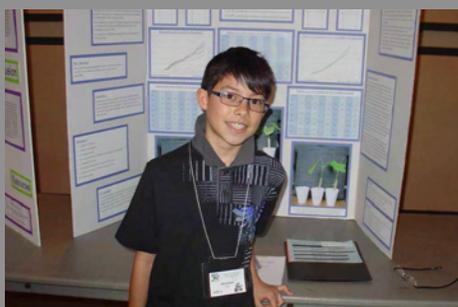
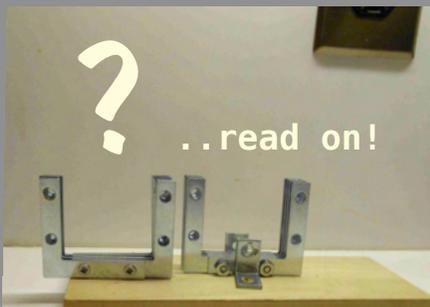


The TISP Canada Courier #2



April 15, 2012

IEEE Symposium on Pre-University Teacher Training

Meeting in Florida, USA, will gather supporters worldwide and mark TISP's 10th Anniversary

This May features an exciting event on the TISP calendar when supporters of the Teachers In-Service Program will convene in Tampa, Florida, USA, for a very special IEEE Symposium on Pre-University Teacher Training. Made possible by an IEEE Foundation Grant, the Symposium will recognize the

first ten years of TISP and serve as a forum for volunteers from around the world to help shape the future of this IEEE Program.

The meeting will take place at the Tampa Airport Hilton from May 18 to May 20.

Topics of discussion are plentiful. Here are just the main topics that the participants will address:

- ◆ *Successful approaches to implementing the Program locally*
- ◆ *Follow-up activities with teachers to measure effectiveness of the in-service presentations*
- ◆ *Opportunities for the Program in developed and developing countries*
- ◆ *Recommendations for enhancing volunteer training.*

In addition, participants will apply their technical expertise to develop new hands-on TISP activities that will support teachers in their classroom instruction. 

For further information contact

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Content

Issue #2

April 15, 2012



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Message from the IEEE TISP-Canada Chair

Anader Beyamin-Seeyar reflects on past, present and future of TISP-Canada



With the TISP-Canada Committee approaching its second anniversary, I take this opportunity to reflect on what we have done, and share my vision of where we go from here.

I am extremely pleased with the teams we have built within

all parts of Canada. Through their skill and hard work, we've delivered highly successful workshops locally, provincially as well as nationally. These workshops have been a forum for us to share our technical knowledge and hear first-hand the day-to-day challenges of science and technology teachers. Many of our volunteers have also worked directly with local schools and school boards.

I believe the strong foundation we've built together will allow us to expand our mission. Fortunately, we have no shortage of talented, dedicated and strongly motivated individuals to support this. Where new initiatives will require re-assignment of those who've been leading current activities, I have no doubt those stepping up will more-than-capably discharge their new responsibilities.

Our highest priority new project will be representation at all major teacher conferences across the country. Our goal will be to present "tried-and-true" curriculum-confirming lesson plans, engage teachers one-on-one at our booths, and connect them to the closest section's TISP volunteers. This is already familiar territory for some of our TISP Champions. The long-standing participation by IEEE volunteers at the Science Teachers' Association of Ontario (STAO) annual conference can serve as an excellent model for working with other teacher association conferences. We can also build on the experiences of more recent partnerships established

by volunteers at similar conferences in other parts of the country. In addition, we will work towards establishing agreements with school boards to encourage, support and recognize those teachers willing to advance their students' career paths by participation in TISP activities. Patrick Finnigan is assigned to head this portfolio with full support from David Hepburn, Murray McDonald, Dennis Cecic, and other committee members. A special "thank-you" is in order to Cathie Lowell for numerous rounds of looking after the STAO booth.

We will still be mounting local engineering workshops separate from teachers' gatherings. Such events can be very effective spring boards for teachers to develop new programming, or directly inspire students to consider careers in science or engineering. The planning and delivery of these activities can also draw in new participants to sections' TISP committees. Examples to date include the annual Math Kangaroo Competition program, led by Rossitza Marinova and Mooney Sherman of Northern Canada Section; TISP contributions to National Engineering Week in Nova Scotia, led by Dirk Werle; and, engineering workshops and conferences in Winnipeg, led by Witold Kinsner. Thank you for the excellent work!

As you read this second edition of the *TISP Canada Courier*, you will note a continuation of the professionalism established in our inaugural edition, published in December. Thanks to the TISP Champions and others who have contributed to its high quality content, and to our excellent editors: Dirk Werle, Patrick Finnigan and Bruce Van-Lane. Moving forward, Dirk Werle will be assuming the helm as Editor-in-Chief, with the support of Co-Editors David Hepburn and Murray MacDonald. Bruce will still continue his professional support in all aspects of the *Courier's* development. The publication and distribution of the *Courier* remains a

key initiative of TISP-Canada, serving as a platform to extend its outreach in Region 7, and encourage IEEE Membership at large in fulfillment of TISP's mission. We look forward to sharing ideas with similar publications that may be launched by other IEEE Regions in the near future.

Finally, I would like to thank Patrick Finnigan for his professional secretarial work for all monthly telecom calls and his accurate minute-taking. Many thanks for a job very well done. As Patrick is being assigned to a new portfolio, Mooney Sherman and Rossitza Marinova have accepted the invitation to become our new Secretaries for TISP-Canada conference calls and all other gatherings; they will back-up each other as required.

I am most proud to be working with my dedicated team within TISP-Canada, in collaboration with IEEE EAB / TISP Management. Let's keep the excellent momentum for this year and more to come. As a united team, we will continue, through our TISP initiatives, the all-important mission of mentoring and encouraging the next generation of engineers and scientists.

Thank you all.

Anader Benyamin-Seeyar

Chair, TISP-Canada Committee
anader.benyamin@ieee.org

TISP Reports from the Regions

TISP-Canada relies on active participation from all regions of the country. These columns report on recent work, trials and accomplishments of TISP volunteers across the country.

British Columbia

The Vancouver Section of IEEE Canada is coordinating the students, teachers and research (STAR) outreach initiative at *Women in Engineering*, WIE. The program was designed to introduce high school students to career options in engineering and present them with female role models. The program also gives students an opportunity to try a hands-on engineering design project. For details see: http://vancouver.ieee.ca/meet_an_engineer

Ontario

The IEEE Kingston Section and its TISP Champion Umar Iqbal, has arranged a series of lectures for the robotics club. Basel Nabulsi, a doctoral candidate at Queen's University, has taken the initiative to R.G. Sinclair Public School and delivered three sessions after the schools hours to Grade 6,7 and 8 students of the robotics club. The students were

excited; one student said "*I want to become an engineer specialist in robotics and navigation!*".

Moreover, Basel has devised a detailed syllabus before starting the lectures. He is working in a very friendly environment with students and is actively engaging them during the lectures. The activities have the full support of IEEE Kingston Section and its Chair, Dr. Yousefi. For further information on the lectures and the syllabus contact Umar Iqbal and Basel Nabulsi at um_ar@ieee.org

Nova Scotia

In Nova Scotia, the IEEE Canadian Atlantic Section is responsible for a number of TISP activities. A TISP Committee has formally been incorporated into the Section's monthly meetings to lend logistical support, a wealth of experience and connections to educators in the Province. Recent highlights include TISP contributions to National Engineering Month, judging at student competition projects, and planning future events at schools outside the Halifax metropolitan area. Contact the IEEE Canadian Atlantic Section's TISP Committee chair Dirk Werle in Halifax for further information at dwerle@ca.inter.net.

A working transformer in 30 minutes? You bet!

TISP Canada members took the initiative to develop and test a new module and prepare a detailed lesson plan for teachers to use in their classrooms

Members may be interested to know that among all 97 (count them) detailed lesson plans available on the Net, there is nothing about either transformers or motors. *Nada*. When this embarrassing state of affairs first came to light last year, Pat Finnigan and Dave Hepburn resolved to take the matter in hand. First up, partly because it was the easier of the two, was the transformer. After some tinkering and false starts a crude but workable demonstration unit was developed. The individual components are illustrated below.

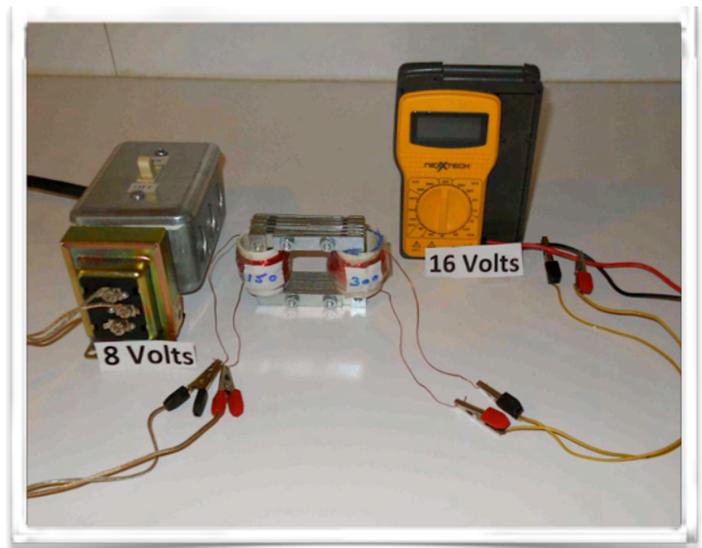
The core (photo below, at left) comprises 24 small steel corner brackets measuring 2"x 2", assembled into a square shape and clamped together with four small nuts and bolts. The two coils each comprise #26 magnet wire wound on short lengths of 1" diameter plastic water pipe. For simplicity, a 2:1 turns ratio was selected, with one coil having 400 turns and the other 200 turns. As an option, the assembled unit can be mounted on a piece of wood. No fancy terminals and no soldering is required, just scrape the varnish off the tag ends with a sharp knife.

Naturally an a.c. power source is required, and for classroom safety a very low voltage is a must. The solution to this is a "Bell Transformer" such as are used to operate domestic door chimes. These step the 120 V domestic supply down to 8 volts. Some bell transformers have additional taps for outputs of 12 and 16 volts. In the interest of safety these should be blocked off, so that with 8 volts, the maximum output with a 1:2 step-up would be only 16 volts, which is considered perfectly safe, for children of this age bracket.

The written text for this lesson, as currently drafted, runs to 10 pages, and covers basic electro-magnetism, including an illustration of one of Faraday's early experiments. It will also include several photographs of large present day transformers, such as the impressive 200 MVA specimen shown on page 5.

It is proposed to use this demonstration at this year's STAO conference with the objective of getting feedback from the teachers. We figure the whole

(continued on page 5)



(Transformer, continued from page 4)

thing could be built by a three-person team in 30 minutes. One to assemble the core and two to wind the coils. We figure that #26 wire is about as small as you can go. Anything smaller is so small you can hardly see it!



Humming a bit louder, this is the utility-sized version.
Photo courtesy of Pennsylvania Transformer Co.

And how well does it work? Not too badly. Energised at 8 Volts, our assembly produces 15 Volts on the “High Voltage” side (see photo on previous page). For obvious reasons the principal limitation is the steel core which has many air gaps which reduce the overall permeability. The text of the lesson concludes with a list of discussion points concerning the limitations, the intention being that the students will learn from discussing these limitations.

But it hums like a transformer and vibrates like a transformer, so it must be a transformer.

Pat and Dave hope to get the text off to the review committee in Piscataway within the next month or so. Next stop will be to develop a similar lesson plan for an electric motor. That should bring the total number of lesson plans to 99. What the heck do we do for #100 ?? 🎓

If you are interested in this transformative experience or in developing plan # 100, contact Pat and Dave at pjfinnigan@gmail.com or dehepburn@sympatico.ca

IEEE and TISP

The Teacher In-Service Program provides a forum for IEEE volunteers to demonstrate engineering, science and mathematics concepts by sharing their real-world experiences with local pre-university educators. IEEE offers workshops for its volunteers on how to provide in-service programs.

Part of the IEEE mandate is to address declining interest of students in engineering. IEEE needs to help raise everybody’s awareness of technology. The “TryEngineering” initiative involves IEEE, IBM and the New York Hall of Science. To-date, **TryEngineering.org** lesson plans have been downloaded more than 3 million times. The site has various great features, including a search for accredited university and college programs in many countries, including Canada. A new **TryComputing.org** portal will be launched this year.

More information is available at www.ieee.org/education_careers/education/preuniversity/tispt



Have you tried www.tryengineering.org lately?

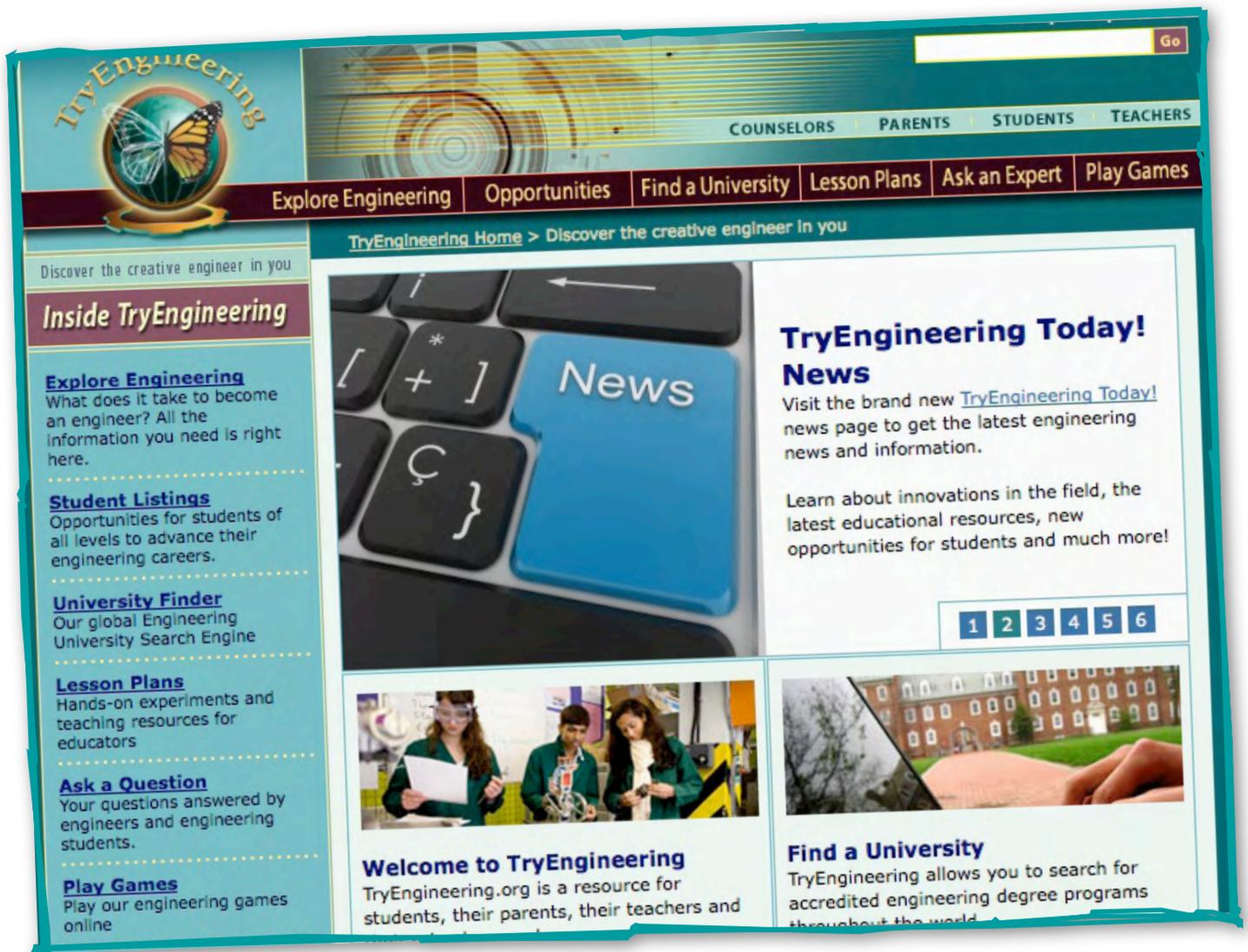
IEEE's source of information for counsellors, parents, students and teachers

Feature: "Find a University!"

The university search feature allows you to search for accredited engineering degree programs offered in Canada. Search by province, city, program, student body size, setting, and/or in-province/out of province tuition ranges. You'll generate links to each university's main page, engineering department, and admissions sites. You'll also view data such as room & board and university location.

If you need additional information about specific universities, we encourage you to continue your research by viewing the university web site or contacting the admissions or engineering departments. Program information was last updated in January, 2012.

TryEngineering has engineering and career resources to help students learn about and prepare for exciting opportunities in engineering. For further details see www.tryengineering.org.



Niagara District Science and Engineering Fair

TISP Canada Courier veteran contributor Dave Hepburn reports from the extraordinary anniversary of the fair which has been held 50 years in a row since its inception in 1962.

On Saturday, March 24 of this year I spent the day acting as one of the judges at the Niagara District Science and Engineering Fair. Note the inclusion of Engineering here. This event was the 50th in an unbroken series which commenced in 1962.

This year the location was at the Brock University campus in St Catharines. The exhibitors were students from the Primary and High Schools in the so-called Niagara Peninsula, which extends from just outside Hamilton, down to Fort Erie. The event is quite a complex operation. There were just over 180 exhibitors, ranging in age from about eight to 18. Each exhibit is reviewed by five judges, which means that in excess of 900 individual marking sheets had to be filled in and collated. In my particular case, I was assigned a total of 11 exhibits, of which eight were in French and three in English. This proportion should not be taken as indicating the French-English ratio in the district, but rather, a serious lack of French-speaking judges hereabouts.

As usual, there is a wide variation of topics that students selected, ranging (literally) from atomic physics to zoology. In my case, two in particular, were a challenge, one dealing with Epilepsy and another with Alzheimer's. Both in French. I just had to hope that the other judges were more knowledgeable in those fields.

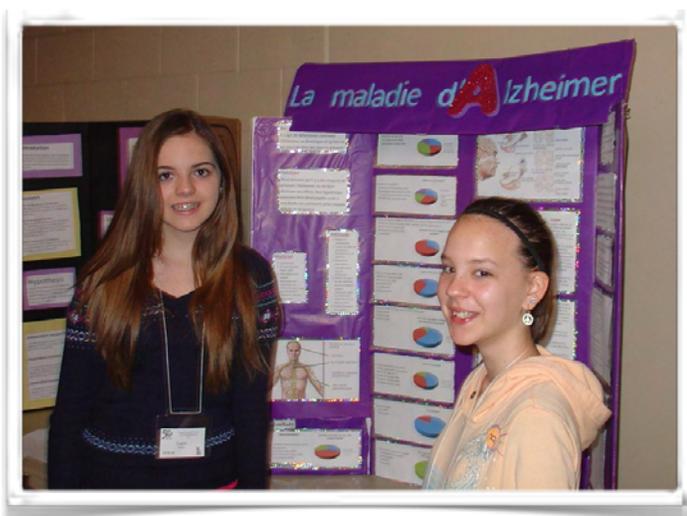
The format for grading is elaborate, with a two-page printed form containing no less than 24 different sub-categories. Here are the main categories: Scientific Thought 45%; Original Creativity 25 %; Visual Display 15%; Oral Presentation 8%; Report 7%

The forms as actually allocated to each project are printed on paper of five different colours, to ensure that each project has been reviewed by five judges.

As might be expected, the students are as varied as the subjects. Many are shy, while others are chatty. The shy ones are permitted to use cue cards to help with their verbal presentations. Teams are limited to two individuals, although some are solo efforts. The fair runs from 8 am to 5 pm. Noise level is high, and the room becomes hot as the day progresses.

But a good time was had by all, nonetheless. I even had the satisfaction of increasing the knowledge of one young fellow by a small amount, who did not know that, in contrast to most materials which contract as they get colder, when water gets to about two degrees Celsius, it actually starts to expand again, thus causing burst pipes in winter. ☔

For more detailed information on the Niagara District Science and Engineering Fair, have a look at their web site at <http://www.niagarasciencefair.org>

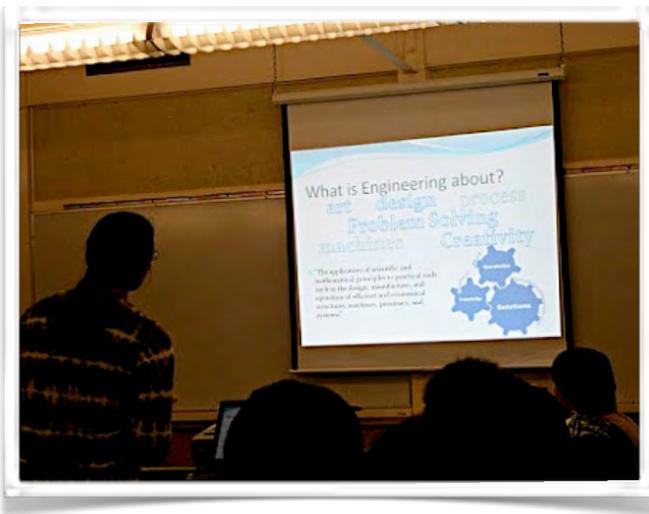


Two contestants and their exhibit at the Fair, putting our reporter's French language skills to the test.

“Meet an Engineer!”

IEEE Women in Engineering, WIE, champion Zahra Ahmadian reports on recent classroom experience in British Columbia.

IEEE WIE held four classroom visits in November and December 2011. They aimed at introducing students at the University Hill Secondary School in Vancouver to careers in engineering and building female role models. The session included a talk that was given by a female



“What is Engineering about?” - IEEE WIE volunteers introduce students in class to the engineering profession.



Discussions were lively and hands-on projects provided some practical experience.

engineering graduate student or engineer in training and a classroom activity that was planned and supervised by the teacher and two IEEE WIE volunteers.

During the activity (tryengineering "Ship the Chip") students were assigned the task of designing with the supplies provided suitable packaging to ship a single wedge of potato chips that can “survive” shipping. At the end of the session, the packages were tested by IEEE WIE volunteers and the winning team received a prize.

Surveys were made before and after the talk to measure the students understanding of the contents and all speakers were requested to follow pre-defined guidelines in preparing their talks. In the questionnaires, which were handed out before and after the talk, the students were asked to name up to five different disciplines within engineering. Our survey results show that, on average, students were able to name five additional engineering disciplines after the talk; the maximum numbers were five disciplines before the talk and 10 disciplines after the talk.

The students were also asked if they are willing to consider a career in engineering and sciences as one of their choices and if they knew what the high school requirements to apply for engineering are. From the surveys it was observed that:

- ◆ 58 % of the students were interested in a career in engineering/sciences before the talk;
- ◆ 22 % of the students who were not interested in engineering, changed their minds after the talk;
- ◆ 28 % of the students knew the high school requirements to apply for engineering before the talk;
- ◆ 85 % of the students who did not know before, learned the high school requirements from the talk.

For further information contact Zahra Ahmadian of IEEE WIE in BC at zahraa@ubc.ca 

High-altitude balloon flights buoyed by school-wide support

Robert Striemer and his colleagues at Winnipeg's Shaftesbury High School have lifted their students' enthusiasm for space research sky-high. But it's not just the science students that are coming along for the ride.

It's a pretty big picture from 126,000 feet. The horizon dissolves into the blackness of space, the earth clinging to mere wisps of atmosphere. Looking down, the kidney-like shape of lower Lake Manitoba, the Province's 3rd largest lake, is evocative of a backyard swimming pool.

On the ground, the vision propelling the Shaftesbury High Altitude Robotics Project (SHARP) is equally expansive. "We try to involve everybody," says physics teacher Robert Striemer, "not just those into the technology." Donations obtained through student fundraising support the program's continued expansion, now into its third year. "Students write the letters and fill out the grant applications. Then they thank those who have responded," Striemer says. "Other students make PowerPoint presentations and explain the science at our feeder schools. It's almost like a sports team, with the whole school cheering us on."

The balloons are launched from an airstrip near Riding Mountain National Park, about 250 km northwest of Winnipeg. Tracked by GPS and amateur radio, they can reach speeds of more than 160 km/hr. The first balloon to launch, SHARP-1 climbed to 107,348 feet before bursting. SHARP-2 pushed the "envelope" to 126,634 feet. The payloads safely parachute to ground, retrieved by students more than a little excited to extract the cameras' memory cards, and in the case of SHARP-2, also a radiation attenuation experiment.

Joining Striemer, SHARP's teacher coordinators include Adrian Deakin and April McKnight. Their

(continued on page 10)

The Teachers' Corner

The TISP community relies on feedback from educators. Tell your colleagues and our mentors what helps you teach science/technology better. Share your triumphs and trials, we welcome them both.



At top, in near-space at more than 120,000 feet, the SHARP 1's payload captured this amazing view of Manitoba. Earlier, the launch crew had readied the balloon and payload for lift-off roughly 250 km upwind of the school (photo below).



(**Balloon** continued from page 9)

journey of discovery into high altitude balloon flights began with the Manitoba Space Adventure Camp, spearheaded by long-standing IEEE Winnipeg section TISP champion Dr. Witold Kinsner. *Space Camp*, as it is informally called, brings together expertise of scientists and laypeople in engineering, science and other fields. “When we began looking at this idea in 2009, we really didn’t know where to begin,” Striemer says. “Through *Space Camp* we determined that using amateur radio for balloon tracking was more reliable and cheaper than using smart phones, plus offered students a whole new community for learning about science.” As SHARP’s student participants learn first-hand the gas laws and those

of thermo dynamics, Striemer and his colleagues have made discoveries of their own. Firstly, the great advantage of science activities that bring together all the grade levels. “The kids in grade 11 and 12 mentor those in grade 9 and 10. The grade level seems unimportant to them – they all have something they can share, and they are dependent on one another to make the flight a success.”

Secondly, tackling an ambitious goal can make it easier to get community support, says Striemer “You can’t fail if you think big. The bigger the problem, the more people you have to draw in – and the more your students will learn.” 

This piece contributed by Bruce Van-Lane, writer for this and other IEEE Canada publications.

Math Kangaroo contest-game in Canada

Noting the importance of math for engineering, Rossitza Marinova, an IEEE TISP Champion in Edmonton and Canadian Math Kangaroo Contest Vice-President, sent this *Courier* contribution.

Math Kangaroo is a broad-participation contest-game. Students in grades 1 through 12 are given the opportunity to participate in a non-selective competition with inspiring and challenging content. The impact of the contest on students is enhanced by various enrichment activities such as on-line and on-campus training sessions, workshops, clubs, and the production of related practice materials. Since joining the International Association "*Kangaroo without Borders*" in 2006, the Canadian Math Kangaroo has associated with many prestigious organizations and universities and continues to expand the reach and scope of its unique programs.

The international contest-game Math Kangaroo is indisputably the largest mathematics competition in the world. The game started in France in 1991 when two teachers, André Deledicq and Jean Pierre

Boudine, decided to organize the Australian Mathematics Competition, a very successful game-like test invented in Australia in 1978. The French organizers called it Kangaroo to pay tribute to the Australians. In 2011, the competition involved hundreds of mathematicians and over six million students from 46 countries.

The main purpose of the Math Kangaroo competition is to dispel the myth that mathematics is boring by creating a positive environment with fun events that emphasize the practical nature of mathematics. Problems are created to be attractive, entertaining and appealing to the students; nevertheless, they are rich in math content and provoke exploration of novel ideas and approaches. There are lots of questions from the area of applied

(continued on page 11)

(Math Kangaroo continued from page 10)

mathematics so that students can see how mathematics is used in real life.

This year, 2012, the number of participating students in Canada was 1780, almost 400 more than last year. Canadian students competed in six grade categories. More than 1000 students across Canada were involved successfully in training (online and on-campus), which is worth much more than the real contest participation. The training component is becoming a network of math enrichment activities for diverse audiences, which contributes to de-demonizing and promoting of math and science.

All contest activities build a sense of community and provide enjoyable experience to everyone involved: by creating a welcoming environment for the program; by providing small souvenirs for all participants; by inviting prominent mathematicians to share the celebrations of students' excellence; and by incorporating music and art performances in the award ceremonies. Activities are family-oriented.

The Canadian Math Kangaroo has its unique place among the outreach programs in Canada, and as such, it has been recognized and supported by reputable national and regional, academic and professional institutions. Nine Canadian universities hosted the 2012 competition.

The positive feedback Canadian Math Kangaroo received from parents, students, teachers, and communities proves that its activities are in high

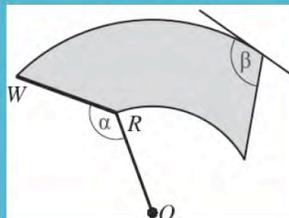
demand. Some of the needs merge with the broader call for increasing the overall mathematical, scientific, and technological literacy and skills of young Canadians. Delivering high quality year-long training programs across Canada, and providing students with opportunities to express themselves in competitive events and informal communications, significantly contributes to improving their analytical skills and helps



SAMPLE PROBLEM

(2011, Grade 11-12, Group B) The rear windshield wiper of a car is constructed in such a way that the wiper blade RW and the connecting rod OR are of equal lengths and are joined at a constant angle α . The wiper pivots on the center O and clears the area as shown. Determine the angle β between the right-hand edge of the cleared area and the tangent of the curved upper edge.

- (A) $(3\pi - \alpha)/2$ (B) $\pi - \alpha/2$ (C) $3\pi/2 - \alpha$
 (D) $\pi/2 + \alpha$ (E) $\alpha/2 + \pi$



them build confidence, which, in turn, motivates them to advance and to look for new challenges and goals.

Engineers use math to build the tools that make our life more comfortable and enjoyable. Today's technology-driven world demands people who are proficient in math. No one believed that the algebra of two values (true-false, on-off, yes-no) George Boole invented would be used a hundred years later in the creation of electronic computers. We know today

that almost every computer ever built stores information and performs operations based on Boolean values. Every image is recorded as a sequence of zeros and ones using mathematical algorithms. Scientists and engineers use mathematics to build ships, trains, and aircrafts. Whenever you fly, mathematics is used to navigate the plane to the destination.

Young Canadians need to learn math and we can do something about it! 

For more detailed information have a look at <http://kangaroo.math.ca/>

IEEE Educational Activities Board Awards Nominations

The IEEE Educational Activities Board is requesting your assistance in making 2012 the most successful year ever for IEEE Educational Activities Board Awards Nominations. Presently, the IEEE Educational Activities Board is seeking nominations for the 2012 awards in the following categories:

- ◆ Meritorious Achievement Award in Accreditation Activities;
- ◆ Meritorious Achievement Award in Continuing Education;
- ◆ Major Educational Innovation Award;

- ◆ Meritorious Achievement Award in Informal Education;
- ◆ Pre-University Educator Award;
- ◆ Meritorious Service Citation;
- ◆ Standards Education Award;
- ◆ Employer Professional Development Award;
- ◆ Society/Council Professional Development Award;
- ◆ Section Professional Development Award

Visit the EAB Awards Nominations web page at <http://www.ieee.org/eab-awards> (Deadline: 30 April)

For more information, e-mail: eab-awards@ieee.org

Some guidelines for contributors

Articles and news items are welcome and should be sent via email to the Editors.

The *TISP Canada Courier* accepts feature articles up to a length of 1000 words with suitable illustration material. Smaller news items should not exceed 500 words in length. Notices for upcoming events should be submitted in a timely fashion keeping in mind the quarterly publication schedule of the Newsletter.

Although the editors will usually consult with contributors regarding any significant change to material submitted, the *TISP Canada Courier* reserves the right to publish such material with any change(s) necessary to meet space requirements, or as otherwise deemed necessary.

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This electronic newsletter is issued quarterly by TISP Canada of IEEE Region 7. Current issues and back issues are available free of charge and may be retrieved at www.tispcanada.ca.

The editorial content of this magazine does not represent official positions of the IEEE or its organizational units.

