



CZT Detectors and CMOS Circuits For Medical Imaging

Dr. Kris Iniewski
Redlen Technologies

CZT is currently the only semiconductor material that is capable of room temperature operation for X-ray and γ -ray radiation detector application. In this talk we will briefly review basic principles of medical imaging modality that is called single photon emission computer tomography (SPECT). We will discuss operation of CZT detectors and associated CMOS signal processing. We will describe various circuit techniques used for signal amplification, filtering, multiplexing, and analog to digital conversion. The talk will conclude with comparison of images taken by γ -ray camera to those obtained using ultra-sound, X-ray and magnetic resonance imaging (MRI).



Speaker: Krzysztof (Kris) Iniewski is managing R&D chip development activities at Redlen Technologies Inc., a start-up company in British Columbia. His research interests are in VLSI circuits for medical imaging and security applications. From 2004 to 2006 he was

an Associate Professor at the Electrical Engineering and Computer Engineering Department of University of Alberta where he conducted research on low power wireless circuits and systems. During his tenure in Edmonton he put together a book for CRC Press "Wireless Technologies: Circuits, Systems and Devices".

From 1995 to 2003, he was with PMC-Sierra and held various technical and management positions in Research & Development and Strategic Marketing. Prior to joining PMC-Sierra, from 1990 to 1994 he was an Assistant Professor at the University of Toronto's Electrical Engineering and Computer Engineering department researching high-speed semiconductor devices and circuits. Dr. Iniewski has published over 100 research papers in international journals and conferences. He holds 18 international patents granted in USA, Canada, France, Germany, and Japan. He is a frequently invited speaker and has consulted for multiple organizations internationally. He received his Ph.D. degree in electronics (honors) from the Warsaw University of Technology (Warsaw, Poland) in 1988. Together with Carl McCrosky and Dan Minoli he is an author of "Data Networks – VLSI and Optical Fibre", Wiley, 2007.

NOTE This talk will be presented twice during January, one sponsored by *Engineering in Medicine and Biology* and the other by *Circuits and Systems* at the following dates and locations:

Engineering in Medicine and Biology

Tuesday 15 January 400pm – 500pm
CHBE, Room 101, 2360 East Mall
UBC

Info: Ezra Kwok - ezra@chml.ubc.ca

Circuits and Systems

Friday 25 January 300pm - 400pm
IRMACS Presentation Studio, ASB 10900
Simon Fraser University

Registration:

http://www.ensc.sfu.ca/~jiel/ieee/2008_Kris.html

Info: Ljiljana Trajkovic - ljilja@cs.sfu.ca

Programmable Micro-scale Self-assembly

Karl Böhringer
University of Washington

Thursday 10 January 2008 - 300pm
10900 Applied Science Building (ASB) SFU

Massively parallel self-assembling systems present a promising alternative to conventional manufacturing. Recently, various successful instances of self-assembly have

been demonstrated, including applications for commercial products such as RFID tags. However, the full impact of this approach will only be realized once these systems can be programmed or reconfigured on demand (i.e. attachment between components is activated by software).

In this talk, we review several projects that lead towards such self-assembling systems. A key concept to achieve this goal is the "programmable surface", an engineered surface whose characteristics (surface forces, hydrophobicity, friction, etc.) can be controlled with high spatial and temporal resolution. We present several projects that address various aspects ranging from real-time control of surface properties, to binding site designs that optimize attractive forces between components, to computational and algorithmic issues in the modeling of self-assembling systems.

Speaker: Karl Böhringer is Professor of Electrical Engineering with adjunct appointments in Computer Science & Engineering and in Mechanical Engineering at the University of Washington, Seattle. He received both his M.S. and Ph.D. degrees in Computer Science from Cornell University and his Diplom-Informatiker degree from the University of Karlsruhe, Germany. He was a visiting scholar at the Stanford Robotics Lab and Transducer Lab and a postdoctoral researcher at the University of California, Berkeley, before joining the faculty at the University of Washington. His current interests include micromanipulation and microassembly, as well as biomedical implants and bioMEMS for single-cell genomics and proteomics. His Ph.D. thesis was nominated for the ACM doctoral dissertation award. He received an NSF postdoctoral associateship in 1997, an NSF CAREER award in 1999, and was an NSF New Century Scholar in 2000. His work was featured among the Top 100 Science Stories in Discover Magazine's 2002 "Year in Science". In 2004, he received the IEEE Robotics and Automation Society Academic Early Career Award and a sabbatical fellowship from the Japan Society for the Promotion of Science (JSPS).

Info: EDS Chair, Bonnie Gray bgray@sfu.ca



Patent Pop Quiz Presentation

Nick Toth
 Nexus Law Group LLP
 Monday 14 January 700-900pm
 BCIT, Bldg SW3 - Room 1750

Test your knowledge about patents in an informative and entertaining presentation



with examples of electronics-related patents and a discussion of patent filing strategies, patent laws to be aware of, and pitfalls to avoid when considering patent protection for inventions. Bring your questions about patents and the patenting process

to this general information public presentation by Nick Toth, who is a registered patent agent with Nexus Law Group LLP. Rest easy: there's no written exam requirement.

Speaker: Nick Toth is a registered patent & trademark agent and intellectual property lawyer (LL.B., University of Victoria, 2002) with Nexus Law Group LLP. Previously, Nick Toth worked as an electronics engineer (B.A.Sc., Simon Fraser University, 1995) for five years in British Columbia high-tech industry. Nick Toth's current practice focuses primarily on intellectual property protection for electronics, electrical, mechanical and optical devices and systems, and computer-related inventions including software. Nexus Law Group LLP is an intellectual property law firm located in Vancouver.

Info: Email Joint Communications Chair Alon Newton, anewton.ieee@gmail.com

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IT AGE

Professor Eduard Babulak
 Fairleigh Dickinson University

Tuesday 22 January - 600 pm
 Fairleigh Dickinson University
 842 Cambie Street, Vancouver

Current advancements in internet and telecommunications technologies facilitate easy access to information resources by anyone, at any time, anywhere on the planet. Internet access has become essential in business, academia, manufacturing, law, medicine, and government worldwide. A new generation of internet applications will facilitate the creation of global work-places and learning environments utilizing fully-automated information cyberspace systems. Professor Babulak will discuss his own vision and concepts of ultimate automated information cyberspace and how this technology might apply in the world of work, education and at home. He will also discuss the current state of the art in the world of telecommunications and internet technologies, new trends and directions in internet and automation industries, ubiquity, convergence, as well as the concept of the fully-automated home, and Microsoft's project on Easy Living.

Professor Babulak believes the time when ubiquitous fully-automated cyberspace technologies will be commonplace equipment in workplaces and homes worldwide is not too far off. For example, consider a person working from home in Vancouver engaged in an augmented video-teleconference with a colleague at the London office. Both the Vancouver home and the London office will be equipped with task specific computers, special computational sensors embedded with intelligent software agents, and multiple cameras and displays. Switch plates mounted near the door of each room monitor the privacy-state of each room providing simple touch-screen interfaces to common room controls. Both the office and home are aware of where people are. Automatic switches would allocate the best video feed for the particular video session. The computational devices in the London office and Vancouver home will be interconnected creating both a typical office and a home environment at the same time.

In light of current innovative communication technologies by IBM, HP, Microsoft, Philips, and Sony, Professor Babulak's work promotes the formation of inter-disciplinary international teams of experts, scientists, researchers and engineers.

Speaker: Prof. Eduard Babulak is an international scholar, researcher, consultant, educator, professional engineer and polyglot with more than twenty five years of teaching experience and industrial experience as a professional engineer and consultant.

Professor Babulak published and presented numerous International Journal and Conference papers, Invited Keynote, Plenary, Panel, Conference, and Colloquial Talks worldwide. He



worked as a University Professor, Associate Professor, Senior Lecturer, Lecturer, College Lecturer and Researcher of Mathematics, Electrical, Computer Engineering and Computing Science in USA, Canada, UK, Spain,

Germany, Austria, Cyprus, Turkey, Czech Republic and Slovakia.

His academic and engineering work was recognized internationally by the Canadian Association of Professional Engineers, Engineering Council in UK and European Federation of Engineers. His research interests are in MIS, IT, Ubiquitous Computing, Educational Technologies, E-Manufacturing, Quality of Service provision, Computer Networks, Telematics and Telecommunications Communications Infrastructures, Electronic Health Record and Automation.

Professor Babulak speaks 14 languages, is a Senior Member of IEEE, a Corporate Member of IEE, a Professional Member of British Computer Society (BCS), a Professional Member of ACM, a Member of American Society for Engineering Education (ASEE), and Member of the Mathematical Society of America (AMS).

Professor Babulak's biography was selected for citation in the Cambridge Blue Book 2005, the Cambridge Index of Biographies 2004-2005, the Dictionary of International Biography 2004, published by the Cambridge Centre of International Biographies, Who's Who in the Science and Engineering 2003, 2005-2006, 2007-2008, Who's Who in the Industry and Finance 2004-2005, 2006-2007 and in Who's, Who in the World 2003, 2004, 2006, 2007, 2008.

Prof. Dr., Eur.Ing., Eduard Babulak MSc, PhD, PEng, CEng, SMIEEE Visiting Professor of Information Technology Fairleigh Dickinson University 842, Cambie Street, Vancouver, BC, V6B 2P6, Canada e-mail: babulak@ieee.org Copernicus :

<http://my.indexcopernicus.com/babulak>.

Info: Philippe Kruchten, kruchten@ieee.org or Sergio Bertani, spbertani@yahoo.com



IN CONTACT WITH..

Bryan Bell

by Mazana Armstrong

Bryan Bell works as an electrical engineer in the Protection and Control Department of BC Hydro. He is the current Chair of the Control Systems Society Chapter.



Mazana: Bryan, thank you for agreeing to this interview for the IEEE Vancouver Section Contact. Where did you obtain your first engineering degree? Do you have any other degrees you would like to mention?

Bryan: I graduated with a Bachelor's degree in Computer Engineering from UVic in 1997.

Have you always known you were going to be an engineer?

Quite the contrary, I went into engineering in my twenties, never having shown much interest or aptitude for it. I chose it initially because I was looking for a challenge. As it turns out, it suited me better than I'd expected.

Can you give us a short description of your job with BC Hydro?

I scope out the SCADA requirements of work on the BC power system. Most substations and generating plants in BC are operated remotely from control centres. Like most other jurisdictions in North America, our load has increased dramatically, at a time when many of our assets – transmission lines, switchgear, and so forth – are approaching their end of life. For a number of reasons, it is difficult to expand the system – for example, people are now more conscious of the impacts of clearing land for a right-of-way. So, we are operating the system ever closer to its limits, and getting real-time information to the operators in the control centres is critical.

If you were not an engineer, what would you be doing instead?

It's really impossible for me to say. Before I took up engineering, my short attention span really limited my career options. I've had to learn discipline, but it turns out that other aspects of a short attention span – wide-ranging interests, and an appetite for change – are beneficial to an EE.

What are you passionate about?

The people around me. And beer. Mainly beer.

A word or a sentence that defines you?

About five-foot-ten. Oh, sorry, I thought you said "describes." I would define myself as curious. In the engineering sense, not the personal ads sense.

The significant other in your life or someone close to you would describe you in short as ...?

About five-foot-eight.

Do you think engineers are generally underpaid and/or undervalued?

With respect to pay, economics defines the value of something as what people are willing to pay for it. In a free market, I think we are paid what we are worth by definition. I do think our contribution is undervalued, because I think most people don't really understand what we do.

What would you do to change that?

One of my many crackpot theories is that this will improve as the gender imbalance in the profession improves. At the risk of repeating a stereotype, I think women tend to be more interested than men in the social impacts of engineering. Habitually translating our technical work into social terms will demystify it for society. Also, the profession will seem less remote to outsiders when our population is more representative of theirs.

Is IEEE doing enough for electrical (and electronics) engineers in promoting our profession and elevating our status in the society/local community?

Personally, I think the IEEE is doing as much as it should be doing in that respect. The IEEE's strength is in facilitating communication between EEs. Our local professional association - APEGBC – is probably better positioned to promote our profession, as it can draw on all the disciplines, and has a stronger local presence. To promote our discipline in particular, EEs need to make sure we have a strong voice in APEGBC.

Can you tell us more about your volunteering work with the IEEE Vancouver Section? What are your goals?

I'm chair of the Vancouver Chapter of the Control Systems Society. My main duty is organizing technical presentations, but getting out and meeting members lets me serve as contact for membership issues, as a liaison between industry and the EE community, or any other role that comes up. As I don't have a background in Control Systems, I originally got involved to explore the field as a potential career. At that time, Manny Sidhu was the first chair after the chapter had been dormant for a few years, and he put a great effort into bringing it back to life. My goal now is to keep that momentum growing – keep the chapter active with presentations, and also focus on succession planning, so the departure of a chair doesn't result in the collapse of the chapter. I'm happy to say I'm now part of a team that also includes Ryozo Nagamune and Meeko Oishi of UBC.

Are we doing enough for young/upcoming engineers? What can we do better or more of?

Meliha Selak, chair of PES, has set a good example in this regard, and from her efforts I've learned that students and young engineers want to get involved, and will do great work, but we need to let them know about the opportunities in our section. I mention Meliha because she has been my mentor, but I have had similar advice from other successful chairs. A technical society chair is an ideal person to reach out and involve the upcoming engineers, and everybody benefits.

If you could change one thing with regards to the IEEE, what would it be (access to IEEEExplore to all members, free membership, more/less strict membership acceptance)?

This is an important question, but my perspective is a bit limited because of the amount of time I spend on duties as chair. The improvements I'd like to see all centre on making life easier for volunteers. That's important to me at the moment, but I don't think it will have much impact on members at large. I do look forward to what others have to say.

Apart from Canada, what would be the other ideal place/country for you to work and live?

I'd like to live in every country, so long as I can drink the water, and I don't get robbed, kidnapped, or tortured. In fact, one of the great things about being an engineer in Vancouver is that, in a sense, I get to visit every country, without leaving home. My colleagues are from all over the world. I work with one EE whose father was a history prof in China, so he has this remarkable insight into Chinese history; in January, a couple of our young engineers are going to host lunchtime Punjabi tutorials. The list goes on. I can drink the water at BC Hydro, and torture is practically unheard of.

What differentiates electrical engineers from other engineers?

This is anecdotal, but I once took part in a focus group that included various engineers and trades, and the only two people who consistently had good things to say about their jobs were me and another EE. That may not be a statement on the engineers so much as on the work – I think we are more likely to be working on really innovative stuff.

**Digital Humans: From Biomechanical
Models to Simulated Surgery**

Scott L. Delp, Stanford University
Thursday 31 January 330-450pm
Room 310 Hugh Dempster Pavilion, UBC

The outcomes of surgeries performed to improve musculoskeletal function are unpredictable. This problem exists, in part, because the development and testing of new surgical techniques rely almost entirely on clinical trials (i.e., trying surgeries on patients), in which the means to quantify surgical changes or predict postoperative results do not exist. I believe that the design and analysis of surgeries will proceed more effectively if computer models are developed that predict the functional consequences of surgical interventions.

My students and I have developed computer graphics models to simulate the biomechanical consequences of bone reconstructions, muscle-tendon surgeries, and joint replacements. This presentation will review our dynamic simulations of movement used to design surgical procedures for the management of cerebral palsy and osteoarthritis. I also will outline some of the major challenges that arise in development of biomechanical simulations of individual subjects.

Speaker: Scott L. Delp received the M.S. and Ph.D. degrees in mechanical engineering from Stanford University in 1986 and 1990. He joined Northwestern University with a joint appointment in the departments of biomedical engineering, and physical medicine and rehabilitation. He returned to Stanford in 1999. He is Co-Director of Stanford's Center for Biomedical Computation. In 2002, Delp became the founding Chairman of Stanford's Bioengineering Department. Delp's work draws on computational mechanics, biomedical imaging, and neuromuscular biology to improve treatments for individuals with physical disabilities. He led the development of a widely-used software system that enables modeling and simulation of complex human and animal movements. These computer models help to provide a scientific basis to better treat movement disorders resulting from osteoarthritis, cerebral palsy and stroke.
Info: 604.822.6894 or info@icics.ubc.ca



Tech Career Fair 2008



Hosted by Computer Science, Electrical Engineering, Engineering Physics, and Cognitive Systems Society Clubs

About Our Fair

Last year's Career Fair attracted 28 companies with each company showing interest in joining our fair again. Due to the success of last year's fair, we are teaming up once again to offer companies access to a greater portion of the student body than ever before.

Our tech career fair means a better opportunity for tech companies to meet with as many as 2000 Computer Science and Engineering students attending our career fair!

Date: January 31st, 2008
Time: 10AM - 4PM
Location: Student Union Building
(Ballroom / Party Room)

A joint event with the Canadian Aeronautics and Space Institute (CASI), and part of their 2008 President's Tour.

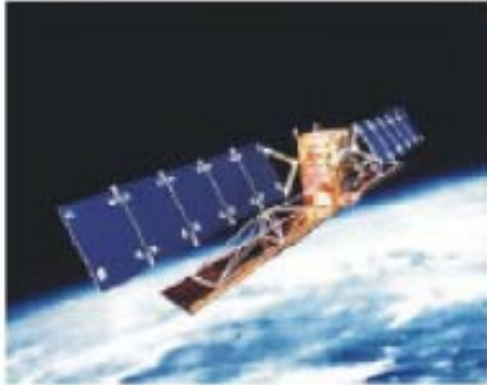
Canada and Radar Satellites

Ed Shaw
CASI President

Friday 01 February - Noon to 1pm
MDA

13800 Commerce Parkway, Richmond

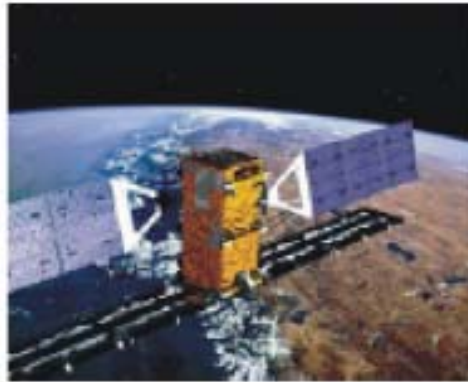
Remote Sensing satellites provide repetitive images of the earth using optical or micro-



Radarsat 1

wave imagers. Canada chose to exploit radar satellites because they can reliably take images in darkness or through cloud. They

are ideal for monitoring sea ice conditions and larger shipping in the Canadian Arctic and east and west coasts. RADARSAT 1 launched in Nov 1998 was developed using innovative technology to produce an image swath 500km wide to track through the North West passage on a daily basis.



Radarsat 2

RADARSAT 2 launched in Dec 2007 has even more capability with higher resolution and dual polarization. These satellites have worldwide coverage and have many applications ranging from disaster assessment to rice crop monitoring. MDA sells the images to many countries through a network of over 40 ground stations.

Speaker:

Ed Shaw CASI President for the 2007-08 term, Edryd Shaw has a Ph.D in Radar Signal Processing. He worked on radar multi-beam antennas in the U.K. before emigrating to Canada in 1966. Ed spent a number of years at Computing Devices of Canada where he helped develop passive sonar systems.



Ed joined the Canada Centre for Remote Sensing to lead the ground system development for LANDSAT1, a US optical satellite launched in 1972. He was the director for the RADARSAT 1 satellite program during the design and program approval stages. Ed retired as the Director General of CCRS in 2001 and now runs a consultancy.

Registration: Registration **IS REQUIRED** for this event. Members and non-members are welcome to attend.

Info: Chapter Chair Rob Leitch at rleitch@ieee.org or 604.231.2184

IEEE UBC STUDENT BRANCH

presents

Matlab Workshop Series

General Introductory Workshop

Effectively introduces Matlab through a live demo. Computers are provided for audience to follow along in real-time. Topics covered:

- Matlab workspace
- matrix manipulation
- plotting, fitting
- Fourier analysis
- basic programming, simulation

Time: 4pm, Jan 10, 2008
Length: 1.5 hrs
Location: Room 358, McLeod Building
UBC Vancouver campus
Fee: \$5

Introduction to Simulink & Controls:

This workshop familiarizes the audience with the basic simulink blocks.

Audience will follow through an exercise to build a simulink model of a simple controller.

Time: 4pm, Jan 17, 2008
Length : 1 hr
Location: Room 358, McLeod Building
UBC Vancouver Campus
Fee: \$5

Please register by email to barrychai@gmail.com
Also feel free to email us for additional information.