

Postdoctoral programme

THIS LEARNING PROGRAMME is designed to give research exposure in specialist fields, working with recognised researchers or laboratories towards a PhD in order to broaden the knowledge base in this area.

The programme contributes to deepening the CSIR's science, engineering and technology base by introducing additional intellectual capital to the organisation. It is also intended to create an additional pool of mentors.

A woman with dark hair tied back, wearing a white lab coat, is focused on adjusting a piece of glassware on a metal laboratory stand. The stand holds several vertical glass tubes, some containing colored liquids. In the background, there are other laboratory equipment, including beakers and a scale, and a window with a view of the outdoors.

Maya Jacob John

Dr Maya Jacob John is a postdoctorate researcher at the forefront of the CSIR's involvement in the crucial field of natural fibre-reinforced composite materials

Paul Herselman

Passion for radar research takes Paul places

Dr Paul Herselman (29) is a proud and passionate farm boy at heart, born on a farm in Langkloof, outside Port Elizabeth. "In standard nine (nowadays grade 11), I had to choose between working on the farm, studying agriculture or taking up electronic engineering," says Paul. He chose a career in science and engineering, which today is very close to his heart.

Dr Paul Herselman's passion for electronics and engineering has brought him to the real world where he uses high tech facilities such as Fynmeet (in the background) to analyse and understand his subject

HIS ENGINEERING ABILITIES were evident early on. He started building electronic gadgets at an early age. "I built my own gadgets such as disco lights," recalls Paul, who is now one of the prolific young researchers in radar and electronic warfare at CSIR Defence, Peace, Safety and Security. "I also built a little electronic educational game in 1994, the same year a CSIR representative visited Port Elizabeth to present the kind of work undertaken at the CSIR," he says. "I knew then that this was the kind of place where I wanted to work."

The young researcher says that after the CSIR presentation, he applied for a bursary and the CSIR paid for his studies at Stellenbosch University. "It's a family thing, both my mother and father graduated there," he quips.

In between his studies, Paul did vacation work at the CSIR and his panache for electronics emerged, setting up his career as a scientist. "When I was doing my vac work here, I built a frequency synthesizer control system for the Fynmeet radar."

Fynmeet is a wideband, dynamic radar reflectivity measurement facility, developed at the CSIR for the South African Air Force. It has been used effectively to characterise the reflectivity of primarily airborne and sea-based platforms, such as the Cheetah fighters and the new frigates.

Last year, Fynmeet was deployed near Cape Agulhas, the southernmost tip of Africa, to characterise small boat reflectivity as well as the sea surface reflectivity, allowing various research questions aligned with the AwareNet programme to be addressed.

"But back then, I thought it was just a project to keep me busy," Paul says. "Four years later, in 2003, when I started working here, I was surprised to see that people were still using the building blocks of my project, although it had been upgraded."

Paul continued with his Master's degree, his studies funded by the Department of Defence through Armscor and managed

The eloquent young scientist – who is more comfortable with 'Paul', than with 'Dr Herselman', says young people should reach for their dreams and goals even though others might discourage them. "Along the way, I got discouraged, but I believed in myself and pushed ahead," he says.

by the CSIR. His project was in the field of borehole radar and investigated the use of radar to find faults and variations in platinum and gold reefs. Stellenbosch University continues to work on it and is in the process of industrialising the technology.

Paul's hard work and flair for electronics paid dividends: his Master's degree was upgraded to a PhD. He attributes it to hard work, as well as to the guidance and contributions by his supervisor, Professor Johannes Cloete, a former CSIR scientist. Paul has always dreamt of undertaking postdoctoral studies and this became a reality when he spent 15 months at the internationally-acclaimed University College of London last year and the first quarter of 2007. "It has always been my goal to do a postdoc at a top university," he says, adding, "I knew that someday I would get the opportunity, but was not optimistic initially. The Department of Science and Technology made funding available under its Professional Development Programme and I jumped at the opportunity, got selected, and will remain eternally grateful for it."

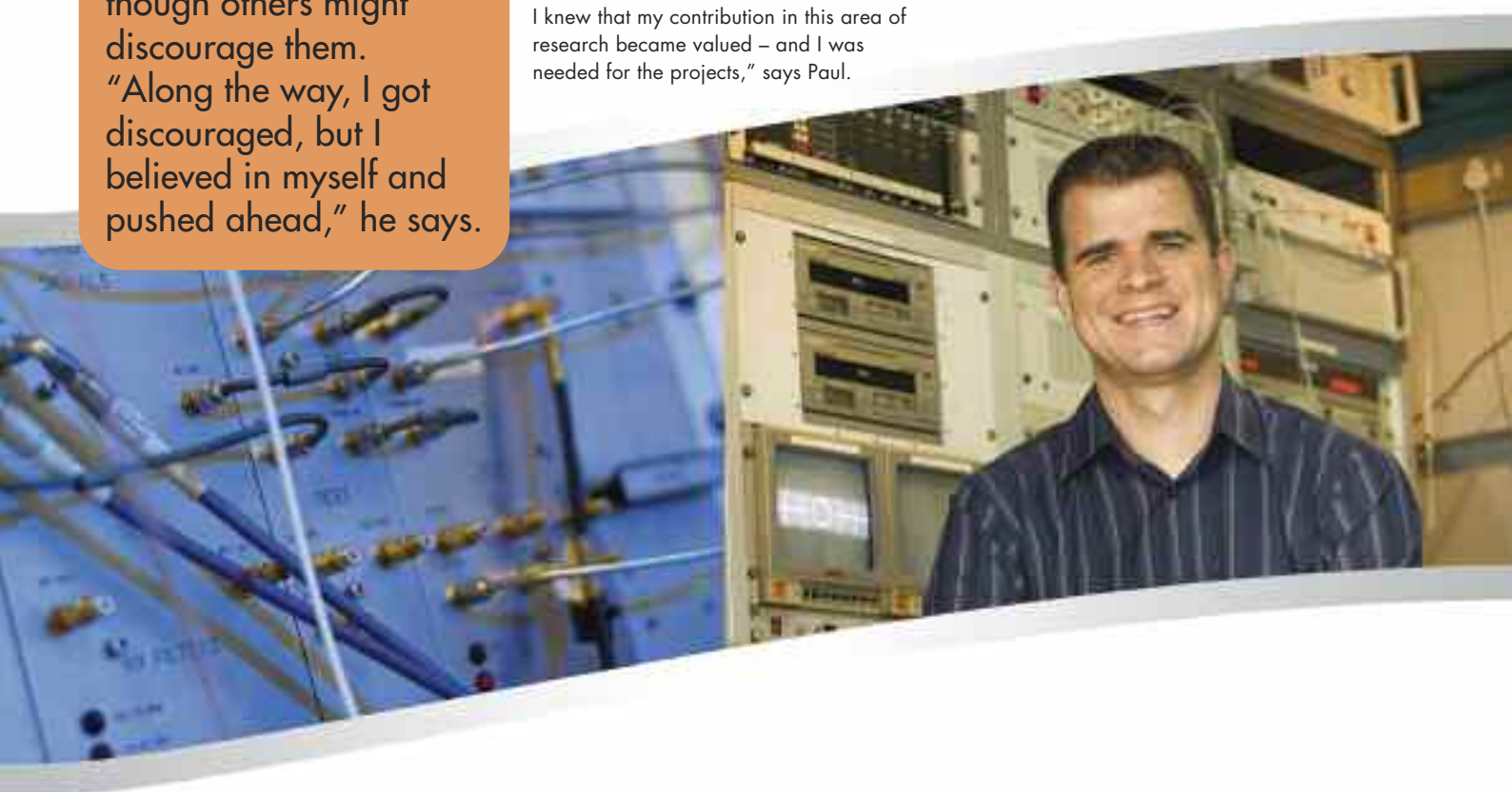
On the one hand it was difficult for Paul to leave his office to pursue his postdoc studies because "I had already settled in here. I was concerned to leave because I knew that my contribution in this area of research became valued – and I was needed for the projects," says Paul.

His postdoc topic was 'Detecting Small Boats using Advanced Radar Technology for Persistent Surveillance' and was based on the CSIR's AwareNet programme. One of the main objectives of this programme is to develop advanced techniques that enable persistent (all the time) and ubiquitous (everywhere at once) maritime surveillance. The ultimate outcome of this is foreseen to be innovative sensing systems providing situational awareness to enhance South Africa's ability to protect her maritime resources and infrastructure in her economic exclusion zone.

Elaborating on his views on a career in science and technology, Paul says: "I didn't study science and engineering for the sake of doing it, I wanted to make a difference, to impact peoples' lives."

Paul has notched up three CSIR awards to date. He was named a Top Young Professional by his unit in 2004 and received an award for Outstanding Contribution by an Individual in 2006. He also scooped up a CSIR Excellence Award for Promising Young Researcher in 2005.

- Mzimasi Gcukumana



Striving for unique alternative materials to ensure a sustainable future

Increasing environmental awareness, growing global waste problems, the continuous rising of crude oil prices and rapid depletion of natural resources have prompted a global resurgence of research interest in environmental sustainability and renewable resources.

THE URGENCY OF THESE challenges is even evident in the growing number of composite and polymer manufacturers, the processing industry, end-users and local communities striving to move from traditional engineering materials to unique alternatives. New strategies are employed in the quest for environmentally and economically viable materials manufacturing and processing to enhance materials with properties that would ensure re-use and recycling.

At the forefront of the CSIR's involvement in the crucial field of natural fibre-reinforced composite materials, is postdoctorate Dr Maya Jacob John.

Dealing mainly with natural fibres, such as flax, hemp, kenaf and sisal, Maya's main interest lies in the semi-crystalline plastics, polypropylene and polyethylene. She joined the CSIR in 2006 after extensive research on lignocellulosic fibre-reinforced natural rubber composites at the Mahatma Gandhi University in India.

Maya explains that she is currently fortunate to be involved with projects on the development of natural fibre composites for structural and transport applications. "This deals mainly with using natural fibres, like flax and hemp, and incorporating these in thermoplastic matrices. As natural fibres are incompatible with plastics, one has to go for compatibilisers, or biological coupling agents, to improve the bonding between fibre and matrix. I am also working on the synthesis of a functionalised compatibiliser that influences the interfacial bonds between fibre and matrix."

The CSIR increasingly undertakes research on biodegradable composites, known as green composites. Maya finds this particularly exciting since there is a mounting movement among scientists and engineers

to minimise the adverse environmental impact caused by the use of petroleum products.

These biocomposites, or natural fibre-reinforced polymeric composites, which substitute glass-fibre reinforcement, have emerged over the last decade as one of the most promising manufacturing materials due to their unique properties.

The potential advantages of biocomposites, which include high strength, weight-saving, lower cost, recycling, as well as the ecological advantages of using renewable resources, could contribute considerably to fulfil the need for demanding applications in structural and interior components in the aerospace and automotive industries.

The CSIR's natural fibres centre in Port Elizabeth, where Maya is a key researcher, is considered one of the top four facilities of its kind in the world and works in conjunction with several national and international academic institutions and industry partners.

For Maya, this research on natural fibre composites not only ensures that the CSIR stays relevant in the global research arena, but also creates awareness of research undertaken worldwide in this field. "The CSIR's investment in this field creates awareness of the approaches adopted by the scientific community in other parts of the world. It also helps in the transfer of knowledge to others," she says.

Achieving the latter clearly lies close to her heart. "As a postdoctoral researcher I am in a position to prepare project proposals and lead several projects. This will help in the training of other researchers who will eventually manage projects, and can contribute to skills transfer."

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"Human capital development (HCD) is very important for the growth of any nation or organisation. The prime aim is to equip people to become future leaders and to adopt new technologies. In a research organisation such as the CSIR, it is imperative to have competent people to perform and impart their skills to others. Mentoring students at postgraduate and doctoral levels is another way of supporting HCD."

Maya boasts no fewer than 36 papers, presentations and publications in her chosen field, testimony to her dedication and the wealth of knowledge she holds to impart to peers and upcoming professionals alike.

With a background in chemistry, she opted for this field that has "touches of both chemistry and technology" and every day has a promise of its own.

The longer term also holds an exciting opportunity and challenge for this researcher. She aims to carve her own niche in the composite field and hopes to undertake more work in interfacial characterisation of composites. To reach for this particular dream, she could not have chosen a better nurturer than the CSIR with its wealth of knowledge and expertise, she says.

- Patsy Scholtz