feedback

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Abstract:

This first part of this talk highlights control capabilities of different Unmanned Aerial Vehicles. It particularly focuses on one patented invention, termed HexRotor, which has unique control capabilities in that it can fly in any orientation it wishes. As such, it can translate in free space completely independently of its attitude and hence enables an onboard camera to look at any point in space without complex gimbaling devices. These control capabilities also allow a vehicle prototype equipped with an outer structural frame to roll on the ground, thereby saving energy while in locomotion and only fly when needed to avoid an obstacle or to peek at an elevated object such as through a window. It can also roll on a surface of any inclination, including a vertical wall or a ceiling. A vehicle prototype has been constructed and has participated in the 2008 MoD Grand Challenge with reports of it appearing in the Times Higher Education Magazine.

The second half of the talk will give an overview of some results pioneered in Negative-Imaginary Theory which is a variation of Passivity theory when position sensors, instead of velocity sensors, are adopted in conjunction with co-located force actuators. This work has been shown to have profound effects in the control of elastic mechanical structures, particularly in nanotechnology where fast and accurate nano-positioning is a key problem. Over the past few years, international colleagues have taken up this new development and applied it in fields as varied as control of vehicle platoons; damping of elastic modes in carbon fibre wings; control of nano-devices; piezo-electric control of optical laser cavities; adaptive radio telescopes to compensate for atmospheric disturbances; and other applications.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 2.00pm - 3.00pm

Travel directions are available at www.hamilton.ie