Student achievements reflect quality academic leadership

The achievements of students in the various departments of the Faculty of Engineering, Built Environment and Information Technology reflect positively on the quality of the academic leadership that is provided at the University of Pretoria. A master's student in Industrial and Systems Engineering received the bronze medal of the Southern Africa Association for the Advancement of Science (S_2A_3) for the best dissertation, while students in Electrical, Electronic and Computer Engineering came second in the student research paper competition of the Institute for Electrical and Electronics Engineers (IEEE) for the Europe, Middle East and Africa (EMEA) region. In addition, his supervisor, Prof Sunil Maharaj, received the Technology and Human Resources for Industry Programme (THRIP) award for technology.

→ *Ms Jacomine Grobler, recipient of the S_2A_3 bronze medal for the best dissertation at master's level in 2009.*

Ms Jacomine Grobler, a master's student who graduated from the Department of Industrial and Systems Engineering, has been awarded the prestigious S_2A_3 bronze medal for the best dissertation at master's level in 2009.

This medal is awarded annually to master's students at various universities in the country and is aimed at commending and encouraging local science and engineering students doing original research.

Jacomine completed her master's dissertation, entitled *Particle swarm optimisation and differential evolution for multi-objective multiple machine scheduling*, under the supervision of Prof Sarma Yadavalli, head of the Department of Industrial and Systems Engineering in the School of Engineering, and Prof Andries Engelbrecht, head of the Department of Computer Science in the School of Information Technology at the University of Pretoria.

Her dissertation focused on the development of a production scheduling algorithm to be used for the scheduling and allocation of tasks to resources in complex manufacturing environments. She worked closely with the Computational Intelligence Research Group and was invited to visit the Automated, Scheduling, Optimisation and Planning Research Group at the University of Nottingham in the United Kingdom, where she had the opportunity to present her work and exchange ideas with pioneers in the field.

She subsequently developed scheduling algorithms that resulted in improvements of up to 24% in terms of solution quality when compared to currently used algorithms.

Jacomine also presented papers at conferences in Hawaii, Singapore, Hong Kong and Norway. She currently works as an industrial engineer at Denel Dynamics and is studying towards her PhD.

Undergraduate students in the Department of Electrical, Electronic and Computer Engineering were also rewarded for their excellent research outputs. Danie Louw received the second prize for the Best Student Research Paper in IEEE Region 8

→ *Contributors to the paper that received second prize in the IEEE MELECON Research Paper Competition held in Malta were (from left): Philip Botha, Prof Sunil Maharaj and Danie Louw.*

(Europe, Middle East and Africa) for a research paper entitled *A low complexity soft-input soft-output MIMO detector which combines a sphere decoder with a Hopfield network*, on which he served as the lead author. His co-authors were Philip Botha and Prof Sunil Maharaj, also from the Department of Electrical, Electronic and Computer Engineering.

Following submissions from 26 student branches of the IEEE in 19 sections, six finalists were selected to present their papers at the 15th IEEE Mediterranean Electrotechnical Conference (MELECON) in Valletta, Malta on 26 April 2010. The University of Pretoria was the only finalist from Africa.

Their paper presented a reduced complexity soft-input soft-output multiple-input-multiple-output (MIMO) detector, which is intended to be used in conjunction with an error correction code. The detector combines a sphere decoder with a Hopfield network to calculate a max-log-map approximation. It is then combined with the error correction code in an iterative structure (turbo). The code used is a quasi-cyclic non-binary LDPC code. The simulation results demonstrate that with less computational complexity, the proposed system's performance equals that of an optimal sphere decoder-based detector.

DTI Award for Sentech Chair in Broadband Wireless Multimedia Communications

Prof Sunil Maharaj, who holds the Sentech Chair in Broadband Wireless Multimedia Communications (BWMC) in the Department of Electrical, Electronic and Computer Engineering, was the winner of the THRIP award for technology in the category Advanced Hi-Tech.

The THRIP project is funded by the Department of Trade and Industry (dti) and managed by the National Research Foundation (NRF) in the Department of Science of Technology (DST). It provides funding to support research initiatives that have industry participation and funding. In 2010, after a rigorous review of all funded research projects across the country, Prof Maharaj's work was placed in the top three in the category Advanced Hi-Tech.

He works in the field of broadband wireless communications. His research group comprises 23 students, who range from final-year Engineering Design Project students to PhD-level candidates.

Their research work has been largely in the area of MIMO systems and orthogonal frequency division multiplexing (OFDM) technology in wireless communication systems.

Their work has resulted in a provisional patent and the results of their research could have a major impact on next generation broadband wireless communication systems efficiencies.