Waterford Institute *of* Technology
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

Projects & Dissertations in Computing

CLASS OF 2009

Department of Computing, Mathematics and Physics

www.wit.ie

Waterford Institute of Technology

Department of Computing, Mathematics & Physics
Eugene Lawler Graduate School of Computing

Presentation of Final Year Projects
Presentation of Dissertation Posters by M.Sc. Students

We would like to welcome the students, their parents and friends as well as our guests from industry to the presentation of Final Year Projects by students on the

B.Sc. (Honours) in Applied Computing
B.Sc. (Honours) in Commercial Software Development
B.Sc. (Honours) in Information Technology
B.Sc. (Honours) in Multimedia Applications Development
B.Sc. (Honours) in Physics with Computing
Higher Diploma in Computing (Applied Computing)

The posters reflect ongoing research on the dissertations by postgraduate students on

M.Sc. in Computing (Communications Software)
M.Sc. in Computing (Multimedia and ELearning)
M.Sc. in Computing (Information Systems Processes)

The faculty of the department are very proud of the level of innovation and creativity achieved by the students. The quality of the presentations is a testament to the hard work of the students. Many of them have surmounted technical challenges and developed advanced applications that have great research potential or are capable of commercial exploitation.

A special word of thanks is also due to staff in the department, for their expertise in devising academic programmes that are stimulating for students and that are also highly relevant to the development needs of the South East Region. The supervisors and coordination team played a very important role in directing the effort of the students and assuring the successful completion of the projects.

I would like to invite you to visit our computer laboratories and to discuss the projects and poster demonstrations with the students. The catalogue of undergraduate projects and postgraduate dissertation topics cover a vast spectrum of applications; potential employers are invited to contact the students using the associated email addresses.

Le gach dea-ghuí,

Dr. Mícheál Ó hÉigeartaigh (moheigeartaigh@wit.ie)

Table of Contents for the remainder of the book:

Flexible Apprenticeship

All our undergraduate programmes incorporate a flexible apprenticeship (semester or year). This is designed to prepare students for their subsequent professional careers by offering them the opportunity to acquire transferable skills and marry theoretical knowledge with practical applications.

Apprenticeships take the form of

- Industrial Placement
- Active Service Learning - Supervised Placement in a Voluntary Organisation
- Erasmus Placement in a Non-English Speaking Environment
- Placement in a Designated Research Laboratory
- Collaborative Project on Commercialisation/ Industry Start Up

The apprenticeship process has matured over many years and the department has successfully placed a large number of students in industries ranging from multinational companies to SMEs. The process has a detailed management structure, incorporating visits from WIT faculty, supervision by professional staff and the requirement that students document their learning experiences within a structured reporting system.

Advantages for Employers

Employers get the opportunity, inter alia, to

- Access a supply of highly motivated young people with high technology skills
- Hire temporary staff who possess a refreshing mix of energy and innovation
- Buy in expertise in emerging areas of technology
- Evaluate and build relationships with future employees
- Cover holiday and short term leave for existing employees
- Implement finite projects that would otherwise be deferred

Student Preparation for the Apprenticeship

Prior to applying for the apprenticeship process, students are required to create a formal CV and to undertake training in interview techniques. Subsequently, they normally undergo a formal and competitive selection process, mandated externally.

Their attributes include

- Good theoretical and practical skills in their domain of study
- Flexibility to learn new procedures and technologies
- Team and interpersonal communication skills
- Documentation and version control skills
- A willingness to innovate and take on technical challenges

For further details, please contact the departmental administrator: mryan@wit.ie

Hiring Graduates

We are always happy to pass on requests from potential employers to students. The Graduate Placement Office offers a comprehensive service to employers. We have fixed the final year timetables, to facilitate students who wish to take up employment at the end of their flexible apprenticeship; they can then complete their final year over two years in block release mode.

Contact Details: Ms. Angela Collins Email: **acollins@wit.ie**

Collaboration on Undergraduate Projects

We welcome the involvement of companies in undergraduate projects. We are particularly interested in encouraging students and companies to cooperate in projects with a commercialisation and applied research focus under the Enterprise Ireland sponsored Innovation Voucher Scheme. However, employers should note that the project life cycle is complex and typically spans a twelve month period, so please contact project coordinator, Mr. Ian Downey, at the earliest opportunity.

Contact details: Mr. Ian Downey Email: **idowney@wit.ie**

Feedback from Employers

The current members of the Industry Advisory Council to the department are:

Mr. Pat Power (Glanbia), Dr. Hakeem Hammad (Boston Scientific),
Mr. Patrick Bruen (Sun Life Financial), Dr. Kevin Brady (Genzyme),
Mr. David Culliton (Kilkenny Chamber), Mr. Bill Kearney (IBM),
Mr. David O'Sullivan (Waterford Crystal), Mr. Liam Cronin (Microsoft)

We are greatly indebted to the members of the council for ongoing advice on all aspects of the department and the graduate school.

Our role is that of service to the South East Region and we greatly welcome advice and input from members of the community.

Contact details: Dr. Mícheál Ó hÉigeartaigh Email: **moheigeartaigh@wit.ie**

Information for Prospective Undergraduate Students

Department of Computing, Mathematics & Physics

At WIT, we take the view that students have unlimited ability and if they engage openly with faculty in their education, their brief stay with us will be marked with a sense of enjoyment, innovation and exhilaration.

The first year contains a sequence of interlinked modules on communication, critical thinking and learning skills. The importance of team work permeates all our academic programmes. Extensive use is made of our ELearning platform MOODLE in line with our philosophy of independent learning and self-directed study.

Practical assignments are blended with theoretical development on all modules. A strong emphasis is placed on industry relevant assignments. Great care is taken to give students industry-related transferable skills. Evaluation is typically a mixture of continuous assessment and formal examinations.

B.Sc. (Honours) in Applied Computing – WD028
Chairperson: Ms. Mairead Meagher Email: **mmeagher@wit.ie**

B.Sc. (Honours) in Physics with Computing – WD132
Chairpersons: Dr. Claire Keary, Mr. Eamonn de Leaster Email: **ckeary@wit.ie**

B.Sc. (Honours) in Computer Forensics – WD161
Chairperson: Mr. John Sheppard, Email: **jsheppard@wit.ie**

B.Sc. (Honours) in Entertainment Systems – WD168
Chairperson: Mr. Karl Sandison, Mr. Robert O'Connor, Email: **ksandison@wit.ie**

B.Sc. in Information Technology – WD 155
Chairpersons: Ms. Mary Barry, Ms. Mary Power, Mr. T.J.McDonald.
Email: **mbarry@wit.ie**

B.Sc. in Multimedia Applications Development – WD153
Chairpersons: Ms. Brenda O'Neill, Ms. Caroline Kelly. Email: **boneill@wit.ie**

B.Sc. in Software Systems Development – WD151
Chairpersons: Ms. Mary Lyng, Ms. Clodagh Power, Mr. David Drohan.
Email: **mlyng@wit.ie**

Higher Diploma in Computing (Business Systems Analysis)
Chairpersons: Ms Deirdre O'Halloran, Mr Chris O'Riordan.
Email: **dohalloran@wit.ie**
Email: **coriordan@wit.ie**

Higher Diploma in Computing (Applied Computing)
Chairperson: Ms. Ciara Cawley Email: **cmcawley@wit.ie**

Higher Certificate in Information Technology Support
Chairperson: Ms. Anne Dunphy Email: **adunphy@wit.ie**

Information for Prospective Postgraduate Students

Eugene Lawler Graduate School of Computing

Students wishing to pursue an M.Sc. by Research or a Ph.D. by Research should contact the chairperson of the Postgraduate Students Programme Board.
Contact: Dr. Noreen Quinn Email: **nquinn@wit.ie**

Alternatively, they are welcome to contact the research groups and centres of the graduate school.

Telecommunications Software & Systems Group (TSSG)
Contact: Mr. Mícheál Ó Foghlú Email: **mofoghlu@wit.ie**

Centre for Information Systems and Technoculture (INSYTE)
Contact: Dr. Larry Stapleton Email: **lstapleton@wit.ie**

Automotive Control Group (ACG)
Contact: Mr. Brendan Jackman Email: **bjackman@wit.ie**

Centre for eLearning Technologies Research (WeLearnT)
Contact: Ms. Mary Barry Email: **mbarry@wit.ie**

Health Informatics Research Group (HIRG)
Contact: Mr. T.J. McDonnell Email: **tmcdonald@wit.ie**

Optics Research Group (ORG)
Contact: Dr. John Houlihan Email: **jhoulihan@wit.ie**

Centre for Scientific Computing (CSC)
Contact: Dr. Noreen Quinn Email: **nquinn@wit.ie**

The Eugene Lawler Graduate School of Computing offers a range of taught M.Sc. programmes in block release mode. These typically consist of 6 taught modules and a research dissertation, delivered over three semesters.

M.Sc. in Computing (Communications Software)
Chairpersons: Mr. Richard Frisby, Mr. Jimmy McGibney Email: **rfrisby@wit.ie**

M.Sc. in Computing (Information Systems Processes)
Chairpersons: Mr. Peter Carew, Mr. Liam Doyle Email: **ldoyle@wit.ie**

M.Sc. in Computing (Multimedia and eLearning)
Chairperson: Mr. Patrick Felicia Email: **pfelicia@wit.ie**

BSc (H) Projects in order of appearance in the book

1. Monitor, alert, and report on network/system availability and performance	David McGee
2. Web Based Video Editing Application	Stephen Power
3. 2D Point-and-Click Game Creator for Play Station 2	Duofeng Liang
4. Website content management system	Antanas Daugela
5. Smart Cards To Enable Transfer of Student Information	Ronan McDermott
6. Travel Management Web Service	John Organ
7. Audio manipulation system	Michael Doyle
8. Poker Simulator and Graphical Hand History re-player	Kieran O' Brien
9. Online Billing System	Lisa Orogun
10. Magic Beans Price Comparison Website	Mark Farrell
11. Interactive Fantasy MotoGP System	Joanne Murphy
12. Web Enabled Robot Control using Direct Input and Automated Control Patterns	David Martin
13. Teach English E-Learning Application	Mary Griffin
14. Mobile Phone Instant Messaging Application	Joe Heung
15. Assistive Vehicle Navigation using existing technologies.	Jerden Martin
16. Distributed Child Recognition and Robot Response	Jianhua Sun
17. Online Fantasy Football	Paul McCarthy
18. Intelligent Timetable Generator	Niamh Howley
19. A Changeable and Interactable 3D house	Darren Maher
20. Global Warming- The Game	Egle Venclovaite
21. Interactive Mathematics E-Learning Application	Elaine Chan
22. Pick-Your-Own-Path Animation Game	Devon Moodie
23. Multiple Genre Game Designed for Multiple Platforms	Shane Kinsella
24. Online Interior Design	Nadia Galiakberova
25. Customer Relationship Management Useful Information Analysis and Mine	Wenzhong Guan
26. Role-playing game	Padraic Mannion
27. Multi-Modal Interface: A New Way to Interact with you Computer	James Coady
28. Object tracking	Liang Zhang
29. Online Auto Ordering System and Learning Guide	Ian Bright
30. Game Design and Implementation	Kaiyi Wang
31. e learning application for children	Olushola Adeleke
32. Reserve Defence Forces Administration System with Secure Data Encryption	Daniel Meade
33. Room Availability Notification System	Aaron Roche
34. A website developed for college blimp	Zheng Yu Gu
35. Online Travel Ordering System and Help Guide	Barry Kearns
36. Health and Safety Induction Training	Anne McAuliffe
37. Irish Traditional Tune Recognition System	Stephen Tutty
38. Production of on-screen effects from the analysis of an audio signal	Eugene Cooney
39. Implementation of a Computational Fluid Dynamics Problem	Niall Donnelly

BSc (H) Projects in alphabetical order of developer's surname

(numbers prefixed refer to the number of the project in the booklet)

31. e learning application for children.	Olushola Adeleke
29. Online Auto Ordering System and Learning Guide	Ian Bright
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23. Multiple Genre Game Designed for Multiple Platforms	Shane Kinsella
3. 2D Point-and-Click Game Creator for Play Station 2	Duofeng Liang
36. Health and Safety Induction Training	Anne McAuliffe
17. Online Fantasy Football	Paul McCarthy
5. To Enable Authorized Transfer of Student Information.	Ronan McDermott
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19. A Changeable and Interact able 3D house	Darren Maher
26. Role Playing game	Padraic Mannion
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30. Game Design and Implementation	Kaiyi Wang
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BSc (H) in Applied Computing

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15. Assistive Vehicle Navigation using existing technologies.	Jerden Martin
16. Distributed Child Recognition and Robot Response	Jianhua Sun
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BSc (H) in Commercial Software Development

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8. Poker Simulator and Graphical Hand History re-player	Kieran O'Brien
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BSc (H) in Information Technology

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30. Game Design and Implementation	Kaiyai Wang

BSc (H) in Physics with Computing

38. Production of on-screen effects from the analysis of an audio signal	Eugene Cooney
39. Implementation of a Computational Fluid Dynamics Problem	Niall Donnelly

If you want to contact any of the developers, please do so by emailing: Ian Downey (idowney@wit.ie)
or by using the information on the web sites associated with individual projects

Sample Disciplines by Project Number

3D Modelling: 19,23,24
Amination: 7,21,22,33,31,38
Apriori Algorithms: 25
Artificial Intelligence: 8
Database: 1,2,3,4,5,8,9,10,13,14,16,17,19,21,24,25,26,27,28,29,30,31,33,35,36
Digital Signal Processing: 37
e-learning: 13,21,29,31,34,35,36
Game Design/Development: 21,23
Genetic Algorithms: 18
Graphics: 1,3,4,9,10,19,20,22,24,31,38
GUI design: 2,7,8,17,30,38
Networking: 1,3,10,26,33,36
OCR: 32
Programming: 1, 3,4,5,6,7,8,9,11,12,13,14,15,16,17,18,20,21,23,26,29,30,33,34,35,37,39
Robotics: 12
Signal Analysis: 38

Sample Technologies by Project Number

ActionScript: 10, 21, 24
Adobe Dreamweaver: 2, 4, 14, 17, 19, 21, 23, 31, 37
AJAX: 4, 26
ASP: 35
ASP.NET: 33
Bluetooth: 12, 15, 34
C, C++, C# : 3, 8, 15, 16, 27, 30, 39
Flash: 4, 10, 11, 21
Groovy on Grails: 12
GWT: 6
HTML/XHTML/XML: 1, 2, 5, 17, 21, 22, 24, 27, 37
Javascript: 4, 33, 37
JSP: 1, 2, 3, 6, 9, 10, 21, 26, 30, 32, 36
Linux: 1, 2, 3
MySQL: 1, 2, 3, 8, 9, 10, 14, 17, 21, 22, 24, 29, 31, 34
NetBeans: 6, 14
NXT: 12, 15
Perl: 9
Rational Rose: 29
Ruby on Rails: 11, 17, 19, 26, 33
SOAP: 6
SuperCollider: 38

suas

Project 1. A web-enabled application to monitor, alert, and graphically report on network/system availability and performance

David McGee

Suas is a web-enabled application that will be able to monitor, alert, and graphically report on network/system availability and performance by utilising and integrating diagnostic tools such as 'Ping' and 'Trace route' provided by the TCP/IP suite.

The project will comprise of three main areas of development: monitoring, alerting, and reporting. The application will have a customisable interface that allows network/system administrators to add nodes that they wish to monitor in real-time by means of an IP address or hostname. It will have an alert/notification application integrated in order to notify specified contacts of system/network status and performance via SMS/E-Mail. The application will also feature fully integrated reporting features to automate the creation of customizable graphs from historical raw data to represent metrics such as current node status and performance, node up/down status over a defined period of time, or to represent a node's historical performance.

Disciplines: Programming, Networking, Databases, Web Development, Programming graphics.
Hardware/Software technologies: JSP, Java Processing, MySQL, xHTML, SQL, MyEclipse IDE, Tomcat, Windows/Linux Ubuntu.

Project 2. Web Based Video Editing Application

Stephen Power

A web based application that allows users to upload small video files to a site and to edit them and add special effects to them.

The application will be based on a web site that will allow users to add small video files, break them up on a time line, add visual effects to them and then export the finished product as a downloadable file. Users will then be given a means to post their finished movies on the site to allow others to view them and rate them.

This application will provide a simple way for users to create personalised movies, and give them a chance to display their work for others. As well as being designed for the general public the application would have uses in industry as an editing tool.

Disciplines: GUI Design, Multimedia Databases, Video, Web Design.
Hardware/Software technologies: Window/Linux, Processing, JSP, HTML, MySQL, MyEclipse, Adobe Dreamweaver.

PlayMaker

Project 3. 2D Point-and-Click Game Creator for Play Station 2

Duofeng Liang

PlayMaker allows people with no programming experience to create games on a standard PC, which can be run on the Play Station 2.
This software allows users to define behavior of any game objects by a point-and-click approach. Based on the framework, users can call the Dynamic Linkable Library to extend the functions. People can download this software, upload and share games via a dedicated website.

Disciplines: Graphics, Networking, Database, HCI, Software Engineering..
Hardware/Software technologies: Play Station Linux, C/C++, MySQL, PHP, JSP, TomcatMyWebCMS.eu.

Project 4. Website content management system

Antanas Daugela

MyWebCMS.eu project is a web application for users who want to maintain their website by themselves. It allows them to update and modify their websites online in a simple way with wysiwyg tools.
Example main functions will be: Modification of websites navigation, Modification on web content e.g. text, Modification of websites design (users will be able to change banners, change colours, backgrounds, font size and type).

Disciplines: Databases, Graphics, Programming.
Hardware/Software technologies: Windows, Tomcat, PHP, mySQL, AJAX, Dreamweaver, Flash, Photoshop, Javascript.
URL: www.mywebcms.eu

Project 5. Using Smart Cards To Enable Authorized Transfer of Student Information Between European Academic Institutions.

Ronan McDermott

A system that allows for the transfer of student information between European academic institutions subject to authorisation by the student in question. The proposed system forms part of a EU funded pilot study involving Waterford Institute of Technology and the Technical University of Lodz in Poland. Authorization will involve the use of smart card technology, such as the WITCard. The information transferred will include academic information such as is embodied in an academic transcript.

Disciplines: Programming, Databases.
Hardware/Software technologies: JSP, Java Processing, MySQL, xHTML, SQL, MyEclipse IDE, Tomcat, Windows/LinJava, XML, Smart Cards, The Banner Information System at WIT.

Travel 2.0

Project 6. Travel Management Web Service

John Organ

Given the current economic climate and the high costs associated with travel, many organisations are looking for ways to save money associated with necessary travel.

This travel management web service will enable an organisation monitor all business processes related to travel from pre-approval of travel plans to expense reports. It is also envisaged that Travel 2.0 will make use of currently available web services.

The system is being developed as a web service and will also make use of service orientated architecture (SOA) that will allow developers replace or upgrade individual components of the software without affecting the entire system.

Traditional business applications like Core E.S.S. used within Waterford Institute of Technology have been developed as tightly integrated systems. However by making use of web services and BPEL processes it is expected that Travel 2.0 will be loosely coupled, easier to maintain and upgrade and will increase productivity compared with traditional applications.

Disciplines: Web Services, Service Orientated Architecture (SOA), Web Development, Programming, Software Development.
Hardware/Software technologies: Eclipse, NetBeans, XML, Business Process Execution Language (BPEL), Web Services Definition Language (WSDL), JavaServer Pages (JSP), Servlets, JavaBeans, Oracle BPEL Process Manager, Oracle SOA Suite 10g, SOAP, Google Web Toolkit (GWT), Apache Tomcat, Apache Axis 1.4.

Maestro

Project 7. Audio manipulation system

Michael Doyle

Maestro is a software system that introduces the art of composition to the digital world. It allows the user to interact and manipulate audio in real-time through the use of hand gestures. Gesturing will be interpreted by a standard web cam which in turn will conduct and generate the audio output of the system. The system will define a physical movement as a specific command that will have its own unique influence on audio.

Disciplines: Object Oriented Programming, Audio (Digital/Analog), Animation, GUI Development, HCI, I/O, Real Time Interaction.
Hardware/Software technologies: Windows, Apache/Tomcat, Java, Processing, MyEclipse, MIDI, Web Cam.

SNGMaster

Project 8. Poker Simulator and Graphical Hand History re-player

Kieran O' Brien

SNG is short for Sit and Go, a popular form of poker tournament made popular online. Since the rise of online poker, there has been a demand for software that can improve a poker player's game. There are many different types of software available. From poker trackers, that track you and your opponent's play, to calculators that calculate pot odds and pot equity.
The focus of this particular software is to help the user get better at poker. There are two parts to the software.

1. Hand Re-player: Hand history files(.txt files describing a hand of poker) imported from online poker sites are converted into a common format and stored in a database. From this database hands can be selected and replayed graphically on screen. This allows players to see how they played a particular hand and allows them to learn from it.

2. Tournament Simulator: The other focus of the software is to create a tournament simulator with AI players. During this simulated game advice is given to the player and things such as pot odds and outs are displayed to the user for additional help.

The software will be developed for the windows platform and will support hand history files from the major poker sites Party Poker, Full Tilt and iPoker.

Disciplines: Databases, Programming, GUI development, Artificial Intelligence.
Hardware/Software technologies: Windows, MySQL, Popcap Framework, Perl, C++.

Irishbills.ie

Project 9. Online Billing System

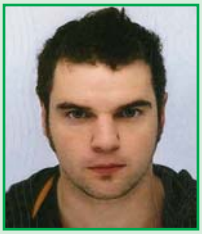
Lisa Orogun

Irishbills.ie is a web-based billing system that will provide users with easy access and a user-friendly means of paying their bills online. The application of the system will be aimed at private businesses, service providers like ESB, NTL, Eircom and their customers.
The main function will include Registration so that user can have access to the system. The user will have to log in using the username and the password assigned. The User can view their bills statement, schedule the exact date for their payment and make payment using Laser or credit card. The system will allow the user to select from different option buttons regarding the type of service they want to access.

Disciplines: Programming, Databases, Web Design, Graphics.
Hardware/Software technologies: Windows, MySQL, JSP, Apache/Tomcat.

MagicBeans Ireland

Project 10. Magic Beans Price Comparison Website



Mark Farrell

MagicBeans is a website that contains product listings and prices from shops all over Ireland built entirely in Flash. It requires businesses to upload product prices and their shop location. Users can then search and receive results by price and location.

The idea is that people generally assume that certain products will only be available online or in the city when it may well be available in their local town, and even priced the same.

Disciplines: Databases, Graphics, Networking.
Hardware/Software technologies: Windows, Flash Actionscript 3, Java, JSP, MySQL.
URL: www.magicbeansireland.com

MotoGPComp

Project 11. Interactive Fantasy MotoGP System

Joanne Murphy

MotoGP is the height of motorcycle racing with the world's top rider racing 800cc prototype machines at top venues around the world. Fantasy MotoGP is a game in which players select a team based on real life riders, constructors, tyres etc. and they score points based on the real life team's performance. Players must register with the site before they can take part in the competition. After each race meeting the points will be added to a player's account and then that player has a choice to make limited transfers if he/she wishes. Points will be given for various aspects such as position finished, position gained, laps completed etc. After each race the player will receive an email containing their results and position in the competition.

Disciplines: Databases, Web development, Programming.
Hardware/Software technologies: Windows, Apache Server, Ruby on Rails 2.0, Flash, Oracle.

Project 12. Web-enabled Robot Control using Direct Input and Automated Control Patterns

David Martin

The goal of this project is to create a web application with an easy to use interface for controlling a robot. The robot used to demonstrate this will be a Lego Mindstorms NXT, but the application will not be limited to just this robot. The driver component of the application will be modular, allowing for many different robots to be controlled. The available modes will allow the robot to be controlled in real-time, or automatically by configuring events, conditions and actions through the web interface.

Disciplines: Web Development, Robotics, Extreme Programming, Test Driven Development.
Hardware/Software technologies: NXT, Bluetooth, Java, Groovy on Grails, lejos, G-Spec.
URL: http://code.google.com/p/webenabledrobotcontrol

Project 13. Teach English E-Learning Application

Mary Griffin

An E-Learning application to teach someone to be able to teach the English language to foreign students.

The system will allow users to register, log-in, view information, take tests and quiz modules one after the other in order to complete the modules assigned to familiarise themselves with English language teaching.

Disciplines: Database, programming, e-learning.
Hardware/Software technologies: mySQL, Netbeans, Apache.

MobileImMe.com

Project 14. Mobile Phone Instant Messaging Application

Joe Heung

MobileImMe is an instant messaging application that allows users access to the most popular IM networks, such as MSN, AIM, GTalk etc. on their mobile phone. A user registers on the website and downloads the application. Once installed on to their phone they can log in and talk to any of their contacts on MSN, AIM, and GTalk etc.
The target market for the application will be any users who use instant messaging programs on their PC. There will be a website with more information and will also act as a means to download the application.

Disciplines: Programming, Web Development, Database.
Hardware/Software technologies: Primary Mobile Device: Nokia n73/ Secondary Mobile Device: Nokia 7610 / Extensibility: All mobile phones capable of supporting J2ME & MIDP 2.0/ Test Emulator: Java Wireless Toolkit 2.5.2J2ME (Java 2 Micro Edition), NetBeans IDE 6.1, Sun Java Wireless Toolkit 2.5.2, Adobe Dreamweaver CS3, MySQL.
URL: www.mobileimme.com

Project 15. Assistive Vehicle Navigation using existing technologies

Jerden Martin

The goal of this project is to make a Lego Mindstorms NXT robot, modelled like a car, drive and park without human intervention. This will be done using a combination of the NXT sensors, motors and software. The main Sensors include Ultra sonic senor, Light Sensor and Touch sensor. There are 3 motors that are adjustable in speed and direction. The software will be written in C, with the possibility of writing some code in Java. Communication between vehicles will be investigated by use of the built- in Bluetooth adapter. This project shows that these features can be implemented in real world vehicles at a very low cost.

Disciplines: Vehicle Automation, Programming, Sensor Networks.
Hardware/Software technologies: C, Java, NXT, Bluetooth, Eclipse.

Project 16. Distributed Child Recognition and Robot Response

Jianhua Sun

A system that works in conjunction with students studying electronics; we will develop a system to be used in open days for school goers. The system will allow Benji, a wheeled robot, to identify and appropriately interact with the audience.
The main goal is to deliver a vision system for a mobile robot, affectionately known as Benjie, who can locate where people are sitting in the Auditorium, visually identifies these positions by superimposing bounding boxes on a video stream displayed at the podium and visually recognise members of the audience and signal this recognition by labelling the corresponding box with the person's name. The system is independent of the position, or pose, of the robot on the Auditorium floor.

Disciplines: Programming, Graphics, Database.
Hardware/Software technologies: Windows, C++, SQL.

Project 17. Online Fantasy Football

Paul McCarthy

An E-Learning application to teach someone to be able to teach the English language to foreign students.

The main idea of this project is that a user registers to the site and must select a squad of players within a given budget. Each squad must have a minimum of eleven outfield players with an additional five substitutes that can be used to alter tactics or to replace players who have been injured. Depending on players' performances in real life throughout the season, the players will receive points depending on performance such as goals for/against, fouls, bookings, assists etc. .Users can change their team at any stage with the cost of points and can either create private leagues among friends or enter an overall league.

Disciplines: Programming, Databases, GUI Development.
Hardware/Software technologies: Dreamweaver CS3, MySQL, MySQL Administrator, Ruby on Rails, JavaScript, HTML.

Project 18. Intelligent Timetable Generator

Niamh Howley

The creation of an academic timetable for a university or college is an onerous task that requires the consideration of many factors such as availability of classrooms, elective subjects etc. This application will automatically generate a timetable that satisfies all necessary criteria given a range of timetable data and constraints. An intelligent method will be used in order to minimise the processing involved. Two user types will be catered for: the administrative staff that will actually generate the timetable and the database administrator. A database population interface will be provided for the latter in order to encourage minimal error in data input since correct data is essential to the success of the timetable produced.

Disciplines: Database, Interface Design, Programming, Genetic Algorithms.
Hardware/Software technologies: Windows, Java Standard Edition. 6, Oracle, Eclipse.

Project 19. A Changeable and Interactable 3D house

Darren Maher

My3DHouse is being developed as a game where users can enter a 3D environment which will be the house and be free to roam around the house and change the look of the house to their preferences. This will be possible by accessing a database with different shapes and models of household items and choosing whichever style the user wants.

Disciplines: 3D modelling, Graphics Design, Databases and Web Development.
Hardware/Software technologies: Windows, Firefox, Ruby on Rails, Adobe Director, Adobe Photoshop, Dreamweaver.
URL: www.my3dhouse.net

Project 20. Global Warming - The Game

Egle Venclovaite

The project is a global warming 3D game based on geographical data with changing sea levels, and ice coverage. Basically the game will allow the user to see how the Earth would change and look like if they decided to remove e.g. half of its waters or to melt the ice.

The main goal is to make people more aware of environmental change- global warming, to let them know how the world is changing, and what impacts it would have when changing sea levels, or melting the ice. It is going to be an interactive game as the users will be able to change the levels themselves and then see what happens.

Disciplines: Graphics, Programming, 3D Modeling.
Hardware/Software technologies: PC, Windows, 3D Studio Max, Processing, open source GIS (e.g. ArcExplorer).

Project 21. Interactive Mathematics E-Learning Application

Elaine Chan

Interactive Mathematics E-Learning Application (InterMaths-E) is about creating a Flash™ web-based maths tool. It helps children to learn electronically in an efficient, effective, and convenient manner. This is a very interactive, fun, and creative application, which is aimed at children from 8 years old upwards. Adults are welcome to join along to help their children to improve and to develop their Maths skills at an advanced level and also, to encourage them to understand and to enjoy Maths more.

Within this application, there are the following topics: Addition; Subtraction, Multiplication, and Division. At the end of each topic, there will be quizzes and a few miscellaneous tests. Each user will receive feedback of their score at the end of each test. Also, it will consist of an interactive blackboard that teaches Maths to students that each student will be able to adapt to. As well as that, a Maths mini-game would be implemented for students on the topics covered throughout the application. Users can create their own Maths tests for other students as well, which is an innovative way for students to learn and can benefit them afterwards.

Disciplines: Animation; Database; E-Learning; Graphic Design; Programming; Game Design.
Hardware/Software technologies: Windows XP, StatCounter, Flash, JSP, XHTML, Java, Actionscript, FTP server, Dreamweaver, Photoshop CS2, PHP, MySQL, Audacity, Sound Forge 6.

Project 22. Pick-Your-Own-Path Animation Game

Devon Moodie

This project takes on the old format of the "Choose Your Own Adventure" books and move it from plain text to the more engaging multimedia format of audio and customisable animation.

Once the user has created a custom character, the character's path through the game then depends on the decisions the user makes. The end of each animated scene leads to a set of choices which influences the next phase of the game differently, thereby allowing the game to be played multiple times, each with an alternative storyline and final ending.

At any point the user will be able to access a recap of all their actions up to that point in time (as each choice gets written to a file), as well as save their progress and re-enter the game at the same point in the story that they left it at.

Disciplines: Animation, Graphics, Multimedia Databases, Web Design.
Hardware/Software technologies: Windows, Flash, Illustrator, Photoshop, MySQL, PHP, HTML.

Project 23. Multiple Genre Game Designed for Multiple Platforms

Shane Kinsella

ScraP is a 3D multiple genre game, where the player must guide a confused teenager with sudden new found abilities through a strange land to find a way back home to the real world.

Inspired by Shigesato Itoi's "Mother" series, the game is designed to make you "laugh, remember, and wonder". Often, the best and most memorable games are those with an attention grabbing, heart warming and humorous storyline and characters; that's exactly what this game aims to do. The game consists of multiple genres that add elements of action, adventure, fighting, and role playing where the player controls the main character in both a 3D and 2D environment. An original music score, voice acting as well as basic motion capture is featured.

Disciplines: Games Development, Programming, 3D Modelling and Design, Animation, Audio Production, Acting.
Hardware/Software technologies: Windows Vista/XP, Adobe Photoshop CS3, Adobe Illustrator CS3, Virtools, Adobe Audition, Cool Edit, Adobe Dreamweaver CS3.
URL: scrap.skinsella.com

Project 24. Online Interior Design

Nadia Galiakberova

An online interior design application. The main focus of this project is to allow users to design different rooms and to create the perfect interior without moving the furniture physically.
The application will allow users to choose a room type, room layout from the selection of pre-made room templates and then change the dimensions of the room to better reflect the user's actual environment. Next step is to design the room. This can be done by placing different objects such as furniture and pieces of decoration in the scene using a "drag and drop" technique. Each furniture type will include several different styles. Also, users will able to change the colour and texture style of objects.
Each room may be viewed at any time from different angles to give a better perspective of the design process. All selected objects may be rotated, replaced or removed at any time. A user will be able to place doors and windows on the room plan to facilitate the accurate layout of the room, e.g. so they don't place the bed across of the doorway or bookshelves across the window.
Users will be able to save and merge multiple projects, for example linking together the plans for master bedroom and bathroom to create an en-suite bedroom.
At the end users will be able to print the final ***design for the future guide.***

Disciplines: Graphics, Web Development, 3D/2D Modelling, Database.
Hardware/Software technologies: Macromedia Flash, Swift 3D, Flash Actionscript 3, Adobe Photoshop, Adobe Illustrator, Adobe Director, HTML, MySQL and XML.

CRM Miner

Project 25. Customer Relationship Management Useful Information Analysis and Mine

Wenzhong Guan

This project is a sort of data mining software that can mine useful information from databases, analysis and reports. As well as that it can predict the trend of customers' behaviours.

CRM Miner will:

- Manage basic customer information
- Analysis these customers' raw data
- Report this information by various charts
- Predict customers' behaviours by using this information

Disciplines: AI Algorithm (Apriori Algorithm), Database.
Hardware/Software technologies: VB6.0, SQL-Server 2000, Windows API.

Project 26. Role Playing game

Padraic Mannion

Fantasy game based post war, using races like Elves and Goblins
that users are familiar with from books like Lord of The Rings. The application will be text-based for simplicity.

There will be an enthralling storyline, a tough boss, a challenging quest and plot twists, these being the things gamers like to have in games. The possibility of interaction among users will be considered in the development of this project.

Disciplines: Databases, Programming, Networking..
Hardware/Software technologies: Ruby on Rails, AJAX, JSP.

The Remoteless Remote

Project 27. Multi-Modal Interface, A New Way to Interact with you Computer

James Coady

This project involves creating a multimodal interface platform for Windows to communicate signals from input device to output programs.
An example of this would be using hand gesture recognition to map out controls for a media centre allowing you not to have to use a remote control.

Disciplines: Service, Video Processing, Database.
Hardware/Software technologies: Windows, C#, XML, Webcam, Microphone, Touch Screens.
URL: http://code.google.com/p/multimoodleinterface/

Project 28. Object tracking

Liang Zhang

Object tracking based on basketball match. The system will be able to track every player's movement and the basketball's movement. It is also involve object recognition; the system can recognise the player who controls the ball.
This system can help the coach or other people to research the match, e.g. find the weakness of the team or each player's performance, etc.
User loads the sequence of pictures (or videos) to the system; the system is going to analyse these images and track the movement of the players and balls. Finally it generates the strategy of the team. The user also can choose the specific time that they want to search.

Disciplines: Databases, Engineering mathematics, c++, AI.
Hardware/Software technologies: Windows, C++, .NET, mySQL.

E-Autos

Project 29. Online Auto Ordering System and Learning Guide

Ian Bright

E-Autos is an online application which provides a comprehensive overview of automobiles. The aim of the project is to give the user the confidence and self-assurance when considering a vehicle to purchase.

There will be two user types; a site administrator and a member. Normal users who first use the site will be required to join the site and become members in order to access specific privileges, such as browsing the catalogue of cars and accessing the learning guide. The administrator will be granted full control over the site and will be responsible for creating and maintaining a straight-forward and comprehensive learning environment.

The catalogue will contain a host of car manufacturers with the most popular models of each specific car make listed. Upon accessing a particular car model, the member will be shown a specifications sheet with detailed schematics of the car.

The learning guide itself will provide simplified definitions of the specification sheets shown on each car model. Members will therefore gain understanding of these and will be more comfortable browsing and ordering the car in which they're interested on the site.

Disciplines: Databases, E-Learning, Programming, Web Design.
Hardware/Software technologies: Windows, MySQL, CSS, Rational Rose.

YingZhengVer2.0

Project 30. Game Design and Implementation

Kaiyi Wang

The Game Project YingZhengVer2.0 is a 2.5D Role Play Game that is designed specifically for the PC platform, as the version 2.0, this year's game project will continue to develop the game based on the last year's first version but with a new game engine TORQUE, and it will be bring in the artificial intelligence and database design which are new to the version 2.0.

The new game engine TORQUE allows us to create more interactions with users and the database allows us to store more items and objects for different player jobs which will make game more realistic and playable unlike the design of last year with Game Makers. This Version 2.0 will be more complex and presentable.

Disciplines: GUI design, Databases,Programming,Graphics, HCI, Sound Design.
Hardware/Software technologies: Windows, Tomcat, JSP, mySQL, JAVA, C++, TORQUE Script language, Photoshop, Illustrator, Audition.

My Alphabet
Project 31. e learning application for children

Olushola Adeleke

An animation application for children between the age of 2 and 5 years. The children will be learning abc and how to join each letter. This project will also have a text book to help the users follow the lessons. The project will be divided into four or five phases. The first phase will contain each letter represent by an image. The second phase will help them to spell the words. The third phase will help them make the words and the last phase will be exercises to test their knowledge.

The text book will contain all the phases above.

Disciplines: animation, database, graphics, e-learning.
Hardware/Software technologies: PC, Dreamweaver, Macromedia Flash 8 and Photoshop.

Project 32. Reserve Defence Forces Administration system with Secure Data Encryption

Daniel Meade

A project to develop an application that will make the processing and administration of Reserve Defence Force personnel easier for Administration Staff for the duration of a course or annual training. The proposed application is not seen as a replacement of the Defence Forces' existing Personnel Management System (PMS), but merely an aid to Reserve Defence Forces administration staff during the reservists' period of active duty, which is often carried out in locations that are not on the Defence Forces data network and hence have no access to the PMS system. The idea for this project comes from years of experience within the Reserve Defence Forces and firsthand experience of the tedious processing of hard copies of personnel data forms to generate personnel lists and statistics. It is important to note that the role of this project will not be to replace the physical hard copies of forms filled out by personnel, but to merely ensure that the administrative staff do not always have to revert to the hard copies. It must also be noted that there is a legal requirement for data protection and that at all times users details must be available on request in line with the Freedom of Information Act.
The project is envisaged as a two stage project. Firstly there is a web page which is the Admin User's front end and is linked to a backend database. This will enable the Admin User to enter the physical data and take photos of the personnel by means of a webcam. The front end application will also allow administrative staff to perform searches and generate relevant reports and lists from the data.
Secondly there will be a level of added complexity in the manner in which digital photos that are taken using a webcam will be encrypted using embedded data. This will ensure that the photos taken by the webcam are signed and in the event of the unauthorised use of a photo, the photo's origin can be traced. It is also planned that the Admin Staff can back up the physical hard copies of any relevant forms by scanning them in and attaching the images of these forms to the relevant person's data within the database.

Disciplines: Webpage Design, Databases, Webcam.
Hardware/Software technologies: Windows, Tomcat, JSP, MySQL, OCR Software.

RANS

Project 33. Room Availability Notification System

Aaron Roche

The Room Availability Notification System (RANS) allows students to plan their access to the computers within the IT block.

There are a limited number of computers provided within the library and these computers contain commonly used software only. The IT block has many rooms with computers, with some rooms having specialist software installed on the computers. Unlike the library, these rooms are subject to availability as they are classrooms during the day. Students working on the computers are usually asked to leave a room when a new class comes in; also, students often interrupt classes while searching for a free room when they open the door and ask about the room.

By placing a monitor in the lobby of the IT block and displaying which rooms are now available and which rooms are known to be available later on, students will have increased and greater access to the computer facilities. Information about what software is installed in each room will be displayed; this will greatly help students plan where to work. Also information on the current class in each room will be displayed; this will help students easily locate the room they are supposed to be in if they have forgotten their timetable and it will also be useful for locating a particular class or lecturer.

Disciplines: Databases, Networking, Programming.
Hardware/Software technologies: Ruby on Rails, mySQL, Windows, ASP.NET, Javascript.

witBlimp.ie

Project 34. A website developed for college blimp

Zheng Yu Gu

witBlimp is developed for college blimp which is designed by engineering students. Blimp control is by a motor and an IP camera is carried. The website is used to display the blimp in school open days.
The goal of this website is to create a platform to communicate between humans and Blimp. People who are interested in the blimp can find out information on the website. Admin (eg. Engineering students) can do remote control on the website as well as by mobile phone through Bluetooth. The video sent back from the IP camera will be displayed on the website as well.

Disciplines: Web Development, Programming, Database, E-Learning.
Hardware/Software technologies: Windows, Java, J2ME, Bluetooth, MySQL.

E-Travel Eire

Project 35. Online Travel Ordering System and Help Guide

Barry Kearns

E-Travel Eire is an online application where a user can order all their travel details with the minimum of fuss. The aim of E-Travel Eire is to meet the customer's specific needs no matter how unusual. Many holidaymakers run into troubles on vacation due to ill-prepared plans and lack of communications between travel agents and host accommodations. I hope to develop a system that will deal with all unusual requests and monitor the upkeep of agreements between the holidaymakers and the destination accommodations.

There will be two user types; a site administrator and a member. Each user of my on-line booking service will logon to the site and be asked to register as a member; they must do so in order to access specific privileges, like browsing the catalogue of accommodation types with the most popular hotels of each holiday destination listed and the holiday packages on offer there. The help guide itself will provide users with help on how to book accommodation or search for flights online etc. This will be of benefit to users who have little knowledge of booking holidays online and for other users it will make browsing and ordering a holiday that they are interested in on the site easier. E-travel Eire will take all the hassle out of booking your holiday ensuring you have a great time.

Disciplines: Databases, E-Learning, Programming, Web Design.
Hardware/Software technologies: Windows, Microsoft Access, Oracle, JDBC, ASP, Apache Web Server.

hasit-safety.com

Project 36. Health and Safety Induction Training

Anne McAuliffe

Hasit-Safety is being developed to facilitate interactive Health and Safety Induction Training through a Graphical User Interface.
The second phase will contain an interactive quiz, to ensure that employees have grasped the fundamentals of the quiz.
On successful completion of quiz the employee will be able to sign the Health and Safety Statement.

Disciplines: Databases, eLearning, Networking.
Hardware/Software technologies: Windows, Tomcat, JSP, mySQL.
URL: www.hasit-safety.com

TradCog

Project 37. Irish Traditional Tune Recognition System

Stephen Tutty

TradCog is being developed as an interactive web-based application to perform the following main functions:

To allow a musician to play a piece of Irish Traditional Music through the microphone connected to the client PC (using any instrument). The system will analyze the captured signal and through determining the frequencies of each note played and the note duration etc, will convert this information into ABC notation (common ASCII musical notation format). Next, the system will compare the captured information against various online Traditional Irish Music Tune books (again in ABC format). The software will interpret the user's input and through various algorithms, provide a 'best-guess' of the tune's title, etc.

Disciplines: Digital Signal Processing (Frequency Analysis), Data Conversion, Pattern Recognition, Programming.
Hardware/Software technologies: PC, Internet, Standard Microphone, Multi-Platform OS, Java, CSS, Dreamweaver, XML, Javascript.

iLive Music Visualiser

Project 38. Production of on-screen effects from the analysis of an audio signal

Eugene Cooney

Music visualisers add a new dimension to the music listening experience. They produce visual on screen effects based on a mathematical analysis of the song that is currently playing. The effects displayed on screen are based on properties of the audio signal such as frequency and loudness. The purpose of this project is to develop an audio visualiser that will create on screen effects based on an analysis of the audio signal that is playing on the sound card. The development tools used for this project will be SuperCollider and Processing.

- **SuperCollider** an object-orientated language designed for software signal processing. http://supercollider.sourceforge.net
- **Processing** an open source programming language and environment for programming images, animation and interactions. http://www.processing.org

Disciplines: GUI design, signal analysis, graphics.
Hardware/Software technologies: SuperCollider, Processing.

Project 39. Implementation a Computational Fluid Dynamics Problem on a Compute Unified Device Architecture

Niall Donnelly

The aim of this project is to investigate the implementation of a computationally demanding fluid dynamics problem on the NVidia TM Compute Unified Device Architecture (CUDA TM) massively parallel processing framework.

Graphics cards are primarily used for rendering complex 3D graphics models in computer games. Due to the demand of ever more complex graphics in computer games (like Crysis) the processing power of graphics cards has undergone significant increases in recent years. This increase has mainly been achieved through the use of large scale parallelisation. For example the graphic card used in this project (NVidia GTX260) consists of 192 cores and is capable of over 800 gigaflops and the current state of the art stands at almost 2400 gigaflops (AMD HD4870 X2). The Compute Unified Device Architecture (CUDA) is aimed at exploiting the processing power of these graphics cards to perform non-graphical calculations for computational expensive problems. One such problem is the N-body problem which describes the movement of N objects mutually interacting due to gravity. This has been successfully implemented on CUDA for up to 16,384 bodies.

In this project the implementation of a fluid dynamics problem using CUDA is investigated. The problem deals with the unsteady flow of fluid past an object and the resulting evolution of vortices in its wake (known as a Karman vortex street). As in the N-body problem, it is anticipated that efficient organisation of the parallisable component of the fluid flow computation will result in significant reduction in computation time.

Disciplines: C Programming, Parallel Programming.
Hardware/Software technologies: NVidia Compute Unified Device Architecture (CUDA), NVidia GeForce GTX260, CUDA Development Toolkit.

MSc in Computing (Communications Software):

The Information and Communications Technologies (ICT) sector plays a very significant role in Ireland and other countries. In Ireland, this sector comprises more than a thousand organisations ranging from multinationals to start-up companies. Up to 60% of ICT activity in Ireland is communications related including wireless applications, infrastructure and telecommunications.

Recent years, however, have seen changes within these industries that could result in lower value activities moving to low cost countries. The best way to counter this, from an Irish perspective, is to create higher value-added jobs in ICT and in converged communications research in particular. The increased level of public investment in ICT research and development in recent years, mainly by Science Foundation Ireland and Enterprise Ireland, has been motivated by this strategic goal.

At the heart of the profound change in the ICT sector is the convergence of telecommunications and Internet technologies and the emergence of large-scale, open networks that can provide all kinds of services. The telephone service is becoming just one of several available, and all these services are being provided increasingly over the Internet. People want so-called 'pervasive' presence – the ability to be connected wherever and whenever they choose, regardless of location. To facilitate this, we will progressively see computing and communications facilities embedded into our 'smart' homes, cars and shared public spaces. At the same time, we will want to protect our privacy and to trust the security of communications and transactions we make using this emerging infrastructure.

Recognising these trends, Waterford Institute of Technology has offered, since September 2005, a taught MSc in Computing that specialises in Communications Software. This MSc specifically addresses the major thematic areas of the ICT sector that are perceived to offer best prospects for growth, particularly in an Irish context. These areas include communications management, service development, security and new developments in ubiquitous and pervasive computing.

For further information about this programme, please contact:

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or

Jimmy McGibney (jmcgibney@wit.ie)

MSc in Computing (Communications Software):

Dissertations in order of appearance in the book

1 Search Space of Node Swapping Algorithms for the TSP	Shay Murphy
2 Information flows between Enterprise Application Systems	Orla Spillane
3 Heterogeneous Location Systems	Stephen Garvey
4 Communication of digital music gestural data	Sam Whelan
5 Information in Pre-paid Telecommunications Systems.	Patrick Hayden
6 Feature classification algorithms for activity recognition	Dominic Macguire
7 Analysis of code complexity in Game development	Eoin Donnelly
8 The application of formal methods for JAVA compilers	Yu Yang Chang
9 IM-2.0 Fusion of Web 2.0, Semantic Web and Instant Messaging	Mark Williamson
10 Investigation of GPS Positioning Accuracy	Frank Walsh
11 Representation of Static Code Analysis results as Treemaps	Ciaran Byrne
12 Trust based Ad-hoc On Demand Vector Routing Protocol	Raghvendra Sahu
13 A Distributed System for storage of Trust Management Credentials	Eric Robson
14 Incorporation of security mechanisms	Robert Taylor
15 Investigation of the existence of 3-level, single-strand interlacing	Andrew O'Leary
16 Multi-level Network Impact Notification Service	Allen Rowell

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For further information about this programme, please contact:

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1. Title: Search Space of Node Swapping Algorithms for the TSP.
Student: Shay Murphy

The TSP is an important test problem for local search algorithms. Arc-swapping algorithms generate a decomposition of tours in the complete graph Kn, while the search space of node-swapping algorithms is poorly understood and high order swaps replicate many designs from lower order swaps. Node swapping algorithms form the basis of many classes of heuristics algorithms e.g., genetic algorithms. However, the research proposal is sited within the combinatorial enumeration (CE) rather than the combinatorial optimisation (CO) domain. The project will examine a number of node-swapping algorithms and examine the structure of their search spaces, for small values of n (the number of nodes). It will derive some theoretical results based on the empirical work.
In particular, it will explore the structural properties of the search space of the heuristic algorithms (i) Ordinal Cross - OC, (ii) Order - OX, (iii) Partial Map - PXM and (iv) Cycle - CX. To support the large amount of numerical work implicit in the empirical research, a library of fundamental graph enumeration algorithms will be created.

2. Title: Graph Visualisation of Information flows between Enterprise Application Systems.
Student: Orla Spillane

Most modern enterprises depend on a range of applications and technologies to carry out day to day business. As a company grows, so to does its application portfolio, often resulting in a large web of diverse heterogeneous enterprise application systems and hardware platforms. It can be important to track the dependencies and information flows between components for reasons such as Problem Management, Configuration Planning, Integration Design and discovering Architecture information.

The focus of this dissertation is to develop a tool to allow the visualization of such a large network and evaluate its use. The tool is to consist of an underlying model to capture the components, their characteristics and the dependencies between them, while using Fisheye techniques to allow a user to easily select an object of interest while still maintaining a global context on the view.

3. Title: Outdoor-Indoor Transition Management in Heterogeneous Location Systems.
Student: Stephen Garvey

Global Positioning System (GPS) receivers employ a constellation of Earth-orbiting satellites to determine location through the use of 3-D trilateration. To ensure the accuracy of the positioning, the technique requires that a minimum of 3 satellites is received by the receiver. Geomatic engineering defines this geometric strength and configuration as Geometric Dilution of Precision (GDOP). The GDOP value is determined to be high when a weak geometry exists. This occurs when the satellites are close together or there are few visible. Conversely, a strong geometry exists when there are several satellites and they are far apart, indicating a low GDOP value. These parameters can be affected when a GPS receiver is used within an urban canyon, when used indoors or in the transition from outdoors to indoors. This paper scrutinizes the alterations of the GDOP when transitioning from outdoors to indoors, and examines and explores the potential use of this dilution of precision as an indicator in heterogeneous location systems.

4. Title: A Network Performance comparison of protocols for communication of digital music gestural data.
Student: Sam Whelan

The purpose of the proposed research topic is to compare two established protocols namely, Musical Instrument Digital Interface (MIDI) and Open Sound Control (OSC) with respect to how they communicate gesture-driven information over a network, using different transport-level protocols. Musicians express notes and rhythm through various physical gestures such as strumming a guitar or hitting keys on a piano. Both MIDI and OSC provide a means of storing and manipulating such gestures in a digital format. There are many applications where musicians wish to collaborate over a network as if they were in the same room. Both MIDI using Real-time Transport Protocol (RTP) and OSC can be used to communicate digital music gestural data across networks. Gestural data has the advantage of using

less bandwidth than real time data and also caters for different applications such as laptop orchestras and remote control of distant instruments for remote musical ensembles.

5. Title: Performance Modelling of Distributed Caching of Credit Information in Pre-paid Telecommunications Systems.
Student: Patrick Hayden

Telecommunications networks that offer pre-paid services maintain a database of customer credit information. The customer credit balance is incremented when the customer purchases credit and decremented periodically when the customer uses telecommunications services. Increasingly operators are offering data services to pre-paid customers and these require frequent credit balance decrements for small amounts in addition to the ability to reserve an amount of credit for a session. To facilitate this, operators are introducing pre-paid platforms to their networks that cache credit balances and reconcile them periodically with the balance in the master database. This dissertation will investigate whether algorithms can be developed that will allow balance reconciliation between the cache and the master database to occur with sufficient frequency to prevent large disparities between the credit balances from occurring while at the same time not overloading the master database. The algorithms will be evaluated by implementing them on a simulated telecommunications network.

6. Title: Comparison of feature classification algorithms for activity recognition based on sensor data.
Student: Dominic Maguire

Context awareness has been defined as a property of a system that uses context to provide relevant information and/or services to the user where relevancy depends on the user's task. Activity recognition fits in to the bigger framework of context awareness by making devices aware of the activity or activities of the user. Research into activity recognition has followed two streams - sensor-based and vision-based. This project will concentrate on sensor-based approaches. Systems used in sensor-based activity recognition usually have three main components: a low-level sensing module, a feature processing and selection module that processes the acquired sensor data and a classification module that uses the features to infer user activity, e.g. walking, running, sitting, having breakfast etc. This project will focus on the latter feature classification module and the accuracy of activity recognition classifier algorithms applied to accelerometer and heart rate sensor data.

7. Title: Analysis of code complexity in Game development.
Student: Eoin Donnelly

A framework that resembles the functionality of Game Maker will be developed on an object orientated framework (in this case XNA). A number of games will then be developed using this framework. Those same games will also be developed using standard XNA. The source code for both games will then be measured to see by how much the code complexity of each game has been reduced.

8. Title: The application of formal methods for JAVA compilers.
Student: Yu Yang Chang

A compiler is a computer program that transforms source code from a high-level programming language to a lower level language. It is the basis of software development so the correctness of a compiler is very important. In cases like this where correctness of software is vital, formal methods (including specification) are an appropriate tool. Formal specification is the specification of a program's properties in a language defined by a mathematical logic. Formal specification gives a clear and unambiguous specification of a program. Whereas it may be possible to prove that the implementation corresponds to the specification by following the entire formal methods lifecycle, there are advantages to limiting the formalism to specification. This dissertation the specification for Java using the Z notation, and using the Z notation to specify the translation of the Java code to machine code. Consideration will be given to current and past work in this area.The formal specification language chosen is the Z notation. Finally compare this technique with others, e.g. B-method, non-formal approach.

9. Title: IM-2.0 Fusion of Web 2.0, Semantic Web and Instant Messaging.
Student: Mark Williamson

IM and Web 2.0 technologies are popular with internet users and are continuing to grow. These technologies are public tools whereby users can create content and share their information with others. There is also the emerging notion of Semantic Web which is considered an evolving extension of the internet used for collaboration and sharing of information. There is an intersection of functionality between IM and Web 2.0 websites in areas of communication, sharing content and developing an online community.
This project will target these technologies attempting to fuse them together by providing context based updates of a user's recent Web 2.0 online activity and presenting it through IM custom presence, notifications and responses to requests. These context based updates from Web 2.0 sites will be generated into a unique user RSS feed and semantic web RDF page available for friends to subscribe to and technology to interface with.

10. Title: Investigation of GPS Positioning Accuracy, and Potential for Autocorrection.
Student: Frank Walsh

A Global Positioning System (GPS) receiver passively receives signals from satellites orbiting the earth. Using signals from at least four of these satellites enables the receiver to calculate it present position to within 10 meters. With the cancellation of selective availability of GPS in May 2000, the main cause of inaccuracy in GPS is the incorrect compensation for the Ionospheric effects on signals travelling from the GPS satellites. Differential GPS (DGPS) is one method that addresses this inaccuracy by providing roving GPS receivers with more accurate correctional information. Traditionally, DGPS requires expensive reference stations and a dedicated radio link to the receiver to transfer this correctional data. This mini-dissertation will focus on a low cost approach to providing DGPS in a local environment. A simple statistical model of GPS positioning error will be developed and applied to data obtained by measurements in order to verify its accuracy. Once verified, this model will be used to generate more accurate correctional information, which is then transmitted to a roving unit. The benefits of this form of DGPS will be examined by comparing accuracy of positional data obtained from a GPS receiver that uses the correctional data provided by DGPS to one that does not.

11. Title: Representation of Static Code Analysis results as Treemaps.
Student: Ciaran Byrne

Within large Enterprise class projects, there is a tendency to have many disjointed pieces, scattered over multiple sites and code repositories, that makes analysis and interpretation of trends, in particular code defects, difficult within those projects. Static code analysis is one way to make sense of those trends, which can get highly technical, and Treemap representation of these results would allow the creation of an easily understandable visualisation of the analysis results. The results can be displayed within a constrained hierarchy for those with only a more general or higher-level interest; the key focus is to facilitate the display of the resulting information and allow identification of trends, and in a manner easily understood by those with less technical knowledge

12. Title: Trust based Ad-hoc On Demand Vector Routing Protocol.
Student: Raghvendra Sahu

In this paper I propose an Ad-hoc network routing protocol that uses trust value among nodes as a metric in route calculation. The intention is to focus on on-demand ad hoc routing protocol, AODV (Ad-hoc On Demand Distance Vector). AODV initiates the route discovery process when there is need to send data from source to destination. To find a route these are the parameters taken into account: Trust value of link, Available bandwidth between links. Trust value of link and Bandwidth between links will be used in conjunction for distribution of traffic in network as well a metric in route discovery. For the validation of routing protocol, OMNET++ will be used as simulator.

13. Title: A Distributed System for storage of Trust Management Credentials.
Student: Eric Robson

Credential based Trust Management (TM) systems are independent systems that provide authorisation recommendations based on defined security policies. The credential is a key component of these systems and is intended to provide enough evidence of authority for the trust management system to make an authorisation decision. However credential based systems do come with their own problems, efficiently compiling chains of credentials and handling revocations in a distributed way are two significant problems. This dissertation will attempt to discover an efficient means for the storage and retrieval of credentials and revocation details that preserves the distributed nature of credential based systems. Peer-to-peer overlays provide an ideal platform for this purpose. The credentials can be distributed to a set of nodes in the peer-to-peer system, and if a credential is revoked the credential can be marked as such and the revocation details stored along side.

14. Title: Incorporation of security mechanisms within the design structure of secure enterprise applications.
Student: Robert Taylor

Organizations control application user access by ensuring that there is effective security features within the WEB design. The technical challenges' covers three major areas.
Firstly, building a secure website, secondly, deploying it to a specific user group and thirdly, providing user management. In this dissertation, I evaluate two development approaches, specifically focusing on two security features, authentication and authorization. With both approaches, I cover the build, deployment and user management areas. Also, I include the requirement to secure heterogeneous environments.
The first approach is where the security is built within the application. Developing sample applications with both J2EE 5.0 and Spring 3.0 technologies, I model the authorization and authentication security features. The second approach is where the security is built outside of the application. I will review Organization X where this model is in place. My evaluation of both approaches is based on both objective and subjective measurements.

15. Title: Use of graph theory to investigate the existence of 3-level, single-strand interlacing.
Student: Andrew O'Leary

Interlacing patterns can be constructed using strands that alternately pass over and under each other where the strands cross. 3-level interlacing occurs where strands of the weave cycle sequentially above, between and below each other at each intersection point. In terms of graphs, the 3-level-interlacing pattern can be represented as a regular graph of degree 6 possessing a restricted Euler tour and some additional technical properties.
Heuristic work by Michael Brennan (WIT) on candidate graphs constructed from odd numbers of nested sets of regular polygons (e.g. triangle, pentagon) has found graphs that satisfy most of the defined criteria but fail to satisfy the transition cycling sequence condition found in the 2-level case. It is unknown whether a closed, 3-level-interlacing pattern constructed from a single strand exists. My work will extend that of Brennan by constructing and searching families of candidate graphs for the existence of such a graph.

16. Title: Multi-level Network Impact Notification Service.
Student: Allen Rowell

Current communication network monitoring systems are geared towards producing output that is catered for use by network administrators or is analysed and summarised as input to a reporting system. This monitoring information is critical in ascertaining the performance of the network and in ensuring that offered communications services are actually being provisioned as agreed to customers. With increasingly large and more complex networks come more sources and higher volumes of monitoring information. By default, there is no inherent correlation of data or semantics associated to these sources of network information. Therefore, it is difficult to establish a link between the collected network data and business oriented concepts, such as service level agreements, and customer product offerings. This research programme proposes a service that can process low-level network data and add semantics to this data so that it can be used to analyse its impact on high level management concerns.

MSc in Computing (Information Systems Processes):

This one-year full-time Masters degree programme aims to produce graduates with knowledge, skills and expertise in Human Factors in Information Systems. The course will also confer on the graduates a set of personal and professional attributes that will allow them greater flexibility in the development of their own career options.

Specifically, the course aims to produce graduates who can:

- Reason and problem-solve to a high level in the context of information systems and its role in business, industry and research.
- Participate constructively in the deployment of information systems.
- Participate in the development of high-quality information systems products.
- Undertake research-based projects for industry, providing effective advice and leadership where required.
- Manage information systems-based projects that require the handling of innovation and change in dynamic environments.

For further information about this programme, please contact:

Liam Doyle (ldoyle@wit.ie)

MSc in Computing (Information Systems Processes):

Dissertations in order of appearance in the book

1 Use of ICT in the tourism industry	Eunjeong Yoon
2 Communication within a software development team	Chrystiane Cavalcanti
3 Key Business Intelligence System Development Failure Factors	Mónica Ramírez
4 How adolescent change affects social networking site use	Yi Zhang Shmily

Dissertations in order of author's surname

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If you want to contact any of the authors, please use the email addresses provided, or in case of difficulty, Liam Doyle (ldoyle@wit.ie)

1. Title: An investigation of the use of ICT in the tourism industry. A Cross-cultural research between Ireland and South Korea.
Student: Eunjeong Yoon ygreta@gmail.com

ICT has been responsible for dramatic structural changes within the tourism industry and it has enabled organisations to distribute their products through a wide range of channels in the tourism industry. Therefore, the future of the travel distribution services in the tourism supply chain has been discussed by researchers. The purpose of this research is to examine and find out what impact ICT has on tourism intermediaries such as travel agencies. This will be done by cross-cultural studies between Ireland and South Korea, both nations at the forefront of ICT. This would be valuable to assess how the impact of ICT varies in these countries' respective tourism industries by geography and different culture. Through this research, we could suggest the future role of travel intermediaries.

2. Title: Examination of the influence and the consequences of power and the control of knowledge in communication within a software development team.
Student: Chrystiane Cavalcanti chrysis04@yahoo.com.br

Communication is an essential instrument for team members sharing knowledge. Bacon asserted that knowledge is power and literature cites that power may arise from controlling knowledge into the organization. Team leaders may act like "gatekeepers" opening and closing communication channels, consequently shaping knowledge according to their own interests (Morgan, 1997). The main purpose of this research is to examine the influence and the consequences of power and the control of knowledge in communication within a software development team. The paper uses a comparative case study between a Brazilian and an Irish company in the service sector to analyse how teams in both countries deal with communication issues related to power and knowledge sharing.

3. Title: Key Business Intelligence System Development Failure Factors: A case study of a complex system development project in Mexico
Student: Mónica Ramírez moniqueazul@gmail.com

A set of key failure factors have appeared for decades in Information Systems Development (ISD), but they have not been properly identified, addressed, and eliminated. These failure factors have caused the challenge or even cancellation of several IT projects around the world. Even though there has been an increase of project successes, the progress has been slow and the cost of failures has remained incredibly high and risky for organisations. The present research is a case study about a challenged ISD project for a business intelligence solution developed in Mexico. Key failure factors from literature will be identified, ranked, related, and then compared to the ones identified by key stakeholders from this project. This analysis will provide with lessons learned and alternative actions to prevent the challenge of similar projects.

4. Title: How adolescent change affects social networking site use.
Student: Yi Zhang Shmily 767767@hotmail.com

This research is aiming at studying the life span transition period from prolonged adolescence to young adulthood and how this offline change affects online social networking site (SNS) use. Although many concerns have been paid to emerging adults in this field, those research efforts were carried out in large urban universities and participants were mostly just college undergraduate students in U.S. This study will extend the range and set the target audience as both college students and nascent workers, in order to compare the difference in use due to the social peer environment change and psychological role and task shifts. In addition situations in China and in Ireland will be compared to discuss the factor of culture difference.

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