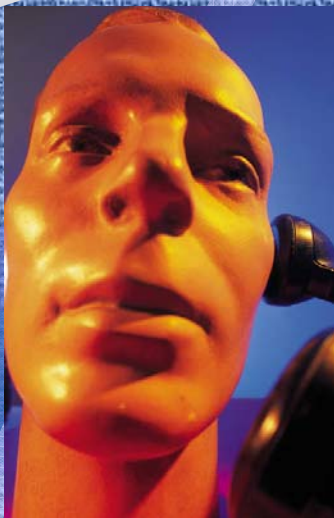


Communications Group

Our group is one of the **8 research groups** in the Electrical and Computer Engineering Department



<http://www.comm.utoronto.ca>

Communications Group

✦ The research interests of the communications group fall into four broad categories:

- ❖ **Information/Communications Theory**
- ❖ **Wireless Communications**
- ❖ **Communication Networks**
- ❖ **Digital Signal Processing**

Communications Group

18 Professors

- ✘ Parham Aarabi (cross - Computer Group)
- ✘ Raviraj Adve
- ✘ Brendan Frey
- ✘ Dimitris Hatzinakos
- ✘ Ashish Khisti (New – 2009)
- ✘ Frank Kschischang
- ✘ Raymond Kwong (cross – Control Group)
- ✘ Alberto Leon-Garcia
- ✘ Ben Liang
- ✘ Jorg Liebeherr
- ✘ Teng Joon Lim (Graduate Coordinator)
- ✘ Hoi-Kwong Lo (cross - Physics)
- ✘ Pas Pasupathy (Emeritus)
- ✘ Kostas Plataniotis (Chair)
- ✘ Elvino Sousa
- ✘ Shahrokh Valaee
- ✘ Tas Venetsanopoulos (Emeritus)
- ✘ Wei Yu

Over 120 Graduate students and visitors

- ❖ Ph.D. 50%
- ❖ M.A.Sc. 30%
- ❖ M.Eng. 20%

Undergraduate Courses

Responsible for teaching:

- ✦ Signal Processing (e.g. ECE216);
- ✦ Probability (e.g. ECE302);
- ✦ Communications (e.g. ECE316);
- ✦ Networks (e.g. ECE361).

Graduate Students

	M.A.Sc.	Ph.D.	M.Eng.
Admissions (commgrp)	22	8	8
Admissions (ECE)	68	32	30

- M.A.Sc. and Ph.D. are research-based degrees; M.Eng. is course-based.
- Large segment of ECE graduate student population.
- Office and lab space mostly in Bahen, but some are in other buildings.

Application Process

- ✦ At end of 4F term:
 - ❖ prepare application material e.g. transcripts, CV, research statement;
 - ❖ Talk to professors about their research areas, and decide which one(s) appeal to you;
 - ❖ Ask professors if they are taking new students (sometimes they don't).
- ✦ Submit application before deadline.
- ✦ Follow up with favourite professor!

Program Requirements

M.A.Sc.

- ✘ Thesis proposal at end of 1S term;
- ✘ Thesis defense approx. end of 2nd summer.

Ph.D.

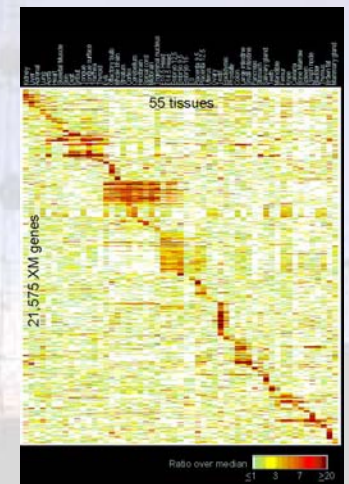
- ✘ Qualifying exam, middle of 1S term;
- ✘ Thesis proposal, middle of 2F term;
- ✘ Yearly progress review with thesis comm.;
- ✘ Thesis defense (whenever supervisor tires of you!)

Information/Communications Theory

- ✘ Information theory: classical and quantum
- ✘ Channel coding and modulation
- ✘ Probabilistic and Statistical Inference

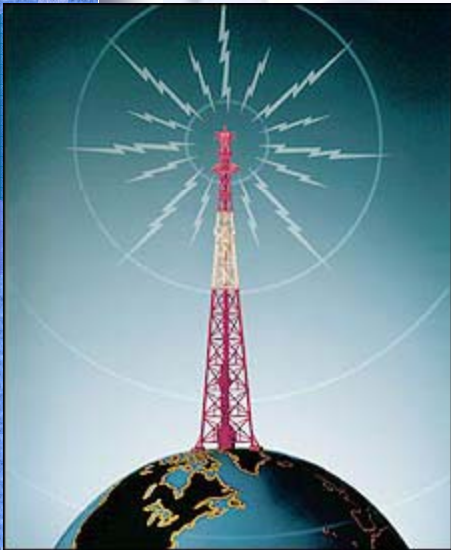
■ Professors:

- Brendan J. Frey
- Ashish Khisti
- Frank R. Kschischang
- T. J. Lim
- Hoi-Kwong Lo
- Wei Yu



From gene expression data to prediction of gene function

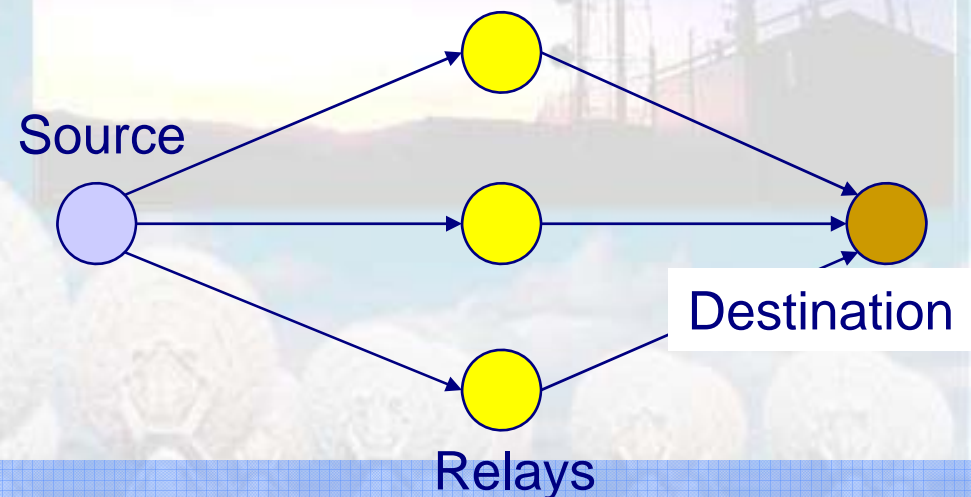
Wireless Communications



- ❌ Fading channels → *Diversity* e.g. multi-antenna (MIMO)
- ❌ Mobility → *Handoffs* between cells, *channel estimation & tracking*, *synchronization* problems
- ❌ High data rate, many users → *Multi-user interference* problems, efficient *resource allocation* vital
- ❌ Ubiquitous coverage → *Cooperative* networks
- ❌ Dynamic spectrum access, *cognitive radio*.

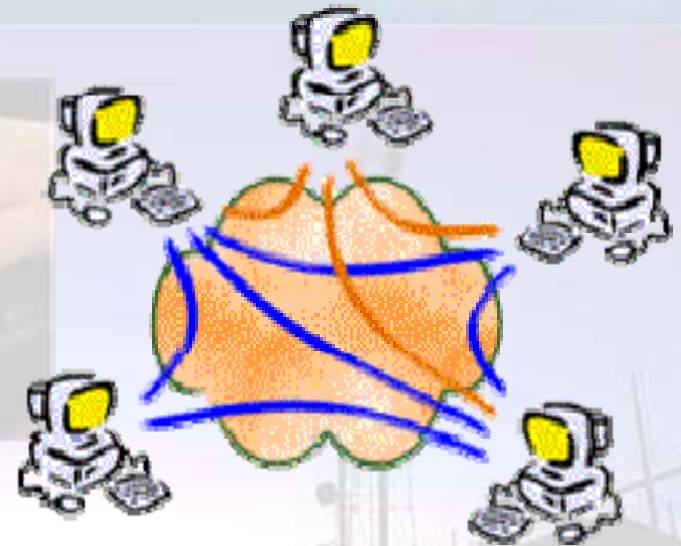
Professors:

- Elvino Sousa
- Teng Joon Lim
- Raviraj Adve



Communication Networks

- **Network Architectures:** application-oriented architecture, autonomic service architecture, service overlay networks
- **Network Protocols:** differentiated services, mobile Internet protocols, photonic-label switching, peer-to-peer networking
- **Network Management:** multimedia networking, wired/wireless integration, radio spectrum management, mobility management
- **Theoretical Foundations:** network calculus, queuing analysis, traffic modeling, game theory, learning mechanisms
- **Wireless Networking:** wireless broadband access, cognitive radio, sensor/ad hoc networking, wireless mesh networks, wireless local area networks, vehicular communication



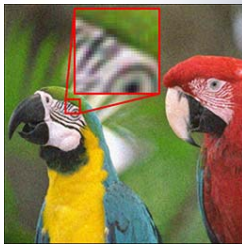
Professors:

Alberto Leon-Garcia
Ben Liang
Jorg Liebeherr
Shahrokh Valaee

Digital Signal Processing

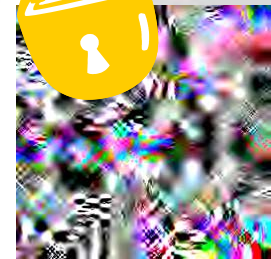
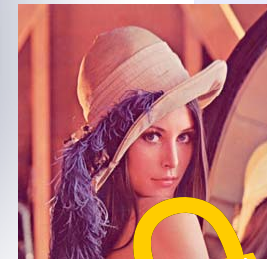
Image and Video Processing

- Digital Camera Processing
- cDNA Micro-array Imaging
- Visual Object Compression
- Universal Multimedia Access



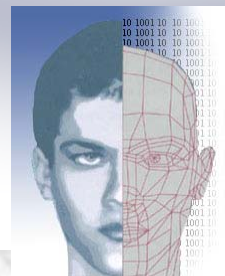
Multimedia Security

- Authentication & Fingerprinting
- Image and Video Encryption
- Visual Secret Sharing
- Secure Streaming
- Watermarking



Biometrics & Surveillance

- Face Recognition
- Gait Recognition
- Visual Surveillance




Professors:

- D. Hatzinakos
- R. Kwong
- K. N. Plataniotis

Technology Sectors



Communications technology impacts many sectors of economy:

- ❖ **Wireless networks:** 3G, Wi-Fi, WiMax, 3GPP-LTE.
 - ❖ Provides convenient connectivity to Internet from anywhere.
 - ❖ **Information security:** cryptography, watermarking, biometric authentication.
 - ❖ **Internet and telephony infrastructure:** networks operated by service providers such as Bell Canada, Rogers, Telus.
 - ❖ **Automobiles:** vehicle-to-vehicle communications, intelligent highways.
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Seminar Series



✦ Communications Group Seminars

- ❖ Announced by Email
- ❖ For Fall 2008, every other Friday 3.00 – 4.00, starting Sep 19.

✦ Toronto Networking Seminar Series

- ❖ Jointly organized by ECE and CS Departments
- ❖ Announced by Email
- ❖ www.comm.utoronto.ca/tons

Questions

T.J. Lim

(tj.lim@utoronto.ca)

Kostas Plataniotis

(kostas@comm.utoronto.ca)