

## S.M. Project Abstracts (2003/2004)

### CS programme

#### Setup of Microarray Data Analysis Modules for Multiple-Conditional Gene Expression Profiling

Student : Aakrosh Ratan  
SMA Supervisor : Assoc Prof Tan Kian Lee  
Company Supervisor : Dr Yang He  
(Bioinformatics Institute)

##### Project Abstract :

This thesis aims to develop better tools for microarray data analysis, thus reducing the false discovery rate. Microarray experiments have many sources of systematic variation which affect the measured gene expression levels. Normalization is the name of the process which is used to describe the process of removing such variation. Out of all the existing normalization processes, most of them do not take care of the systematic biases that may occur in the data. But LOWESS (Locally Weighted Linear Regression) is one method which does this and the simplistic model it assumes has made it very popular among the biologists.

Though the difference in the results of the various methods is very small, when you are looking for such subtle biological differences, these small differences can be crucial. LOWESS has several advantages as well which include use of a simple model, intuitive weight functions and localized regression. This thesis proposes a new algorithm which is essentially a modification to the LOWESS algorithm for microarray data analysis and accounts for intensity and spatial dependence in dye biases for different types of cDNA microarray experiments. Several performance criteria for such algorithms are also discussed and the new proposed algorithm is compared to the standard LOWESS algorithm.

#### Transactional Data Storage Framework for Smart-Card based Solutions

Student : Advait Deepak Karande  
SMA Supervisor : Assoc Prof Lee Wee Sun  
Company Supervisor : Mr Kelvin Chin  
(Encuentate Pte Ltd)

##### Project Abstract : Confidential

#### Mobile Enterprise Solution – Speech Interface

Student : Ai Ting  
SMA Supervisor : Assoc Prof Wong Weng Fai  
Company Supervisor : Mr Winston Woo Mun Sum  
(Motorola Electronics Pte Ltd)

##### Project Abstract :

Mobile devices such as Pocket-PC and cellular phones have similar characteristics, including small displays and limited user input due to size constraints. These limitations require manufacturers to invent new methods of providing efficient and friendly user interaction with the device. This report evaluates the

feasibility of speech interfaces on mobile devices. We investigate various speech technologies and existing products on the market. From the investigation, we conclude that speech interfaces for mobile devices are the logical next step in pervasive computing. Although, unconstrained speech recognition is the ideal interface that humans would want, the current state of technology does not allow this possibility. The most practical speech interface for a mobile application today would be either a server-based scheme over WLAN or an embedded recognizer. The former would allow more powerful recognition capabilities, while the latter would work in any environment, requiring no external data network (WLAN). From our ROI analyses, it is seen that speech interfaces to mobile applications can significantly improve the productivity of a mobile workforce. We also developed a prototype on 'safe force automation' to demonstrate ideas from the feasibility studies.

#### Software Development using Java

Student : Ang Ho Keat  
SMA Supervisor : Assoc Prof Chin Wei Ngan  
Company Supervisor : Mr Ba Thein Naing  
(Motorola Electronics Pte Ltd)

##### Project Abstract :

In a continual effort to enhance internal processes, Motorola has invested resources in adhering to the Capability Maturity Model (CMM) and is recently in the process of changing to the Capability Maturity Model Integration (CMMI<sup>SM</sup>) [1]. CMMI<sup>SM</sup> provides guidelines in improving organisation processes and an integration framework to aid in enterprise-wide process improvement. In order to refine processes, Motorola is attempting to use Casual Analysis and Resolution (CAR), one of the Process Areas (PAs) in CMMI<sup>SM</sup>, to understand the common root causes of variation and remove them from current process to lead to an overall improvement. Motorola has an inspection process in place to discover and correct defects in products in various stages of product development and the defect analysis data is accumulated in a database; Data obtained during product testing are being stored as well. A CAR tool is then necessary to extract relevant data from this pool of resources to facilitate further analysis of the data and to collect metrics that will be useful in determining the Return of Investment (ROI) and identifying which processes needs refinement. In this project, the CAR tool will be web-based and is to be created using Java 2 Enterprise Edition (J2EE) [2] technologies like JavaServer Pages (JSP), Javascript and HyperText Markup Language (HTML) with the database in Oracle 8i and resin as the web server. The iterative form of the standard Software Development Life Cycle (SDLC) methodology will be employed in the execution of the project. The project will draw to a close when the tool passes the User Acceptance Test (UAT).

### **Performa - The Revolutionary Form Development Platform**

Student : Cheng Xiaoyi  
SMA Supervisor : Prof Ooi Beng Chin  
Company Supervisor : Mr Tang Weng Sing  
(Crimsonlogic Pte Ltd)

#### **Project Abstract :**

Web forms are the essential elements of the interactive Web. Building robust, extensible and scalable Web applications is a challenging task for both enterprise and developers. The Perfect Forms Automaton or Performa under development at CrimsonLogic Pte Ltd aims to become a commercial-standard Web forms development framework. The entire framework is based on XML and its derivative standards. It stresses on the sound principle of separation of duties and proposes an evolutionary view of the web contents as a collection of business objects. The main purpose of the project is to evaluate Performa both qualitatively and quantitatively. For qualitative analysis we described a set of criteria to evaluate Performa as a Web application framework and an Integrated Development Environment (IDE). For quantitative analysis, we have attempted to get hands-on experience developing the same prototype application using both Performa and other IDE based on different technologies.

### **Total Immersion Game Combining Online and Mobile Experience**

Student : Dai Peng  
SMA Supervisor : Assoc Prof Cham Tat Jen  
Company Supervisor : Dr Lai Kok Fung  
(BuzzCity Pte Ltd)

#### **Project Abstract :**

In this thesis, I discussed the whole process of designing a role-playing game on an extent instant messenger named GAMMA. The ultimate aim of this project is to design and implement a gaming application via which to grow the existing customers. Our design is to develop a virtual city on GAMMA, and this virtual city contains all the basic features of the popular web virtual communities. In this application, players will be regarded as the members in a virtual city. They can do all the things they are able to do in the real society, like work, play games, sports and leisure as well as interact with other players, also they can invest their virtual money into our site market. Avatar is also included to the extent that players can see their virtual appearance on the screen. In each of the portions, we are using the TUS format for the display of pages, by which decreases the data flow significantly. Also, we have proposed some other types of technology such as quiz structure and profile logging to make our implementation simpler. So far, some parts of our implementation are launched, and we are expecting to launch our whole application in the near future. Of course, we will make some modifications of our design and implementation according to our customers' feedback. Furthermore, a

web portion that contains more content will be our future work.

### **Mini-ERP Implementation**

Student : Girish Kalyanaraman  
SMA Supervisor : Assoc Prof Chin Wei Ngan  
Company Supervisor : Mr S. Kumar (Manico Technologies Pte Ltd)

#### **Projects Abstract :**

A 'mini-ERP' software solution is all about enabling small businesses to do more with less. As companies strive to increase the efficiency of their business functions and remain competitive in the market, they must constantly assess and upgrade their ERP systems, incorporate more relevant features and discard outdated methods. This report discusses the development and implementation of one such mini ERP system, called *Vertex Integrated Solutions*, which aims to be a complete business management solution that would address the precise requirements of Small and Medium sized business enterprises. The contribution of the author to the product was the design, development, testing and integration of the Financial Accounting Module. The project initially involved a market survey to gain insights into the current ERP implementation trends among companies worldwide, and challenges to successful implementations. There was then the task of design and development of the product, with all the customizations in place as per the requirements of the prospective clients.

### **Continuous Nearest Neighbor Search with Obstacles in Large Data Sets**

Student : Ha Mai Lan  
SMA Supervisors : Asst Prof David Hsu (Singapore) & Prof Tomas Lozano-Perez (MIT)

#### **Project Abstract :**

In many database applications, most of nearest neighbor search using Euclidian distance. However, in fact, obstacles exist in a large number of database applications. In this project, I implemented algorithms for building visibility graph and finding a shortest path which can be used nearest neighbor search with obstacles. I also propose a method to do the continuous query with a low cost by avoiding repeating the computation of the whole nearest query process.

### **Fault Tolerant and Distributed IMS Server**

Student : Ian Wen Min Hall  
SMA Supervisor : Assoc Prof Lee Wee Sun  
Company Supervisor : Mr Tee Chee Han  
(Encentuate Pte Ltd)

#### **Project Abstract : Confidential**

### **Mobile Enterprise Solution – Speech Interface**

Student : Jose Kunnackal John  
SMA Supervisor : Assoc Prof Wong Weng Fai  
Company Supervisor : Mr Winston Woo Mun Sum (Motorola Electronics Pte Ltd)

#### **Project Abstract :**

The increasingly ubiquitous use of wireless devices in recent times has made information readily accessible to anyone, anywhere. Businesses depend on the services provided by such devices and the underlying networks to operate efficiently and increase the productivity of their workforce. With the increased usage of such devices, it has been found that using these devices can be quite cumbersome and frustrating. This project highlights such difficulties and proposes speech as an alternate means of interaction with mobile devices. In this report speech recognition technology is explained and the existing standards in the industry have been surveyed. Evaluating the feasibility of such a voice interface, it concludes that speech interfaces for mobile devices are the logical next step in pervasive computing. Unconstrained speech recognition is the ideal interface that humans would desire. However, the current state of technology does not allow this possibility. The most practical speech interface for a mobile application today would be either a server-based scheme over WLAN or an embedded recognizer. The former would allow more powerful recognition capabilities, while the latter would work in any environment, requiring no external data network (WLAN). From ROI analyses, it is seen that speech interfaces to mobile applications can significantly improve the productivity of a mobile workforce. During the course of this project, a white paper on the feasibility of mobile speech interfaces was published. A speech interface on a Pocket PC device was implemented to support the findings of this study.

### **Learning from the Cortico-Hippocampal Network**

Student : Namit Chaturvedi  
SMA Supervisor : Assoc Prof Ng Teck Khim  
Company Supervisor : Dr Ng Gee Wah (DSO National Laboratories)

#### **Project Abstract :**

Memory is an important component in all intelligent systems. Good memory structure will ensure robust and optimized storage and retrieval of data for information processing. This project is to study, understand, and re-engineer the way human brain structures its memory. Human memory could be broadly classified into sensory buffer memory, short-term memory, and long term memory. The project involves an investigation on current human memory function and its association to information processing. Also investigated, is a model of the functioning of a part of the brain, called the cortico-hippocampal region. The model explains how brain can learn to predict stimuli based on context cues. The current

work explores the possibility of an extension of this model, and its possible applications in the field of intelligent computer systems.

### **Design and Implementation of Push Install and Auto Update Feature for Encentuate AccessAgent in Enterprise Environment**

Student : Neel Kamal  
SMA Supervisor : Asst Prof David Hsu  
Company Supervisor : Mr Mohit Chugh (Encentuate Pte Ltd)

#### **Project Abstract : Confidential**

### **Formulation of Enterprise Solutions Technology Frameworks**

Student : Nelly Kasim  
SMA Supervisor : Assoc Prof Teo Yong Meng  
Company Supervisors : Mr Ng Beng Lim & Ms Wong Mei Kwan (NCS Pte. Ltd.)

#### **Projects Abstract :**

The project aimed to formulate technology framework of Enterprise solutions to address the business needs of a regional Systems Integrator. Main areas of evaluation that were identified are Reporting, Enterprise Content Management (ECM), Business Intelligence (BI), and Enterprise Application Integration (EAI). The areas were chosen after careful survey and evaluation of enterprise solution market and vendors. Considerations were made based on the market maturity, field awareness, promises held by each market, and the size of the field.

The framework formulated the definition, scope, and boundaries of each area. Discussions and comparisons, when necessary, were made across products that solve similar problems or offer similar capabilities. Evaluation was made across three broad categories; vendor, product, and technology. The four issues of the framework formulation were to formulate the problem statement, evaluation of vendors and market visions, determining and evaluating key functional capabilities, and relevant technology standards for each field.

By deploying combinations of research and evaluation skill, and business awareness, the technology frameworks were formulated for the four main areas of evaluation. Each area was unique in its maturity, deployment objectives, promises of investment returns and market awareness. Based on characteristics of each area, frameworks were formulated with different objectives; informative or consultative.

### **Context Mediation: Ontology Modeling using Web Ontology Language (OWL)**

Student : Philip Tan Eik Yeow  
SMA Supervisors : Assoc Prof Tan Kian Lee (Singapore) & Prof Stuart Madnick (MIT)

#### Project Abstract :

The Context Interchange strategy is a novel approach in solving heterogeneous data source interoperability problem through context mediation. In the recent implementation, a FOL language is used in the modeling and implementation of the application ontologies. In this project, we close the gap between COIN and Semantic Web by adopting the use of W3C Recommendation for ontology publishing, OWL Web Ontology Language in the strategy realization. The ontological model in COIN is represented in OWL, by mapping the respective ontological concepts in COIN to its counterparts. Emerging rule markup language of RuleML is used for modeling rule-based metadata in the ontology. In conjunction with that, we have developed a prototype demonstrating the use of this COIN-OWL ontology model.

#### **Context Mediation Approach to Improved Interoperability Amongst Disparate Financial Information Services**

Student : Sajindra Kolitha  
Bandara Jayasena  
SMA Supervisors : Assoc Prof Tan Kian  
Lee (Singapore) & Prof  
Stuart Madnick (MIT)

#### Projects Abstract :

There is no such entity as a 'World Wide Bank' managing the central database of all possible financial activities. Such a concept makes neither technical nor business sense. Each player in the financial industry, each bank, stock exchange, government agency, or insurance company operates its own financial information system or systems. The systems communicate via intranet, proprietary extranets or even the internet. By its very nature, financial information, like the money that it represents, changes hands. Therefore the interoperation of financial information systems is the cornerstone of the financial services they support. Furthermore financial information is complex. Naturally these characteristics led to the development of standards for the management and interchange of financial information. Yet connectivity and standards alone are not the panacea: different groups of players use different standards or versions of a standard's implementation. I believe that the solution lies in self-documented languages like XML, semantically rich services and meta-data as promised by the semantic Web, and a mediation architecture for the documentation, identification, and resolution of semantic conflicts arising from the interoperation of heterogeneous financial services. As the first contribution, in this report I present a case study illustrating the nature of the problem and the viability of the solution we propose. The case is *Electronic Bill Presentment and Payment Industry*. I would describe and analyze the integration of services using four different formats, the IFX, OFX and SWIFT standards, and a proprietary format. To accomplish this integration we use the COIN architecture framework. The COIN architecture leverages a model of sources and

receivers' contexts in reference to a rich domain model or ontology for the description and resolution of semantic heterogeneity. The focus has been on how COIN would facilitate such mediations in interoperability between IFX standard and Internal proprietary system, OFX and standards and a Internal proprietary system, SWIFT and a Internal proprietary system and direct mediation between OFX and SWIFT covering semantic heterogeneities spanning ontological, contextual and temporal conflicts. Further, the ability to use such a complex system requires a certain level of skill and knowledge on underlying implementation mechanism resulting in narrowing down the user segment for COIN. I believe that in order to provide these services, a certain level of abstraction needs to be provided to the user with a less skill and computer science literacy that would facilitate him to model and create the required applications and services for mediating an actual scenario. The best approach is to provide with an interface which has a smaller learning curve and familiarity to an already existing Human Computer Interaction mechanism like windows, icons, pointers and graphical drawing capabilities. As the second contribution in this research I provide a detailed implementation of such a graphical modeling and designing tool that acts as the Metadata Management system in COIN, which would facilitate in graphically creating, modeling and defining the entire domain under analysis and the relevant mediation logic rather than modeling it using in a language like prolog.

#### **Incorporation of Challenge/Response Authentication in a Password-Based Infrastructure**

Student : Sharad Ganesh  
SMA Supervisor : Asst Prof David Hsu  
Company Supervisor : Mr Mohit Chugh  
(Encentuate Pte Ltd)

Projects Abstract : Confidential

#### **Total Immersion Game Combining Mobile and Online Experience**

Student : Soh Cheng Lock, Donny  
SMA Supervisor : Assoc Prof Cham Tat  
Jen  
Company Supervisor : Dr Lai Kok Fung  
(Buzzcity Pte Ltd)

#### Project Abstract :

We are at the brink of the onset of a gigantic revolution in mobile services. As we move on to higher bandwidth and devices with a higher computational ability, the potential for such services is limitless and there will surely be many vast opportunities to explore in this realm. In this project, I was attached to Buzzcity, Asia's premier provider of mobile phone entertainment, communication and information services using leading mobile communication technology. Leveraging on the current mobile community in Buzzcity, the project will be to develop an application to foster greater relationships among the users of the community. This involves looking at trends in the current mobile environment, and looking through the requirements of a game.

I was closely involved in the development process of the company, going through the different stages of its development work. At the closing stages of the attachment, an assessment of the company was done, with an analysis of the essence of their working culture. A short forecast of the future of mobile computing as well as suggestions on the paths the company can move are also presented.

#### **Web Based Access Agents for Single-Sign-On**

Student : Sriram Saroop  
SMA Supervisor : Assoc Prof Lee Wee Sun  
Company Supervisor : Mr Tee Chee Han  
(Encentuate Pte Ltd)

Project Abstract : Confidential

#### **Performa - The Revolutionary Form Development Platform**

Student : Wang Caixia  
SMA Supervisor : Prof Ooi Beng Chin  
Company Supervisor : Mr Tang Weng Sing  
(Crimsonlogic Pte Ltd)

Project Abstract :

HTML forms have successfully created a platform-independent environment for electronic commerce across the Internet since 1993. However, they have created numerous obstacles for the Web development community. W3C XForms — declared as the next generation web forms — addresses every concern or problem with ease. Perfect Forms Automaton (Performa), building on the XForms standard, is an enterprise-grade forms management solution, developed by CrimsonLogic Pte Ltd since 2003. In this project, the overall architecture and concepts of Performa are studied. An Integrated Broadcast System for Mediacorp is developed by using the traditional HTML-JSP as well as Performa, to illustrate how Performa develops Web applications in a brand-new manner. In addition, Performa can be viewed as a Web Application Framework, as an Integrated Development Environment or as an Enterprise Eforms Solution. The evaluation criteria of the three different concepts are studied and then Performa is evaluated according to these criteria. During the analysis, we also compare Performa with the well-known products in the respective fields and analyze how Performa fulfills the requirements.

#### **Design and Implementation of a Bayesian Learning System**

Student : Wang Junqing  
SMA Supervisor : Assoc Prof Teh Hung Chuan  
Company Supervisor : Mr George Wong  
(ReasonEdge Technologies Pte Ltd)

Project Abstract :

Bayesian networks have become increasingly popular in developing AI-based systems, especially in the medical usage domain. In this project, a Bayesian

Learning System is designed and developed in order to serve as a general and flexible framework, which could be utilized in various domains as well. The whole new framework consists of four main components -- Database Manager, Bayesian Learner, SMILE Library and OMS Logics Module, and the first three modules cooperate together to work as the Bayesian Learning System which is focused on in this paper; additionally plus the last module, the whole system is serving as an Outcomes Management System, which evaluates a large collection of data on a broad population, suggests based on prediction when certain events might precede or herald significant complications. The framework is developed in platform-independent fashion. The core module – Bayesian Learner, extracts the data from Database Manager, further uses the functionalities provided by SMILE Library to establish the Bayesian networks. The constructed networks are supervised continually to learn the conditional probabilities by means of sample statistics algorithm in the scenario of complete data and known structure. In the end, the trained Bayesian network can be explored by the OMS Logics to manage the outputs to the Web Front-end as the suggestion for end-users. The evaluation of the system is based on several study-cases of medical domain, and proved to be useful and effective.

#### **Web Tier Technology and Practice – An Employee Manger Self-Service using a MVC Framework**

Student : Wu Yan  
SMA Supervisor : Assoc Prof Hsu Wen Jing  
Company Supervisors : Mr Cho Jia Yang & Mr Charles Ho (elipva Ltd)

Project Abstract :

With advances in network and browser technology, companies have been moving more and more of their corporate information resources to web-based applications and making them available to employees via the company intranet. EMSS (Employee Manager Self Service) is such a solution that enables employee's access to corporate intranet or the Internet and enables employees to make changes on their own behalf. On the demand of the customers from an international pharmacological company SPL, we build an integrated and comprehensive EMSS with emerging web tier programming technology and existing infrastructure – Zephyr. Zephyr provides a lightweight J2EE framework for the development and deployment of web-based applications. It is a Model-View-Controller pattern based framework, which enforces the separation between model and view to achieve flexibility and modularity. In addition, Zephyr leverage the powerful OR mapping tool Hibernate to provide transparent data persistence. SPL EMSS is a good practice for Zephyr programming. From the development process, the power of the Zephyr framework has been fully exploited and accordingly it resulted in a rapid development cycle. However, it also shows some disadvantages of Zephyr, i.e. code maintenance and user interface. The

possible solution is to combine the other mature frameworks i.e. strut and JSF with Zephyr to achieve the best of both worlds.

#### **A Framework for Distributed Simulation using HLA on Grid**

Student : Xie Yong  
SMA Supervisors : Assoc Prof Teo Yong Meng (Singapore) & Prof Alan Edelman (MIT)

##### **Project Abstract :**

With the increase in complexity of simulations, there is a growing need for accessing large amount of computing resource and data sets which could be geographically distributed. The Grid provides an infrastructure for collaborative resource sharing to execute large-scale applications. We propose a framework for distributed simulation using the High Level Architecture (HLA) over the Grid. The framework makes use of a Federate-Proxy-RTI architecture, in which a remote proxy acts on behalf of the federate in interacting with RTI. This architecture hides the communication over the Grid network, and provides user transparency and simulator reusability. It also facilitates migration of federate without affecting other parts of the simulation, and the Proxy-RTI backbone can also be migrated, as it does not involve any simulation logic. Moreover, the framework, implemented in Java, allows simulators on heterogeneous platforms to join into a simulation over the Internet. We have implemented and tested a Grid-enabled HLA API based on DMSO's RTI NG 1.3 V6 implementation, and the Grid system runs the Globus Toolkit version 3.

#### **Designing Local Behavior to Achieve Global Objectives: An Application on Acoustic Sensor Network**

Student : Xu Jin  
SMA Supervisor : Assoc Prof Ng Hwee Tou  
Company Supervisors : Mr Foo Mao Ching & Mr Rodney Teo (DSO National Laboratories)

##### **Project Abstract :**

This paper proposes a decentralized algorithm for a multi-sensor multi-target tracking problem. For the problem we consider, there are several challenges to address. First, sensor nodes have energy constraints imposed by their finite power supply, which motivates computations that are energy-conserving. Second, the utility derived from a sensing task may vary depending on the placement and size of the set of nodes who participate, which often involves complex objective functions for sensor nodes to targets. Finally, nodes must attempt to realize the system global objectives with only local information. We present a concrete model a specific application, in which we define appropriate local behavior to achieve global objectives. Then, for an important class of utility functions, we present a decentralized algorithm which attempt to

maximize the utility derived from the sensor network over its lifetime. The algorithm and experimental results we present enable sensor agents to adaptively change their roles over time and use dynamic reconfiguration of routes to load balance energy consumption in the network. The simulation result proved to be robust against uncertainty.

#### **Employee Self-Services using J2EE Technology on a MVC Architecture**

Student : Yang Jingwei  
SMA Supervisor : Assoc Prof Hsu Wen Jing  
Company Supervisor : Mr Cho Jia Yang (elipva Ltd)

##### **Project Abstract :**

This paper introduces the 'Security Pass' and 'Gate Pass' modules I developed during the internship using J2EE technology on an MVC technology. I developed applications on the elipva Zephyr platform which is a J2EE compliant web application that provides aggregation for content, applications, data and multimedia through an easy-to-use user interface and a compact platform for the development and deployment of web-based Java and J2EE applications. J2EE is the Java 2 Platform Enterprise Edition, which is the technology for distributed and enterprise development in Java. MVC stands for Model-View-Controller framework, which applies a minimalist approach in allowing almost everything to be configurable and pushes flexibility in development for all extension modules. In addition, I used Hibernate to persist my data since it is mature, complete open source, widely used and very actively developed. Furthermore, I also present the initialization flow of Zephyr and its powerful identity management including authentication, access control and user management.

#### **Performance Study of a Wide-Area Grid System**

Student : Yee Chin Peng  
SMA Supervisor : Assoc Prof Teo Yong Meng  
Company Supervisor : Dr Simon See (SUN Microsystems Pte Ltd)

##### **Project Abstract :**

Super scheduling, a scheduling process involving resources of multiple administrative domains, is one of the main challenges of Grid Computing. An efficient job scheduler utilizes systems more efficiently while enabling higher throughput for the user. As it is very time-consuming to perform experiments, doing simulation enables the user to evaluate the performance of algorithms under different Grid environments. The work here revolves around the creation of a Graphical User Interface for the Super Scheduler simulator that enables a user to create a dynamic Grid of many administrative domains by using drag-and-drop, and thereafter to run a simulation of this Grid environment using several different algorithms and parameters. Using these different scenarios, the user can evaluate how

bandwidth variation, computation duration, dataset size and job arrival interval can impact the average response time, average stretch and data transfer times.

#### **Development and Testing of Wireless Server and Client Applications using C#. NET**

Student : Zhang Jiahui  
SMA Supervisor : Assoc Prof Chin Wei Ngan  
Company Supervisor : Mr Philip Wong  
(Motorola Electronics Pte Ltd)

#### **Project Abstract :**

In this SMA project, I've investigated Microsoft Visual Studio .NET architecture and platform, C# Object Oriented programming language, Open Network Computing (ONC), Remote Process Call (RPC), Unified Modeling Language (UML), as well as various Testing Techniques in Software Engineering. After studying and understanding the project requirements, my first major achievement is that I have designed and developed a Wireless Server Client Application based on ONC/RPC remote process calls and computer aided dispatch API (Application Programming Interface). My second accomplishment is that I have designed and developed the Wireless Server Simulator for testing with client based on ONC/RPC and computer aided dispatch API. My third major task is to learn the various software engineering testing techniques, execute testing cases, report errors and document log files.

#### **Total Immersion Game Combining Mobile and Online Experience**

Student : Zhou Lei  
SMA Supervisor : Assoc Prof Cham Tat Jen  
Company Supervisor : Dr Lai Kok Fung  
(Buzzcity Pte Ltd)

#### **Project Abstract :**

The project involves developing a virtual community that exploits both the online and mobile experience. The objective of this project is to provide opportunities for mobile users to interact with other users via mobile phone and online by engaging graphics and role-playing elements to entice usage and interactions within the digital community. The game our team designed is aimed to simulate daily life in a virtual city. The players' experiences are further complemented by using a web version of the game to provide richer game features and allow online and mobile users to interact in the game.