



THE  
UNIVERSITY OF  
BRITISH  
COLUMBIA

# ingenuity

Faculty of Applied Science  
Engineering News

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## Manufacturing efficiency

### Professor Yusuf Altintas yields productivity through precision

Cars, airplanes and engines—most people see these as merely necessary and readily available objects. Mechanical Engineering Professor Yusuf Altintas sees them as the end result of a complex metal cutting process, which is as much art as science.

"My research is about manufacturing," said Dr. Altintas. "We develop high performance, ultra-precision, computer-controlled machines and machining control systems based on the scientific principles of metal cutting, vibrations, solid mechanics, and control theory."

And when Dr. Altintas says precise, he means it. One of the machines in his laboratory offers metal cutting control down to a few nanometers, or close to one one-thousandth of a micrometer! His work is of great interest to automobile and aerospace manufacturing companies, such as General Motors, Pratt and Whitney Canada, Boeing, and Caterpillar, all of whom value the ability to be precise because it equates to huge cost savings and dramatically increased productivity.

For example, when Boeing manufactures an airplane wing, engineers start with a 120 kg metal block and gradually cut away 97-98% of the material until they are left with the first wing component that typically weighs about two and a half kilograms. Making a mistake anywhere in the machining process results in huge and extremely costly waste, particularly if the mistake causes damage to the cutting tools or machines.

"Our objective is to mathematically model metal cutting processes and machines using engineering science and principles. We have designed a practical



software system that simulates the manufacturing process. The program allows engineers on the floor to input machine measurements and select their tools and materials. Using this information, the program simulates machine operation in a virtual environment. The engineer can adjust machine speed, feed and various other characteristics based on the way the material and machine behave together, setting the stage for maximum productivity—all before any material is cut."

Dr. Altintas' virtual machining software is a commercial success with more than 40 product licenses being held around the world by companies such as Pratt and Whitney Canada, Lamb Technicon, Boeing Rocket Dyne, six Japanese tool manufacturers, the Sandvik Corporation in Sweden (largest tool company in the world), a number of research centres, and many others.

Dr. Altintas also develops precision machines, such as the "ultra precision peizo tool actuator," which can deliver motion to a tool tip to within plus or minus 20 nanometres. The actuator has been tested successfully with Timken Bearings and Pratt and Whitney Canada, where it eliminated the need for a secondary grinding station, which may save

# Message

## from the Dean

Welcome to the Fall 2001 issue of *Ingenuity*. You will note that this issue includes an expanded four-page section devoted to reporting on alumni reunions and events. This reflects the increased emphasis we are placing on alumni relations—in recognition of the great importance of this partnership to us. Over the past few months, I have had the privilege of hosting and attending events in Calgary, Edmonton, Seattle, Toronto, and Menlo Park in California, as well as several in the Vancouver area, and I have found these to be informative, beneficial and most enjoyable. A special thank you to our Alumni Relations Officer, May Cordeiro, who is making outstanding contributions in furthering alumni relationships and activities.

I would like to use this opportunity to highlight the changing face of engineering education at UBC. The University's visioning document, *Trek 2000*, calls for our students to be "exposed to learning that is interactive in process, facilitating two-way dialogue and 'hands on' experiences". The University's Academic Plan emphasizes "integrative, interactive, and experiential learning". And the 1999 report of the Canadian Academy of Engineering, *The Evolution of Engineering Education in Canada*, indicates that the undergraduate curriculum should emphasize "problem solving and design, and the development of the learning skills of students". Feedback from the Engineering Advisory Council, our alumni, industry partners and friends affirm the importance of these kinds of shifts in engineering education.

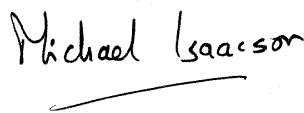
At UBC we are responding to these suggestions in a number of ways, most notably by increasing significantly project-based learning in our curriculum. This seeks to integrate the understanding of engineering principles with design and the practical application of those principles. Material spanning several traditional courses may be covered, several faculty members work jointly with the students, and the students themselves work in teams, so that there is also an

emphasis on teamwork and interpersonal skills.

We are introducing project-based learning through the new Integrated Engineering Program; through the introduction of case-based learning in the first year program; and through the Project-Integration Program in Electrical and Computer Engineering—which now forms part of the regular curriculum after two very successful years as a pilot. As well, plans are underway to introduce project-based learning for the entire second year program in Mechanical Engineering. However, as you can imagine, this mode of education is demanding of resources, as there are smaller class sizes and greater use of equipment and materials. Securing funds and support for new equipment and facilities and for dedicated teachers has been a challenge.

At the same time, we are very pleased that, partly in response to this need, there has been a significantly increased level of financial support from our alumni, friends and industry partners over the past year. This support—such as through the form posted in this newsletter—allows the Faculty to enrich the learning environment for students—and has enabled us to embark on the various project-based learning initiatives that I have indicated.

Overall, the Faculty continues to demonstrate excellence in all aspects of its operation, and we are so very grateful for the support being shown to the Faculty, which is ensuring that it continues to make advances in innovative engineering education and leading edge research. As always, please feel free to contact me—by letter, telephone (604) 822-6412, fax (604) 822-7006, or e-mail dean@apsc.ubc.ca—if you would like further information on the Faculty's activities, if you can assist in the development of the Faculty, or if you have any suggestions to provide.



**Michael Isaacson**

Dean



## Appointments

### Chemical and Biological Engineering

- Dr. Richard Kerekes was appointed Professor on July 1, 2001. Dr. Kerekes was the Principal Research Engineer at the Pulp and Paper Research Institute of Canada (Paprican), Director of the UBC Pulp and Paper Centre since 1983, and an Honorary Professor in the Department Chemical and Biological Engineering since 1978. His main research areas are flow of fibre suspensions, flocculation of fibres and behaviour of fibre systems in papermaking operations.
- Dr. Kevin Smith was appointed Department Head on July 1, 2001. He replaced Dr. Paul Watkinson who led the Department for just over eight years, and during that

time, had a tremendous impact on faculty, staff and students. Details of Dr. Smith's plans for the Department are outlined on page three.

### Metals and Materials Engineering

- Dr. Akram Alfantazi was appointed Assistant Professor on July 1, 2001. His research expertise lies in electro and aqueous processing of materials and corrosion of materials.
- Dr. Rizhi Wang was appointed Assistant Professor on August 1, 2001. His research focus is "hard" biomaterials, with an emphasis on the micro-mechanics of mineralized collagen tissues and interfaces in biological materials.

# Congratulations are in order

## Chemical & Biological Engineering Professor

### Kevin Smith makes the transition to Department Head

When Professor Kevin Smith took on his new role as Head of the Department of Chemical and Biological Engineering on July 1, 2001, people offered him one of two things—“congratulations or condolences,” he said with a laugh. And while he truly believes the first is more appropriate, he is fully aware of the challenges facing the Department.

“As many people know, the biggest single issue for us is the state of our facilities. We have faculty scattered over eight different locations. This is a major problem, which increases our overall operating costs and makes interactions among faculty and students difficult,” explained Dr. Smith. “So for me, the priority has to be a new building that meets our Department’s special requirements for laboratory space and takes into account our unique safety issues. We need to have a positive decision on this very soon.”

In other areas, Dr. Smith’s plans are in progress, but they will emphasize the student experience and promote faculty research. Generally, he sees it as his responsibility to make the student experience a very positive one. “My focus will be making sure we deliver a quality program; to make sure

our students leave here with a good feeling about the experience and that they remember UBC.”

Fortunately, Dr. Smith believes the groundwork is already in place for this to happen. In the past few years, the Department has worked hard to improve the undergraduate program, which is regarded as unique for its high emphasis on laboratory work and hands-on experiences, as well its new structure, which gives students the flexibility to pursue three different program options in Biotechnology, Environmental Engineering, or traditional Chemical Engineering.

“In the next year or two, we will turn our attention to revamping our graduate programs in a similar way by improving course offerings, formalizing delivery, and hopefully, reducing the time it takes to complete our programs,” said Dr. Smith. “I hope to involve as many people as possible in this process, including faculty, staff, students, and industry stakeholders—all of these people will have something to contribute.”

In considering his motives for accepting the job of Department Head, Dr. Smith admits he had both personal and practical reasons. “On the personal side, this role seemed like a challenge and a good opportunity for me. The Department has gone



Dr. Kevin Smith became Head of the Department of Chemical & Biological Engineering on July 1, 2001.

through a lot of changes in recent years—most notably the merger with the Bio-Resource Engineering Department into the new Chemical and Biological Engineering Department—and I thought I could build on those changes. I consider myself fortunate because our former Department Head, Paul Watkinson, has left me a good foundation to work from,” reflected Dr. Smith.

As for his practical reason, Dr. Smith felt it was necessary to recognize the history behind the changes. “I thought it was important that the next Head be aware of what had gone on before and be able to take this into consideration when making decisions about the future of the Department.”

Even more important than both of these reasons was Dr. Smith’s conviction that his Department is home to a good group of people who are quick to offer their support and willing to work hard. In fact, he believes they deserve more credit than they get.

“In Chemical and Biological Engineering, we have excellent people doing great things that probably not many people know about. We have done very well in things like the CFI, we have two Canada Research Chairholders, and we are engaged in exciting collaborative research with Paprican and numerous industry partners. In other words, we’re doing great things and as Department Head, it’s my job to make sure more people know about them.”

# Breathe easy

## Clean Energy Research Centre kicks off at UBC

Picture a day in the not-too-distant future when smog and global warming are concepts from the past, not the present. In this world, cars, trucks and buses run on alternative fuels with high efficiency and minimal exhaust emissions; power plants operate without producing harmful “greenhouse gases” and the use of renewable energy sources is commonplace, rather than the exception. This world is foremost in the minds of the researchers and supporters of the Faculty’s new Clean Energy Research Centre (CERC) in the Faculty of Applied Science at UBC.

The new Centre is meeting two very real needs: First, it is consolidating the exciting clean energy research already underway at UBC under one umbrella, allowing researchers to share space and resources and inspire future innovation. And second, through the results of this research, the Centre will be helping Canada meet its international commitment to reduce greenhouse gas emissions to 6% below 1999 levels by the year 2012. The latter is extremely important because based on current projections, Canada will have to cut current emissions by about 21% by 2010 to meet that commitment, which will only be achievable with further development of alternative fuels and renewable energy options.

“Our country is uniquely positioned to be a leader in this crucial, exciting field,” said Centre Director and Mechanical Engineering Professor Bob Evans. “CERC will give some outstanding researchers and visionaries the space, time, and resources necessary to help Canada pursue these goals through scientific discovery and engineering development of a wide range of ‘clean’ energy technologies.”

Some areas where research is already underway include:

- Advanced hydrogen production methods
- Fuel cell systems integration
- Alternative fuels for internal combustion engines
- Selective catalytic reduction of Nitrogen Oxide emissions
- Bioconversion of wood wastes to fuel
- The use of Computational Fluid Dynamics to improve the efficiency of hydro turbines.

These projects will serve as a springboard for developing the Centre’s capacity and lead to virtually unlimited opportunities for new research, particularly in the areas of fuel cell systems and anything to do with the use of hydrogen in fuel cells (production, storage, etc.). Dr. Evans envisions the Centre being a place where “engineers and scientists will be free to pursue imaginative new research directions—which will foster the development of truly innovative energy technology.”

So far the Centre has received support from Suncor Energy, Westport Innovations and Methanex, and it has submitted a major application for support to the Canada Foundation for Innovation (CFI). As research progresses, the Centre will likely attract additional partners interested in collaborative opportunities.

“The research here will not just enhance our future—it will protect and secure a healthy environment,” emphasized Dr. Evans. “Our research findings about alternative energy sources and new technologies will help reduce the production of greenhouse gases which lead to global warming, and will reduce the nearly 5,000 deaths per year in Canada which are attributed to air pollution.”



Clean Energy Research Centre Director, Dr. Bob Evans.

### Who’s involved?

The Clean Energy Research Centre is a collaborative project drawing on the expertise of researchers working in virtually all areas of Applied Science and the engineering industry. Currently, the following UBC faculty members are involved:

#### Chemical & Biological Engineering:

- Assist. Prof. Tony Bi
- Prof. Sheldon Duff
- Prof. Peter Englezos
- Prof. John Grace
- Assoc. Prof. Anthony Lau
- Prof. Jim Lim
- Prof. Colin Oloman
- Prof. Kevin Smith
- Prof. Paul Watkinson

#### Mechanical Engineering:

- Assist. Prof. Kendal Bushe
- Prof. Bob Evans
- Assist. Prof. Dan Fraser
- Emeritus Prof. Phil Hill
- Assoc. Prof. Steven Rogak

#### Metals & Materials Engineering:

- Emeritus Prof. A.C.D. Chaklader
- Prof. Alec Mitchell
- Assoc. Prof. Tom Troczynski

# Supporting teaching and learning

## Faculty launches new Instructional Support Centre

Applied Science faculty members know their stuff. They can tell students everything they need to know about engineering, but these days, they're being asked to go one step further and deliver their material with modern learning technology. It's a challenge, but one that they don't have to face alone thanks to the recent launch of the Faculty's new Centre for Instructional Support (CIS).

"The purpose of the Centre is to encourage and assist faculty members in making increased—and wise—use of information or learning technology. Ultimately, this will enrich the learning environment for our students, and in doing so, support the objectives of *Trek 2000* and the University's Academic Plan," emphasized Dean Michael Isaacson.

"Very broadly, learning technology employs media communication or digital technology in the teaching or learning process,"

explained Centre Director Cathryn Jackson. "When successfully deployed, learning technology should enhance the learning experience, expose a wider audience to a given program or subject, and/or offer efficiencies in time or expense without reducing the quality of learning. The goal of the CIS is to help faculty members choose and use learning technology most effectively by capitalizing on best practices."

The CIS has evolved from related activities within the Faculty over the past few years such as the Applied Science Teaching Technology Committee, which helped the Faculty take a leadership role in University-wide endeavours such as MyUBC and MyCourses.

Some of the specific tasks of the new Centre include providing consultation and support, participating in resource development, and coordinating and delivering workshops and



Centre Director Cathryn Jackson and Educational Technology Coordinator Jim Sibley.

training. The Centre will also serve as a liaison for the Faculty of Applied Science to UBC and beyond, promoting the Faculty's strategic mission to provide innovative and quality educational programs.

The CIS began operation in May 2001 and renovations to its "home" in room 2008 of the Civil and Mechanical Engineering Building are expected to wrap up in time for the Centre's official opening in late September or early October. The Centre's physical space is designed to encourage a drop-in environment for consultation, support and development of courses and course materials.

Coordinator Jim Sibley also hopes that faculty members will take the opportunity to come by and work with the Centre's developers and make use of the hardware and software designed to fulfill a variety of teaching technology needs.

To learn more about the Centre and its plans to integrate technology into Applied Science teaching, please contact:

**Jim Sibley**  
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(604) 822-9241  
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**Cathryn Jackson**  
Centre Director  
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jackson@nursing.ubc.ca



The CIS website ([www.learning.apsc.ubc.ca](http://www.learning.apsc.ubc.ca)) connects visitors with great resources on education and technology, as well as upcoming workshops and tutorials.

# Funding a vision—*The Way Ahead*

An update from the Faculty development team

Through the active involvement and generous support of alumni and friends, and Dean Isaacson’s ongoing commitment to fundraising, we have made real progress toward securing a solid and sustainable foundation of support for the Faculty. Donors gave \$5.2 million in support last fiscal year, have contributed over \$5 million thus far this year, and a number of planned gifts have been established as well. Dean Isaacson’s three-pillared vision to recruit and retain professors, build upon the student experience, and enhance the physical infrastructure is being realized with the thoughtful support of alumni and friends.



A number of trends have appeared as donors plan their giving and learn about the needs of the Faculty. Donors are interested in giving to intellectual capital (chairs and professorships) to help us recruit and retain the best professors and students. They’re also interested in long-term solutions, such as funding for our Clean Energy Research Centre. Our supporters also want to ensure that undergraduate engineers are

building the skills they will need to succeed, and are directing funds to help improve the quality of undergraduate programs. We’re confident that future generations of engineers will benefit from the wisdom and guidance of the Faculty’s alumni and corporate friends as they assist us in building our engineering programs.

Projects that we are currently seeking funding for include named classrooms, laboratories and other areas in our planned new buildings (Chemical and Biological Engineering; and Electrical and Computer Engineering); named chairs and professorships in all areas of engineering; and student program enrichment funds. As each department and program has different priorities, we welcome you to contact us to learn more about what can be accomplished.

Thank you for the wonderful support and sincere interest in Applied Science at UBC. Keep in touch,

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Senior Development Officer  
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mona.miller-tait@ubc.ca

**Willow Smith**  
Faculty Development Officer  
Tel: (604) 822-6197  
willow.smith@ubc.ca

## Yes, I would like to support the Faculty of Applied Science

Name \_\_\_\_\_

Address for tax receipt \_\_\_\_\_

- I would like to make a tax-deductible donation of \$ \_\_\_\_\_, which will be directed to the *Faculty of Applied Science Endowment Fund for Student Support*. (Please make cheque payable to “The University of British Columbia”.)
- I would like my gift to be \_\_\_ undesignated/ \_\_\_ directed to the following program:
 

<input type="radio"/> Chemical & Biological Engineering	<input type="radio"/> Engineering Physics	<input type="radio"/> Metals & Materials Engineering	<input type="radio"/> Minor in Commerce
<input type="radio"/> Civil Engineering	<input type="radio"/> Geological Engineering	<input type="radio"/> Mining & Mineral Process Engineering	<input type="radio"/> Combined Arts / Engineering Program
<input type="radio"/> Computer Engineering	<input type="radio"/> Integrated Engineering	<input type="radio"/> Co-operative Education Program	<input type="radio"/> Minor in Information Technology
<input type="radio"/> Electrical Engineering	<input type="radio"/> Mechanical Engineering		
- I would like my gift to remain anonymous.
- I would like the Faculty’s Development Officer to contact me (phone and/or e-mail address: \_\_\_\_\_ ) to discuss:
 

<input type="radio"/> support for a named Chair or Professorship	<input type="radio"/> a planned gift	<input type="radio"/> the tax advantages of gifts of securities
<input type="radio"/> a gift-in-kind		<input type="radio"/> support for a named infrastructure project

Please return to:  
**Business and Development Office**  
Faculty of Applied Science  
The University of British Columbia  
2006–2324 Main Mall  
Vancouver, BC V6T 1Z4

Tel: (604) 822-8335  
Fax: (604) 822-0688  
e-mail: development@apsc.ubc.ca  
web: www.apsc.ubc.ca/development

# Alumni update

## Faculty celebrates successful “alumni season” in photo highlights

Our spring/summer 2001 issue of *Ingenuity* provided highlights of the reunions held in the Fall of 2000. Since then we have had several more opportunities to meet many of you through our mentoring program, reunions and receptions, and now we are happy to share some of these moments through photo highlights.

Our alumni play a vital role in the past, present and future success of the Faculty and we strive to ensure that we maintain strong links with you—just tell us how and when you’d like to connect with your old classmates and we’ll do our best to make it happen!

## Toronto alumni & friends reception— May 10, 2001

On May 10, 2001, Dean Isaacson hosted an evening reception for Toronto engineering alumni and friends at the Royal York Hotel. Mr. Alan Hutton (MECH '64), former President and CEO of Star Data Systems Inc. and now President and CEO of FundSERV Inc., spoke to guests about the importance of the information technology industry and reflected on the impact of UBC and the Faculty of Applied Science on his life and 30-year career.

In commenting on his pleasure at reconnecting with the University, Mr. Hutton said, “As time moves on, I am more conscious of the opportunities that life has presented, and appreciative of who or what contributed to each step forward. The experience and the degree I earned at UBC have been important assets on my personal balance sheet... and I am grateful of the opportunities and privileges a quality education from a recognized institution has brought to my family and me.”



Above: Dean Michael Isaacson (centre) with engineering alumni who took time from their busy schedules to participate in the mentoring luncheon at Cecil Green Park on Tuesday, February 27, 2001.

## Old Red New Red Mentoring Program— February 27, 2001

In the spring of 2001, the Faculty partnered with UBC Career Services and the UBC Alumni Association to launch an initiative called the “Old Red New Red” Mentoring Program, intended to help build long-term relationships between our current students and alumni. The program provides alumni an opportunity to take an active role in campus life, and more importantly it gives current students the opportunity to network with engineering graduates.

The first mentoring lunch, held in February for third, fourth and fifth year engineering students, was well received by all. A similar mentoring lunch for second year students is scheduled for November 2001. Further details on how you can be a part of this event or future mentoring events is available at [www.apsc.ubc.ca/alumni](http://www.apsc.ubc.ca/alumni).

## Chemical Engineering Class of 1966 reunion— May 18, 2001

Right: The Chemical Engineering Class of 1966 marked their 35th reunion with a three-day celebration, which included a good old-fashioned pub night at the Cheeze Factory and a private dinner at Cecil Green Park.

Left: Mr. Alan Hutton (MECH '64), gave a speech marked by memories of life at UBC.



# Alumni update



Above from left to right: Don Smith (BA '31, BASc '32, MASc '33), Robert Ellison (BASc '33), Mickey Thomas (BASc '31), Dean Michael Isaacson, Florence Graham (BASc '35), and Alan Webster (BASc '33).

## BASc Classes of 1931–35 reunion — June 12, 2001

The BASc Classes of 1931–35 celebrated their annual reunion at Cecil Green Park with a lunch hosted by Dean Isaacson. The wonderful stories shared around the table provided insight on the great contributions that our alumni have made to their communities and to society.

## California alumni & friends reunion — June 14, 2001

Dean Isaacson and Electrical and Computer Engineering Department Head Michael Davies hosted a reception in Menlo Park for UBC engineering alumni and friends now calling California home. The reception, which included a talk by Mr. Sandeep Gupta (ELEC '88), was thoroughly enjoyed by

all present. (Thanks to Ed Medley (GEOE '78) for the use of his business facility for the event.)

Below: Ed Medley (in his “engineering red”), Dean Isaacson, his wife Sharon Isaacson and Alumni Relations Officer May Cordeiro with engineering alumni.



Above: Edmonton alumni enjoyed breakfast at the Sheraton Grand Hotel.

## Edmonton alumni & friends breakfast — June 28, 2001

Edmonton engineering alumni joined Dean Isaacson and Prof. Bob Evans, Professor of Mechanical Engineering and Director of the Clean Energy Research Centre, for breakfast at the Sheraton Grand Hotel on June 28, 2001.

The breakfast setting provided an opportunity for a frank discussion, where alumni could provide the Dean with direct feedback. Topics of discussion included the necessity for an emphasis on communication skills in undergraduate curriculum, the benefits of co-op education and the need for more student spaces in the Faculty.

Some of the alumni emphasized that the new focus on e-learning should not supplant laboratory skills, which they viewed as integral to the core engineering skill set, and the Dean Isaacson assured them that the emphasis on laboratory and hands-on learning was not being diminished.



**Calgary alumni & friends reception—  
June 28, 2001**

Alumni and friends from Calgary caught up at a reception with Dean Isaacson and guest speaker Mr. Patrick Daniel (MAsc 1970), President and CEO of Enbridge Inc., at the Calgary Petroleum Club on the evening of June 28, 2001. Mr. Daniel's speech focused on how much engineering has changed since his graduation and cited two growing and laudable trends: diversity amongst engineers, and the internationalization of the

profession. He noted that in this new international context, companies need engineers who have the core skills but who are also flexible people with strong communication and interpersonal skills. He also added that engineering as a profession has to consider the societal impact of the work, and graduates must remember their responsibility to their community and to the environment.



Above: Dean Isaacson thanked Patrick Daniel, President and CEO of Enbridge Inc., for his talk at the Calgary alumni reception.

Below: ECE grads with Department Head Michael Davies (right).

**Electrical and Computer Engineering Classes of 1970-90 reunion—July 26, 2001**

The Museum of Anthropology was the site for the second annual reunion for grads of Electrical and Computer Engineering (Classes of 1970-90). More than 120 alumni enjoyed the evening, which included a delicious salmon barbecue, live entertainment and speeches by Bill Wong (ECE '71) and Jim Gurney (ECE '71) and Victor Goncalves (ECE '87). Dean Isaacson and Department Head Michael Davies co-hosted the event and took the opportunity to update alumni on Faculty and Department activities. All in all, it was a perfect setting for classmates to meet and talk about the good times of their undergraduate years.



Above: Guests enjoyed a salmon BBQ buffet on the picturesque grounds of the Museum of Anthropology.



Right: Erik Lindholm (ECE '83) and wife Judy Ting with Dean Michael Isaacson.

# Alumni update

## Electrical and Computer Engineering Classes of 1991-00 brunch — August 11, 2001

On Saturday, August 11, 2001 grads from the Electrical and Computer Engineering classes of 1991-00 attended a brunch at the University Golf Club. Many guests had not been back to campus since graduating ten years ago and were happy to have the chance to meet some of their old professors and hear Department updates.



Above (from left to right): Dean Isaacson, Tom Taylor (Civil '67), David Kemle (ECE '58), and Jim Forrester (ECE '52).



Above: Alumni at the Washington breakfast engaged in a thoughtful discussion about key issues facing engineering education, such as the need for more hands-on learning and early design experiences.

## Washington State alumni & friends breakfast — September 6, 2001

Graduates living in and around the Seattle area enjoyed breakfast with Dean Isaacson in The Bombay Room of the elegant Hotel Monaco in downtown Seattle on the morning of September 6, 2001. The event included alumni from the 1950s all the way to 2000. Dean Isaacson sought feedback on the engineering programs, the changing emphasis on project-based learning and learner-centered education and design, and the outlook for the high-tech and resource sectors.

## Other recently celebrated reunions

Most of these events were underway while *Ingenuity* was on the printing press. Watch for photo highlights in our next issue.

Class	Date of Function	Details
BASc '51	Friday, September 28	Luncheon at the Asian Centre
BASc '51	Saturday, September 29	Reception and tour in the Civil and Mechanical Engineering Building
BASc '61	Monday, October 1	Reception at Cecil Green Park
BASc '71	Friday, October 5	Reception hosted by the Dean followed by dinner at CGP
CIVL '51	September 19 and 20	Trip to Harrison Hot Springs Resort
CIVL '61	September 29, 2001	Dinner at Cecil Green Park
CIVL '91	September 22, 2001	Barbecue and games at the Cheeze Factory
MECH '51	September 28, 2001	Dinner at University Golf Club
MECH '76	September 29, 2001	Pub evening at the Graduate Student Centre
Metallurgy '61	Sunday, September 30/ Monday, October 1	Dinner at local restaurant/Tour of MMAT and seminar by Steve Cockcroft

If you would like more information about upcoming alumni activities or you're interested in organizing your own reunion, please contact our Alumni Relations Officer May Cordeiro by phone at (604) 822-9454 or by e-mail at [mcordeiro@apsc.ubc.ca](mailto:mcordeiro@apsc.ubc.ca).

# And the walls came tumbling down

## Earthquake 99 Project aims to improve housing construction in BC

The walls were shaking and the earth was quaking—and it was a very good thing. On September 11, 2001, UBC's Earthquake Engineering Research group wrapped up the physical testing portion of an ongoing project that began in September 1999.

The Earthquake 99 Project was a \$1.3 million collaborative research effort between UBC's Earthquake Engineering Research Facility, the Department of Civil Engineering and several industry partners, including project manager TBG Seismic Consultants Ltd. and Simpson Strong-Tie Co., Inc. Other financial supporters include Forest Renewal BC, the National Research Council of Canada and the Canadian Mortgage and Housing Corporation.

The project consisted of two research phases. The first began last summer with the shaking and subsequent evaluation of "seismically engineered" structures matching California construction. As expected, these houses, which were engineered to withstand earthquakes of magnitude reasonable for the West Coast, held up quite well.

The second phase, which consisted of 11 different tests between June and September 2001, focused on the behaviour of "non-seismically engineered" structures of construction typical to homes built in

BC since approximately 1985. As predicted by the research team, these homes did not fare as well. During the test conducted on July 27, the house sustained major damage as evidenced by broken windows, cracked doorframes and drywall, and toppled furniture.

Following this test, Earthquake Engineering Research Facility Director and Civil Engineering Professor Carlos Ventura noted that, "This is the most damage we've seen so far. Following an earthquake like this, where the strength of the house has been severely compromised, residents could return, but only after significant repair by a qualified structural engineer."

Civil Engineering Professor Helmut Prion oversaw all of the tests, which were conducted using full-scale, two-story wood frame houses in UBC's Structural Engineering Laboratory. When the first test ran in July 2000, it marked the first time that anyone in Canada had conducted earthquake simulation studies with a full-scale house.

"The results of all of these tests will help us improve the design of wood construction homes," said Dr. Ventura. "Our research will have an impact on the wood construction industry, the insurance industry and virtually all British Columbians concerned

about earthquake safety. I expect that the results of our work will affect wood construction in British Columbia, California and Japan."

Improving construction of wood frame homes was the overriding objective of the Earthquake 99 project and some of the specific questions the group aims to answer (or has already answered) include:

- What is the contribution of drywall panels to the lateral load capacity of walls with different framing systems?
- What is the interaction between the wall framing and glass windows?
- What is the effectiveness of stucco in helping wood frame walls resist lateral loads?
- What are some possible and economic retrofits that may increase the earthquake resistance of a house?

If you would like more information about our earthquake engineering research activities at UBC, please contact Dr. Carlos Ventura at (604) 822-6946 or [ventura@civil.ubc.ca](mailto:ventura@civil.ubc.ca)

Below: Professor Carlos Ventura notes damage to an interior wall of the house following the shake test on July 27, 2001.



Left: Interior damage, such as toppled furniture and computer monitors, may be typical in many BC homes and offices.

# Crash course

## New Engineering Physics course offers early design experience

They had a crash course in control instrumentation, a pile of sheet metal and Meccano parts, a lesson or two in the machine shop, no formal design experience, and a mere six weeks of construction time.

Welcome to Physics 253, a new Engineering Physics course where second-year undergraduate students are challenged to design and build autonomous robots in just 13 weeks, without the benefit of formal study in instrumentation and control, which most students acquire in third or fourth year engineering.

“Physics 253 is a crash course in practical design, modeled after similar courses at MIT and Stanford,” explained

Assistant Professor and Physics 253 coordinator Andre Marziali. “The idea is that by the time these students take courses such as control theory, it won’t be as abstract because they’ll have seen the practical application—even if they didn’t understand all of the details at the time.”

The course is 13 weeks long, with students learning the basics of instrumentation during the first six weeks and then applying their new knowledge to the design and construction of robots (which they built in teams) in the last six. In order to make it more interesting, Dr. Marziali added a team competition at the end.

“Students were required to spend just three hours per week in the lab, but in the last two weeks before the competition, most teams were here for more than 60 hours per week. Sometimes students were here all night!” said Dr. Marziali.

“Up until recently, undergraduates spent all of their time on theory and concepts. This course is part of a shift to teach design before theory and it’s been a tremendous success,” emphasized Engineering Physics Program Director Jeff Young. “I’ve never seen undergraduates so excited about and engaged in engineering physics.” The robots built in this course are very different than those portrayed on popular television shows such as “Robot Wars” or “Robotica,” which, according to Dr. Marziali, are not robots at all, but rather “remote controlled cars with weapons.” These robots are autonomous, meaning students could not manipulate them during competition. Instead, they had to build them with sensors, motors, moving parts and preprogrammed, on-board computers. On race day, all students could do was push the start button and hope their calculations were correct.

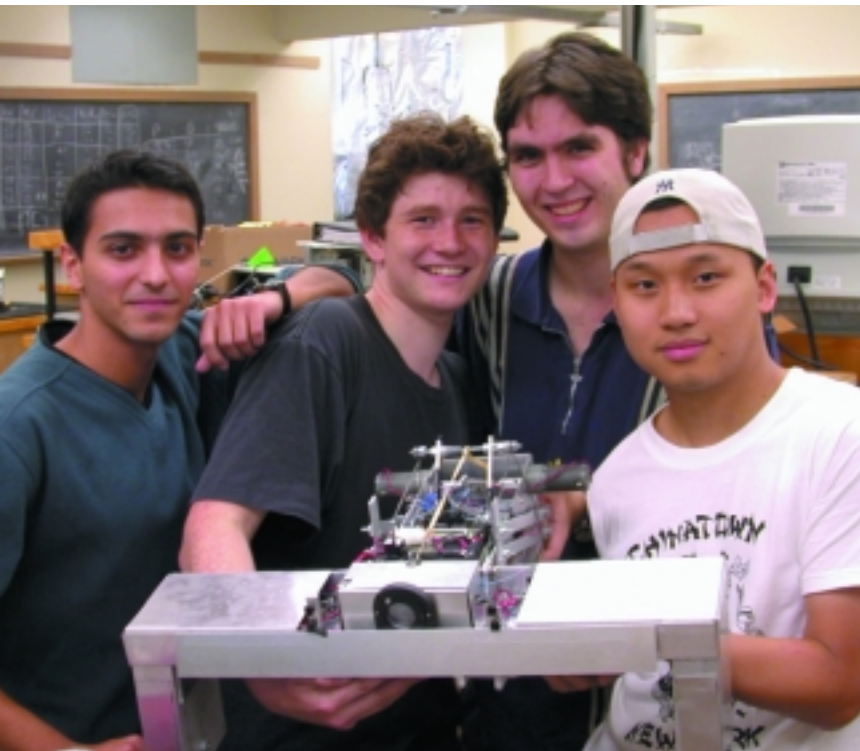
Most students agreed that the course had been one of the most exciting, exhausting and yes,

fun, experiences of their University lives so far.

“I’ve been building stuff since I was a kid, but I’ve still learned a lot about electronics, mechanics and especially troubleshooting—that’s probably the best skill I’ve learned here,” said competitor Justin Lemire-Elmore. “I haven’t been home in two days and I wake up dreaming of circuits, but this is great. This is what university should be about!”

Students aren’t the only ones excited about the early design experience. Members of industry, particularly Engineering Physics co-op employers, have been very supportive. They recognize that students participating in courses like this one will come to the workplace better prepared at a much earlier stage. CreoScitex President Dan Gelbart was so enthusiastic about the project that he helped judge the competition and, on behalf of CreoScitex, contributed digital voltmeters to all members of the winning team: Bradley Buss, Luke Zimmerman, Jimmy Koo, and Joshua Vines, (and their robot Skull Dog).

Congratulations to all 42 students who participated in Physics 253 and competed with such enthusiasm on race day. We hope the rest of your engineering experiences measure up!



Members of the second place team with their robot “Justin Time,” from left to right: Payam Mousavi-Masoudabadi, Justin Lemire-Elmore, Darren Thomson, and Bayo Lau.

# Project Bluetooth

## earns ECE students top ten finish

UBC's international reputation for innovation and achievement is stronger than ever thanks to the outstanding efforts of an Electrical and Computer Engineering student team, which recently competed under the guidance of Adjunct Professor Dave Michelson at the 2001 IEEE Computer Society International Design Competition in Washington, DC.

The UBC group earned an amazing top ten finish in a field consisting of more than 75 teams from universities in Poland, Germany, Slovakia, Taiwan, Singapore, the United States, and Canada. Judges awarded the team a \$1,500 prize for their project entitled, "Application of Bluetooth to Guided Audio Tours," which was cited for its "technical depth and commercial potential."

Bluetooth is a wireless technology that allows laptops, cell phones, and other portable devices to connect using

low-cost, short-range radio links. It is being developed and promoted by an industry consortium that includes 3Com, Ericsson, IBM, Intel, Lucent, Microsoft, Motorola, Nokia and Toshiba.

The competition judges were also impressed with news about the UBC team's plans for a 2.0 version of their project, which, with a simple change, will increase Bluetooth's system capacity and allow it to be effectively applied in a variety of new applications including, translation services, assistance for the hearing impaired and local area information services.

Because the UBC group finished in the top ten, team members and their faculty mentor earned an additional prize—the IEEE Computer Society covered all of their competition expenses including airfare, accommodation and meals. The team consists of undergraduates Kenneth Cheung, Myles Lu, Martin Ma and Peter Leung.

## We have liftoff!

### UBC's SAE Aerodesign team captures top Canadian finish in California competition

It takes time, creative design, presentation skills, and most of all, a really great airplane. This is what UBC's Aerodesign team brought to the SAE Aerodesign West 2001 Competition in Palmdale, California when its members recently secured third place overall and the top Canadian finish.

The SAE Aerodesign Competition challenges students to design and construct a fixed wing model aircraft to carry heavy payloads. The ultimate goal is to lift the heaviest weight possible while abiding restrictions on engine size, platform area, and takeoff/landing distances.

The competition is split into two portions: design and flight. In the

design portion, students must submit a comprehensive engineering report, complete with detailed drawings and calculations showing payload prediction. They must also give an oral presentation covering all the design aspects. Finally, in the flight portion, teams fly consecutive rounds to see which airplanes can lift the most weight.

"Our team successfully completed six takeoffs and six landings," said UBC team member Terence Lee. "We lifted the fourth highest weight in the flight competition, but it was our first place finish in the design portion that really helped us out and led to us earning third place overall."



The 2001 UBC SAE Aerodesign team, from left to right: Petro Lappas, Sandra Yue, Terence Lee, Peter Lee, Dave Giesbrecht (pilot), Al Bowers (pilot), Eric Young, Isabella Li, Edmond Young, and Kay Seah.

The UBC Aerodesign team has finished in first place overall three times since it started competing in 1992, but this year's results are the best in four years. This year's top team was from the University of Akron in Ohio.

UBC team members credit much of their success to the support of their sponsors, which include the Department of Mechanical Engineering, the Association

of Professional Engineers and Geoscientists of BC (APEGBC), SAE (BC Chapter), Air Canada, and Norburn Hobbies. They are also grateful for past support from the Walter Gage Memorial Fund and the Engineering Undergraduate Society Endowment Fund.

# Patrick Campbell Chair

## promotes design education and research



One of Dr. Gadala's graduate students, Henning Keiner, adjusts an experimental set-up aimed to improve the design of rotating pulp and paper machines.

One commitment made to design engineering has had an inspiring ripple effect, impacting undergraduate education and facilities, faculty research and industry partnerships. All of this is thanks to the Patrick Campbell Chair in Mechanical Engineering Design, created by alumnus

Patrick D. Campbell (BASc 1947) to enhance the undergraduate design experience through support for curriculum, laboratory facilities, and new design research.

Professor Mohamed Gadala became the first holder of the Patrick Campbell Chair last September, and has since moved ahead on a number of successful proposals to improve undergraduate design opportunities. The first was a proposal submitted to PACE (Partner for the Advancement of CAD/CAM/CAE Education), a consortium of companies including General Motors, Sun Microsystems, and several software companies. Under the agreement, the Mechanical Engineering Department will receive 28 new Sun workstations and an extensive package of engineering software.

"Our next success came when our proposal to establish a new undergraduate design laboratory was accepted

by UBC's Teaching and Learning Enhancement Fund (TLEF)," said Dr. Gadala. "We're still waiting to secure the physical space for this lab, but when we combine it with the workstations and software from PACE, our students will have access to a truly state-of-the-art facility complete with machines and small hand tools where undergraduate as well as graduate students can fabricate and test design projects."

When it comes to design research, Dr. Gadala is experiencing similar success, particularly with some of his industrial projects, which range from online monitoring of rotating machines, such as those used in the pulp and paper industry, to working with a consortium of steel companies in Canada and the US on manipulating the cooling of hot steel plates to produce novel properties of steel, and finally, to designing a more efficient fish feeder for a large commercial fish farm in Campbell River, BC.

Even while engaged in these varied industrial projects, Dr. Gadala is continuing with his own NSERC-funded design research in numerical and finite element formulation and application. He is most interested in the applications to metal forming, metal cutting, crack propagation, and of course, design optimization.

To learn more about the activities and research associated with the Patrick Campbell Chair, please contact Dr. Mohamed Gadala at (604) 822-2777 or [gadala@mech.ubc.ca](mailto:gadala@mech.ubc.ca).

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## Manufacturing efficiency... Continued from page 1

the company millions of dollars over time. In recognition of his work, Pratt and Whitney Canada honoured Dr. Altintas with a manufacturing research award.

Yet another of Dr. Altintas' manufacturing developments is an open computer numerical controlled (CNC) system, which can be reconfigured to adapt any machine tool, robot or motion control system. Basically, the system responds to simple commands, which allow users to create custom

software without writing the software from scratch. Currently, the system is used by almost 14 institutions worldwide and Dr. Altintas is continuing work on it with the help of Electrical and Computer Engineering Professor Mabo Ito.

Dr. Altintas is quick to identify the collaborative effort behind his research. His laboratory is full of graduate students hailing from all corners of the world, most of who contribute to joint projects involving centres in Germany, Switzerland, France, Sweden, the United States, and Japan. At UBC, Dr. Altintas

participates in research with the NRC Innovation Centre with Adjunct Professor Pak Ko, and Mechanical Engineering Professors Mo Gadala and Elizabeth Croft, as well as Professor Mabo Ito.

Dr. Altintas' innovation extends to teaching and academic life as well. In 1994, he played a leading role in the creation of the Electro-Mechanical Engineering program, a highly successful dual undergraduate/graduate program that combines core mechanical engineering courses with digital electronics and software

engineering courses, as well as a major design project, providing students with the skills to design and control machines.

When asked about his hobbies and outside interests, Dr. Altintas admitted that the list is short. He contributes his time and talents to a number of professional associations including CIRP, ASME and SME, and he enjoys camping and "trying to catch fish," but he said most of his pastimes revolve around his laboratory at UBC because quite simply, he loves what he's doing.

# Achievements

- Chemical and Biological Engineering Professor **John Grace** earned two distinct honours when he was named a Fellow of the Canadian Academy of Engineering and also a Fellow of the Royal Society of Canada in recognition of his reputation as Canada's most eminent engineer and scientist in the field of fluidization.
- Civil Engineering Emeritus Professor **Peter Byrne** was named a Fellow of The Engineering Institute of Canada in recognition of his exceptional contributions to geotechnical engineering in Canada.
- Civil Engineering Emeritus Professor **Liam Finn** and Professor **Carlos Ventura** were named Fellows of the Canadian Society for Civil Engineering at the CSCE 2001 Annual Conference in recognition of their service to the Society and their important contributions to earthquake engineering research.
- Civil Engineering Professor **Frank Navin** was honoured with the 2001 Sanford Fleming Award by the Canadian Society for Civil Engineering in recognition of his outstanding contributions to the development and practice of transportation engineering in Canada.
- Civil Engineering Professor **Yogi Vaid**, and two of his recent graduate students, **Dave Stedman** and **Sivapathasundaram Sivathayalan** won the American Society for Testing and Materials (ASTM) Award for their outstanding article on the practice of geotechnical testing, which was published in the September 1999 issue of *Geotechnical Testing Journal*.
- Electrical and Computer Engineering Assistant Professor **Mihai Huzmezan** received the 2001 Outstanding Chapter Chair Award from the Vancouver Section of the Institute of Electrical and Electronics Engineers (IEEE) in recognition of his contributions as Chair of the Vancouver Chapter of the IEEE Control Society.
- Electrical and Computer Engineering Professor **Nick Jaeger** and UBC, along with industry partners NxtPhase, BC Hydro and the BC Advanced Systems Institute, received a 2001 British Columbia Technology Industry Association (BCTIA) Award for Excellence in Technology Innovation for their work in developing an innovative optical-based high bandwidth voltage sensor for use in the power industry.
- Electrical and Computer Engineering Professor Emeritus **Charles Laszlo** was honoured with the 2001 Gold Medal of the Canadian Council of Professional Engineers at the CCPE Annual Meeting in recognition of his outstanding work using infrared technology to create innovative communication devices for the hard of hearing and for the founding of two biomedical firms.
- Electrical and Computer Engineering Adjunct Professor **Dave Michelson** received the 2001 Outstanding Service Award from the Vancouver Section of IEEE in recognition of his contributions as Chair of the Vancouver Joint Communications Chapter (representing the IEEE Communications Society, IEEE Antennas and Propagation Society, and IEEE Vehicular Technology Society), and as IEEE Vancouver Section Webmaster.
- Electrical and Computer Engineering Professor **Tom Tiedje** (who holds a joint appointment with the Department of Physics and Astronomy), was named a Fellow of the Royal Society of Canada in recognition of his experimental and theoretical contributions to the understanding of the optical and electronic properties of amorphous semiconductors.
- Electrical and Computer Engineering Professor and CICS Director **Rabab Ward** was named a Fellow of the Canadian Academy of Engineers in recognition of her reputation in the field of digital signal processing.
- Faculty Communications Officer **Laurie Dawkins** won a Blue Wave Award of Merit in the category of special publications from the International Association of Business Communicators (IABC), BC Chapter, for the communications planning, writing and production of "Inside Applied Science—A guide for prospective faculty members."
- Mechanical Engineering Associate Professor **Elizabeth Croft** was recognized with a Peter Wall Institute for Advanced Studies (PWIAS) Early Career Award. The Institute confers awards on UBC faculty members who are within the first few years of their appointments, and who are considered to be involved in research that is fundamental, interdisciplinary, innovative and unique, in order to encourage the exchange of ideas and research approaches.
- Mechanical Engineering Assistant Professor **James Olson** won the 2000 I.H. Weldon Medal for his best paper entitled "Fibre fractionation caused by pulp screening, slotted screen plates," at the Pulp and Paper Technical Association of Canada (PAPTAC) Annual Meeting.
- Mechanical Engineering Professors **Faro Sassani** and **Gary Schajer** were elected Fellows of the American Society of Mechanical Engineers in recognition of their exceptional achievements in and contributions to the field of mechanical engineering.
- Metals and Materials Engineering Professor **Dave Dreisinger** was awarded the 2001 Metal Chemistry Award by the Metallurgical Society of CIM in recognition of his achievements in and dedication to the field of hydrometallurgy.
- Metals and Materials Engineering Professor and UBC Vice President Research, **Indira Samarasekera** was awarded the 2001 Williams Prize by the Institute of Materials, U.K., for a series of papers considered the most meritorious in the area of "Iron and Steel, Manufacture and Use." The papers include both graduate and undergraduate students as co-authors.

# Tell us what you think

## Ingenuity survey aims to probe reader opinion

Ingenuity is four years and eight issues old. We often hear positive things about our newsletter, but it's time for an official check-up. We hope you'll take a minute to tell us how we're doing. We'll post the survey results in spring/summer 2002 issue and do our best to act on your comments. Thank you in advance for your help!

You may fax your completed survey to (604) 822-7006 or complete the survey online at [www.apsc.ubc.ca](http://www.apsc.ubc.ca)

**1. When you receive Ingenuity, do you usually read:**

- all of the articles
- most of the articles
- a few of the articles
- none of the articles

**2. Overall, how would you rate the quality of information presented in Ingenuity?**

- Excellent
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**3. Overall, do you find the articles in Ingenuity:**

- Very easy to understand
- Easy to understand
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- Difficult to understand

**4. Overall, how would you rate the quality of the layout in Ingenuity?**

- Excellent
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(check all that apply)

- Faculty member profiles
- Dean's Message
- Research initiatives
- New program profiles
- Development activities
- Donor profiles
- Alumni updates
- Student activities
- Achievements
- Appointments
- Other \_\_\_\_\_

**6. Which of the above, if any, would you like to see more of in Ingenuity?**

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**7. How would you describe yourself?**

(check all that apply)

- Alumni (if yes, in what year and program did you graduate? \_\_\_\_\_)
- Donor
- High school teacher or guidance counselor
- Science/technology journalist

**8. Additional comments**

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- Electrical and Computer Engineering
- Engineering Physics
- Geological Engineering
- Integrated Engineering
- Mechanical Engineering
- Metals and Materials Engineering
- Mining and Mineral Process Engineering

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**The Faculty participates in several research centres and laboratories including:**

- Institute for Computing, Information and Cognitive Systems (ICICS)
- The Advanced Materials and Process Engineering Laboratory (AMPEL)
- The Clean Energy Research Centre (CERC)
- The Biotechnology Laboratory
- The Pulp and Paper Centre
- The Centre for Advanced Technology in Microelectronics

