



### PhD Studentship in Functional Programming at the University of St Andrews

A PhD studentship is available in the Functional Programming group at the University of St Andrews. We are looking for a well-qualified student to work on the recently-funded £1M Islay project (**Adaptive Hardware Systems with Novel Algorithmic Design and Guaranteed Resource Bounds**), which exploits new and advanced functional programming technology to overcome fundamental challenges in high-performance computing. The project is multi-site and interdisciplinary, and builds on world-leading work in signal and image processing methods, techniques to assess the performance and complexity of computer software, and complex processor design techniques. Students must have achieved or expect to achieve a First Class or Upper Second degree in Computer Science or a relevant discipline, and have a strong interest in Functional Programming.

The PhD research will involve:

- o Extending Hume with new language constructs and extending the Hume Abstract Machine (HAM) with new instructions to enable exploitation of SIMD/DSP modes in both specialised processors and standard CPUs. This will include appropriate formal semantics extensions
- o Developing complementary new models and analyses of time and space behaviour of specialised Hume Abstract Machine instructions for SIMD/DSP architectures.
- o Extending existing formal time and space analyses to handle FPGA implementations
- o Developing formal models of power consumption at a source level, based on empirical measurements of power usage, and capturing this information in a formal power-usage analysis
- o Developing new analyses (or extending existing analyses) so that they can exploit this dynamic system reconfiguration capability in order to optimise time and power resource use

Further details can be found as follows:

The Islay Project: <http://www.see.ed.ac.uk/~jst/hardware/>  
The Hume Language: <http://www.hume-lang.org>  
Functional Programming at St Andrews <http://www-fp.cs.st-and.ac.uk>

The studentship is offered under the standard terms and conditions for project studentships laid down by the UK's Engineering and Physical Sciences Research Council (EPSRC). It offers both fees and maintenance, and is open to applicants of any nationality. The position is available immediately, or by negotiation.

For further information, or to apply for the studentship, please contact

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