YCCSA Seminar Series
Spring 2020

An interdisciplinary seminar series hosted by the York Cross-disciplinary Centre for Systems Analysis aimed at researchers from all disciplines

Designing future computers using AI

Dr Matthew Dale

YCCSA / Computer Science, University of York

Friday, 31 January 2020
CSE/102&103, Computer Science, 13:30

Abstract:

Digital computing is extremely powerful but the paradigms upon which it was built have some fundamental limitations. Forcing silicon to bend to our will has led to inefficiencies (e.g. power consumption, "death by heat", speed limits, manufacturing limits and serial processing) and its separate processor-memory design has created crippling bottlenecks. Today, a key advantage of digital is universality but this comes at a price. Universality is often unnecessary for intense computing applications such as physical modelling and machine learning, and even for low-power applications where we want to compute "at the edge".

Analogue and hybrid computing offer solutions to all of the above problems. However, building these systems brings new challenges, requiring new tools, models, architectures and algorithms.

In this talk, I will show how methods from bio-inspired computing and AI can help design and build new powerful (unconventional) computing systems that were too challenging to control or conceive of before. Inspired by nature and the physical world, we harness the existing properties of materials/systems – rather than impose them -- and evolve their design through artificial evolution towards our needs. I will give examples of current systems including electronic, optical, chemical, and even some stranger systems. Then, I will discuss some key challenges and how we at York are attempting to solve them.

The seminar includes a refreshment break to fuel interdisciplinary discussion

Ron Cooke Hub is on Heslington East Campus – accessible by free bus services
Nos. 66 and UB1 running at frequent intervals from Heslington West.