Editorial

Welcome to the 5th and Royal Special Issue of iCS. We cover an exciting Software Engineering Project undertaken by our Computer Science students, which was demonstrated to Her Majesty the Queen during her visit to the University of Leicester on the 4th of December 2008.

The development of the project software, a “Virtual Teaching Hospital System”, was carried out in cooperation with Dr John Omara and in consultation with Leicester’s Medical School. The system provides simulations of diagnosis and patient management using real patient data and is an exciting interdisciplinary application of Computer Science that requires the solution of real computing problems. There is an added bonus that the work could lead to direct benefits to the public by assisting the medical profession in its daily activities.

The system was presented to Her Majesty by the student group who won the 2008 BEA Systems Award for the best 2nd year Software Engineering Project, along with Adwoa Donyina who continued this work during her MSc. She is now doing her PhD in the Department under the supervision of Professor Reiko Heckel (who also led the group project). The Queen had previously visited the University of Leicester in 1958, when she opened the Student’s Union and in her latest visit the Queen opened the new David Wilson Library.

In this issue you can find out more about the Royal Visit and the group presentation, read in detail about the project work leading to the Virtual Teaching Hospital System, and learn how second year software engineering projects engage our students each year in the development of a real product that involves interacting with a real client.

The Royal Demonstration

The VTHS was demonstrated to Her Majesty the Queen on her recent visit to the University by a group of Computer Science students. The undergraduate students are Mayur Bapodra, Jung-Ming Chong, John Pickering, and Dumisani Papaya, as well as postgraduate student Adwoa Donyina. You can read about her experiences in our Meet a Computer Scientist column.
Virtual Teaching Hospital System (VTHS)

Medical students are trained in a variety of different skills: how to take a patient history, do clinical examination, and interpret the results of examinations to decide what is wrong with the patient, prescribe the appropriate treatment, and continue the care.

Over the last two years, Leicester Computer Science students have developed a computer system to help medical students practice and develop some of these skills through computer simulations using real patient data. In particular, the system will improve supervision of medical students during placements in clinics and hospitals and provide feedback on their diagnoses and treatment choices. The system software development is part of a project between Leicester Medical School and the Computer Science Department at the University of Leicester, led by Professor Reiko Heckel in collaboration with Dr. John Omara. The system grew out of an idea of Dr. Omara’s to improve health care in rural areas of Africa, and the current system has evolved through the work of numerous project students from the Department of Computer Science at the University of Leicester. The first of the projects was at undergraduate bachelors level in spring 2008, then at postgraduate masters level in summer 2008, and the system is being further developed by undergraduates in spring 2009.

Welcome Jane.

This diagnosis is then confirmed or contradicted by the expert system, essentially a database of connections between observations and diseases, which is consulted for each case. The student’s diagnosis and explanation will be stored and presented to the supervisor for comments and assessment.
Undergraduate Student Projects

The general software engineering education in our degrees culminates in a group project in the 2nd semester of year 2. It provides a realistic experience of a software project, including technological challenges such as the use of modern programming languages like PHP or Java and their associated tools, along with organisational challenges such as planning and coordinating a number of interdependent tasks within a group.

The ability to work in teams is crucial in today’s software industry. Many problems such as projects going over budget, missing deadlines or not delivering the required functionality are often due to organisational issues such as poor communication or lack of flexibility in the case of unforeseen changes to requirements. Learning the skills to deal with such issues is an important outcome of this project.

During the Software Engineering Group Project module, groups of 6-8 second-year students work on developing a software system throughout the 2nd semester. The students work for a real client solving a real-life problem. In the VTHS project Dr. John Omara played the role of the client. An extra challenge was posed by the unfamiliar domain of medical diagnosis. Lack of familiarity of the problem domain is a day-to-day challenge for IT specialists.

Early Learning

Preparation for the challenges of a project starts in the 1st year of undergraduate teaching. A module on Study Skills and Professional Practice provides among other things training in group work. In the 1st semester of year 2, a module on Software Project Management provides the necessary background in planning, risk management, and reporting as well as an introduction to the development methods employed.

Postgraduate Student Projects

All postgraduate masters students undertake a summer project. They decide on their own project to work on: something that they find exciting that uses the skills and techniques learnt during the Masters course. The bulk of the project occupies 3 months of full-time work cumulating in a written dissertation, along with some software or research results. For many masters students this project is the highlight of their Masters Course. For some students it is the first time they experience the challenge of a large-scale full-time project.

“The project, when implemented, will make it easier to explain and teach the complex process involved in making clinical diagnosis.”

Dr. John Omara
Meet a Computer Scientist

Adwoa Donyina obtained a BSc with Honours in Computer Science specialising in Software Engineering at the University of Toronto and an MSc with Distinction in Advanced Software Engineering from the University of Leicester in January 2009. She now works as a Graduate Teaching Assistant at the University of Leicester and is pursuing a PhD in Computer Science, studying Graph Transformations and Service Oriented Architectures.

ICS: Are you still involved with VTHS?
Adwoa: In addition to presenting my work to Her Majesty I assist future undergraduates who continue to work on VTHS. This will continue as long as there is a significant amount of work to do on it.

ICS: How did you get involved with the VTHS?
Adwoa: I was actually involved from October 2007, before my Masters project began. I consulted with the customers, including Dr. John Omara, and presented their requirements to the undergraduate project students. The students developed some of the technical functionality required for the VTHS.

ICS: So your Masters project extended the undergraduate’s work?
Adwoa: Yes, I selected the undergraduate project closest to the initial requirements and then undertook further work on it. The medical school provided a flowchart detailing a medical student’s real-life thinking process that I was to model in the VTHS system. I also used an artificial neural network system to improve the diagnosis-making component so that it could reflect possible diagnoses of several doctors.

ICS: What do you find especially satisfying about your work on the VTHS?
Adwoa: My project has helped me to develop high quality research skills and has provided me with a valuable teaching experience. Working with computer scientists and medics has given me experience of interdisciplinary research. These skills are a great asset.

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The value of the system lies in the way the VTHS can be used by medical students to explore ‘what if’ scenarios – i.e. ‘what if this same patient presented with the same symptoms and signs but also with a temperature or, ‘but without the abdominal pain?’

Dr Jonathan Hales

Adwoa Donyina

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