2018 YCCSA SUMMER SCHOLARSHIP PROJECT SUBMISSION

This form is for prospective project supervisors to submit their projects to be included in the YCCSA Summer Scholarships Programme for 2018.

It is the purpose of the YCCSA Summer School that any projects submitted are novel and interdisciplinary in nature.

Date	*23 January 2018*
Supervisors' Names and Departments / Affiliation and Contact Email	*Prof. Susan Stepney* *Computer Science* https://www-users.cs.york.ac.uk/susan *Dr Angelika Sebald* *Chemistry* https://www.york.ac.uk/chemistry/staff/academic/o-s/asebald
Project Title	**The Dynamics of Boolean Tree Networks**
Project Description	Artificial Chemistries (AChems) are abstract computational models built on analogies of real-world chemical reaction systems and networks. One aim is to provide a means of generating computational novelty, to provide a computational substrate for Artificial Life. Most AChems in the literature work at a single level ("atoms" bonding to form "molecules"). We wish to investigate higher level structures. We have an AChem (called *RBN-world*) based on the computational dynamics of "Random Boolean Networks", which have complex, but computationally tractable, behaviours that can be used to build complex structures. We now want to investigate whether these structures, the analogue of molecules, can themselves be interpreted as "higher level" Boolean networks. But they have a *tree* structure, not a general network structure, and sparser connectivity than true RBNs. We want to find out whether they have the needed "complex, but computationally tractable, behaviours" that would make them suitable as the basis for building further levels of structure. This project will investigate the computational dynamics of these "Boolean tree networks", and build a small proof-of-concept system, to evaluate their usefulness as a higher level AChem.
Required Skills	The project would suit a student with any science and/or engineering background with a keen interest in interdisciplinary work on computational investigations of complex systems. Basic programming skill are essential.
Supervision and Collaboration Arrangements	The student will be co-supervised by Prof. Stepney and Dr. Sebald.

Project Dates	The summer school runs for 9 weeks, starting on Monday, 09 July 2018 and finishing on Friday, 07 September 2018.
Other Information	
References	1. *Mihail Krastev, Angelika Sebald, Susan Stepney. Functional grouping analysis of varying reactor types in the Spiky-RBN AChem. ECAL 2017, Lyon, France, September 2017, pp.247-254, MIT Press 2017* https://www-users.cs.york.ac.uk/susan/bib/ss/nonstd/ecal2017-krastev.pdf 2. *Mihail Krastev, Angelika Sebald, Susan Stepney. Emergent Bonding Properties in the Spiky RBN AChem. ALife 2016, Cancun, Mexico, July 2016, pp.600–607, MIT Press, 2016* https://www-users.cs.york.ac.uk/susan/bib/ss/nonstd/alife2016-k.pdf

When complete, please email the form to sarah.christmas@york.ac.uk