



Flagship Technology Aboard Different Ships

by Tim Lougheed

THOSE OF US OLD ENOUGH to remember Apollo 11 may have felt a twinge of nostalgia cum disappointment this past summer with the advent of the 40th anniversary of mankind's first landing on the Moon. Didn't we expect to be *vacationing* on the Moon by now, not wondering whether we would ever return? Just where did all those exciting and inspirational explorations of the 1960s take us?

Quite far, it turns out. The dashboards of our cars have sprouted devices that use satellite technology to guide us around unfamiliar streets and highways. No television newscast would be complete without a picture from space to help us take stock of tomorrow's weather. Similarly, photos identify pollution in far-flung corners of the globe or monitor agricultural production closer to home.

In fact, yesterday's adventures in space have become today's business opportunities. Companies continue to develop tools for operating in the harsh environment of space, with results that have transformed our lives here on Earth. Among the most successful of these firms has been Ottawa-based Neptec Design Group Ltd. which has created innovative software and hardware that rides with NASA's space shuttle.

Since the early 1990s, Neptec has been honing its flagship product, an imaging system that tracks changes that occur on the surface of spacecraft during flight. More recently, the company has partnered with the University of Ottawa in applying this technology to automobile assembly lines, checking for dents and dings that might occur to vehicles during their assembly. Professor Pierre Payeur of the University of Ottawa's School of Information Technology and Engineering helped devise mathematical algorithms enabling cameras to scan and locate damage to vehicles.

The University has also contributed to Neptec's ongoing success in a more fundamental way through its president, Iain Christie. When the company was founded in the late 1980s, Christie was completing his PhD in physics at the University. His background and expertise turned out to be a good match for Neptec's pioneering efforts in computer-based imaging. Even before he had submitted his doctoral thesis, he was working for the firm on contract. By the time his education was complete, he was a full-time employee, heading up research activities from a tiny field office at NASA's Lyndon B. Johnson Space Center in Houston, Texas.



GETTY IMAGES

The Johnson Space Center has been famous since the first Mercury flights of the 1960s, and all of NASA's crewed flights are still coordinated from there. It remains the focal point for innovation in aeronautical and astronaut training, attracting thousands of the world's most talented and ambitious technicians. Looking back on it now, Christie still thinks of it as an exciting way to start out.

"They were certainly heady days," he recalls, "working at NASA on site, working in the Mission Control Center, working on board the space shuttle. I helped build mission procedures and worked with astronauts doing their astronaut training. All those kinds of things certainly have been very special in my career."

By the time Christie returned to Ottawa in the late 1990s, Neptec had established a respected position within NASA's technical community. The company's first instrument, the Space Vision System (SVS), had proven its worth repeatedly.

"Human beings enjoy being part of something that is larger than themselves, and the space program is highly visible and very tangible," says Christie. The sheer satisfaction of seeing Neptec products perform well in space has been regularly enhanced by positive feedback. "Astronauts come back and tell you the contribution you made was important to their success, and senior people within NASA say, 'We don't want to do this if we have to do it without your company.'"

Neptec's SVS helped NASA crews overcome major challenges during the building of the International Space Station. Described as a "machine vision system," it is an elaborate combination of video hardware and software that analyzes images, then quickly

Neptec is working with the University of Ottawa in applying its imaging system to automobile assembly lines, to check for dents and dings that may have occurred during assembly.

generates detailed information about where everything in those images is located. The SVS can immediately provide data for analysis by automatically identifying any movements or changes that occur. The space station, which is now large enough to cover a football field, grew in stages as various pieces were sent into orbit and added to the structure. Astronauts regularly used the system to install new sections.

In 2004, Neptec provided a second instrument that helps NASA guarantee the safe return of the space shuttle. NASA uses the Laser Camera System (LCS) to investigate damaged tiles and panels that make up the heat shield located on the underside of the shuttle. The LCS provides NASA with the information needed to determine if repairs are necessary before re-entry, dramatically reducing risks to the crew.

Neptec's laser-based systems continue to evolve. In addition to the prospect of building cars more efficiently, the company's technology is welcomed by Canadian helicopter pilots working in the high plains of Afghanistan, whose vision may be completely obscured due to dust kicked up by the large overhead rotors. Neptec is contributing to an approach called the Augmented Visionics System, which uses remote sensing to yield a highly accurate computer-generated image of a landing site. Christie maintains that this venture might look like a major departure from space travel, but it represents an equally inspired use of the company's talents.



GETTY IMAGES

On July 15, 2009, Julie Payette (a recent recipient of the University’s Distinguished Canadian Leadership Award) joined Pilot Doug Hurley (left), Commander Mark Polansky (right) and four others for a 15-day mission to the International Space Station aboard the Endeavour. Neptec products are important to the success of NASA’s space program.

“I have a hard time believing there are many things more exciting than getting stuck on the top of a rocket and fired into orbit.” — Iain Christie



US ARMY

Tools developed by Neptec for space exploration also have uses right here on Earth, such as helping helicopter pilots navigate Afghanistan’s plains when vision is obscured by dust.

“At the end of the day, it’s not about a particular product or a particular technology,” he says. “What we’re really good at is doing complicated tasks in environments where things really have to work reliably.”

Company co-founder Larisa Beach agrees — she believes diversification is just as important and is key to the longevity of an enterprise. She emphasizes that Neptec was originally premised on finding and retaining the best people for certain types of highly specialized work.

“The only way to keep people is to continue having a successful business and focusing on the company as being a group of people — the people being the assets,” she says, describing Christie as an outstanding example of a valuable human resource. “Since becoming president, Iain has taken the vision and discipline that he used to run the R & D group and applied it to our business development. He’s positioning our company for a good, successful future.”

Christie adds that human resources are no less valuable to the success of any space endeavour.

“The eye-opener for me, working at the Johnson Space Center, was the enormous number of people required to get five, six or seven people into space for two weeks — and back down,” he says. “There are literally tens of thousands of people involved in that process. Some may be involved only for five minutes, some for two years. But every one of them makes a contribution that’s absolutely essential.”

For all the satisfaction these people take from their respective roles, Christie understands why we tend to be distracted by the astronauts, the individuals on the front lines.

“I have a hard time believing there are many things more exciting than getting stuck on the top of a rocket and fired into orbit,” he laughs. ■

A writer and editor specializing in science, medicine and education, Tim Lougheed’s work has appeared in Canadian newspapers and magazines. He is past president of the Canadian Science Writers’ Association.