E3 Scholarship Project Description
Birdsong Forensics for Species Identification and Separation

Principal Investigator: Naomi Harte (School of Engineering, Electronic and Electrical Engineering)

Official Collaborator: Nicola Marples (School of Natural Sciences, Zoology)

Brief Description of the Research
The analysis of birdsong has increased in the speech processing community in the past five years. Much of the reported research has concentrated on the identification of bird species from their songs or calls. Smartphone apps have been developed that claim to identify automatically a bird species from a live recording taken by the user. A lesser reported topic is the analysis of birdsong from subspecies of the same bird. Among experts, birdsong is considered a particularly effective way of comparing birds at species level. Differences in song may help uncover cryptic species. In many species, such as those living in the high canopy, catching the birds in order to obtain morphological (e.g. weight, bill length, wing length) and genetic data may be time-consuming and expensive. Identifying interesting populations by detection of song differences allows such effort to be better targeted.

Figure: Combining spectral analysis of birdsong with machine learning can help quantify differences between bird sub-species. Black-naped Orioles (left and right) and Olive-backed Sunbirds (centre) and are just two of the bird species currently being studied by TCD zoologists.
Birdsong presents many unique challenges as a signal. The use of signal processing and machine learning techniques for birdsong analysis is at a very early stage within the ornithological research community. This PhD project seeks to lead the way in defining the state-of-the-art for forensic birdsong analysis. The research will develop new algorithms to quantify levels of similarity in birdsong systematically, transforming the comparison of birdsong in the natural sciences arena. The results will be of importance internationally for the study, monitoring and conservation of bird populations.

The research will push out the boundaries of feature analysis and classification techniques in signal processing, contributing to the ongoing evolution of automatic human speech recognition systems.

**Applicant Profile and Procedure**

The ideal candidate for this position will

• have a first-class honours primary degree in electronic engineering, electronic and computer engineering, or a closely related discipline;
• possess strong written and oral communication skills in English;
• have a strong background and interest in digital signal processing (DSP);
• be mathematically minded, and be curious about nature.

Experience in Matlab will be a distinct advantage.

This E3 Scholarship covers full annual PhD tuition fees, and provides an annual stipend of €8000, for three years. In addition, the E3 Scholar will receive a further €8000 annual stipend from the Sigmedia Group within the School of Engineering, bringing the net award in line with TCD’s Postgraduate Ussher Fellowships.

To apply, please send an email to Naomi Harte (nharte@tcd.ie), to include the following:

• *curriculum vitae (CV)* (maximum two pages)
• short statement of motivation (half page)
• scanned academic transcripts
• name and contact details of TWO academic referees

Incomplete applications may not be considered. Dr Harte may also be contacted for further information and enquiries about this E3 Scholarship opportunity.

The closing date for applications is **31st August 2013**. The successful candidate should be available to commence their PhD studies at Trinity College Dublin in **late September 2013**.