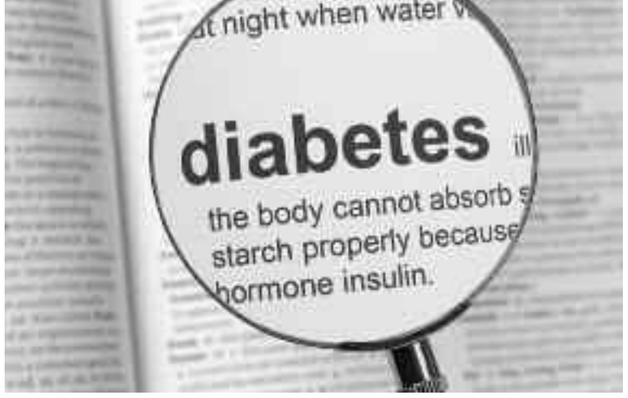
Postgraduate research news

Blood glucose level prediction for diabetic patients using intelligent techniques



Diabetes mellitus is one of the most common chronic diseases. The number of cases of diabetes in the world is likely to increase more than two fold in the next 30 years; from 115 million in 2000 to 284 million in 2030.

Khaled Eskaf, PhD student in the School of Computing Science & Engineering is focussing his research around helping diabetic patients to manage themselves by trying to predict their blood glucose level (BGL) after 30 minutes on the basis of the current levels in order that they can administer insulin.

Khaled who is supervised by Professor Tim Ritchings and Professor Osama Badawy has taken a slightly different approach to his research.

Standard approaches to management of diabetic conditions involve questioning the patients and adding many constrains to the diabetic patient's day to day life activities; this study is based only on their recent blood glucose level. Khaled said: "This project will enable the diabetic patient to continue to live and be involved in normal everyday life activities as much as possible whilst reducing the risks of severe complications such as a heart attack or stroke, frequent infections, eye problems, kidney disease and nerve damage which can lead to the amputation of a foot or leg. In order to achieve this objective, three techniques were developed and evaluated: a Numerical Analysis Algorithm (NAA), an Artificial Neural Network (ANN), and a Genetic Algorithm (GA). These three techniques are widely used in computer science fields. Data was derived for a virtual diabetic patient from a web-based educational simulation package for glucose–insulin levels in human body using the AIDA software. The Dexcom SEVEN System was used to capture the BGLs of two diabetic patients and a non diabetic person for 24 hours for three weeks with a sampling frequency of 5 minutes. These two databases were used in all prediction algorithms. Three weeks of diabetic patient's blood glucose levels (BGL) were recorded and used in a training phase in the first week, a predictive phase of blood glucose value in the second week and the third week for analysis phase. Finally, all practical results of our project show that the error of our system is less than in other research studies".

Khaled's recent success with his research is a step further in making a diabetic patient's condition easier to manage and enhancing the diabetic's life.

If you would like to know more about Khaled's research contact him at:
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Reconstructing the Community – the people that matter

User and participant involvement is key to good planning and decision making in any area of life, and never more so in areas affected by disaster. After the occurrence of a natural disaster, communities are often put in a weak position with little or no consultation of their basic needs and, with life as they know it drastically changed.

Empowering and involving an affected community actively in the reconstruction of their environment can be a key factor in bringing life back to normal, this empowerment itself though can cause risks in the reconstruction process. The vital questions are; to what extent should a community participate in decision making? And, how to manage the risks that may arise? Taufika ophiyandri, a PhD student from the School of Built Environment, under the supervision of Professor Dilanthi Amaratunga and Dr Chaminda Pathirage from the Centre for Disaster Resilience, is researching into just such questions.

Taufika said: "In recent years we have seen millions of houses which have been destroyed or damaged by natural disasters, leading to the construction of large numbers of housing units for disaster affected communities with different models of reconstruction strategies implemented. However, although this activity is vital to reconstruct communities, problems on providing houses for beneficiaries have always arisen; cost overrun, delay, low quality, low accountably and beneficiary dissatisfaction have become common problems. One procurement method that can be adopted to reduce the adverse effect of such issues is to implement a community based programme.

This risk reducing method works by involving the community, inviting them to actively participate in and share control of the reconstruction project. In practice the community acts as the owner, as the supervisor or even as the contractor of their own housing reconstruction project. However, this method has its own problems and high risks. My current research aims to develop a risk management model for community based post disaster housing reconstruction project measuring the probability and impacts of identified risks e.g. the lack of understanding with regard to the concept of community based method by partners involved especially local government and poor coordination between stakeholders".

Taufika will be reporting further on his findings in future issues, in the meantime if you would like to find out more about his project contact him at: **t.ophiyandri@pgr.salford.ac.uk**

Weave Microstructure and woven composites

Rayudu Pasupuleti, a recent post graduate from the Aerospace Engineering Department, in the School of Computing Science and Engineering here at the University has been examining moisture diffusion in multilayer woven composites, supervised by Dr Yu Wang.

Through his research Rayudu aimed to find a simulation model which could predict the moisture concentration in the composite materials. Composites are light in weight, highly durable and stiff, which when used will reduce the weight of the structure and increase the efficiency which in turn reduces the carbon foot print. Rayudu said: "moisture concentration is one of the reasons for the composite structure to fail. The moisture can cause plasticisation of the polymer matrix, alter the stress state and degrade the fibre/matrix interface, understanding of moisture absorption and desorption behaviour is critical for predicting long-term material and structural performance. My research focused on the effect of weave microstructure on the moisture diffusion behaviour of polymer matrix woven composites".

His research has proved successful and Rayudu has achieved the prediction model and practical testing. Based on this model the concentration of the moisture in a composite can be predicted exactly to the second thus predicting when exactly the structure is starting to fail.

So not only a success for Rayudu and his research but also a benefit for major industries. Industries which usually face these sorts of problems are aerospace/aviation, marine, FMCG (Fast Moving Consumer Goods) and various other industries that use these composite structures. By using this prediction they can estimate the life time of the composite structure and take precautionary measures before failing. Rauydu is also, in an extension to this model, working towards finding the right weaving technique which when used during the manufacture of composite structures increases the strength and the stiffness of materials. Rayudu continued: "Implementing this prediction model can save the time and financial investment in setting up a manual test set up and various other trial and errors methods to overcome the problems caused by the moisture attack on the composite structures".

If you would like to know more about Rayudu's research contact him at:
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Hop in the water's lovely!

Picture the scene: still water reflecting the sky, dragonflies darting back and forth, ducks dabbling in the shallows, calm; a classic image of the English rural idyll. This pond, however, is in the centre of a housing estate, surrounded by urban development.

The vast majority of the UK population now live in towns and cities, far removed from the rural idyll. Urban green spaces provide many city dwellers with their only daily contact with nature. Hidden away within those green spaces are more ponds than most people imagine. Ponds have been shown to hold a diverse array of animals and plants, more than larger water bodies such as rivers or lakes. However, 70% of ponds in the UK have been lost over the last 200 years. Researchers have tended to view urban ponds as degraded and of little interest. David Gledhill, a Postgraduate Researcher in the Research Centre for Urban Change, School of Environment and Life Science, has undertaken a study which has challenged this view. David's research is one component of a programme questioning and re-evaluating the services delivered by ecosystems in urban areas. Part of David's work, conducted in partnership with Halton Borough Council, was to record the aquatic species present in ponds in Runcorn and Widnes. This research revealed that ponds in Halton have a richness of species comparable to those reported nationally. David said: "The study also showed the importance of creating and conserving networks of ponds. These networks allow aquatic species to colonise even densely developed areas. There is though a cautionary note, although additional development has little impact on ponds in already urbanised areas, just a little development in rural areas can be disastrous. Perhaps its time to think again about neglected urban ponds. Next time; stop for a moment by that pond you, normally, walk past; you know, the one with the shopping trolley. Watch the water; you may see more life than you expected!"

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