Professor Millham

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Profile

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Richard Millham is currently an Associate Professor at the Durban University of Technology, Department of Information Technology. He holds a BA (Hons) from the University of Saskatchewan in Canada, MA from Sheffield Hallam University in Sheffield, England, MSc from the University of Abertay in Dundee, Scotland, and a PhD from De Montfort University in Leicester, England. He is a Chartered Engineer (UK) and Senior Member of IEEE.

After fifteen years of industrial experience, Richard Millham joined academe where he has worked at several universities in different countries. He has been actively involved in academe as a conference/journal reviewer, journal editor, grant recipient, and keynote speaker. He has published extensively in his research fields of software evolution, aspects of cloud computing with m-interaction, aspects of big data, social media, security, and creative computing.

Present Projects:
Big data Mining: Frequent items and deep learning
Big data, particularly in some fields such as the stock market, often involve frequently occurring and changing data with implication on prices within high-frequency trading practices effecting low-latency trades. The purpose of this study is to research into dimensions of data mining such as frequently changed numeric value and time of most frequent items. This is because existing data mining algorithms are focused on mining frequent items with support and confidence that satisfy a minimum threshold. However, minimum support and confidence does not show interestingness of patterns in selecting actionable sequence that brings value to business. In order to measure business value, the study explores deep learning theory with occurrence frequency approach to develop a hybrid multistage approach that identifies interesting patterns for more informed decision making.
A Framework to Lower Maternal Mortality and Morbidity Rates within Kajiado North Constituency using Feasible Ubiquitous Technology
Maternal mortality is a great concern in many developing countries due to its

devastating effects on family and society. In many developing countries, access to maternal health and information is the deciding factor between a healthy pregnancy and delivery and maternal mortality. The role of this research is to identify specific causes of maternal mortality, within the selected region of Kajaido North Constituency in Kenya, and then develop an ICT-based feasible intervention to provide maternal information and communication to minimise pregnancy and delivery complications. Using a quasi-experimental design, the effectiveness of this intervention will be validated through designated metrics. Based on the results of this intervention, a proposed framework to lower the maternal mortality and morbidity rates in the selected constituency by minimising pregnancy complications through the use of feasible ubiquitous technologies will be verified.

Telecentres Determining and developing appropriate techniques for requirements validation and modelling of telecentre operational monitoring in a developing country Telecentres are often viewed by governments in developing countries as a means for providing ICT access to people in disadvantaged areas. However, these telecentres suffer from a lack of continuous and accurate operational data gathering which prevents the use of correct business decision making, especially sustainability, towards them. After identifying general attributes and processes of telecentres, a common operational monitoring system, TeleMun, was developed. Techniques for this system's requirements and model validation were explored and further developed. The need for a software development phase-consistency verification tool, Veriscene, was identified and developed. This operational monitoring model was given a R500 000 TIA grant to ensure its development and deployment.

Developing a Feasible SQLIA Defence for Recently Web-Migrated Legacy Systems within the West African IT Context

Changing business and technological conditions are forcing many legacy systems to migrate to the web environment where they face new threats, including Structured Query Language Injection Attack (SQLIA). To mitigate these threats, an adequate security defence is required that takes into account West African IT contextual constraints of low IT budgets, inadequately trained professionals, and poor infrastructure. A defence mechanism of combined enhanced RBAC and parse tree analysis that is suitable for the West African IT context has been developed. Using a representative West African legacy system and a suite of representative test cases, this defence is systematically tested for its effectiveness in detecting and preventing the three most common types of SQLIA: tautology, union, and comment.

Monitoring and Evaluating Community Development Projects

In order to improve the management of community development initiatives (a core undertaking of governments), the task of project monitoring and evaluation must be improved. The purpose of this project is to investigate a common subset of the business processes for monitoring and evaluating community development projects. The outcome of this study is the development of a mobile cloud service system that will cause an innovative change in project monitoring and evaluation. The rationale for using mobile cloud computing to seek an innovative change in community service delivery include, the problems of lack of scalability, data integration, data sharing and

support for mobility. Mobile cloud computing could help to mitigate these challenges because it provides the means to flexibly increase computational resources, enable data sharing regardless of geographical boundaries and facilitating massive public participation in service delivery process. The proposed mobile cloud service system will be implemented based on integrated framework of system innovation life cycle model (SILCM), analytic Kano model and service systems development process (SSDP) - which integrates case study methodology, value co-creation, process modelling and system evaluation to create innovative change in the process of monitoring and evaluating community development projects.

Past Projects:

Use of a selected **computer game in expanding English vocabulary** among tertiary students

South Africa, like many countries, faces a globalisation of its educational system using a lingua franca, English, although large numbers of its students use English as a second language. Consequently, there is a dire need to develop methods to expand South African students' vocabulary while engaging their interest. After identifying a suitable commercial game, quasi-experimental groups of tertiary students were used to determine the effectiveness of this game in expanding their English vocabulary. Besides validating its effective through classical test theory, this project identified game characteristics useful in learning and students' perceived usefulness of the game in learning. Furthermore, lessons learned from this study confirm that ICT relevant tools (such as this study's computer game) do complement teaching and learning.

Multi-Dimensional Views and Interactive Navigation of the Historical Development of a Town

History education through creative technologies is an emerging trend in computing which tries to address the need to make history become "alive" to the participant. A prototype with multiple modes of interactivity was developed that demonstrated the development of a town over different periods of time. Besides providing a glimpse into the past, this prototype was used to demonstrate the correlations of historical developmental factors to a varied audience of growing people, young adults, and experienced adults.

Big data and social media

Social media is playing an increasing prominent role in society, politics, and business. However, due to its unstructured nature and large volume, it poses issues for big data. The role of social media in terms of cause-effect-solution was explored with its effect on political power and on business. In addition, data structuring techniques with a feasible database architecture for social media was determined. The efficacy of these techniques were demonstrated through selected social media case studies.

System Architecture for Secure Mobile Internet Voting

Conventional poll-site voting systems suffer from challenges from lack of mobility support for voters, voter inconvenience, election misconduct, and possible voter

coercion. To address these challenges, an enhanced innovative secure mobile Internet voting system architecture was proposed. This architecture leverages the auto-coupling capability of near field communication, as well as the intrinsic merits of global positioning system, voice biometric authentication, and computational intelligence techniques. This architecture provides a theoretical mitigation of some of the electoral challenges outlined above as well as ensuring voter authentication. Several voice biometric based authentication algorithms, based on voice spectral features reduced by the Spectral Histogram of Oriented Gradients (SHOG) algorithm, were investigated with a neural network ensemble for pattern matching. The most promising set of algorithms were identified as being suitable for the voice authentication module of this Internet voting architecture.