Student 1

Degree: BSc Hons Artificial Intelligence and Computer Science

Classification: Second Class, Upper Division

Third Year Courses:

- AICS Large Practical
- Algorithms and Data Structures
- Computability and Intractability
- Computer Architecture
- Genetic Algorithms and Genetic Programming
- Introduction to Cognitive Science
- Introduction to Computational Linguistics
- Introduction to Vision and Robotics
- Operating Systems
- Professional Issues
- System Design Project

Fourth Year Courses:

- Advanced Vision
- Computer Graphics
- Computer Networking
- Distributed Systems
- Human-Computer Interaction
- Multi-agent Semantic Web Systems
- Parallel Architectures
- Semantics and Pragmatics of Natural Language Processing

Honours Project:

Title: P131: Memory-Constrained Routing Algorithms for Specknets

Abstract:

The aims of this project are to analyse the performance of four common network routing algorithms under highly-constrained memory conditions. The four algorithms, Dynamic Source Routing, Ad-hoc On-Demand Distance Vector Routing, the Zone Routing Protocol and On-Demand Multicast Routing are modified in the Qualnet network simulator to allow for new overall memory constraints and structure-specific limits. These new versions are tested and compared against the original “unconstrained” protocols, with all other protocols at the application, transport, network, MAC and physical layers taken into account. Results of this testing demonstrate the immense difficulties facing Specknets and the development of a realistic platform for speckled computing.
Student 2

Degree: BSc Hons Artificial Intelligence and Psychology

Classification: First Class

Third Year Courses:

AI/ Psychology Large Practical
Genetic Algorithms and Genetic Programming
Introduction to Cognitive Science
Introduction to Vision and Robotics
Learning from Data
Psychology Methodology
Psychology Papers 1 and 2

Fourth Year Courses:

Advanced Vision
Automated Reasoning
Cognitive Modelling
Face Perception
Intelligent Autonomous Robotics
Multi-agent Semantic Web Systems
Psycholinguistics of Language Production
Psychological Testing: Methods, Problems and Applications

Dissertation in Psychology

Title: Evolutionary Methods for Tuning a Robot Sound Recognition System

Abstract:

A spatially-dispersed GA with co-evolutionary methodology was developed to artificially evolve temporal-parameters for a spiking neural-model of the cricket auditory system capable of performing phonotaxis. Male chromosomes containing genes that encode for the temporal properties of calling songs were simultaneously evolved in the co-evolutionary model. The application of A.I. modelling to the evolution of cricket species and their mating behaviour is reviewed. The GA model produced discrete spatial groupings of individuals, which had distinct genetic code within the male and female chromosomes. Networks with neural-parameters set by the female chromosome’s genes showed a higher phonotactic performance when responding to songs produced by males within that group than to songs produced by males from other groups, supporting conspecific preference of calling song. However, this effect varied greatly between groups and trials. The algorithm’s behaviour is complex, dynamic and chaotic, with highly dimensional data necessitating complex analysis. The resulting analysis does not provide a clear or concise synopsis of the behaviour and has left some open questions that would require further research.
Student 3

Degree: BSc Hons Computer Science

Classification: Second Class, Upper Division

Third Year Courses:

- CS Individual Practical
- Computer Communications
- Database Systems
- Enterprise Computing
- Functional Programming and Specification
- Language Semantics and Implementation
- Operating Systems
- Professional Issues
- Software Engineering with Objects and Components
- System Design Project

Fourth Year Courses:

- Embedded Software
- Human-Computer Interaction
- Modelling and Simulation
- Multi-agent Semantic Web Systems
- Parallel Programming Languages and Systems
- Querying and Storing XML
- Software Architecture, Processes, and Management
- Text Technologies

Honours Project:

Title: Hardening Soft Information Sources: Object Matching

Abstract:

Object matching has been recognised as important for many decades. It is an essential stage in many data integration and data cleaning processes, ranging from integrating restaurant reviews from multiple websites, to matching medical records from different institutions. In this project I perform a general exploration of three approaches, comparing their merits and evaluating their performance. The three approaches are the Boolean model, the Vector Space model and the Naïve Bayes model. Previous studies have concentrated on single approaches and their optimisation. My experimental results demonstrate that the Boolean model is capable of achieving significantly better results than the Vector Space and Naïve Bayes models. I have also shown that the Vector Space model is by far the least suitable approach.
Student 4

Degree: BSc Hons Computer Science

Classification: First Class

Third Year Courses:

- Algorithms and Data Structures
- CS Individual Practical
- Compiling Techniques
- Computability and Intractability
- Computer Design
- Enterprise Computing
- Functional Programming and Specification
- Language Semantics and Implementation
- Operating Systems
- Professional Issues
- System Design Project

Fourth Year Courses:

- Advances in Programming Languages
- Compiler Optimisation
- Computer Graphics
- Formal Programming Language Semantics
- Human-Computer Interaction
- Modelling and Simulation
- Software Architecture, Processes, and Management
- Types and Programming Languages

Honours Project:

Title: Using a Satisfiability Modulo Theory Solver on Verification Conditions

Abstract:

Recent improvements to techniques for solving the propositional satisfiability problem, SAT, have lead to a desire to combine SAT solvers with decision procedures for other, richer, theories than Boolean logic.

This project is concerned with researching these combination techniques and examining one particular implementation, and its usages in solving verification conditions
Student 5

Degree: BSc Hons Computer Science and Management Science

Classification: Second Class, Upper Division

Third Year Courses:

- CS Individual Practical
- Computer Architecture
- Computer Design
- Database Systems
- Enterprise Computing
- Entrepreneurship and Small Firms
- Management Science and Operations Planning
- Professional Issues
- The Management of Technology

Fourth Year Courses:

- Computer Graphics
- Decision-Making under Uncertainty
- Human Computer Interaction
- Mathematical Programming
- Modelling and Simulation
- Visualisation

Honours Project:

Title: WebExp2 Graphical Front-End

Abstract:

WebExp2 is a software system for conducting psychological experiments over the World Wide Web and its experiments are written in an XML-based language. Writing these manually in a text editor such as Notepad or Vim is not only tedious due to XML’s verbose syntax, but it is also error-prone. WebExp2 only has limited error reporting capabilities, so debugging erroneous experiments can be difficult for novice users. Generic XML editors can simplify the task, but they are still limited in their ability of creating valid WebExp2 experiments and making it clear to the user how various WebExp2 elements and attributes work. For this project, a front-end for creating WebExp2 experiments has been developed to make the creation of them easier, quicker, and less frustrating than it would be with a text- or a generic XML editor.
Student 6

Degree: BSc Hons Computer Science and Physics

Classification: Second Class, Upper Division

Third Year Courses:

- Algorithms and Data Structures
- Computational Methods
- Computer Design
- Computer Security
- Dynamics and Relativity
- Electromagnetism
- Operating Systems
- Optics
- Quantum Mechanics
- Statistical Mechanics
- System Design Project

Fourth Year Courses:

- Condensed Matter Physics
- Distributed Systems
- Human-Computer Interaction
- Lagrangian Dynamics
- Laser Physics
- Physics Skills
- Quantum Physics
- Software Architecture, Processes, and Management

Physics Honours Project

Semester 1 Project
Title: Phonons in Periodic and Quasiperiodic Systems

Abstract:
Beads are set up on a vibrating wire in monatomic, diatomic and Fibonacci chains to simulate the discrete structure of crystals and quasicrystals. A lock-in amplifier is used to measure the resonance frequencies $\omega$ of each system. They are paired with corresponding wave vectors $k$ to obtain the dispersion relation $\omega(k)$ for each system. The dispersion relations for a bare string, and both monatomic and diatomic chains agree well with both theoretical predictions and previously published results\(^1\). The behaviour exhibited by the Fibonacci chain (a 1-d simulation of a quasicrystal) has some similarities to that of a monatomic chain. Further evidence was obtained to support the claim that the smaller the amplitude of a vibration, the fewer non-linearities there are in that vibration, and the better it matches the theoretical prediction.
**Semester 2 Project**  
**Title:** A Crystal Structure Study of Ice VI using X-ray Diffraction

**Abstract:**  
The structure of the high-pressure phase VI of Ice has been solved from X-ray diffraction data from a crystal contained within a Merrill-Bassett Cell under a pressure of 16 kBar. The space group of the crystal was found to be P42/nmc and the structure is that of two interpenetrating tetragonal networks. The positions of both the Oxygen and Hydrogen atoms were refined to a 3.4% error. Ice VI is the dominant intermediate phase between phases Ih and VII. Phase Ih has a hexagonal arrangement of O atoms, while phase VII has a cubic arrangement. In each of these three phases, every O atom is tetrahedrally linked to 4 nearest neighbour H atoms. The bonds of phase VI however, show considerably more disorder than phases Ih and VI, producing a much less regular tetragonal structure in terms of both bond angles and lengths. To learn and practice the experimental techniques required to solve the structure of Ice VI, the structure of FeS₂ was first solved as a learning exercise.