



## Doctoral Thesis Defense

Speaker:	Ai Hua WU
Supervisor:	Dr. J. Paquet
Examining Committee:	Drs.W. Du, F. Khendek G. Butler, P. Grogono
Title:	OO-IP Hybrid Language Design and a Framework Approach to the GIPC
Date:	Thursday, April 9, 2009
Time:	14:00
Place:	EV 1.162

## ABSTRACT

Intensional Programming is a declarative programming paradigm in which expressions are evaluated in an inherently multidimensional context space. The Lucid family of programming languages is, to this day, the only programming languages of true intensional nature. Lucid being a functional language, Lucid programs are inherently parallel and their parallelism can be efficiently exploited by the adjunction of a procedural language to increase the granularity of its parallelism, forming hybrid Lucid languages. That very wide array of possibilities raises the need for an extremely flexible programming language investigation platform to investigate on this plethora of possibilities for Intensional Programming. That is the purpose of the General Intensional Programming System (GIPSY), especially, the General Intensional Programming Compiler (GIPC) component.

The framework presented in this thesis provides a superior solution compared to all other techniques used to this day to implement the different variants of intensional programming. Because of the functionality of hybrid programming support in the GIPC framework, a new OO-IP hybrid language is designed for further research. This new hybrid language combines the essential characteristics of IPL and Java, and introduces the notion of object streams which makes it possible that each element in an IPL stream could be an object with embedded intensional properties. Interestingly, this hybrid language also brings to Java objects the power which can explicitly express context, creating the novel concept of intensional objects. By this new feature, we extend the use and meaning of the notion of object and enrich the meaning of stream in IPL and semantics of Java.

At the same time, during the procedure to introduce intensional objects and this OO-IP hybrid language, many factors are considered. These factors include how to integrate the new language with the GIPC framework design and the issues related to its integration in the current GIPSY implementation. Current semantic rules show that the new language can work well with the GIPC framework and the GIPSY implementation, which is another proof of the validity of our GIPC framework design. Ultimately, the proposed design is put into implementation in the GIPSY and the implementation put to test using programs from different application domains written in this new OO-IP language.