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THE TETRA SOCIETY OF NORTH AMERICA: CUSTOM ASSISTIVE DEVICES

Slip sliding away over household barriers

GOING MOBILE: DEB KESSLER SHOWS HOW SHE EXITS HER APARTMENT WITH A LITTLE TETRA INGENUITY. SHOWN WITH DAUGHTER AMBER AND SERVICE DOG KELSO.

KAMLOOPS: Tetra was approached to devise a series of projects to allow a 53-year-old Kamloops woman more freedom to move around her apartment.

Interior Health Authority occupational therapist Philippa Coxon approached Tetra Society Kamloops volunteer Ralph Adams with a concern that her client, Deb Kessler, could get trapped in her apartment in an emergency. She wanted to enable Deb to get out of bed unaided, help herself from the floor when she falls, and exit safely.

It turned out that Deb, who lost both arms in a farming accident, uses the resulting Tetra devices every day as they improve her independence.

"When I had my accident I went through a period of 10 or 12 years adjusting and becoming accommodated to being without arms," she said.

"I'd been helping my partner on the farm. We were digging post holes and I got caught on the power take-off shaft on the tractor. I lost both arms above the elbow. I also dislocated both knees, broke several ribs and my legs in several places — I was pretty messed up."

The first issue was being able to get out of bed when daughter Amber was not around to help. Because Deb sleeps in a motorized reclining chair, Adams created a foot-operated switch which he wired into the remote.

The big challenge was helping Deb exit her suite past the 15-inch patio transom — the main entrance, due to stairs, is even less accessible. Adams came up with the idea of a stool that Deb could push into place, then sit on and shuffle along.

"Think of it as a piano stool, on large wheels, and with an overhang of 12 inches," he explained.

"She uses her foot to push it into place so the overhang is over the lip of the door. Then she sits down. The wheels go back up and the chair moves down an inch and sits hard on the floor, and the overhang locks over the transom. It's stable enough to slide over."

Next was a transfer stool to help Deb, who has poor balance, get back on her feet whenever she falls. This involves a ramp that clips onto the side of a custom-built 19 ½ -inch stool, which, along with the stool was prayed with non-staining woodworker's silicone lubricant.

Deb's service dog, Kelso, helps open and close the door, and moving the transom bench.

"He knows 89 commands. I went for a border collie because I could get him to climb onto something and then come back down.

"The project means I can also let Kelso out for a comfort break. He does so much for me I want to look after him to the best of my ability."

Meanwhile, Ralph Adams, who also coordinates the Kamloops chapter, needs to recruit volunteers. If you can help, contact him at 250-828-0558 or tetrakam@telus.net.

CALGARY CHAPTER BUILDS OWN WORKSHOP

CALGARY: Tetra's Calgary chapter has a new resource at its disposal — a fully equipped workshop.

The Calgary Tetra volunteers were given the workspace in early October, along with $20,000 of donated equipment and a $7,200 Rick Hansen Foundation grant, said volunteer Brad Clements.

It will be equipped for metal and plastic fabrication, along with woodwork, and fitted out for welding, working with plastics and spray painting.

"What our volunteers really wanted to do was create a space where they could complete more technical projects — things a bit beyond the scope of their home workshops," he explained. " The other issue is volunteers looking to downsize their homes and move into a smaller place that might not have shop space.

"It will also make consulting with clients easier. They can bring the client in and fabricate the part right there and then, which means less driving around."

Spin-offs of the project might involve allowing the chapter's 12 volunteers to mentor students, and enabling clients to take supervised workshop courses.

Murphy lays down the law

STRAIGHTSHOOTER: DOUG BLESSIN PUTTING HIS TETRA-ENGINEERED SHOOTING TABLE THROUGH ITS PACES.

HALIFAX: The new coordinator of the Halifax Tetra chapter is anything but new — Kevin Murphy has been a board member the past seven years.

He's also received Tetra projects as a client, and, going further back, instigated adaptations to a ride-on lawnmower, so he knows how the adaptive engineering process works. In addition, he's currently employed by the Rick Hansen Institute as community partnership coordinator, which has seen him working with Tetra volunteers across Canada.

Murphy, 41, became quadriplegic in a 1985 hockey accident — soon finding "there is no disability-related challenge that you cannot overcome." The answer lies in a combination of "determination and technology, or useful design."

An early project of his, adapting a John Deere lawn tractor to hand control, was featured in a Canadian Paraplegic Association magazine 11 years ago. Murphy is still getting calls from all over North America from people looking to do the same.

He came across Tetra when looking for a device to attach a 35mm camera to his wheelchair, and joined the board of directors shortly afterwards. A 2007 project enabled him to play street hockey with his son, then aged four, which was featured in the Fall 2007 *Gizmo* edition.

"Both projects were very simple but very effective — something you could not get in a store. It's so refreshing as a person with a disability to be connected to a person with the technical skills and thought process to come up with a solution."

Murphy became coordinator Aug. 1 this year, replacing Audrey Peake who has steered the chapter for the best part of 15 years. The chapter produces between 40 and 50 projects a year, with current requests including three separate calls for modified PlayStation controllers, a transfer board, a toboggan for a six-year-old, modifications to enable a lady with MS to open her fridge and a wheelchair-accessible woodworking bench.

TETRA ON TARGET WITH SHOOTING TABLE

VANCOUVER: Tetra hit a bullseye with a project for a sharpshooter with an eye on the Paralympics.

Doug Blessin, 38, of New Westminster, took up target shooting in 2009, and within a year was representing his country at international events as a member of the Canadian National Adapted Shooting Team.

A C-6/7 quadriplegic following a December 1995 auto accident, Blessin competes in the 10-metre air rifle class, using a wheelchair-mounted shooting table.

"I used to play wheelchair rugby before we had children," he explained. "Now I'm getting older and don't want to punish my body so much.

"I needed a sport I could be competitive at. I don't like to do things in a sports regard unless I can do them really well. I'm not a hunter, but I did try target shooting as a kid, and people said I shot very well."

Before he quite knew it, he'd ordered a competition-standard air rifle from Walther Airguns, Germany, and a fellow shooter from his range — in the basement of the Arenex at Queens Park in New Westminster — had offered to build a shooting table.

He quickly outgrew the table, which was becoming rickety, so wondered if Tetra could take a shot at it. The new table would need to be lightweight, stable, and designed so that Blessin could assemble and adjust it as required — and be of regulation proportions to be legal for use in competition.

Tetra Vancouver volunteer Ryan Jackson, who had shot competitively in the Air Cadets as a teenager, took up the project.

"Part of the challenge was posed by the regulations and part was the need for portability," said Jackson. " The table he had been using was a big, solid piece of aluminum, weighing around 30 lbs — the new one is around 5 lbs.

"It gave me the opportunity to work in a new medium: foam core plywood. There was a lot of machining involved — wherever a bolt went in, there had to be a machined insert, as you can't bolt into foam.

"Making the table adjustable was a challenge. I went through four designs, and one day I was sitting looking at a bicycle and noticed it had a quick-release mechanism for the seat — and had a eureka moment! Someone else had already worked it out and perfected it."

The completed table is kidney-shaped, 50 cm wide by 25 cm deep at its largest, attaching to Blessin's wheelchair via semi-permanent brackets. It is level to within one degree, and can be easily adjusted via quick-release latches.

He has put it to use, in practice and competition – Blessin represented Canada at the International Paralympic Committee's Shooting World Cup in Fort Benning, Georgia, in early October.

Blessin needs to secure a tally of first and second spots at world championships in order to land a place at the Paralympics – which is currently in his sights.

"The shooting table is an unbelievable piece of equipment," added Blessin. "Ryan did an exceptional job with it."

Taking Tetra onto the campuses and into the future

CART BLANCHE: STUDENTS FROM MEMORIAL UNIVERSITY, LED BY PROFESSOR JAMES YANG, DEMONSTRATING THE GARDEN CART LEVER BRAKE.

Today's engineering students will build the world of tomorrow – so it makes sense for Tetra, an organization that prides itself on innovation, to be making inroads on campuses.

The Tetra Society is currently working with universities across Canada to both teach and test engineering students. It's win-win, with Tetra clients receiving innovative projects and the students involved getting a real-world test of their learning.

Dr. Leonard Lye, associate dean of the Faculty of Engineering and Applied Science at Memorial University of Newfoundland, has been running the St. John's Tetra chapter since 1996 — all along bringing students in on appropriate projects.

He most recently challenged his first year students to add a braking system to a riding garden cart used by a St. John's woman in her early '60s, Patricia Power, who has poor balance and only the use of her right arm following a stroke.

"The solution seems simple, now — but it took a long time and a lot of effort to come up with something so simple," he said. "It's a lever-operated friction brake."

Several teams of students worked on the project, before picking the "most do-able" solution. This final design was supported by three-dimensional assembly drawings and parts lists, with the brake system fabricated and then tested with the client.

Dr. Lye presented a paper, *Incorporating Real-Life Open-Ended Design Projects in a First Year Design Course*, based on this and other Tetra projects at the Canadian Engineering Education Association Conference, held in St. John's in June 2011.

"Whenever there is a Tetra project, if I feel the scope is wide enough for students I get them involved," he explained. " The lower tech stuff I give to the first year class.

"One of the requirements of engineering programs is something called engineering design. This involves open-ended projects. All Tetra projects are open-ended because no-one knows what the solution is beforehand. The students are working on a real problem.

"It's difficult for a prof to come up with a project for students that's realistic, not contrived. Tetra projects are ideal. There's a person involved, and the students feel more motivated to work on the project — they feel they are contributing to society."

TAKE A BRAKE: TETRA CLIENT PATRICIA POWER PUTTING THE CART THROUGH ITS PACES.

Dr. Lye completes the simplest projects himself in his basement — as the "scope has to be wide enough, and the project complicated enough for a group of five to six students."

Also participating in the June engineering conference was Dr. Philippe Kruchten, who holds the NSERC chair in design engineering in the Electrical and Computer Engineering Department of the University of British Columbia, in Vancouver.

This is the third year that UBC has worked with Tetra, as part of the interdisciplinary capstone project, which all fourth year mechanical engineering students must complete. Students are currently working with Tetra on three projects: a motorized scissor-lift that can raise someone in a wheelchair or scooter over household steps, a motorized arm that can bring a rear-mounted wheelchair backpack around and within reach of its owner, and a portable wheelchair wheel cleaning system.

"In order to graduate from an accredited program, engineering students must do a capstone project to show they have acquired a wide range of engineering skills from design to project management," said Kruchten.

"Profs can use graduating students as slave labour for some weird idea they want to try out and the experience is not all that great, but we want to have a more meaningful capstone project, working for a real client. Students are getting experience outside the school, and they feel good about doing something meaningful."

Students work individually or in small teams, with outside groups, to give them a feel of "working for a real client." The project shows they can work within regulations, budget and deadlines, and the engineering department ensures that experts outside the school are on hand to advise and inspire their work.

"When working with the Tetra Society there is a real problem, and people with that problem are local, and students can speak to them. The capstone projects are inter-disciplinary without being too big and complicated."

He said capstone projects such as these will be featured in the soon-to-be completed Wayne and William White Engineering Design Centre on campus. This $6.6M development "is expected to raise significantly the profile of engineering design across the faculty and the campus," states a UBC profile.

Meanwhile, fourth year engineering students at University of Calgary have a relationship with that city's Tetra chapter. This is their second year of working together.

Currently, they have the challenge of devising a functional bedside storage system for a Calgary high-level quadriplegic, Barry Lindemann, outlined volunteer Brad Clements.

"It's very difficult to design meaningful storage for someone with no hand function," said Clements. "It's giving someone the opportunity to put something away and close the door on it –people take for granted that they can just open a drawer and see what's there, but what if you have no arm function?

"We gave the students a list of things that needed to be done, and they selected this. The students bid on them."

He said the students were considering at least one additional project.

"Ultimately, universities want real-world problems," he added.

TETRA ROUND-UP

CHANGING TIMES: TETRA VOLUNTEER JOHN CONNOR'S FOLDING CHANGE TABLE.

MAPLE RIDGE: As it's often the simplest projects that make the greatest difference, it comes as no surprise that a fold-out wooden change table has been in constant use by a woman caring for three children with disabilities.

Long-serving Tetra volunteer John Connor built it for a Maple Ridge woman who is providing foster care for three children between six months and four years of age. It enables her to bathe them and change diapers in a small bathroom.

His device clips up against the wall until required and then folds out over the sink and toilet. Ingeniously, the latch mechanism is based on a security catch from an external door.

"She uses it every day to change the kids," said Connor. "It's secure: one end is attached to the wall with a hinge, there is a support leg that goes over the sink, and on the far wall, above the toilet, I put a strip of wood to support it.

"To me the project is so simple it doesn't merit a lot of explanation. However, the client is very satisfied with the project and uses it every day."

The client is looking into a follow-up project, a wheelchair elevator built into the back porch, as she currently has to physically lift the children into the house. She is currently waiting for input from the BC Ministry of Children and Family Development.

HELP US TO HELP

If you — or someone you know — can make a donation to Tetra, please check out the orange *How you can help us* box on the Tetra website homepage (www.tetrasociety.org).

Donations are tax-deductible.

TETRA CHAPTERS

Abbotsford/Mission, BC
John Connor
info@tetrasociety.org
604-820-0568

Armstrong, BC
Gary Arbuckle
arbuckle@sunwave.net
250-546-6449

Cranbrook/ East Kootenay, BC
Russ Kinghorn
Russ.Kinghorn@
kinghornsystems.com
250-426-2158

Creston, BC
Andre Hebert
kayaker2@telus.net
250-866-5518

Fort St. John, BC
Perry Leonfellner
leonfellner@shaw.ca
250-264-2192

Kamloops, BC
Ralph Adams
tetrakam@telus.net
250-828-0558

Kelowna, BC
Pat Tweedie
ptweedie@tetrasociety.org
1-877-688-8762

Nanaimo, BC
Pat Tweedie
ptweedie@tetrasociety.org
1-877-688-8762

Prince George, BC
Contact head office
info@tetrasociety.org
1-877-688-8762

Prince Rupert, BC
Contact head office
info@tetrasociety.org
1-877-688-8762

Salt Spring Island, BC
Derek Emmerson
demmerson@shaw.ca
250-537-9351

Trail/Castlegar, BC
Jim Rees
jmrees@shaw.ca
250-364-1878

Vancouver, BC
Pat Tweedie
ptweedie@tetrasociety.org
1-877-688-8762

Vernon, BC
Contact head office
info@tetrasociety.org
1-877-688-8762

Victoria, BC
Pat Tweedie
ptweedie@tetrasociety.org
1-877-688-8762

Whistler, BC
Hugh Tollett
info@whistlerforthe
disabled.com
1-877-688-8762

Calgary, AB
Kim Beckers
tetracalg@yahoo.com
403-259-5783

Edmonton, AB
Mike Otto
mike@mikeotto.ca
780-977-6453

Lethbridge, AB
Chris Schamber
hatesnow@quaddesign.ca
403-381-7450

Medicine Hat, AB
Maxine Tindall
tinker046@hotmail.com
403-488-1322

Red Deer, AB
Jim Stone
jstone05@telus.net
403-438-0172

Regina, SK
Terri Sleeva
tetraregina@sasktel.net
306-545-7378

Saskatoon, SK
Contact head office
info@tetrasociety.org
1-877-688-8762

Winnipeg, MB
Contact head office
info@tetrasociety.org
1-877-688-8762

Guelph, ON
Leanne Conrad
tetraguelph@gmail.com
519-836-6656

Hamilton-Halton, ON
Sylvia Baliko
sbaliko1@sympatico.ca
905-319-2843

Kingston, ON
Grant Bell
Grant538@gmail.com
613-538-9762

London, ON
Wilma McIntyre
tetralondon@rogers.com
519-453-5005

North Eastern Ontario, ON
George Ewen
metalmuncher49@gmail.com
1-877-688-8762

Ottawa, ON
Contact head office
info@tetrasociety.org
1-877-688-8762

Peel Region, ON
Matthew Fleet
Matthew.fleet@sympatico.ca
905-814-8789

Metro Toronto, ON
Contact head office
info@tetrasociety.org
1-877-688-8762

York Region, ON
Anu Missar
tetrayorku@hotmail.com
647-880-1028

Trenton, ON
Gary Richard
grichard@reach.net
613-398-0505

Windsor, ON
Sharon Lumsden
windsortetra@sympatico.ca
519-735-8763

Montréal, QC
Contact head office
info@tetrasociety.org
1-877-688-8762

Fredericton, NB
Christine Plourde
cplourde@craworld.com
506-462-7662

Antigonish, NS
Cyril MacGillivray
Cyril.macgillivray@strait.
ednet.ns.ca
902-870-3054

Halifax, NS
Kevin Murphy
tetrahalifax@ns.sympatico.ca
902-860-1995

St. Johns, NL
Dr. Leonard Lye
llye@engr.mun.ca
709-753-0733

Los Angeles, CA
Dr. Sam Landsberger
slandsb@exchange.calstatela.edu
1-877-688-8762

San Diego, CA
Peter Newman
pcnewman@earthlink.net
858-232-4038

San Francisco, CA
Pat Tweedie
ptweedie@tetrasociety.org
1-877-688-8762

Salt Lake City, UT
Kent Remund
kremund@gmail.com
801-448-6107

Cincinnati, OH
Christopher Kubik
coordinator@may-we-help.org
513-248-4045

Columbus, OH
Russ Weir
weir.russ.linda@att.net
1-877-688-8762

TETRA SOCIETY OF NORTH AMERICA

Have an idea for a project? Want to know what's possible? Want to overcome a barrier?

Here's how to reach us...

T: 604-688-6464 / 1-877-688-8762 (toll-free)
F: 604-688-6463
E: info@tetrasociety.org
www.TetraSociety.org

Tetra Society of North America Suite 207 - 3077 Granville Street, Vancouver, BC V6H 3J9