The background is a deep blue, textured surface representing a night sky. It is filled with numerous stars of varying sizes and colors, including yellow, white, and light blue. A large, bright yellow star with a prominent white glow and radiating lines is positioned in the upper right quadrant. In the lower left corner, a human hand is depicted, reaching upwards with fingers slightly spread, as if reaching for a star. The hand is rendered in shades of pink, red, and purple, with visible brushstrokes. The overall composition is vertical and evokes a sense of aspiration and hope.

From optimism to wariness

Grads look to
the future

By
Michael
Mastromatteo

A group of recent graduates from various engineering schools across Ontario express a generally positive vision for the future of the profession. As the engineering community looks back on some of its accomplishments, this group speculates on the regulatory and professional concerns on the horizon.

Recent engineering school graduates reflect a gamut of hopes and expectations for the profession in the coming decades. On the occasion of the 85th anniversary of PEO, *Engineering Dimensions* took a random sampling of up-and-coming graduates to get their impressions on such issues as professionalism, engineering education, the importance of the P.Eng. licence, career interests and the profession's evolution.

Nawal Chishty, bachelor of science (nuclear engineering), University of Ontario Institute of Technology, 2007

Nawal Chishty has become a prime example of engineering at UOIT. She is among the first crop of engineering graduates from the new Oshawa-based university, whose nuclear and manufacturing engineering programs were just recently accredited by the Canadian Engineering Accreditation Board.

Prior to graduation, Chishty appeared on posters and advertisements celebrating the university's link with Ontario Power Generation (OPG), and she was selected to speak at the recent dedication ceremony for a new engineering building at UOIT.

Now working as an applied science trainee at OPG's Pickering Nuclear Generating Station, Chishty is an engaging realist who chose the nuclear option in response to the industry's appeal for more engineering practitioners with nuclear expertise.

"As I progressed through university, I began to really understand and appreciate the worth of my nuclear engineering degree and the net positive effect it could have on society," she said. "Once I was able to see myself as being part of the solution to the inevitable energy crisis, my passion and conviction for the industry and profession solidified, giving me the inspiration I needed to achieve more."

An accomplished artist and musician, Chishty defies the lingering stereotype of engineers as technology-obsessed eccentrics who speak their own jargon and appear aloof from real-world conditions.

As such, she sees only positive things for the profession's future as it struggles to

Mixed in with the respondents' enthusiasm and hopefulness are some interesting insights and challenges for the profession at large. One recurring theme is the great potential for the engineers of the future to make improvements to human health, the environment and the other quality of life issues that were deemed so important in PEO's recent roundtable (*Engineering Dimensions*, July/August, pp. 54-64).

make inroads in public policy formation, and in promoting a better understanding of the importance of the engineering licence to the public interest.

"Engineers, on a whole, have represented themselves as persons with integrity and passion in what they do, so I'm not too concerned with their image at present," she said. "I am excited to see the next generation of engineers entering the world. With the mentorship and knowledge of senior engineers and the current tools and resources at their disposal, I hope to see great things from these young minds in the near future."

And despite her neophyte status, Chishty exhibits the wisdom of experience in analyzing the problems of bringing an engineering mindset to pressing public concerns, particularly on the energy supply front.

"It's been interesting to see various societal issues pertaining to energy supply and environmental degradation that have been dormant for so many years coming

to the forefront and gaining the attention," she mused.

"I don't believe that our current societal issues are a surprise to the seasoned professionals, because they have been aware of them for many years prior. I think they have done as much as they could have, given the circumstances, to prepare and minimize against the potential negative consequences. Now they are passing the torch to the next generation in hopes they will be able to carry on with innovative solutions."

Michael Afara, bachelor of engineering science (chemical engineering), University of Western Ontario, 2007

Michael Afara is employed as a maintenance supervisor at Canada Bread Limited, an independent operating company of Maple Leaf Foods. Although he is in his first rotation of the management trainee program, Afara is looking forward to taking on leadership roles in the company's production, maintenance, engineering and quality control areas.

Nawal Chishty



Michael Afara



The new graduate is still mulling his longer-term career plans, and is considering plans to pursue the P.Eng. when he completes the work experience requirement.

“Since I invested four years into studying to become an engineer, I would like to obtain my P.Eng. licence,” he said. “However, depending on where my career path will take me, it may not be a necessity and I am willing to accept that.”

Afara comes to an engineering career honestly. His father, Souheil Afara, P.Eng., is a chemical engineer with the University of Western Ontario, and his older brother, James, is an engineering graduate also working for Maple Leaf Foods.

The London native likens professionalism in engineers to that of today’s major league athletes. “As a recent engineering graduate, I believe professionalism embodies many characteristics,” Afara said. “First and foremost, a professional must perform. Much like a professional athlete, a professional engineer is a hard worker, who is self-disciplined, with a desire to succeed and produce superior results. They must be confident in themselves and take full responsibility for their actions.”

Afara does not appear concerned that the engineering profession might have lost prestige compared to other senior professions. At the same time, he welcomes the potential engineering holds in steering decision makers and public policy mandarins in a technologically sound direction.

He also believes that finding new and alternative energy sources will be of top concern for the profession in the coming decades. “Since I graduated with a bachelor’s degree in chemical engineering, I will say that one of the greatest challenges for the profession will be discovering alternative fuels and efficiently producing them, such as the tar sands in Alberta.”

Lindsay Corstorphine, bachelor of engineering (chemical and bioengineering), McMaster University, 2006, pursuing master’s degree through the University of Toronto’s Institute of Biomaterials and Biomedical Engineering

Lindsay Corstorphine is one of the new breed of engineering graduates who appear to be furthering the vital connection between engineering and health care. As is



Lindsay Corstorphine

evident from her master’s degree thesis, *Characterization of Oxygen Transport in Modular Tissue Engineering*, Corstorphine’s work is another part of the emerging partnership of engineering and medicine.

The Timmins native parlayed proficiency in mathematics and science into engineering study, with a grander view of the profession’s life enhancing role.

Although Corstorphine is too modest to proffer opinions on the general state of the engineering profession in Ontario, that doesn’t prevent her from making an observation about some of its potential.

“While I don’t have the experience to give suggestions on the actual practice of engineering in the ‘real world,’ I think it would be nice to have engineers play a more prominent role in society,” she said. “Unlike the professions with which the general public interacts, such as doctors, lawyers, dentists and accountants, engineering is not well understood. It seems that unless you have an engineer in the family, many people do not really understand the profession, its diversity and opportunities. By becoming more involved in the community, young people will realize there is more to engineering than designing cars or machinery, and the profession will draw an even more diverse population.”

Scott Fitzpatrick, bachelor of engineering (chemical and bioengineering), McMaster University, 2006, pursuing master’s degree in bioengineering at McMaster

Scott Fitzpatrick is another of the recent engineering graduates who is excited about the contributions engineering can bring to health care. Perhaps it says something about



Scott Fitzpatrick

the new generation of engineering students, many of whom favour nurturing of the individual over the nurturing of structures.

“Growing up, I had two major ambitions: to be involved in the cure for cancer/AIDS, or to play in the NHL,” Fitzpatrick said. “As my dreams of playing in the NHL faded, my other ambition began to expand, from developing a cure to improving quality of life for ailing patients worldwide. My undergraduate studies allowed me to pursue this goal.”

Although it appears Fitzpatrick and the other graduates of McMaster’s bioengineering program are well disposed to the nature of the school’s engineering education, he has some thoughts on the training of tomorrow’s practitioners.

“Having obtained a multi-disciplinary undergraduate degree in chemical and biological engineering, I feel that my technical knowledge is well balanced,” he said. “However, I feel the professional and social responsibilities of an engineer must be taught in a more captivating manner than simply through lectures. Perhaps this could be achieved through hands-on experience, or via relevant, informative videos. Social and professional responsibilities are especially important in the field of biomedical engineering, where the engineered systems are now human beings. It is essential that ethics be maintained and governed.”

This consideration of “quality of life” again speaks to the emphasis by younger engineers on the profession’s stewardship potential. For Fitzpatrick, it also represents the increasing importance of multi-disciplinary practitioners and work teams.

“While lawyers must keep up to date with new laws, and doctors with new research findings, I feel engineers will be forced to continually learn a variety of different specialties and broaden their knowledge as technologies from different areas become increasingly interwoven.”

Ayesha Hashambhoy, bachelor of engineering science (materials engineering), McMaster University, 2007, entering a PhD program at Carnegie Mellon University’s materials engineering department

Ayesha Hashambhoy is pursuing materials engineering and renewal energy technology with the view that this particular area could provide many answers in a community desperate for breakthroughs in energy supply and consumption. The McMaster University graduate also recognizes that energy matters provide an important passageway for engineering professionals to take on a greater public policy role, an interest that explains her choice of Carnegie Mellon University for her doctoral work.

“I chose Carnegie Mellon not only because of its excellent materials engineering facilities and faculty, but also because of its engineering and public policy program,” she said. “Although I will be in the materials engineering department, a number of my courses will be taken from the engineering and public policy faculty, so that my dissertation can have a strong focus on both the technology and related policies.”

Hashambhoy is another recent graduate who belies the typical image of engineers. Accomplished in artist pursuits, she also

Ayesha Hashambhoy



“It’s my belief that an engineer who does not continually learn and upgrade his or her skills, not just technical abilities, eventually becomes obsolete.”

Derrick Fournier

appears to be something of a virtuoso when it comes to her materials interest.

“In my undergraduate final-year thesis,” she said, “I looked at the effects of iron and manganese on the bendability of a 6000 series aluminum alloy commonly used for automotive applications. My advisor was Dr. David Wilkinson, P.Eng., and the materials were provided by the Novelis Global Technology Centre in Kingston, where I formerly did a 15-month work term.”

The doctoral student believes engineering education across the board is coming to emphasize the special responsibility of practitioners to a higher sense of public safety and control of technology for a greater good. While at McMaster, Hashambhoy served for one year as a teaching assistant in the first-year introduction to professional engineering course. The experience furthered her personal commitment to impress other students with the engineering profession’s commitment to the environment, public health, and sustainability.

Derrick Fournier, bachelor of engineering science (electrical engineering), University of Western Ontario, 2007

Derrick Fournier believes new graduates should take advantage of opportunities to gain first-hand experience of the issues likely to be encountered in industry.

Derrick Fournier



Fournier is now working at JMP Engineering in London, an organization specializing in engineered factory automation and process control systems. Prior to graduation this spring, he spent three summers working at General Motors in St. Catharines.

Although Fournier acknowledges the critical thinking and problem-solving skills he acquired as an engineering undergraduate, he has some ideas for enhancement.

“I think that practical application of theory is an area of improvement for the curriculum,” he suggested. “For instance, in electrical engineering, we didn’t really discuss elements of the electrical code or get the chance to do enough varied electrical design for real-world applications. I believe it is critical that all students gain real-world experience prior to completing their degrees. This ensures they get a good feel for their future work, and gain valuable skills that aren’t taught in the classroom.”

Like the majority of the recent graduates contacted by *Engineering Dimensions*, Fournier is intent on becoming licensed by PEO.

“Becoming a licensed professional engineer is extremely important to me as it represents the culmination of years of work and fully qualifies me as a professional,” he said. “I consciously chose to take an engineering job at JMP Engineering and seek out my P.Eng. designation, instead of going directly into the managerial/business world.”

He supports the commitment to continuous learning and personal professional development, an issue that continues to spark some debate between engineering regulators and within the membership. “It’s my belief that an engineer who does not continually learn and upgrade his or her skills, not just technical abilities, eventually becomes obsolete,” he said. “I enjoy learning and it is one of the reasons I chose this profession. If I am not learning, I don’t enjoy what I am doing. Employees who

are knowledgeable and up to date are most certainly productive.”

Fournier has an interesting take on a potential problem area for engineering—and society—in the coming decades: “The baby boomer generation collectively holds a significant amount of important innovative, creative and critical knowledge in this country. As they are retiring and new engineers are replacing them, I fear that not all of their knowledge is being transferred to new engineers. It will be a challenge to the profession, government and industry to ensure that engineers are not replaced prematurely, and that opportunities for knowledge transfer and mentoring exist.”

Danuta Mahabir, bachelor of engineering science (civil engineering), University of Western Ontario, 2007

Danuta Mahabir has already accumulated an impressive record of service in engineering education and outreach activities, even while compiling the work experience leading to her first posting.

Now working in the engineering development program with the Ontario Ministry of Transportation in London, Mahabir has been active in outreach to female engineers and young women via the GoEngGirl women in engineering clubs, and the Girls Recognizing Engineering and Technology (GREAT) weekend camp at Western.

Mixed in with this outreach, she was one of three students to participate in an Infrastructure Opportunities Partnership, involving work with the Ministry of Transportation, Dillon Consulting Limited and Huron Construction Co. Limited as a summer engineering co-op student.

Her current role with the transportation ministry involves short stints in different engineering sections, such as planning and design, structural, geotechnical, maintenance and construction. As Mahabir explains, “the aim of this four-year program is to provide new graduates with the experience required to obtain our engineering licence, as well as increase our knowledge in transportation engineering.”

It's obvious that a priority for this new graduate is diversity within the profession. “It's important for women practitioners to feel welcome in the engineering pro-



Danuta Mahabir

“fession,” Mahabir said. “As a woman in engineering, my experience, both in academia and work, has been positive, but not all women share my experience. There still needs to be a shift in the organizational culture of engineering to make it more welcoming of women practitioners, both in school and at work.”

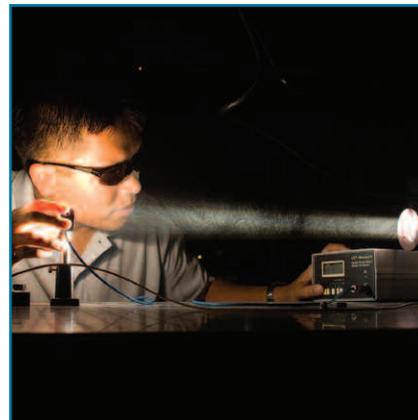
Mahabir cited inclusion of harassment definitions in PEO professional practice guidelines, and initiatives such as GoEngGirl and other outreach activities, as important steps for a profession bent on attracting under-represented members of Ontario society.

“There have been positive changes in the engineering profession that aim at fostering a more welcoming environment, such as the inclusion of harassment as professional misconduct in the *Professional Engineers Act* and Professional Engineers Ontario's publication, *Guideline on Human Rights in Professional Practice* in 2000.”

Mahabir's other priorities include promoting greater public understanding of engineers and engineering, and implementing strategies supporting sustainable development that address environmental, economic and societal needs.

Avery Yuen, bachelor of engineering management (engineering physics), McMaster University, 2005, pursuing a PhD in engineering physics at McMaster

Avery Yuen is a recent graduate—and ongoing PhD student—who is primed for a research-intensive kind of engineering career. His area of research is in organic photovoltaics (PV) or plastic solar cells, which are being considered for wider use



Avery Yuen

as an energy source that could eventually compete with fossil fuels in terms of cost and efficiency.

There are also certain nanotechnology implications to Yuen's research activity. Yuen, who is the engineering manager for the McMaster Solar Car Project, has also developed expertise in the area of nanotechnology, and he is often called on to discuss its potential.

“Since [solar PVs] can be put on flexible substrates from a solution process, one can imagine the possibility for rapid reel-to-reel processing, as well as embedding them into fabrics for purposes such as charging portable electronics,” Yuen said. He envisions a situation in which someone could wear a T-shirt that charges an iPod.

Yuen is still determining if his career path will be science-based pure research or practical engineering. When asked about the likelihood of obtaining his P.Eng. licence, Yuen, like a lot of recent graduates, said the decision will depend on circumstances.

“My getting the licence is somewhat dependent on my job post-graduation, but I think I will probably get it if time allows me and if my employer is willing to help me out with it financially and/or logistically,” he said.

The uncertainty, however, has not prevented the doctoral student from some thoughtful reflections on the future of the profession, and how it might better appeal to the next generation of would-be practitioners.

“A fundamental problem is that an engineer, almost by definition, is in the background,” Yuen said. “Doctors and lawyers have a direct face-to-face con-

tact with the people who use their services, whereas an engineer designing a more efficient automation process, for example, will probably never see the people who use that product. So, in that respect, I don't think that engineering can ever attain a public status as high as a doctor or lawyer, but that is not necessarily a bad thing. I think the focus of any campaign to improve public perception has to be aimed at young people."

Yuen also voiced the vexing problem of reconciling the environmental and sustainability imperatives to do more with fewer resources—all the while giving proper scope to efficiency, economy and profit or self-interest motives.

Dana Tessler, bachelor of engineering science (civil engineering), University of Western Ontario, 2007

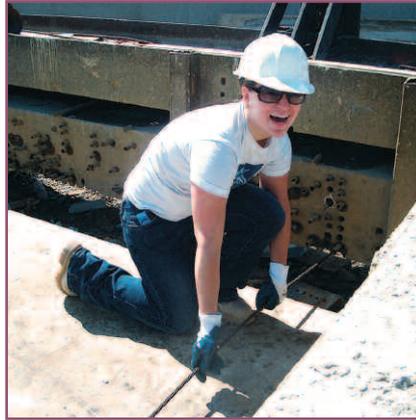
Fresh from graduation from the University of Western Ontario, Winnipeg native Dana Tessler is earning her civil engineering wings as junior designer with the Halcrow Yolles structural engineering and architectural organization.

Tessler's undergraduate work with the Boundary Layer Wind Tunnel and general building integrity, coupled with emphasis on the overall environmental impact on new structures has coloured her perceptions of today's civil engineer.

"I want to be involved with green buildings and projects that will change the way we look at structures in terms of designs, materials and construction methods," she said. "My association with Halcrow Yolles will allow me to work on many different types of projects in these areas and I'm sure I'll be able to meet these goals here."

But in addition to environmental considerations, Tessler is eager to develop the business, administrative, design and even marketing dimensions inherent in building new things. It's a reflection in many ways of the emphasis in engineering schools to turn out graduates who are fluent in more than hard technical details.

In speculating as to future challenges for tomorrow's engineers, Tessler hit on an interesting paradox, namely that technological innovation will best succeed with "buy in" from the public.



Dana Tessler



Carol Temple, EIT

"There has been a shift in recent years towards environmentalism, and society is becoming more aware that actions today lead to repercussions tomorrow," she said. "It is now the job of all engineers, no matter the field, to produce solutions to energy requirements, pollution reduction, waste removal and proper land development. However, creating these new technologies is insignificant when compared with the daunting task of getting society to change. One of the biggest challenges for engineers to overcome is eliminating the public fear associated with the high price tag and possible lifestyle changes that would come with the development of new technologies."

Carol Temple, engineer-in-training, bachelor of applied science (mechanical engineering), University of Toronto, 2006

As one recent graduate already registered in PEO's Engineering Internship Training (EIT) program, Carol Temple has her sights firmly set on the P.Eng. brass ring.

She now works at the Lafarge organization's Caledon aggregate site, where she manages safety meetings, and is involved in plant inspection, sales and production reports, budget reviews, inventory reconciliation and related activities.

"I enrolled [in the EIT program] because I thought it would be a good stepping stone to getting my P.Eng. designation," Temple said. "I liked how the EIT program is catered to new grads with various information programs. In talking to others with their designation in the industry, they had told me that they found the EIT program helpful."

Temple made sure to raise the issue of eventual licensing when applying for career-related work after graduation.

As a recent graduate fully committed to her eventual licensing, it's not surprising that Temple would have a healthy regard for the profession's image and reputation and the importance of professional self-regulation for the public interest.

She regards the large size of first-year engineering classes at the University of Toronto as a symbol of the profession's renewed appeal to young people, but remains concerned that some would-be graduates will lose interest over the course of the four-year curriculum.

"I do worry, however, that the [engineering profession's reputation] may be overlooked by young students applying to university, because it is a professional undergraduate program, whereas most professional programs are at the graduate level, when the students are more mature," Temple suggests. "As well, engineering has always been known for being such a rigorous program, that maybe some students shy away."

And while the need for new technical solutions to address environmental and energy supply issues will certainly be a draw to the profession, Temple is another voice calling attention to the diversity concern.

"One of the greatest challenges for the next 10 to 20 years is to increase the numbers of females enrolled in engineering. This has been a challenge for many years now, and although we've made progress, the numbers are still not as high as they should be."