

## STUDENTS' WORK (TRANS)RECEIVED WELL IN SPAIN



→ The international jury (seated from left): Zeljko Jakopovic, Kurt Richter, Martin Bastiaans (co-ordinator), Kamel Hassan, and Ryszard Romaniuk

As part of their final-year electrical engineering projects, Neil Naudé and Mladen Božanic decided to go further than just submitting their material on transceiver systems to their professors at the University of Pretoria. The pair also submitted an article for the Institute of Electrical and Electronics Engineers (IEEE) Region 8 Student Paper Contest. This region consists of Europe, Africa and the Middle East.

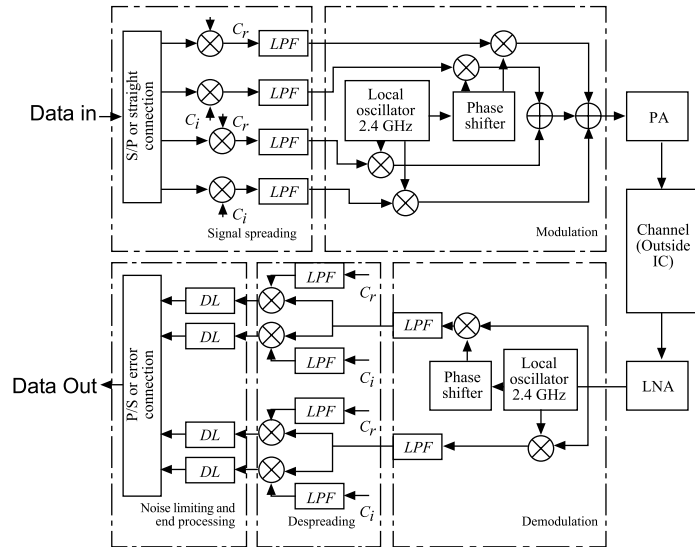
The paper dealt with transceiver systems. An analogue DSSS transceiver is presented to demonstrate an ideal receiver and a decision-directed Costas carrier recovery loop (DDC-CRL) is presented that performs carrier and phase estimation in the receiver. These systems operate anywhere over a 20 MHz bandwidth within the 2.4 GHz to 2.4835 GHz ISM (industrial, scientific and medical) band and are implemented for the 0.35 µm CMOS process from Austria Microsystems (AMS).

Based on the technical and linguistic merit of papers, the best six papers of all Region 8 submissions are selected for an oral presentation. The oral submissions for 2006 were held in Benalmádena (Málaga), Spain from 16 to 19 May 2006 as part of the 13th IEEE Mediterranean Electrotechnical Conference, MELECON 2006.

The work presented by Naudé and Božanic was submitted jointly with study leader Saurabh Sinha, and co-study leader, Prof. Louis Linde. The two study leaders have different backgrounds in electrical engineering. Sinha is a member of the Microelectronic Research Group, while Linde is from the Signal Processing Research Group. The collaboration between the groups is aimed at miniaturising signal-processing concepts at a microelectronic level or integrated circuit level design to



→ Neil Naudé, virtually working while attending MELECON 2006.



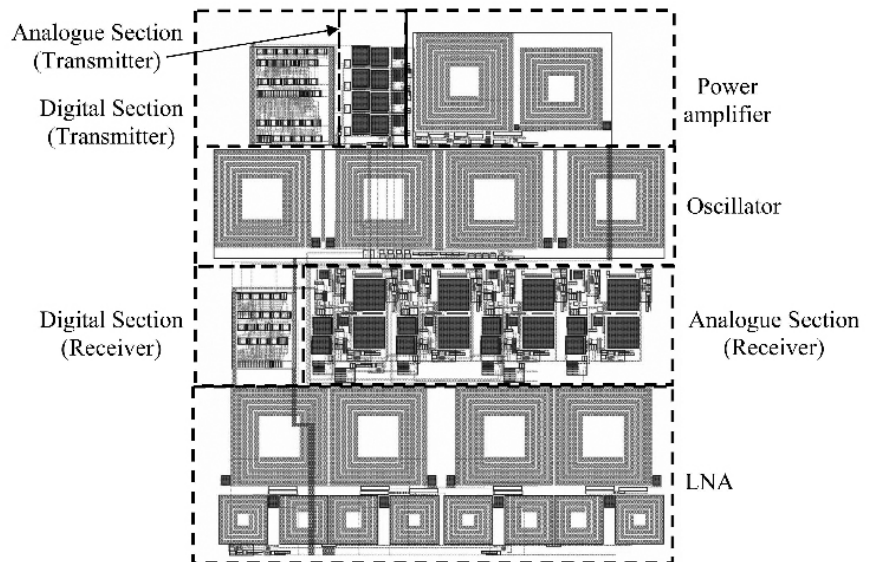
→ 1 Block diagram of the full transceiver system (including the channel) showing the transmission and recovery processes

produce the results delivered by Naudé and Božanic and others.

The two students' work is a step towards the realisation and CMOS-level implementation of the following patents:

- LP Linde and MP Lötter, "Spread-Spectrum Modulator and Method", South African Patent no 96/0355, 17 January 1996.
- LP Linde and FE Marx, "Multidimensional Spread-Spectrum Modem", South African Patent no 2000/2645, 26 May 2000.
- LP Linde and FE Marx, "Multidimensional Spread-Spectrum Modem", USA complete patent no 6,744,807, 1 June 2004. 📍

Neil Naudé and Mladen Božanic are both practising engineers. Božanic works for Yusis Technologies in Johannesburg, while Naudé is employed by the University of Pretoria. Both students are continuing with postgraduate studies in Micro-Electronic Engineering. Božanic received the South African Micro-Electronic Systems (SAMES) Award in 2005.



→ 2 The layout of the complete system excluding pads