

IRIS DYNAMICS

PART OF A GROWING VICTORIA, B.C. SIMULATION TECHNOLOGY CLUSTER

For CDR's on-going series on the SME (Small and Medium-size Enterprise) in Canada's defence industry, we sent Senior Staff Writer, **Joetey Attariwala** to visit this Victoria, BC based company to learn more about their innovative flight simulation technology. Here is our report.

Iris Dynamics Ltd., may just be the most innovative small technology company you haven't heard of.

Imagine a remotely-operated vehicle (air, land, or sea) which is capable of providing tactile warnings of approaching obstacles and threats to operators through their controls, or a training simulator that allowed participation in training exercises providing real-time, realistic feedback from operators in remote facilities across the country.

That is exactly what Iris Dynamics can provide using their innovative magnetic technologies. The Victoria-based company has invented a state-of-the-art solution called "Magnetic Force-Feedback" that replaces complex and expensive mechanical systems found in traditional force-feedback (control loading) systems with precisely controlled magnetic fields.

Iris Dynamics was originally spun out of work being done at both the University of Victoria and the University of British Columbia. The company had their start in aviation simulation training equipment while CEO, Patrick McFadden, operated a small commercial air service and realized the need for lower cost and higher reliability force-feedback in the industry.

"The idea was to build a better control-loading flight yoke for flight simulation equipment," McFadden told CDR. "Over time the technology was incorporated into various applications, including actuators, rudder pedals, cyclics, joysticks, as well as other applications." Iris's technologies - actuators and joysticks - have been used with great success in various flight simulation/training applications, Olympic sports simulation/training applications, theme park rides, virtual reality, and other human-interface applications.

As a young technology company in Canada, Iris credits much of their success to the support of leaders from Defence and Aerospace industry, as well as the support of government programs and events.

"The support from within Canada in our industry was crucial in the early years of business," said McFadden. Iris has also received substantial support from the NRC, NSERC, Mitacs, and AIAC Pacific to develop and promote their technology. Without the support of such programs and organizations, McFadden said he isn't sure where the company would be today.

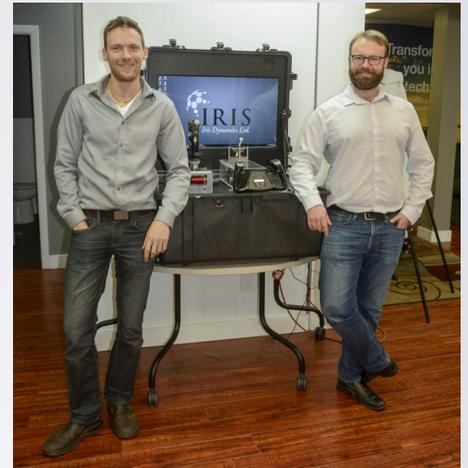
"Since inception, an important piece of our company has been not only representing our country proudly on a global scale, but also keeping a focus on business in Canada. We pride ourselves on business decisions that support the Canadian economy as much as possible," said McFadden. Strategic partnerships, such as with Victoria-based simulation & training company RaceRocks 3D (previously profiled in SME Corner), have given Iris opportunities to provide comprehensive solutions to the defence industry already.

GAME CHANGING TECHNOLOGY

"Control systems, such as joysticks have become an integral part of modern life, however, today's devices usually do not provide force-feedback," said McFadden. "Tactile feedback has been shown to yield faster reaction times and greater recognition in high stress environments compared to visual or audible cues. Magnetic force-feedback can vastly improve the operator situational awareness by letting the operator feel the physicality they are controlling."

The secret behind Iris' magnetic force-feedback technology is the use of active magnetic fields to replicate a very wide variety of forces using software commands. Traditional force-feedback systems have been used in the aerospace and defence industry dating back to the 1950s in the CF-105, but such traditional solutions have very complex mechanical systems, including gears, hydraulics, external processors, or pulleys.

Iris's technologies provide a higher resolution "feel" with only one moving component. Its functions are designed using sophisticated proprietary mathematical



Iris Dynamics CEO, Patrick McFadden (right) with CTO, Kyle Hagen

multi-physics software that interpolates and optimizes the interactions of magnetic fields. This technology fundamentally changes the way assets are controlled thus reducing power consumption and providing silent tactile operator force-feedback, all while drastically lowering costs, eliminating maintenance, and significantly reducing the risk of mechanical failure.

A WIDE RANGE OF APPLICATIONS

Magnetic Force-feedback can be applied in a wide variety of applications. Iris' linear actuators are designed for human-interface applications, and have continually outperformed servo-motor technology in both cost and performance. By using the static and generated magnetic fields in devices more efficiently, Iris Dynamics is providing the world with a competitive, low-voltage, direct-drive solution to control loading and motion control.

While traditional passive joysticks and thumb sticks require the operator to rely solely on a computer display for all of their situational awareness, Iris technologies make this a thing of the past.

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One interesting project in the works at Iris is bringing magnetic force to UAVs for first responders. Currently, when a fire crew arrives at the scene of a fire, they will deploy a UAV overtop of the fire for monitoring. As the UAV moves around the fire it may encounter strong updrafts and downdrafts. Modern UAVs automatically compensate and remain solidly locked in position. To accomplish this, the aircraft may need to double the output of its engines which results in halving its flight time.

Replacing legacy controls with Magnetic force-feedback controls allows the operator to “feel” the change in engine output by replicating engine RPM as small oscillations through the stick. The stick will also let the operator remotely feel the updrafts and potential collision hazards, ultimately increasing situational awareness.

Iris has proven its technologies time and time again. Of particular note was Iris’ participation in NASA’s Ground Collision Avoidance Technology programs at Edwards AFB. The company helped capture pilot data on the ground in order to test the efficacy of various human/machine interface designs. Iris’ products are also being used by the 136 Airlift Wing in Fort Worth, Texas, as well as in several laboratory applications with Boeing, LHM Technologies, Airbus, and the FAA.

THE FUTURE OF MAGNETIC FORCE FEEDBACK

Currently, Iris Dynamics is in talks to license their technologies to several companies, specifically for helicopter and other aerospace control applications. Due to the high adaptability of Magnetic Force-feedback technology, it is ideally suited for the harsh conditions often found in Arctic and marine applications.

Iris is continuously looking for opportunities to apply magnetic force-feedback in new applications and believes strongly that their technology can be incorporated into more applications in the defence sector. “The defence industry has always been at the forefront of technological innovation, often being the major driver behind those advancements,” says McFadden. “More and more companies in the industry have reached out to us as we continue to advance our technology and grow as a company.” ■

Joetey Attariwala is CDR’s Senior Staff Writer and Aviation Editor

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