

## Special

## Engineering in Canada

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## The right stuff

Developing skills for specialized demands

Engineering schools, government and industry have to work together to ensure that programs are preparing graduates with the specialized skills that future careers will require, says Paul Acchione, acting CEO for the Ontario Society of Professional Engineers. ISTOCKPHOTO.COM

The broad disciplines from the past have given way for higher levels of specialization, says Adrian Chan, associate professor of engineering at Carleton University, but ultimately companies will need smart people who understand technology and can solve complex problems, the characteristics of the engineering profession.

Technology is now engrained in medicine, for example, making a technical engineering background more and more important, says Prof. Chan.

"Engineers are now expected to have an understanding of medicine, because we will be working with researchers, doctors, nurses and physiotherapists. Engineers work as a part of a trans-disciplinary team to help with the integration of devices or processes that will reduce

the length of hospital stays and medication errors, improve monitoring and ultimately patient outcomes," he adds.

Given Canada's aging population, there will be a huge demand for engineers with biomedical specializations. Engineering schools must adapt to meet the skill gap, because in the future, their graduates will increasingly work in non-traditional engineering jobs.

"At Carleton over the last few years, we've introduced a number of new undergraduate and graduate level engineering programs, such as our biomedical and electrical, biomedical and mechanical, aerospace, sustainable and renewable energy, and architectural conservation engineering programs," Prof. Chan says.

The challenge is to educate and train the next generation of

engineers to be better equipped with the right blend of technical, intellectual and management skills required to land a job and survive in the working world, says Paul Acchione, a professional engineer and both acting CEO and board past-chair for the Ontario Society of Professional Engineers (OSPE).

In 2012, according to Engineers Canada, more than 18,500 students completed undergraduate and graduate engineering degrees from 271 accredited engineering programs at 43 schools across Canada. So while there isn't a shortage of graduating engineers right now, engineering schools, government and industry have to work together to ensure that programs are preparing graduates with the specialized skills that future careers will require, Mr. Acchione says.

A 2014 OSPE report highlighted a current disconnect between what employers need and what engineering graduates are being prepared for. In fact, less than 30 per cent of engineers with a bachelor degree or higher were actually working as an engineer or engineering manager. Also, in 2013, Engineers

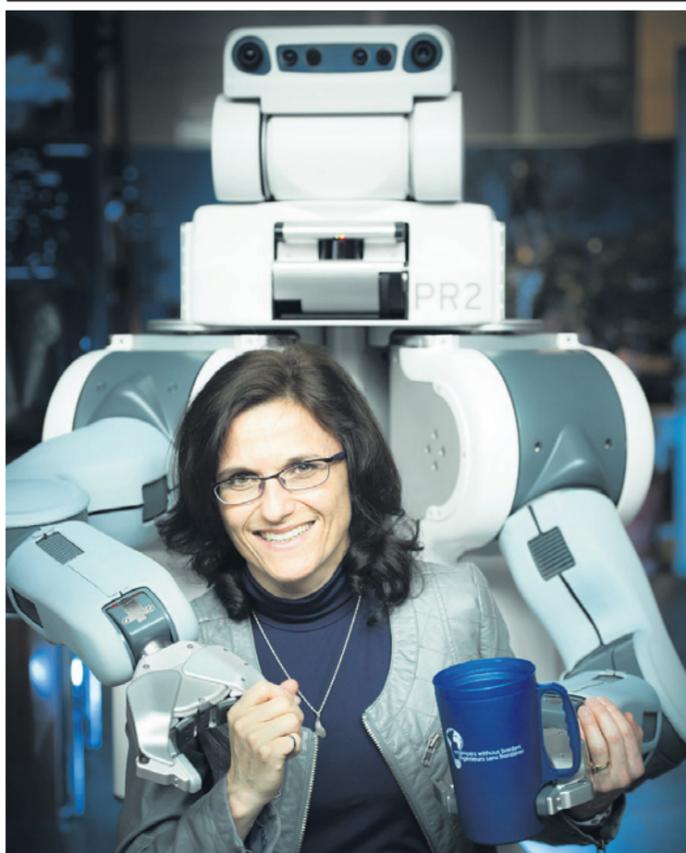
**"Engineers work as a part of a trans-disciplinary team to help with the integration of devices or processes that will reduce the length of hospital stays and medication errors, improve monitoring and ultimately patient outcomes."**

**Adrian Chan**  
is associate professor of engineering at Carleton University

Canada released its most recent labour market study predicting that more than 1,300 engineering positions will remain unfilled annually in Ontario. This will become increasingly important as an estimated 95,000 engineers will be retiring by 2020.

Mr. Acchione has observed two trends. "One is from academia itself, that is getting far more sophisticated and focused on speciality areas at universities, because the knowledge base is growing tremendously, so everything seems to require greater specialization to get sufficiently deep in the subject area to be useful," he explains. "The second trend is that employers are demanding much greater specialization before they'll hire people, so we are encouraging the various players to work together."

"Students who have been exposed to real life work experiences before they finish their degree, whether it is internships, co-ops or taking a year off school to get work experience, are much more successful finding an engineering job," Mr. Acchione says, adding that he has seen a growth in co-op programs, for example.



Elizabeth Croft, professor of mechanical engineering at UBC, has helped Charlie the robot deliver a cup of coffee without spilling. She believes that the focus on how engineering impacts people appeals to prospective female students. SUPPLIED

## WOMEN IN ENGINEERING

## Shifting the focus from technology to people

If you'd like your cup of coffee delivered by a robot, you'll be glad to know that professor Elizabeth Croft and her team are working diligently on making the hand-over go smoothly.

As the area of service robotics is growing, Elizabeth Croft, professor of mechanical engineering and associate dean of education and professional development at the University of British Columbia (UBC), is especially interested in the interactions between people and robots.

The focus on how engineering impacts people can be found in all aspects of the profession, and Prof. Croft believes this appeals to a diverse group of prospective engineers, including women.

Pondering the question whether robots should be

designed for people or people should conform to robots, Prof. Croft leans toward the former approach. She uses analysis of human behaviour as a basis for defining the parameters of a robot's design.

"If a robot brings me coffee, I want the robot to hand me the cup in a way that I feel comfortable it's not going to end up in my lap," Prof. Croft says. To determine how to safely pass things back and forth, she and her team designed an instrument measuring human handover.

The rules for human handover are that the giver is responsible for the safety of the object, while the receiver is responsible for the timing of the transfer, Prof. Croft explains. **People-centric, Page EC 3**

## By the numbers

More than **18,500** students completed undergraduate and graduate engineering degrees in Canada in 2012.

**18.1%** of total enrolment in university engineering programs in Canada are women in 2012.

**11.3%** of professional engineers in Canada are women.

Less than **30%** of engineers with a bachelor degree or higher were actually working as an engineer or engineering manager.

More than **1,300** engineering positions will remain unfilled annually in Ontario.

**16,000** new engineering jobs will be created due to investments in resource and infrastructure projects, between 2011 and 2020.

Sources: Engineers Canada and Ontario Society of Professional Engineers



In other words,  
wow!

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