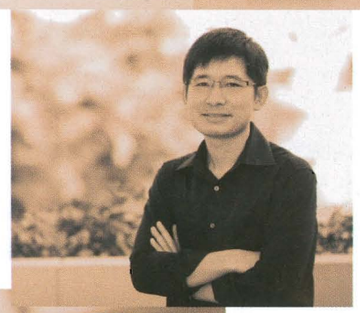
From left: Asst Prof Adams Kong, Asst Prof Arul Chib, Assoc Prof Louis Phee, Asst Prof Poh Chueh Loo and Asst Prof Matthew Chang.

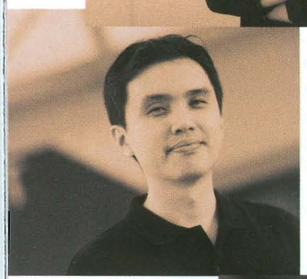
Feature

young and restless

Early career scientists in the world of academia, these five NTU dons have already made their presence felt globally, with inventions that improve lives around the world. Lester Kok finds out that their restless energy in the quest for the unknown keeps them going and growing...

"When you have passion for your work, it becomes a very serious pastime and that is what drives you."





From top: Assoc Prof Louis Phee, Asst Prof Arul Chib, Asst Prof Adams Kong, Asst Prof Poh Chueh Loo and Asst Prof Matthew Chang.

LOOK, NO SCAR Assoc Prof Louis Phee is a serial inventor. In a career spanning 15 years, he has come up with six inventions, mostly in the field of medical robotics.

His latest – and proudest – invention is a world first: a robotic endoscope with two small arms that can remove tumours in the stomach without leaving scars.

And it slashes surgery time to a fraction of the eight hours originally.

"I wake up for my hobby," says Assoc Prof Phee from the School of Mechanical & Aerospace Engineering.

"When you have passion for your work, it becomes a very serious pastime and that is what drives you."

Assoc Prof Phee built his first robot – a device that can insert a flexible endoscope through the anus to inspect the large intestine – in 1995 when he was a 24-year-old NTU undergraduate. "Innovation has no age limit," he explains. "Even a six-year-old boy building with his Lego set does it in his own unique way."

Some of Assoc Prof Phee's robots have been commercialised and used in hospitals. He has won honours for his work, among them the Tan Kah Kee Young Inventors' Award in 2001, Singapore National Academy of Science Young Scientist Award in 2006 and Outstanding Young Persons of Singapore (Honoree) Award in 2007.

"Whatever I do, whether it's for research and development or something else, it needs to be tangible. There must be some product at the end that makes a difference to someone. I always hope to see my work bringing benefits to patients," says the elder of two siblings whose parents supported his early interest in creating and fixing things.

"You need to really want to do something to be thinking of it all the time," he says of his passion. "It's a kind of commitment that consumes you and gets your subconscious mind working on it."

So how can we be more inventive? Always look at things differently, be critical and test the limits, he advises. "Innovators always push the boundaries to see how things can be done better."

HELP, A PHONE CALL AWAY This Assistant Professor has a life-changing story to tell. It is a story with the word passion written all over it.

Saddened by the plight of millions of people the world over, 39-year-old Arul Chib dumped his high-paying job at Procter & Gamble for something that is now bringing smiles to the faces of thousands of underprivileged women in the tsunami-ravaged Indonesian province of Aceh Besar.

The cause of the smiles: one of the world's first healthcare mobile phone systems which the don from the Wee Kim Wee School of Communication & Information developed for midwives.

Each phone comes with an easy-to-use application that can transmit expectant mothers' vital signs to city hospitals, helping doctors anticipate complications in pregnancy.

His efforts helped improve the delivery of rural healthcare services and in 2011 he was recognised with the ProSPER.Net-Scopus Young Scientist Award in the category of information and communication technologies for sustainable development.

"I have a favourite catchphrase: *make it personal*," he says.

In his younger days, Asst Prof Chib sold products like soap and shampoos at Procter & Gamble, a multinational corporation. He was earning more than twice his current pay but gave it all up for his passion.

He recalls the turning point: he had been selling a new kind of adhesive sanitary pad to villagers when one of the women asked him what panties were.

He soon found himself spending time in underdeveloped regions using information and communication technologies in

creative ways to help the poor.

"If you are a young person wondering what to do with your life, let me ask you: should there be this huge divide between the rich and the poor, or a society in which everyone has the same opportunity to reach a basic standard of quality of life?"

"It's very easy to expect the next person to pick up the baton and run with it, join a non-governmental organisation, create innovations for the poor or develop a vaccine to eradicate cancer. If you feel for something, just go ahead and get involved. Once you make it personal, you'll have this connection with the community and you will want to get involved anyway," he says.

Asst Prof Chib believes innovators must get down close to the ground in order to fully appreciate the needs of the community.

It helps that, growing up, his parents instilled in him the value of respect for all others, no matter what their social status. "Fishermen, for instance, deserve my utmost respect. In remote rural areas, they are the ones who keep me alive and fed," he says simply.

"We have a choice what to do with our lives. I could have a multi-million-dollar bank account and leave this world with the money sitting there, or I can leave knowing I have been a positive force. Which option is more satisfying?"

I WITNESS, I FIGHT His reverse-engineering skills combined with a consuming spirit not to let criminals roam the street led Asst Prof Adams Kong to a world-beating discovery.

He is the proud inventor of the world's first body vein identification system.

This leading expert in palm print identification has gone one step further by having a system that identifies criminals by taking photographs of them and reverse-engineering them so the veins, or blood vessels, on the bodies are more visible.

These are then compared to photos of suspects that are also put through the same process. The system was inspired by a case Asst Prof Kong helped crack when he used skin marks to identify a paedophile and put him behind bars in the US.

In 2010, he received a $250,000 proof-of-concept grant from the National Research Foundation for the identification system. Despite his success, the humble don from the School of Computer Engineering insists he is just trying to do his bit for society.

"Many girls suffer as victims of sexual offences while the perpetrators roam free. How would a normal person react? They would want to help," says the 37-year-old, who holds five patents and has two more in the works.

"I care for the young ones among us and I would also like for there to be justice in society. It is a driving force for me," Asst Prof Kong adds.

With fresh media reports about victims of crime being left in the lurch and, in some cases, to die, Asst Prof Kong feels that helping people is slowly becoming less of a social norm.

It's a trend he attributes to rising individualism. "Society tends to overemphasise accomplishment, which draws on the 'I am better than you' mentality instead of 'what can I do for others?'."

"As an educator," says Asst Prof Kong, "do I equip my students with knowledge that will aid their careers in a self-serving way? Or do I equip them with values that help them become good people eager to contribute to society?"

"To shape the world – that's the goal I'm working towards," he adds.

I CONTROL, YOU FOLLOW It is not something a newsmaker is likely to admit in public. "I'm a control freak," says Asst Prof Matthew Chang in describing his work with microbes.

"I want to be able to direct the behaviour of microbes and programme them to do the things we want them to do," he says.

Last year, this scientist from the School of Chemical & Biomedical Engineering bioengineered an E coli bacterium to kill a deadly bacterium resistant to most antibiotics.

Thanks to Asst Prof Chang and his colleague, Asst Prof Poh Chueh Loo, the world can now combat the superbug *Pseudomonas aeruginosa,* which causes infections in the upper respiratory, gastrointestinal and urinary tracts.

Asst Prof Chang's pet peeve turned out to be the inspiration for this innovation. "What frustrates me is that we can't control bacteria. I've always believed that someday I would make microbes act like robots."

A biochemical engineer by training, Asst Prof Chang, 36, is part of a team that was awarded a research grant in 2010 under the National Research Foundation's Competitive Research Programme funding scheme for their innovative work in engineering microbes to produce valuable biofuels from bio waste. Under the scheme, a project can receive up to S$10 million in funding.

"I'm keen to return the help I received as a child using what I'm good at," says Asst Prof Chang. Hence, his continuous desire to innovate.

For Asst Prof Poh, it's a privilege to groom the next generation of scientists as well as develop new technologies in the field of healthcare, which is his interest.

"Research means being at the forefront of something new and exciting that could potentially make our lives better," says the 35-year-old.

"Whenever I visit a hospital and see sick people on their beds, I'll wonder what else I can do to help them."