Cancer Informatics Proposal – Modelling the contribution of proteases to cancer progression (ID-UNN1)

Dr. Rosemary Bass & Prof Alamgir Hossain
School of Computing, Engineering and Information Sciences, Northumbria University, UK

A common factor of the pathogenesis of all forms of cancer is that extracellular proteases are deregulated. The consequences of this aberrant protease activity are still not completely understood after decades of research. The main classes of proteases considered here are serine proteases including those of the plasminogen activation cascade and metalloproteases which can be further divided into MMPs (matrix metalloprotease), ADAMs (a disintegrin and a metalloprotease) and ADAMTSs (a disintegrin and a metalloprotease with thrombospondin like repeats). It was thought that cancer cells up-regulated cell surface proteolytic activity to facilitate invasion though the extracellular matrix during metastasis. This was based on hundreds of studies demonstrating that protease expression was increased in tumours in comparison to normal tissues, and cancer cells in comparison to normal cells. It has subsequently been realised that proteases play more diverse cellular roles than originally conceived; something dramatically illustrated by the failure of broad spectrum MMP inhibitors as cancer treatments in clinical trials. It is now acknowledged that proteases are both targets and anti-targets for cancer therapeutics, there are numerous reports of the protective effects of proteases in the progression of certain cancers – for example breast cancer patients with high expression of MMP-8 in their tumours have markedly improved survival.

The proteases in the body potentially have enormous destructive power, as such they need to be tightly controlled by a combination of regulating expression and activity. Expression is regulated at the transcriptional and translation levels. The activity of proteases is controlled by the secretion of most as inactive precursors called zymogens and by the activity of specific innate inhibitors e.g. TIMPs (tissue inhibitors of metalloproteases) which inhibit metalloproteases. This means that one of the considerations for the development of personalised cancer therapies is a need to understand the interplay between proteases and their innate inhibitors in each individual patient. Here it is proposed to exploit the wealth of data available in the public domain, to understand the profile of proteases and inhibitors which are deregulated at the different stages of the progression of a chosen tumour type, using resources such as Oncomine. Then the change in expression of individual proteases (or inhibitors) with time with be modelled by prediction modelling to determine the behaviour of tumour cells before and after the protease is dysregulated. This will consider the positive and negative contributions of different proteases, informed by published literature. This will then be further extended to include modelling the effect of real/hypothetical inhibitors, as the future potential of specifically targeted protease inhibitors is an important consideration. This could include modelling temporally and spatially e.g.. what happens if TIMP-1 is present in a compartment at time X and MMP-2 there at time Y? In the future this will inform intelligent decision making systems for the next generation of specifically targeted protease inhibitors as cancer therapies.

Intelligent Robotics and Mobile-based Games for Learning (ID-UNN2)

Dr Li Zhang and Dr Rebecca Strachan
School of Computing, Engineering and Information Sciences, Northumbria University, UK

The project aims to establish an interdisciplinary network between EU and Asian partners and develop an intelligent tutoring system with advanced functionalities in natural human-robot/agent interaction and robot-robot/agent cooperation to benefit learners.

Motivation: It is an inspiring and longstanding research goal to make computer interfaces more human-like in order to provide personalised intelligent tutoring. This endeavour has given rise to agent-based interfaces. For example, conversational agents were developed to perform multimodal dialogue with learners. However, there is usually high level of uncertainty embedded in intelligent tutoring systems since activities are more open-ended and less well-defined than pure problem solving and learners' meta-cognitive abilities and affective states are sometimes difficult to assess unobtrusively from interaction events. Therefore it is still a challenging research task in the cognitive and computer sciences to produce an intelligent system capable of performing context understanding, interpreting social relationships, general mood and emotion, sensing or reasonably predicating others' inter-conversion, identifying its role and participating intelligently in open-ended pedagogical interaction.

Aims: The project aims to respond to the above challenges and develop an artificial robotics system that operates in dynamic real life environments. The robotics system will be equipped with active learning, cognitive reasoning, machine translation, user modelling and multimodal affect detection to reach new levels of autonomy and adaptability.

Methodologies: The robotics system will be developed based on an existing framework of a humanoid robot or a serious game like virtual real world setting in handheld/mobile devices. In order to enhance users' learning experience, the robotics system will employ context understanding, speaker identification and reaction/adaptation to users' emotions and topic & environmental changes. Non-verbal (such as mimicry behaviour and eye gazing) and verbal (e.g. cultural related small talk) behaviours will also be developed to benefit learners' experience. Several leading techniques for active learning (such as Stream-Based Selective Sampling and Pool-Based Sampling) and multilingual machine translation will be explored. Machine learning approaches such as Hidden Markov Model and Support Vector Machine will also be explored in the context of cognitive modelling, context/scene understanding, sentiment interpretation and decision making to improve the system's robustness and autonomy.

Applications & Requirements: The project will promote interdisciplinary research involving Computer Science, Education, Cognitive Science and other disciplines. The proposed robotics system will benefit technology enhanced teaching and learning of second language, new subjects and social communication skills. It promotes novel forms of pedagogical interactions and adapts to learners' traits beyond knowledge (e.g. learners' meta-cognitive abilities and affective states). It also shows great potential to benefit disadvantaged user groups such as people with cognitive and learning difficulties and provide personalised tutoring for children and adults with different types of autistic spectrum disorder. The postdoctoral researcher working on the project should hold a PhD degree in Computer Science or Engineering. He or she should have artificial intelligence and machine learning related background and possess strong programming skills of C++, Python, Java or Android SDK.

Smart Medical Context-Aware Sensing for e-Health(ID- UNN3)

Dr. Nauman Aslam and Prof. Safwat Mansi, Northumbria University, UK

Scope:

The Computational Intelligence Group (CIG) at Northumbria University is seeking a competent and motivated Post-Doctoral Fellow in the area of wireless sensor networks to pursue research in intelligent medical monitoring and context aware sensing. Medical context-aware sensing is a new challenging application area in wireless sensor networks that holds a great promise to modernize the traditional health care systems. The term medical context-aware sensing is coined based on idea of remotely monitoring patient's vital signs as well as other contextual information. Body area sensors such as glucometer, blood pressure monitor, heart rate and pulse-oximeter can be employed for capturing the diagnostic vital signs of patients. The context monitoring sensors such as room temperature, light intensity, humidity and accelerometer. Once collected locally, the patient's medical and contextual information can be processed and automatically transmitted to the relevant health-care staff.

The candidate selected for this position will be expected to work collaboratively with the interdisciplinary team to develop new solution for intelligent e-Health systems. In particular, focus will be on design and development of novel communication algorithms/protocols to mitigate the challenges associated with delivering sensitive medical information with reliability and quality of service guarantees.

Qualifications

1. PhD degree in computer science, engineering or a closely related discipline. Experience in working in research projects/groups related to sensor networks.
2. Experience in technical writing, communicating scientific results through journal and technical reports.
3. Experience with wireless sensor networks: programming plat- forms, strong programming and systems skills, hands-on knowledge of TinyOS and/or Contiki is highly desirable, and so is experience with building WSN in-field deployment.
4. Good analytical, technical, and problem solving skills
5. Good teamwork and organizational skills

This position is supported by cLINK project funded by EU's ERASMUSMUNDUS program to establish interdisciplinary research network between EU and Asian Partners. For more information on cLINK please visit the website: http://www.clink-edu.eu

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Visible Light Communication Systems (ID-UNN4)

Dr Hoa Le Minh, Prof Zabih Ghassemlooy
Optical Communications Research Group (OCRG)
School of Computing, Engineering and Information Sciences, Northumbria University, UK

Outline of the Proposal

Lighting technology is experiencing revolutionary changes to meet the growing demand for energy-efficient illumination in domestic and industrial environment to meet the global green agenda. In recent years we have seen the introduction of light emitting diodes (LED) based on solid state technologies for replacing the traditional incandescent and fluorescent lamps. LEDs are widely used in a wide range of applications spanning from personal use (e.g. mobile displays, sensors etc.) to industrial and domestic appliances (television, office illumination, automobile, aircrafts, street lighting etc.). As well as lighting LEDs can be used to offer data communication by means of modulating the intensity of emitted light.

This emerging technology is capable of offering additional and complementary bandwidth for existing wireless communication systems for closed environment. The current research activities are mainly focused on achieving extra modulation bandwidth for such systems. However, there is a need to explore the feasibility of this wonderful technology by further investigating number technical challenges such as mobility, energy efficiency, lighting incorporation (dimming, control etc.). The project will involve theoretical analysis as well practical implementation carried out within the OCRG research laboratories. We envisage that the combination of smart lighting and mobile communications will unprecedentedly create a heterogeneous landscape for future short-range wireless communications.

Background of the candidate

You must have PhD in electrical and electronic engineering, communication systems, optical communications, with some knowledge of programming (C++, Matlab).

Contact Details

Contact: hoa.le-minh@northumbria.ac.uk
Web site**:** http://soe.northumbria.ac.uk/ocr/

Modelling of Cancer Cell Signalling Systems and Designing Optimal Therapeutic Combinations (ID- UNN5)

<u>Contact person</u>: Prof. Alamgir Hossain; Email:Alamgir.hossain@northumbria.ac.uk

Cell signalling controls the phenotypes and fates of cells. A cell signalling system typically comprises a large number of proteins and other signalling molecules (e.g. lipids), as well as a larger number of molecular interactions. A cell signalling system enables a cell to sense changes in its environment and respond to them. A systems-level understanding of cell signalling is crucial for finding better treatments for a number of diseases involving deregulation of cell signalling systems, such as cancer. In cancer cells, the tightly regulated and fine-tuned dynamics of information processing in signalling networks is altered, leading to uncontrolled cell proliferation, survival and migration. The malignancy of cancer cells is driven and/or sustained in part by mutations that affect signalling proteins, many of which are the products of oncogenes and tumour suppressor genes. The therapeutic control of a solid cancer tumour depends critically on the responses of the individual cells that constitute the entire tumour mass. A particular cell's spatial location within the tumour and intracellular interactions, including the evolution of the cell-cycle within each cell, has an impact on its decision to grow and divide. The cells are also influenced by external signals from other cells as well as oxygen and nutrient concentrations.

Mathematical modelling of cell signalling systems has emerged as an active research area in Systems Biology, Computational Biology, Drug Discovery and Intelligent Decision Support Systems. There are several reasons why a good mathematical model of cancer cell signalling system is very useful in such research. Firstly, while experimenting cancer treatment on an animal, the disease (cancer) may take months to run its course; in human, years. There is also a question of ethics. It is often quicker and cheaper to formulate a mathematical model and simulate it on a computer than a clinical trial. Mathematical model of cell signalling system provides flexibility that allows predictions to be made via computation under different operation conditions. Once a model has been formulated, computational procedures can usually be applied to monitor/observe the functional/logical consequences of the model. More importantly, mathematical models of cell signalling systems present opportunities for model-guided drug design/discovery. The main aim of this research is to develop intelligent model of cancer cell signalling system and thereby designing optimal therapeutic combinations for cancer treatment.

Several attempts have been taken to find a biologically/clinically realistic model of cancer cell signalling system. Network wiring diagram is commonly used to provide a visual representation and summary of available knowledge about a cell signalling system, in particular the molecules involved and their interactions. Ordinary differential equations (ODEs) are traditionally used to

model the kinetics of bio-chemical reaction systems, and many models of cell signalling systems take the form of a system of coupled ODEs. If the number of protein considered in cell signalling system increases, the number of ODE increases significantly that is difficult to solve/analyse. For example, a recent model encompassing only about 30 proteins is composed of nearly 500 ODEs. Other efficient approaches of cell signalling modelling include logical modelling, rule-based modelling, artificial-intelligence-based modelling etc. In rule-based modelling approach, graphs are used to model proteins, and graph-rewriting rules are used to model protein interactions. Rules can be specified using a formal language. Here, molecules are treated as the building blocks of chemical species and the rules represent molecular interactions/reactions. It is expected that, methods are needed to make modelling more automatic, robust, incrementally improved through an iterative process, including parameter estimation, experimental tests of model predictions, and model refinement. The first phase of research aims to develop mathematical models of cancer cell signalling systems and tumour growth using neural networks, fuzzy logic and other commonly used techniques giving more emphasis on intracellular interactions. In the second phase of the research, the developed models will be verified with clinical data to assess its effectiveness/coherence in clinical practices, especially for prediction, detection and diagnosis of tumour growth.

Most drugs used in cancer treatment have toxic effects and usually have narrow therapeutic indices - dose at which these drugs significantly kill the cancerous cells are close to the levels at which harmful toxic side-effects occur. Moreover many important pharmacokinetic (PK), pharmacodynamics (PD) characteristics of drugs, metabolic and biochemical reactions vary from patient to patient despite similar physiological conditions and body surface areas. An effective drug scheduling requires suitable balancing between the beneficial and adverse side-effects. So considering all complexities, it is very difficult to find optimum drug doses in clinical practice and research in underway to make the treatment/drug scheduling more effective. The third phase of the research will focus on development of optimal therapeutic combinations based on model of cell signalling system. The proposed model for optimal therapeutic will also consider PK-PD characteristics of drugs, drug resistance, drug distribution and blood circulation inside the tumour as these affect treatment. Initially the drug scheduling technique will be developed for a single drug and then it would be extended for multi-drugs as it appears to be more effective in practice. In principle, the best drug scheduling scheme would be to eradicate the cancer tumour with minimum level of toxicity and unfortunately these two objectives are generally found to be in conflict and may not be easy to achieve with traditional methods. So, multi-objective evolutionary algorithms can be combined with different artificial intelligence-based control strategies such as neural networks and fuzzy logic to trade-off among different conflicting objectives and find acceptable solution in single drug or multi-drug treatment. Recent research shows that targeted therapeutics hold tremendous promise in inhibiting cancer cell proliferation. However, targeting proteins individually can be compensated for by

bypass mechanisms and activation of regulatory loops. Designing optimal therapeutic combinations must therefore take into consideration the complex dynamic networks in the cell. In brief, **goals** of this research are**:**

Phase-1: To develop intelligent model of cancer cell signalling system and tumour growth using neural networks, fuzzy logic and other techniques giving more emphasis on cell signalling and intracellular interactions.

Phase-2: To verify the developed model with clinical data and further investigation/modification will be made on modelling, if necessary.

Phase-3: To design optimal therapeutic combinations (chemotherapy/immunotherapy) scheduling model for cancer treatment using artificial intelligence-based techniques.

Post-Doctoral Position in Medical/Health Informatics (ID-TU1/2)

Gheorghe Asachi Technical University of Iasi, Romania

Open Position: Post-Doctor at the Intelligent Systems and Biomedical Engineering Group, Faculty of Electronics, Communications, and Information Technology, Gheorghe Asachi Technical University of Iasi, Romania. The position is supported by the **cLink** ERASMUS MUNDUS project.
We are seeking a highly motivated post-doctoral candidate in the field of medical/health Informatics, who has a broad understanding of the field and who is proficient in at least one of the following topics: image processing; pattern recognition; AI techniques in signal processing; knowledge based systems; data mining; speech processing; epidemics modeling.

RESPONSIBILITIES

The successful applicant will:

* perform research in the field of Medical/Health Informatics
* Design new algorithms, contribute developing new methods and techniques and implement interactive prototypes
* write and review scientific publications
* participate in scientific and consulting projects
* participate in scientific events
* work within a creative, highly motivated, and international team
* contribute to an international scientific conference organization
* contribute to writing grant applications
* supervision of PhD students
* occasionally give lectures to master degree students and advise them

DESIRED QUALIFICATIONS/SKILLS

* PhD degree in Computer Science, Medical Informatics, or an equivalent university study
* experience in programming (preferably Java, Javascript, C/C++, or similar)
* knowledge or interest in at least one of the following topics: image processing; pattern recognition; AI techniques in signal processing; knowledge based systems; data mining; speech processing; epidemics modeling.
* basic knowledge or interest in one or more of the following is a bonus: Visual Analytics, Information Visualization, Human-Computer Interaction, Social Networks
* abilities to work as an independent and flexible researcher in interdisciplinary teams
* fluency in the English language both orally and in written form.

The successful candidate needs strong programming skills, the ability to work independently, strong interpersonal skills. Candidates should be qualified for and willing to perform research in the above topics; they may be required to contribute to the teaching activities of the department.

DATES
* Application deadline: September 15, 2012
* Start date: October 1, 2012 (negotiable)
* Duration: 10 months

APPLICATION AND CONTACT
Please send your application with a statement of interest, full CV, list of subjects taken at university plus grades, publications, etc. by email with the subject "post_doc_cLink" to Prof. HN. Teodorescu: hteodor@etti.tuiasi.ro.
Applicants are not entitled to claim reimbursement of traveling expenses and/or other costs caused by the application procedures.

If you have any questions, please contact Prof. HN. Teodorescu: hteodor@etti.tuiasi.ro.

MORE INFO
Iasi is one of the 5 largest cities in Romania (about 350.000 inhabitants). It is an old city and capital full of cultural and entertainment attractions. It is located in the NE of Romania.
See www.tuiasi.ro, www.etti.tuiasi.ro

PostDoc Subject Proposal (ID – ULL1)

Country: France

University: Univetsity Lumiere Lyon 2 (ULL)

Laboratory/Department: DISP –Lyon 2 Laboratory

Lack of coordination has often been listed as a major weakness of humanitarian operations. This issue has received a lot of attention lately in the humanitarian field, such as the 2005 humanitarian reform and its major achievement, the cluster approach.

This way of operating has shown its limits. According to humanitarian workers, "the coordination System that has generally been put in place tends to take a 'silo' approach to response, with sectors/clusters looking at issues that then (should) feed into a broader coordination process. Over the years, as a result, gaps have been identified in the approach – gender, HIV/AIDS, the elderly, etc. – with guidelines and task forces created to try and fill those gaps. [. . .] While each of these gap areas rightly requires a response, the result is a more 'congested' coordination field with a myriad of guidelines and task forces at the global level and numerous meetings at the field level. This system makes it difficult to ensure that there is an adequate shared analysis of the overall needs and vulnerabilities to be addressed by humanitarian actors" [1]. Furthermore, as humanitarian supply chains have a short shelf life, a volatile environment and a wide diversity of stakeholders, coordination can take many forms.

In January 2009, Peru officially launched its National Platform for Disaster Risk Reduction. In February 2011, the Act about National Disaster Risk Management (SINAGERD) in Peru has been signed. It requires an adaptation of existing national and regional plans to adjust theirs activites and duties, in order to follow an agreement signed by 168 countries [2], which demand commitment into actions following three objectives:

The more effective integration of disaster risk considerations into sustainable development policies; planning and programming at all levels, with special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction.

The development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards.

The systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programs in the reconstruction of affected communities [3].

The main issue faced by the local authorities is linked with coordination. Many small or big communities participate in disaster preparedness and response. The Catholic Church, for instance, has stock prepositioned in various places all over the country. So has the Peruvian government. Yet no consolidation of the supply chain has been done because of misaligned incentives, lack of knowledge or poor decisions.

To support this attempt at reinforcing Peruvian capacity in terms of disaster management, we propose to use multi agent systems to illustrate the mechanism which actually hinders aid delivery. We will then demonstrate the impact of human behavior in this issue, and propose some trade-offs to improve the situation.

Data from the peruvian government and local peruvian communities have already been gathered.

[1]   The International Council of Voluntary Agencies (ICVA). The Essential Humanitarian Reforms. Tech. rep. 2008.

[2]   Cartilla Ley del Sistema Nacional de Gestión del Riesgo de Desastres, Sinagerd, N° 29664, Centro de   Estudios   y   Prevención   de   Desastres   (2011),   available   at http://www.predes.org.pe/publicaciones_cartillas.htm

[3]   Peru National Progress Reports on the implementation of the Hyogo Framework for Action 2009 - 2011, Instituto Nacional de Defensa Civil INDECI, review on 8th november 2011, available at http://www.preventionweb.net/english/hyogo/progress/reports/v.php?id=15952&pid:223.

[4]

PostDoc Subject Proposal

(ID- ULL2)

Country: France

University: Univetsity Lumiere Lyon 2 (ULL)

Laboratory/Department: DISP –Lyon 2 Laboratory

Domain (Computer Science, Management, Economics...):   Computer Science
Doctorate Title: Computer Science

Abstract *(context of reserach, objectives, methodology... - 1 page min, 2 pages max):*

A Multi-Agent System for dynamic e-Tourism Services Composition.

Sustainable E-Tourism project aims at helping tourism enterprises for improving the share of knowledge and ideas among their partners. It encourages collaboration between tourism partners and proposes a methodology and an Information and Communication Technology (ICT) infrastructure to enhance the Tourism service.

Internet and web technologies have changed significantly the relationship between communities, customers and retailers. Customers can access to virtually unlimited tourism products and services selection, precisely they have more control over any transaction, which resulted in great competition. More importantly, it is the speed of changes in tourism industry which is directly resulting from technology advances. Efficient knowledge sharing within and between tourism clusters is required in order to maintain the collaboration sustainability.

In this context, the aim of this PostDoc study is to propose a framework which combines multi-agent techniques with semantic web services to enable dynamic, context-aware service composition, thus providing users with relevant high level services depending on their current context and activity.

In a service-oriented approach, we can distinguish two abstraction levels in proposed services. On the one hand, basic services are elementary functionalities, usually provided by devices in the environment. On the other hand, composite services aggregate a set of functionalities into higher level applications, closer to the users' actual needs. Thus, service composition

enables to fill the abstraction gap between user activity and needs and elementary service level.

As an answer to service composition issues, our proposal in this Post Doc work is to investigate a Multi-Agent System (MAS) as a complement to a service-oriented approach towards adaptable and reconfigurable tourism environment, in which users interactions will become simple and intuitive. We aim to use semantic service descriptions to abstractly describe services' functionalities. We consider that descriptions can be provided by various sources (computers, GPS, mobile phone,...), since they do not need to comply with a commonly defined standard.

Using such descriptions, service agents will dynamically discover and enhance their capabilities with existing services. Depending on their interests or their current role in an activity, agents can either discover services to answer a current need or pro-actively provision services for expected use. A part from these service agents, various agents handle other information that will have an impact on the behavior of the system.

The architecture required to developp the Multi-Agent System and to support web services will be implemented using the JADE plateform (Java programing language) and the most important standards used in web services architectures as XML-RPC (XML Remote Procedure Call) and SOAP (Simple Object Access Protocol), both of these standards are XML-based.

Keywords *(3 to 5) :* Multi-Agent System, Knowledge Management, SOA, e-Tourism Services composition,

Publications related to the subject *(2 to 3 references):*

- Korhonen, J., Pajunen, J., & Puustjarvi, J. (2003). Automatic composition of Web Services workflows using a semantic agent. In Proceedings of the IEEE/WIC International Conference on Web Intelligence (WI'03), Beijing, China, pp. 566–569.

- M. Bichler, K.J. Lin, Service-oriented computing, IEEE Computer 39 (3), 2006, pp.99–101.

- Michael Wooldridge (2009) "An intrduction to Multi-Agent Systems" Wiley Ed. May 2009.

PostDoc Subject Proposal

(ID- ULL3)

Country: France

University: Univetsity Lumiere Lyon 2 (ULL)

Laboratory/Department: DISP –Lyon 2 Laboratory

Research subject proposed by: Yacine OUZROUT and Néjib MOALLA

Domain (Computer Science, Management, Economics...): Computer Science
Doctorate Title: Computer Science

Abstract *(context of reserach, objectives, methodology... - 1 page min, 2 pages max):*

Agile platform for Long Term knowledge Retention (LTKR)

The aim of this research is to support the integration of knowledge reuse in SME's through the development of long term knowledge retention culture. The proposal of agile and "Bespoke" knowledge system supports small companies in the structuring and archiving for their knowledge for future reuse. The aim goal of this challenge is to accelerate future engineering processes with the enterprise assets of knowledge.

The actual research works in the DISP lab cover several archiving dimensions with the proposal of a model based platform using the OAIS reference model. This platform aims to cover the different functionalities expected by a LTKR system.

The research work expected in this PostDoc aims to extend this background to develop new perspectives for our LTKR prototype through:

- The proposal of an analytic process helping SME's to identify the relevant knowledge to archiving
- The proposal of a cost analytic process to estimate the cost of the archiving process in the long time perspective
- The proposal of an adaptation model to compose the archiving platform according to SME profile
- The proposal of the archiving planning mechanisms in adequacy with the archiving model

In this research work, several technologies will be used: BPMN, SOA, BPEL, WSDL, etc. and the POC will be developed by Oracle Suite.

Keywords*: Knowledge Management, knowledge Retention, OAIS, Model based architecture, BPMN, SOA, BPEL, Ontology based business rules, etc.

Publications related to the subject *(2 to 3 references):*

[KOPeR] Nissan, 2000. An intelligent tool for process redesign: Manufacturing supply chain applications. International Journal of Flexible Manufacturing Systems, 12, 4, Special Issue, 321–339.

[OrgCon] Burton, R.M., and Obel, B. 2004. Strategic Organizational Diagnosis and Design: Developing Theory for Application, 3d ed. Boston, MA: Kluwer.

[ODM 2] Ontology Definition Metamodel, second Revised Submission to OMG/RDF ad/2006-04-13

[CommonKADS] Orsvarn K., Waern A. and Gala S., Olsson O., Hanssan H.A., Hook K., Gustavsson R., Holm P., Van de Velde W., Breuker J., Duursma C.: Specifications of CommonKADS – knowledge management and engineering methodology. Swedish Institute of Computer Science, (1993--1995)

[Racer] V. Haarslev, R. M¨oller, Racer system description. In Gor´e, R., Leitsch, A., Nipkow, T., eds.: International Joint Conference on Automated Reasoning, IJCAR' 2001, June 18-23, Siena, Italy, Springer-Verlag (2001) 701–705

[Pellet] B. Parsia, E. Sirin, Pellet: An owl dl reasoner. In: Proc. International Semantic Web Conference. (2005)

[FaCT] I. Horrocks, The FaCT System. International conference. on Analytic Tableaux and Related Methods (TABLEAUX'98), pp 307-312,vol 1397, Springer-Verlag, 1998

www.oracle.com/SOA

All references about LTKR: http://iutcerral.univ-lyon2.fr/LTKR/

Multi-Agent Based Simulation in Logistics UNI-BH (1)

The Bremen Research Cluster for Dynamics in Logistics (Log*Dynamics*) is an interdisciplinary competence network at the University of Bremen. Working groups of the Faculties of Business Studies/Economics, Mathematics/ Computer Science, Production Engineering and Physics/ Electrical Engineering are cooperating to conduct fundamental and applied research and educate young scientists. Examples of current research projects are "The Intelligent Container", "Autonomous Control in Logistics" and "Green Logistics".

Log*Dynamics* offers excellent researchers from all around the world – especially from the so called "emerging logistic markets" China, Southeast Asia, Latin America – the opportunity to complete an efficient, structured graduate training at a logistic location of long standing tradition: The International Graduate School (IGS) meets the challenge of globalisation through practice oriented research within a scope of interdisciplinary and cross-cultural cooperations.

For further details, please, visit our home page at

www.logdynamics.com

Research topics such as Energy Optimisation, Security, Technology enhanced solutions for business, Robotics/ control, Technology Enhanced Learning are parts of the research within Log*Dynamics*. In the context of Green Logistics and Technology enhanced solutions for business we are looking for a Post-Doc who is interested in the following research question.

Post-Doc Research (No.1)

The working group „Artificial Intelligence" is looking for a Post-Doc interested to extend the capabilities of PlaSMA (http://plasma.informatik.uni-bremen.de/) towards more universal applications with a focus on requirements as given especially in INDIA.

For Indian heterogeneous traffic conditions it would be worthwhile to make PlaSMA capable of handling a varied set of agents types like 3-wheelers, carts etc. which are governed by their own rules bases and decisions support.

- Addition of typical traffic agents (Indian and in particular Bangalore) and their behavior.

- Create impact parameters such as time delays for such agents as well as existing ones.

The expansion in ontologies rules and definitions – such as tlo.owl (Top-Level Ontology) and trans.owl (Transport Ontology) – are important ones for PlaSMA modeling. GraphGermany.owl is an example (governed by German conditions) for a hand-modeled traffic infrastructure, based on concepts from trans.owl. A similar one for Indian city specific conditions should be emulated.

In prod.owl, we look for concepts and relations from the field of production logistics. This can be researched upon extensively since in India such practices are in a nascent stage.

Inculcating complete Bangalore public transport data sets in PlaSMA some of which has already been fed in PlaSMA database by our research team at University of Bremen.

Through interaction with the developers of PlaSMA at the development site the candidate would enhance the personal understanding of real time implementation and functioning of PlaSMA which in future could be deployed remotely from the sending Indian center in conjunction with University of Bremen and could lay the basis for a long-lasting cooperation.

Computer Vision in Robotics and Automation UNI-BH (2)

The Bremen Research Cluster for Dynamics in Logistics (LogDynamics) is an interdisciplinary competence network at the University of Bremen. Working groups of the Faculties of Business Studies/Economics, Mathematics/ Computer Science, Production Engineering and Physics/ Electrical Engineering are cooperating to conduct fundamental and applied research and educate young scientists. Examples of current research projects are "The Intelligent Container", "Autonomous Control in Logistics" and "Green Logistics".

LogDynamics offers excellent researchers from all around the world – especially from the so called "emerging logistic markets" China, Southeast Asia, Latin America – the opportunity to complete an efficient, structured graduate training at a logistic location of long standing tradition: The International Graduate School (IGS) meets the challenge of globalisation through practice oriented research within a scope of interdisciplinary and cross-cultural cooperations.

For further details, please, visit our home page at

www.logdynamics.com

Research topics such as Energy Optimisation, Security, Technology enhanced solutions for business, Robotics/ control, Technology Enhanced Learning are parts of the research within LogDynamics. In the context of

Autonomous Control and Robotics/control we are looking for a Post-Doc who is interested in the following research field.

Post-Doc Research (No.2)

The growing demand for flexible and modular production and logistics systems increasingly requires methods and technologies to ensure reliable interaction with the environment. Such technologies can be served by fast and accurate vision sensor data analysis. Especially in robotic scenarios computer vision technologies are important. The application of this technology will increase the safety on the one hand side and efficiency on the other hand.

The Bremer Institut für Produktion und Logistik GmbH (BIBA) is a research institute at the University of Bremen. Our section in the department "Intelligent Production and Logistics Systems" (www.biba.uni-bremen.de/ips.html) develops and investigates technologies and future robotics and automation systems for fast, safe and reliable industrial solutions. We are looking for a Post-Doc who is an expert in the intersection of the following topics:

- Signal/image processing and computer vision algorithms (e.g. robot vision)
- Robotics and automation technologies
- Knowledge of parallel hardware (e.g. GPU), or programmable logic (FPGA) would be beneficial but not mandatory
- Experiences with C++ and MATLAB

We are a motivated and young team of researchers in the field of production engineering and computer science on the Doctoral level. Additionally, we offer our guest researchers international project and team partners as well as a very good technical infrastructure for collabo- rative research activities within the BIBA and in the LogDynamics Lab. This research stay at the University of Bremen could lay the basis for a long-lasting cooperation.

Universität Bremen

Corvinus University of Budapest: Proposals for Post-docs/1(ID - CUB1)

Keywords: Technology enhanced solution for business, Technology Enhanced Learning.

Corvinus University of Budapest is looking for a Research Associate (Postdoc) under the framework of cLINK Project (EU EACEA 42/11). CUB seeks outstanding researchers for the topics of research that will be focused on **Semantic Business Process Management** and includes:

- business process modeling and process management
- service oriented architecture
- ontology based systems
- e-learning, mobile learning
- process mining, text mining
- complex event processing

All of these will include an interdisciplinary and application-oriented approach as well as touching issues of several fields in each individual research theme. Research is conducted in close collaboration with public authorities and industrial partners, and the results will be utilized by EU financed R&D projects.

The goal of the research project is to develop a solution to extract, organize and preserve knowledge embedded in organisational processes in order to (1) enrich organisational knowledge base in a systematic and controlled way (2) support employees to easily acquire their job role specific knowledge, (3) help to govern and plan the human capital investment. In order to achieve this goal a complex IT solution and method will be developed which integrates a) organisational process management tool, b) learning management tool, c) real-time data monitoring and processing tool and d) data and text mining tools for developing knowledge base (domain ontology) and the interfaces which are responsible for the communication between these components. The novelty is based on the connection between process model and corporate knowledge base, where the process structure will be used for building up the knowledge structure. The main innovation lies in new algorithms for the extraction and integration of the static and dynamic process knowledge and a novel integration architecture that enables smoothly integration of the eLearning methods in the process execution models.

Related projects and initiatives: http://www.corvinno.com/web.nsf/do?open&lang=en&page=proj-ebest

Applicants should have an excellent background, a PhD and ideally specialised knowledge in the above-mentioned fields and an interest to extend their research. The candidate should have a strong research and publication record relevant to the field.

Language Skills: Fluent written and verbal communication skills in English are required.
Employee status: scholarship, 2-year fixed term contract, full time (40 hrs/week).
Specific questions concerning the Research Program can be directly addressed to Dr. András Gábor (gabor@informatika.uni-corvinus.hu).

Corvinus University of Budapest: Proposals for Post-docs/2(ID – CUB2)

Keywords: Health Informatics, Technology Enhanced Learning.

Corvinus University of Budapest is looking for a Research Associate (Postdoc) under the framework of cLINK Project (EU EACEA 42/11). CUB seeks outstanding researchers for the topics of research that will be focused on Technology Enhanced Learning and eHealth including:

- knowledge management
- ontology based systems
- e-learning, mobile learning
- human resource management

All of these will include an interdisciplinary and application-oriented approach as well as touching issues of several fields in each individual research theme. Research is conducted in close collaboration with public authorities and industrial partners, and will be implemented under the framework of European Commission's Lifelong Learning Programme.)

The project **Adaptive Medical Profession Assessor** (Acronym: **Med-Assess**) is an innovation transfer project for the measuring of knowledge and qualifications of employees in the medical field regarding certain work related topics. Based on the measuring results, recommendations regarding training courses, qualification measures or additional learning material will be provided. This way the solution supports training on the job. The research project is based on the **OntoHR** project attempted to trial its system in a corporate environment for selecting and recruiting employees for an organisation. Results indicate that the ontology based job knowledge models in the system provide HRM managers to constitute highly personalised jobs and job descriptions. These jobs are described with a certain set of technical competences, which are constituted by knowledge elements and general mental ability facets. The combination of these two adds up automatically to an employee training profile with the relevant learning materials. Med-Assess will allow to realize this dynamic learning system in the medical sector. In particular, the proposal aims to transfer results, tools and competences developed in the OntoHR project to model care taking jobs. This system will support medical organisations to update and qualify own employees, but also VET students or applicants entering the German labour market. All OntoHR project results and products - including the full OntoHR assessment - are available to everyone on the official OntoHR website: www.ontohr.eu

Applicants should have an excellent background, a PhD and ideally specialised knowledge in the above-mentioned fields and an interest to extend their research. The candidate should have a strong research and publication record relevant to the field.

Language Skills: Fluent written and verbal communication skills in English are required.

Employee status: scholarship, 2-year fixed term contract, full time (40 hrs/week).

Specific questions concerning the Research Program can be directly addressed to Dr. András Gábor (gabor@informatika.uni-corvinus.hu).

CUB Details of admission process and related other information: http://fba.uni-corvinus.hu/

UG area (site address and subject area)	Business and management studies: General information: http://fba.uni-corvinus.hu/ and http://isc.uni-corvinus.hu/ Course lists for spring and fall semesters: http://isc.uni-corvinus.hu/index.php?id=16722 General information for exchange students: http://www.uni-corvinus.hu/index.php?id=44542
PG area (site address and subject area)	Business and management studies: General information: http://fba.uni-corvinus.hu/ and http://isc.uni-corvinus.hu/ Course lists for spring and fall semesters: http://isc.uni-corvinus.hu/index.php?id=16722 General information for exchange students: http://www.uni-corvinus.hu/index.php?id=44542
PhD area (preference will be based on above keywords; ensure you have supervisors)	Technology enhanced solution for business: • Semantic Business Process Management • Business Intelligence • Text Mining, Oppinion Mining, • Egoverment, policy modeling • IT audit (COBIT) and IT controlling (ITIL) Technology Enhanced Learning: • Knowledge management • ontology-based applications Recent research activities: http://informatika.uni-corvinus.hu/root/web/web.nsf/do?open&lang=en&page=projektek and http://www.corvinno.com/web.nsf/do?open&lang=en&page=innovacio Publications: http://informatika.uni-corvinus.hu/root/web/web.nsf/do?open&lang=en&page=publikaciok
Post-docs (two proposals) from each partner EU countries)	Semantic Business Process Management Technology Enhanced Learning (see the attached pages)
Research and teaching facility linked with academic staff mobility (few sentences)	Academic staff (research and teachers) specialized on Computer Science, Management Information Systems, business IT applications, e-business are welcome. Department of Information systems (http://informatika.uni-corvinus.hu/root/web/web.nsf/do?open&lang=en) will provide

	accommodation, office and computing facilities to the visiting academic staff. Visitors can participate in the research (http://informatika.uni-corvinus.hu/root/web/web.nsf/do?open&lang=en&page=projektek) and teaching activities of the Institute of Informatics (there are IT and MIS oriented courses in English for BA/BSc, MA/MSc and Ph.D students).
Site address for university/local accommodation	Local coordinator will help students and visitors in finding appropriate accomodation. There are also services available centrally: http://fba.uni-corvinus.hu/index.php?id=29358
Student insurance (private or through university)	Student insurance can be managed individually, but the University can facilitate the process (in Budapest, through the ISP office): http://isc.uni-corvinus.hu/index.php?id=16735
Medical facility (university/private)	There are no university-based medical facility. All international students are recommended to insure themselves in their home country. Valid health insurance for the duration of your stay in Hungary is obligatory. Further information is available at: http://www.uni-corvinus.hu/index.php?id=45244 and: http://isc.uni-corvinus.hu/index.php?id=16735

<u>**Post-doc Details**</u>

This project is built on our recent £160k EPSRC-funded Human Adaptive Mechatronics project (www.EPSRCHAM.org) which includes seven national and seven international collaborators. This project has attracted a national and international reputation in this research area. The project team has: organised one workshop and three invited sessions on HAM in international conferences - such as IEEE, UKACC; organised two special issues on HAM in two international journals; published over 50 conference and journals papers. The team headed by Prof Yu with JCB - a UK based excavator developer presented a physical demonstration in an exhibition hosted by Sellafield - a UK based nuclear decommissioning company, where ten universities and fourteen companies in robotics made the presentations. The demonstration system made by the team involved a dummy excavator, an observer robot being controlled over a Mobile Ad-hoc Network (MANET). The team has strong international collaborations, such as Japan, China, Romania and Italy, in this research area.

From the technical perspective, the project may cover one of the following 3 areas:

1) To investigate the current challenging issues of unmanned mobile robots which move in the uncertainty environment for example, algriculture robots, robots wlaking in the rough and rugged terrain, etc. The unmanned mobile robot should be remotely controllable by the human operators in the remote location.
2) To develop in vivo robots for minimally invasive abdominal surgery to address the issues of laparoscopic surgery and robot-assisted laparoscopic surgery.
3) To investigate wireless networked control systems across mobile ad-hoc networks as and their quality of service. The ability to control a remote device in an environment that is dangerous to humans, this will be done via transmitted video images back to the users for them to control the device from a safe location.

The postdoctoral on this project is required to contribute the followings:

• To carry out a high level of research in areas of mobile robots, capsule robots, human and robots interaction, miniature Robots for minimal invasive surgery, and human adaptive mechatronics
• To develop collaboration and partnership with key stakeholders and researchers nationally and internationally
• To work with the team and disseminate research through peer reviewed journals, presentation at conferences, seminars, workshops, reports and toolkits
• To manage research projects ie design appropriate trials and other methods, ensuring compliance with regulatory requirements (research governance and ethical issues), co-ordinate data collection and analysis
• To help supervise the PhD, MRes and BSc projects

Keywords: *Mobile robots, HAM, modelling and control of miniature robots, intelligent control*

Publications related to the subject

1. Fangnian Lang, Jiliu Zhou, Shuang Cang, Hongnian Yu, and Zhaowei Shang, A Self-Adaptive Image Normalization and Quaternion PCA Based Color Image Watermarking Algorithm, International Journal of Expert Systems with Applications, 39(15), pp.12046-12060, 2012.
2. Yang Liu, Hongnian Yu, and Shuang Cang, Modelling and Motion Control of a Double-Pendulum Driven Cart, IMechE-Part I– Journal of Systems and Control Engineering, Vol. 226, pp. 175-187, 2012.
3. Hongnian Yu, David Owens, Robert Parkin, Special Issue on Human Adaptive Mechatronics, IMechE-Part I: Journal of Systems and Control Engineering, 225: 705-708, September 2011.
4. Yang Liu, Hongnian Yu, Luigie Vladareanu, Shuang Cang and Feng Gao, Trajectory planning of a Pendulum-Driven Underactuated Cart, Romanian Journal of Technical Sciences, Applied Mechanics, 56(3), 2011
5. M. Nazmul Huda, Hongnian Yu and Samuel Oliver Wane, Self-contained Capsubot Propulsion Mechanism, International Journal of Automation and Computing, 8(3), pp. 348-356, August 2011.
6. Hongnian Yu M. and Nazmul Huda, A novel acceleration profile for the motion control of capsubot, IEEE Robotics and Automation Conference, pp. 2437-2442-475, May 9-13, 2011, Shanghai, China 2011
7. Huosheng Hu, Hongnian Yu and Yi Zhang, Special Issue on Biologically Inspired Systems and Intelligent Robots, International Journal of Modelling, Identification and Control, Vol. 10, Nos. 3/4, pp. 181-183, 2010
8. Hongnian Yu, Yang Liu and Mohammad Shahidul Hasan, Review of modelling and remote control for excavators , Int. J. Advanced Mechatronics Systems, Vol 2, Nos 1/2, 2010
9. M S Hasan, H Yu, A Griffiths and T C Yang, Co-simulation of Wireless Networked Control Systems over Mobile Ad-hoc Network using SIMULINK and OPNET, IET Journal of Communications, Volume 3, Issue 8, p. 1297-1310, August 2009.
10. Special Issue on Human Adaptive Mechatronics", Hongnian Yu, Hiroshi Inaba, David H. Owens and Katsuhisa Furuta, International Journal of Modelling, Identification and Control, Vol. 4, No. 4, 2008.

Post-doc position in the Staffordshire University (ID – SU2)
Post-doc Title: Intelligent Real-time Decision Systems with applications in Healthcare, Environment, Manufacturing, Supply Chains, and Logistics

Post-doc Details:
This project is built on our EPSRC-funded CTA project and EASTWEST Asia-Link project in Information Engineering System Technology. (http://eastwest.inf.brad.ac.uk/), and the currently running EU funded 5.5 m Euro eLINK project. Currently five PhD students and a MRES researcher and a number of Erasmus students are working in this area by collaborating with three local companies and, Liverpool University, Shanghai Jiaoton University, and Chiangmai University (Thailand). This project has strong industry collaboration (through the CTA project) and international collaboration (through the EPSRC network project).

The project covers three main areas:

1) Real-time data capture such as RFID, Internet of Things – this includes selections of the right devices and integration of them for the specific applications. This part work will investigate an innovative use of an existing data capture technology to meet the needs from manufacture supply chain management, healthcare. And the second aim is to identify the barriers that would need to be overcome before implementation.
2) Intelligent decision making systems – this includes optimization, AI, simulation, intelligent database etc.
3) Integrating 1) and 2) to develop a holistic real-time system

The postdoctoral on this project is required to contribute the followings:

- To carry out a high level of research in areas related to data capture, supply chains and logistics using RFID and Internet of things
- To develop collaboration and partnership with key stakeholders and researchers nationally and internationally
- To work with the team and disseminate research through peer reviewed journals, presentation at conferences, seminars, workshops, reports and toolkits
- To manage research projects ie design appropriate trials and other methods, ensuring compliance with regulatory requirements (research governance and ethical issues), co-ordinate data collection and analysis
- To help supervise the PhD, MRes and BSc projects

Keywords *(3 to 5) real-time data capture, healthcare, supply chains, logistics, simulation, optimisation, internet of Things, RFID*

Publications related to the subject

1) Md. Monzur Morshed, Anthony Atkins, and Hongnian Yu, Efficient Mutual Authentication Protocol for RFID Systems, accepted by IET Journal for Communications, 2012.

2) Saisakul Chernbumroong, Anthony S. Atkins, and Hongnian Yu, Wrist-worn Accelerometer Based Activity Classification Using Decision Tree and Neural Network for Smart Health Application, The Mediterranean Journal of Computers and Networks, 2012

3) Md M Morshed, Anthony Atkins and Hongnian Yu, Secure Ubiquitous Authentication Protocols for RFID Systems, EURASIP Journal on Wireless Communications and Networking, 2012

4) Tashi, Mohammad S. Hasan, and Hongnian Yu, Design and Simulation of UHF RFID Tag Antennas and Performance Evaluation in Presence of a Metallic Surface, SKIMA Benevento, Italy, 8-11 September 2011

5) Saisakul Chernbumroong, Anthony Atkins, Hongnian Yu, Document Management System Using Wireless RFID technology for Intelligent Healthcare Operations, *Proceeding of the IADIS International Conference e-Health 2010*, Freiburg, Germany 2010.

6) "Integrated Wireless Information Technologies for Improving Agriculture Transport Logistics in Thailand", Noppon Choosri, Hongnian Yu and A. S. Atkins, International Journal of Computing Science and Communication Technologies, 2009

7) "A Simulation-based Dispatching Optimization Algorithm in Batch Scheduling", Xin Zheng, Hongnian Yu, and Anthony Atkins, Proceedings of the SKIMA Conference, Fes, Morocco, 21-23 October, 2009.

8) RFID Technology in Supply Chain Logistics Applications, N Choosri, H Yu and A Atkins, the SKIMA Conference, Kathmandu, Nepal, 18-21 March, 2008.