

## PhD Positions

### Bio-inspired Guidance and Control of Unmanned Aircraft

As part of a collaboration between Boeing Research & Technology-Australia (BR&T-A), The University of Queensland (UQ), and The Queensland University of Technology (QUT), we have two projects that seek to draw inspiration from nature to address aspects of guidance, navigation, and motion control for unmanned aircraft.

The first project (a collaboration among BR&T-A, UQ, and QUT) seeks to develop strategies for mid-air collision avoidance in aircraft based on bird behaviours. Birds seldom collide with each other and other objects, despite the high speeds at which they fly in complex environments. In this research, we will study how birds use sensory information, make decisions, and perform manoeuvres, and draw inspiration from experiments on bird flight to develop and test novel strategies for the detection and avoidance of potential aircraft mid-air collisions.

The second project seeks to investigate and model how aggressive honeybees pursue and intercept moving targets, and use the results to design novel, biologically inspired guidance systems for unmanned aircraft that are engaged in surveillance, security and safety missions. Although it is well known that aggressive honeybees are very effective at detecting, pursuing and intercepting moving targets, this behaviour has never been studied quantitatively. We will use high-speed video cinematography to investigate this behaviour, to develop visual algorithms for the detection of moving targets, and to create dynamical models of the mechanisms that control pursuit. The resulting algorithms will be incorporated into unmanned aircraft for detecting, monitoring and tracking other objects in the sky, and their performance will be evaluated. The results will provide a better understanding of the biological basis of pursuit behaviour, as well as lead to novel technologies for aerial surveillance and safety.

#### Research Areas

We are looking for highly-motivated individuals to complete a doctoral degrees in areas of

- Inverse optimal control and Markoff decision processes
- Probabilistic robotics
- Guidance and motion control
- Computer vision

#### Timeline

Several positions are required both at UQ and QUT, and some applications for scholarships and top ups close on 30th September 2014. We are looking for several candidates with backgrounds in Electrical and Mechatronics Engineering as well as Applied Mathematics and Computer Science.

#### Contact

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