

## OPEN SEMINAR SERIES

**Wednesday 18 December, 2013**  
**17:00 – 18:00**

**ROOM L1**  
**7<sup>th</sup> Floor-L. Sofou Bldg.**

**"Specification, Verification and Testing of Hybrid  
Conventional/Unconventional Computing Systems".**

**By**  
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### ABSTRACT

Research is currently being undertaken at many institutions across the world to identify natural processes that can be exploited computationally. The technologies underpinning these processes are extremely varied, and include such things as slime mould propagation, hybrid quantum computers, molecular computing, DNA self-assembly and oscillatory chemical reactions. The resulting computational systems can also take a wide variety of forms, including, for example, quantum computing, stochastic systems, analogue computation, discrete (Turing-style) computation, and more. When designing complex systems, it makes sense to use the best components available for each subtask, but this raises an obvious question: if the technologies used to implement these components are radically different from one another, how can we formally specify, verify or generate test sets for the combined system? Can we find a single language in which to express the required system and/or component behaviours, or do we need to combine many different approaches on an essentially ad hoc basis? In this talk I will propose one possible solution to this problem, based on a generalised version of Eilenberg's X-machine model of computation. I will argue that all of the relevant behaviours can be modelled using these machines, and that component behaviours can easily be combined within the model to generate higher-level system descriptions. Provided certain extended design-for-test conditions, which I will outline in more detail, are satisfied, it should then be possible to exploit known X-machine testability results to establish the existence of complete finite test sets for even very complicated hybrid systems comprising mixtures of conventional and unconventional components. This work is still at the proposal stage, and we are keen to collaborate with other interested parties.

**The seminar series is open to all members of *staff* and *students* of CITY and to any *externals* that wish to attend.**



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