IEEE Information Theory Society Newsletter

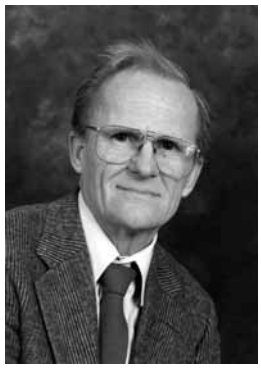
Vol. 58, No. 3, September 2008 Editor: Daniela Tuninetti ISSN 1059-2362

Annual IT Awards Announced

The principal annual awards of the Information Theory Society were announced at the Toronto ISIT. The 2009 Shannon Award goes to Jorma Rissanen. The 2008 Wyner Award goes to Vincent Poor. The winners of the 2008 IT Paper Award are two 2006 IT Transactions papers on compressed sensing by David Donoho and by Emmanuel Candes and Terence Tao, respectively (with acknowledgment of an earlier paper by Candes, Romberg and Tao). The winner of the 2008 Joint IT/ComSoc Paper Award is a Communications Transactions paper on Accumulate-Repeat-Accumulate Codes by Aliazam Abbasfar, Dariush Divsalar and Kung Yao. Three student authors of ISIT papers received ISIT Student Paper Awards: Paul Cuff of Stanford, Satish Korada of EPFL, and Yury Polyanskiy of Princeton. Finally, the 2008 Chapter of the Year Award was presented to the Kitchener-Waterloo (Canada) Chapter.

The Claude E. Shannon Award, awarded for "consistent and profound contributions to the field of information theory," is the highest honor of the IT Society. Jorma Rissanen, who spent most of his career at the IBM San Jose Research Laboratory, has published over 140 papers in a variety of areas including lossless and lossy compression, probability and statistics, and systems theory. He is best known for introducing and promoting the Minimum Description Length (MDL) principle for model selection and statistical inference. He was an early inventor of arithmetic coding. He has previously received the 1986 Information Theory Paper Award and a 1998 IT Golden Jubilee Award for Technological Innovation, as well as the 1993 IEEE Hamming Medal. He will give the Shannon Lecture at the 2009 ISIT in Seoul, Korea.

The Aaron D. Wyner Distinguished Service Award recognizes an "individual who has shown outstanding leadership in, and provided long-standing exceptional service to, the information theory community." Vince Poor, Dean of the School of Engineering and Applied Science at Princeton University, has served in every major role of the IT Society, including President (1990) and Editor-in-Chief of the Transactions (2004-2007). He has also served on the IEEE Board of Directors (1991-92), and as Chair of the Electronics Section of the U.S. National Academy of Engineering (2007 to date). He will be General Co-Chair of the 2009 ISIT in Seoul.



Jorma Rissanen

The Information Theory Society Paper Award is given annually to an outstanding publication in the fields of interest to the Society appearing anywhere during the preceding two calendar years. The winners of the 2008 award are "Compressed sensing," by David Donoho, which appeared in the April 2006 IEEE Transactions on Information Theory, and "Near-optimal signal recovery from random projections: universal encoding strategies," by Emmanuel Candes and Terence Tao, which appeared in the December 2006 Transactions. These two overlapping papers are the foundations of the exciting new field of compressed sensing. An earlier paper, "Robust uncertainty principles: Exact signal reconstruction from highly incomplete frequency information," by Candes, Justin Romberg and Tao, in the February 2006 Transactions, was also cited for stimulating the development of this field.

The Joint Information Theory and Communications Society Paper Award recognizes outstanding papers published in any publication of the Communications Society or the Information Theory Society during the previous calendar year. The winner of the 2008 award is "Accumulate-repeat-accumulate codes," by Aliazam Abbasfar, Dariush Divsalar and Kung Yao, which appeared in the IEEE Transactions on Communications in April 2007. This paper presents a new class of remarkably simple capacity-approaching codes.

Vince Poor

The ISIT Student Paper Award is given annually to one or more outstanding papers in that year's IEEE International Symposium on Information Theory for which a student (or students) is the primary author, and is also the presenter of the paper. The winners of this year's awards are "Communication requirements for generating correlated random variables," by Paul Cuff; "Exchange of limits: Why iterative decoding works," by Satish Babu Korada and Ruediger Urbanke; and "New channel coding achievability bounds", by Yury Polyanskiy, H. Vincent Poor and Sergio Verdú.

From the Editor

Daniela Tuninetti

Dear IT society members,

Here we are again: the beginning of a new academic year. Instead of worrying about all the deadlines and duties that lay ahead of us, let us linger with some pleasant summer memories. In particular, I am thinking of the shores of Lake Ontario, in Toronto, in a mild sunny day of the beginning of July. Toronto is in many ways similar to my (by now) home town Chicago --Toronto is actually one of 27 Chicago's sister cities-- and I liked it immediately. Like many of you, I was there for our flagship conference, ISIT. My congratulations for the organization to the symposium co-chairs Frank R. Kschischang and Enhui Yang; the TPC co-chairs Helmut Bölcskei, Ralf Koetter, and Gerhard Kramer; and all the other organizers (too many to mention). In this issue you will read about the IT awards announced at ISIT, and a couple of news from the Board of Governors meeting in Toronto. For a detailed summary of the major ISIT events however, you must be patient and wait for the December newsletter.

In addition to our regular columns, you will find a detailed account of the first Annual School of Information Theory that was held on the Penn State campus during the first week of June, organized by Aylin Yener and Gerhard Kramer. Joao Barros and Steve McLaughing, co-chairs of the 2008 ITW held in Porto, Portugal, in March, report from the event. Lalitha Sankar and Vince Poor share with us their experience of teaching information theory to freshmen with interesting observation that are applicable to more senior classes too. Finally, we catch up with the BoG minutes from the meeting in September 2007 in Allerton, and the meeting in March 2008 in Porto.

Last but not the least, please carefully read the calls for nominations for the society paper awards, for IEEE fellows and many other IEEE awards, and please do send in nominations.

Please help to make the Newsletter as interesting and informative as possible by offering suggestions and contributing news. The deadlines for the next few issues of the Newsletter are as follows:

Issue	**Deadline**
December 2008	October 10, 2008
March 2009	January 10, 2009
June 2009	April 10, 2009
September 2009	July 10, 2009

Electronic submission in Ascii, LaTeX and Word formats is encouraged. Potential authors should not worry about layout and fonts of their contributions. Our IEEE professionals take care of formatting the source files according to the IEEE Newsletter style. Electronic photos and graphs should be in high resolution and sent in as separate file.

I may be reached at the following address:
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Have a productive fall semester, sincerely,
Daniela Tuninetti

IEEE
Information Theory
Society Newsletter

IEEE Information Theory Society Newsletter (USPS 360-350) is published quarterly by the Information Theory Society of the Institute of Electrical and Electronics Engineers, Inc.

Headquarters: 3 Park Avenue, 17th Floor, New York, NY 10016-5997.

Cost is $1.00 per member per year (included in Society fee) for each member of the Information Theory Society. Printed in the U.S.A. Periodicals postage paid at New York, NY and at additional mailing offices.

Postmaster: Send address changes to IEEE Information Theory Society Newsletter, IEEE, 445 Hoes Lane, Piscataway, NJ 08854.

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The Historian's Column

Anthony Ephremides

One of the high points of scientific, as well as social, discourse in our Society is the (now) annual Symposium. Those who have participated in any ISIT are aware of the excitement of meeting old friends, making new ones, discovering new directions and ideas for their research, enjoying new, often exotic, locations, and just having plain fun. And those who have been involved in the organization of any ISIT know the, still exciting, "headaches" in attending to the details and ensuring that everything runs smoothly in the face of uncertainties and unexpected crises. Today, I will highlight a small sampling of personal memories that confirm the excitement and, often, the hilariousness of the symposia experiences.

Take, for instance, the 1979 ISIT in Grignano, Italy. It was Saturday afternoon before the start of the Symposium as the participants had started flocking in when the co-chairs (Lee Davisson and Pino Longo) discovered to their surprise that the Proceedings volumes that were to be part of the packages handed to the registrants were missing. After some frantic calls they discovered that these volumes were in the Milano airport customs office, languishing there for several weeks after they had been shipped from New Jersey. Recall that these were the pre-CD days and the era in which almost everything regarding the symposia had to be done in the United States. What to do? The following day registration would start and it would be a huge embarrassment, and a bad omen, if the registration packets did not include the Proceedings. So, the co-chairs made a bold decision. They hired a taxi and agreed to pay the driver a stiff fee of $500 (which in current dollars would be around $4,000) to have him go Milano (around 500 kilometers away) along with one of Pino's assistants (or with Pino himself, I do not recall), retrieve the Proceedings and drive back overnight to have them available on Sunday morning. This was an unbudgeted expense and I had to authorize it as I was the Symposium Treasurer. I did that and the next day the Proceedings were being handed out normally as if nothing happened.

But History repeats itself! Just at the recent ISIT in Toronto, the books of abstracts did not show up and phone calls to locate them were unproductive up until Saturday morning before the start of the Symposium. This time, it was Frank Kschischang himself, (the Symposium co-chair) who drove to the docks at the outskirts of Toronto and managed to locate them. Forklifts were used to load the abstract books to his car and he drove them safely back to the hotel just at the knick of time! Future ISIT chairs, beware!

Then there was the historic ISIT of 1991 in Budapest. Preparations for that had started already in 1986 as this was the first ever IEEE conference of any kind to take place behind the infamous Iron Curtain. As co-chair (along with Imre Csiszar) I took repeated trips to Budapest to ensure that all the trimmings for the Symposium were set correctly. Indeed, in the end, everything worked superbly exactly as planned, except of course that the Iron Curtain collapsed in the meantime. At the festive and luxurious banquet Imre had said : "the IEEE had meant this to be the first conference sponsored by it in a communist country; I am happy to report that IEEE failed to accomplish this goal"!

Of course, as the momentous events of the political transformation were unfolding, there were a myriad of side-events that added unique color to that process. For example, a group of about one dozen of us decided one evening to hire three taxis to take us to a recommended restaurant a few kilometers away from the conference venue and then hired another three taxis to get us back. Of the total of six fares paid no two of them were within 10% of each other. In the cab I was riding in, I was amused to observe that as the driver shifted to lower gears or revved up the engine, the meter would accelerate mightily. It was clear that the meter was not connected to the odometer but rather to the engine axis. So, we were paying not for the distance the wheels traveled but, rather, the distance the engine axis did independently of the conversion ratio of the gearbox! Quite smart!

And, finally, here is a personal memory from the 1985 legendary Symposium in Brighton England, known in the annals of History for the participation of Claude Shannon and for the atrocious food at the banquet. As it happened, concurrently with the conference, the famous opera festival of Glyndebourne was taking place in the relative vicinity of Brighton. I had managed to procure a ticket for a performance of "Arabella" by Richard Strauss which features two major soprano roles. As it happened, in that performance one of them was rather tall while the other one was somewhat short. So, I put on my best clothes, which, alas, consisted of a bright yellow suit and an open-neck orange shirt and headed for the opera. Upon arrival I noted with discomfort that everybody (I mean, EVERYBODY) was clad in tuxedos and formal evening gowns. I hesitated and contemplated turning back. But I decided to proceed and was uneventfully admitted by a poker-faced ticket controller and shown to my seat by a phlegmatic, expressionless usher.

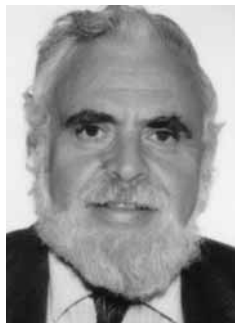
At intermission, as the elegantly dressed patrons were perambulating on the grounds of the theater, I felt completely out of place and terrible uncomfortable like a canary amidst hundreds of penguins. Suddenly, a tall, distinguished-looking gentleman with silver hair and white-tie tails approached me ominously. For a moment I thought he would ask me to leave. Instead, he simply asked: "Excuse me, Sir, who is Arabella, the tall one, or the sort one?" What a relief!

Oh, I could go on, and maybe I will in future columns. However, I would like to solicit your inputs about your own unique and memorable ISIT experiences. I will duly report them.

GOLOMB'S PUZZLE COLUMN™

Some problems about primes

Solomon W. Golomb



Here are three standard definitions from elementary number theory.

[a.] p_n = the n^{th} prime number. ($p_1 = 2$, $p_2 = 3$, $p_3 = 5$, etc.)

[b.] $\pi(x)$ = the number of primes $\leq x$, where x is any positive real number. (Clearly $\pi(p_n) = n$. It is also well-known that $\lim_{x\to\infty} \frac{\pi(x)}{x} = 0$.)

[c.] $\phi(n)$ = the number of integers k, $1 \leq k \leq n$, where *g.c.d.*$(k, n) = 1$. (Thus $\phi(n)$ = the number of fractions $\frac{1}{n}, \frac{2}{n}, \frac{3}{n}, \cdots, \frac{n}{n}$ that are in "lowest terms." It is easily shown that $\phi(n) = n\prod_{p|\,n}(1 - \frac{1}{p})$, where the product is extended over all prime divisors p of n.)

Now for the problems.

1. Show that every positive integer is in one and only one of the two sequences $A_n = n + \pi(n)$ and $B_n = p_n + n - 1$.

2. Show that every positive integer $n > 1$ occurs at least once as the ratio of N to $\pi(N)$, with $N \geq 2$.

3. What is the largest integer N such that all the values of k with $1 < k \leq N$ that are counted in $\phi(N)$are prime? (e.g. the values of k that are counted in $\phi(12) = 4$ are 1, 5, 7, 11, and the ones of these that exceed 1 are all prime; but $N \equiv 12$ is not the largest such value.)

4. What is the largest odd integer N such that all the odd values of k with $1 < k \leq N$ that are counted in $\phi(N)$are prime?

5. Eratosthenes (ca. 240 B.C.) observed that a number $N > 1$ is prime if and only if N is divisible by none of the primes p_i with $p_i \leq \sqrt{N}$. For what integer values of $N \geq 1$ is $Z(N) = N\prod_{p_i \leq y}(1 - \frac{1}{p_i})$ an integer, where $y = \sqrt{N}$?

6. With $Z(N)$ and y as in Problem 5, we should expect

$$(*) \quad \pi(N) \approx \pi(y) + Z(N) - 1,$$

because $\pi(y)$ counts the number of primes $\leq y$, and $Z(N)$ roughly counts the number of primes p_i with $y < p_i \leq N$ (but also counts "1", which we don't consider a prime).
For what positive integers N does (*) give the *exact* value of $\pi(N)$?

Report on the First Annual School of Information Theory

Aylin Yener and Gerhard Kramer

The First Annual School on Information Theory was held on June 1-5, 2008 at University Park Campus, Penn State University. The First Annual School was dedicated to the memory of Sergio Servetto.

The aim of this new initiative of our society is to bring together graduate students, postdoctoral researchers and senior researchers working on Information Theory in an interactive campus environment following the tradition of the European Winter School on Coding and Information Theory. We reported on the preparations for this event in the 2008 March Newsletter. The response to our advertisement was overwhelming and the final count of attendees was 114 comprised of 101 students and 13 senior attendees.

Student participation was a requirement for attendance: every student presented his or her work in the form of a short talk or poster. The school further featured three outstanding sets of lectures on June 2-4. Muriel Medard of MIT delivered three lectures on Network Coding, David Tse of UC Berkeley presented three lectures on Interference Channels and Relay Networks, and Toby Berger of the University of Virginia gave two lectures on Bio-information Theory. The school also had a panel discussion on June 4 and a keynote lecture by H. Vincent Poor of Princeton University on June 5. A welcome reception was held on the evening of June 1, and a banquet dinner was held the evening of June 4.

Students enthralled by the lecturer.

The panel discussion on June 4.

Students cannot contain their excitement after the keynote lecture.

The school was co-organized by Aylin Yener of Penn State University and Gerhard Kramer of Bell Labs, Alcatel-Lucent. We are happy to report that the school was everything we had hoped for and more. The student presentations were well-prepared and enthusiastically delivered. The instructors gave wonderful lectures that generated many questions during and after the lectures, and much interaction among the school participants.

Several colleagues and friends put much of their time into the organization. Sennur Ulukus (University of Maryland) and Ivana Maric (Stanford) helped with the applications. Nick Laneman and Matthieu Bloch (both University of Notre Dame), Lalitha Sankar (Princeton), and Brooke Shrader (University of Maryland) helped with the web and publicity. We are especially grateful to Debbie Lauder, Min Chen, Ertugrul Ciftcioglu, Ye Tian, and Marsha Church for their tremendous help with the local organization. Finally, the school was made possible by the financial support from the IEEE Information Theory Society, DARPA, the Networking and Security Research Center at Penn State, the Electrical Engineering Department at Penn State, and the School of Engineering and Applied Science at Princeton University.

We now look forward to next year's school, and we will communicate the details on this event as the preparations get underway. In the meantime, we invite you to visit the school web site that has the lecture slides, video recordings of the lectures and the panel discussion, and the student presentations: see http://school.itsoc.org.

ITW 2008 in Porto, Portugal

João Barros and Steven W. McLaughlin

In the year we celebrate the 60th anniversary of Shannon's 1948 landmark paper, the 2008 IEEE Information Theory Workshop was held in Porto, Portugal. From May 5 to May 9, about 150 scientists and 20 PhD students from the University of Porto enjoyed the magnificient setting of the Palacio da Bolsa, right by the River Douro, in the heart of the World Heritage Site of Porto.

Dr. Emina Soljanin and Prof. Andreas Winter chaired a diverse Technical Program Committee and organized a very original program under the motto “Looking back and looking forward”. The Society Historian, Prof. Anthony Ephremides, gave the first keynote lecture entitled “Beyond Shannon” and set the tone for the invited sessions, which took a brief look into the recent information theory past and then proceeded to explore opportunities for information theory research in biology, computer science, statistics, control theory and quantum communication. Alberto Apostolico, Amin Shokrollahi, Andrew Barron, and Michal Horodecki were the keynote speakers for each one of these special topics. Contributed papers were selected among 170 submitted papers from 38 different countries.

The University of Porto did not spare efforts in announcing the workshop to the general public. A 13 meter long banner with Shannon’s capacity formula was placed on the façade of the Palace and a press release was sent out with the suggestive title "Brains from all over the world celebrate the Birth of the Bit at Palacio da Bolsa". The Instituto de Telecomunicações(IT), a Portuguese national institute with more than 180 PhD researchers in telecommunications provided generous logistical support.

The social program gave ample opportunity for port wine tasting, including a “Port of Honor” reception in the Palace’s Hall of Nations, which featured a musical performance by women engineering students, and the traditional banquet dinner, which took place at Taylor’s, one of the most famous Port wine cellars and was hosted by the President of the University of Porto. One of the afternoons was devoted to an excursion to the beautiful medieval city of Guimarães, known as the birth place of the Portuguese Nation. The PhD students of the Networking and Information Processing group at IT Porto set up a workshop blog, which can be accessed the conference webpage. The conference organization would not have been the same without their enthusiasm and hard work, right from the first minute until the final detail.

For a glimpse of the atmosphere of ITW 2008 in Porto, check out the picture gallery set up by Luisa Lima, which is available from http://www.dcc.fc.up.pt/~itw08

keynote lecturer Tony Ephremides.

The 13 meter long ITW banner with Shannon’s famous capacity formula.

Workshop attendees.

Elements of Information Theory workshop: Coverfest 2008

Suhas Diggavi and Young-Han Kim

To celebrate Professor Thomas M. Cover's upcoming 70th birthday and honor his numerous contributions to information theory, statistics, and communications, his colleagues and students gathered at the Elements of Information Theory Workshop on Friday, May 16. The workshop was hosted by the Information Systems Laboratory (ISL) of the Department of Electrical Engineering at Stanford University.

Tom Cover.

The technical program included presentations by leading experts in various topics, reflecting Professor Cover's broad research interests: Andrew Barron (Information Theory Principles in Probability and Statistics), Charles Bennett (Quantum Information), Imre Csiszar (Maximum Entropy), Abbas El Gamal (Broadcast Channel), Peter Gacs (Algorithmic Randomness Test), Hal Stern (Mathematics in Sports), and Sergio Verdu (Across Cover's Universe). There was also a special session on recent results, open problems, and mathematical puzzles. Modeled after Professor Cover's weekly research group seminars, this session hosted many short talks with active audience participation. The technical program was followed by a reception and banquet at the Cantor Art Center.

The workshop was attended by more than one hundred participants. Professor Cover's great influence on many researchers in diverse disciplines was evident at the event.

More photos and slides of technical talks can be found at http://isl.stanford.edu/eit/

Some workshop participants.

teaching it ... to freshmen

Lalitha Sankar and H. Vincent Poor, lalitha,poor@princeton.edu

Each year, Princeton University's Council on Science and Technology (CST) grants five to six three-year teaching postdoctoral fellowships distributed over all University departments in engineering and the natural sciences, following a process of applications, interviews, and with support from the applicants' research and teaching faculty mentors. The Council's aim is to fund research fellows who devote a semester each year to teaching science and technology courses to undergraduates, preferably those with non-science backgrounds, and to this end, the Council expects each applicant to propose such a course with his/her teaching mentor.

As a CST postdoctoral fellow and her mentor for the academic period 2007-2010, we proposed a course entitled 'Fundamental Ideas of the Digital Revolution: Insights into Technology, Language, and Biology,' with the aim of introducing the fundamental concepts of entropy, compression, and coding of Shannon, which of course, are at the heart of the modern digital revolution. We offered the course as a Freshman Seminar in the 2008 spring semester and, in keeping with the small and diverse class sizes for such seminars, had an enrollment of six first year undergraduates with majors and interests as varied as anthropology, linguistics, economics, life sciences, political science, and mechanical engineering.

Our primary approach to teaching the course was to motivate the need for Shannon's basic ideas using examples. A natural first step towards this was to develop the notion of information. To this end, we owe a debt of gratitude to our Princeton colleague Sergio Verdú for introducing us to the book *Information: A New Language of Science*, by Hans Christian von Baeyer [1], which we used as one of the textbooks for the class (and we also owe Sergio for the title of this article!). A professor of physics, von Baeyer introduces readers to the concept of information starting with a semantic history of the word and culminating in a discussion of quantum information. In the process, he discusses the contributions made by Morse to the first electrical communication network and by Shannon to information quantification and communication, introduces the readers to probability and the logarithm as tools for measuring information, and makes elegant connections between the notions of entropy in information theory and in thermodynamics. Using this reference we developed the fundamental idea that information (Greek root, *eidos* or form) exchange is meaningful only when it is not known *a priori* at the receiver. This led to the notion that meaningful sources of information are not deterministic but rather are random entities that generate letters from an alphabet with different probabilities. Here it was natural to use spoken and written languages as the primary examples.

To further develop the notion of measuring information measure in bits, we introduced binary representation through an interactive lesson. This then allowed us to define entropy, having developed a simple mathematical representation of a random variable taking finitely many values, and to introduce Huffman coding as an approach to compress data for sources with known statistics. To complement these abstract discussions, we developed hands-on experiments using diode-based light switches, courtesy of the optoelectronics group at Princeton, to experiment with signaling, coding, and communication schemes. The different colored diodes allowed binary, ternary, and quaternary signaling of English letters given their prior probabilities. In fact, these hands-on experiments even helped the students understand the nuanced difference between top-down Shannon-Fano coding and bottom-up Huffman coding techniques.

This experiment in turn naturally led to the concept of compression. Using examples, we developed the idea that information sources can be either continuous or discrete. The need to store and communicate information using finite resources served as a motivation to introduce the concepts of sampling and quantization as *pulse-coded modulation* (PCM) [2]. With knowledge that the electronic alphabet is binary, the power of PCM was illustrated with practical examples such as telephony, where speech signals are sampled and quantized to 64 kbps, and compact discs, where audio signals are sampled and quantized at about 1.5 Mbps. With a brief nod to Nyquist, the discussion of PCM only hastened to reveal the need for compression to store and transmit multimedia information sources. To this end, we briefly introduced the ideas behind a variety of lossy compression techniques such as differential PCM, Linear Predictive Coding, JPEG, MPEG, and subband coding schemes such as mp3. In the process of doing so, it was gratifying to help students who could not distinguish between the audio quality of mp3 and CD understand the technical difference. Finally, we also briefly introduced lossless dictionary-based compression schemes such as Lempel-Ziv as the basis for compression formats such as Zip™.

In our desire to use natural language as an example to illustrate Shannon's novel ideas, we followed the discussion on information compression by a reading and discussion of Shannon's paper on the compressive and predictive properties of the English language [3]. While the students intuitively grasped the concept of correlation between consecutive letters in a word/sentence as described by Shannon, developing the mathematical concept of joint probability distribution to quantify the entropy of the language using N-grams was extremely challenging . It was however a worthwhile investment as it made it easier to formally define mutual information later in the course. These ideas were also applied to study the classical hypothesis of information coding and compression in animal nervous systems as proposed and discussed by Atick in [4].

We set the stage for a discussion of error correction and coding using hands-on experiments to provide insight into the unreliable nature of communications. Our task of presenting the simple principles that ensure reliability in modern communications systems was made significantly easier thanks to Bob McEliece of Caltech, who shared with us his multimedia productions aimed at teaching these concepts to high-school students. The video presentations allowed the students both to see the wide range of applications of error-control coding, from bar codes to deep space communications, and to get a basic understanding of the mathemati-

cal principles behind the Reed-Solomon code. Our thanks also go to our Princeton colleague Sanjeev Kulkarni for sharing his undergraduate course notes on this topic. As an example, we discussed the error-correction scheme applied to the PCM bits stored on a compact disc. To this end, we owe thanks to Kees Immink of Turing Machines, Inc. for his encouragement and feedback, including his recent article in the IT newsletter [5]. As an historical example of error-correction, the class (including the instructors) learned about the sophisticated error-detection and correction schemes used by the ancient Indians in their oral tradition of chanting the Vedas (religious texts), which among other approaches analogous to modern coding techniques also included a text-to-binary[2] mapping technique to aid one of the chanters in the group to detect errors [6]. Finally, having developed the notion of noise as an essential nuisance [1] and the need for error correction, we discussed, albeit briefly, the contribution of Shannon to quantify the maximum rate for reliable communications, thereby introducing the concept of mutual information.

In the last part of the course we used a combination of guest lectures, multimedia presentations, and reading assignments to present a variety of applications of information theory. In particular, Stuart Altman of Princeton's Department of Ecology and Evolutionary Biology discussed his work on non-deterministic modeling of social communications among primates, and Michael Berry of Princeton's Department of Molecular Biology presented a three-hour lecture on 'Information Theory in the Brain.' Shannon's contribution to cryptography and communication secrecy was briefly studied using technical papers and popular science literature (e.g., [7]). Multimedia presentation on the Navajo Code Talkers illustrated the application of natural language to encryption. We also owe thanks to Joachim Hagenauer of Technical University of Munich for enthusiastically sharing with us his ideas and articles on the application of information theory to genomics [8] and the analysis of historical texts [9].

The students' understanding of the course's subject matter was put to test with a final project in which they were expected to write a paper on a topic of their choice illustrating the principles they had learned in the course. The topics of these papers ranged through applications of information theory to language, biology, finance, and cryptography. An impressive original paper by one of the students was on the study of the 'Entropy and Redundancy of the Hand Signs of American Sign Language,' a language which defies a simple characterization of its alphabet as it involves hand signs, facial expressions, and body movements. Another impressive paper by a student on 'An Information-theoretic Approach to the Massoretic-Biblical Text' discussed the complex error-detection and correction techniques used by scribes over centuries to preserve this ancient text. Yet another student used popular literature to draw connections between Shannon, John Kelly, and gambling, culminating her presentation with a brief summary of Tom Cover's contributions to portfolio theory. The literature on the application of information theory to explain coding and information storage in the neuronal systems was the topic for a student majoring in biology, while the social sciences students presented various contributions of Shannon and his predecessors to cryptography.

Teaching Shannon's complex mathematical concepts to freshmen using intuitive ideas and examples has been in equal measures challenging and satisfying. One of the primary challenges is the lack of accessible reading materials that clearly and simply describe Shannon's ideas. We look forward to teaching the course again next year and we hope we can better address a number of ideas, including the simple yet oft-repeated question of why Shannon's contributions have been such a well-kept secret from the general public. We invite comments and suggestions from the community at large on books, reading materials, and techniques that can make the teaching less abstract. Finally, we wish to thank the CST at Princeton, and in particular Ms. Carol Prevost and Prof. Neta Bahcall, for their continued support and encouragement and for giving us an opportunity to try this as yet untried teaching experiment. Those interested can find more details on the course at http://www.princeton.edu/~lalitha.

References:

[1] Hans Christian von Baeyer, *Information: The New Language of Science*, Harvard University Press, Cambridge, MA, 2005.

[2] H. Vincent Poor, *Pulse-Coded Modulation*, Lecture notes from "ELE 391: The Wireless Revolution," taught at Princeton, Spring 2003.

[3] Claude E. Shannon, "Prediction and Entropy of Printed English," *Bell System Tech. Journal*, 50:50-64, 1951.

[4] Joseph J. Atick, "Could Information Theory Provide an Ecological Theory of Sensory Processing?," *Network*, Vol. 3, pp. 213-251, 1992.

[5] Kees A. Schouhamer Immink, "Shannon, Beethoven, and the Compact Disc," *Information Theory Society Newsletter*, vol. 57, no. 4, Dec. 2007.

[6] R. L. Kashyap, "Mathematics in the Vedic Age," http://cobweb.ecn.purdue.edu/~kashyap/.

[7] Simon Singh, *The Code Book: The Science of Secrecy from Ancient Egypt to Quantum Cryptography*, Anchor Press, New York, 1999.

[8] Pavol Hanus, Berhard Goebel, Janis Dingel, Johanna Weindl, Juergen Zech, Zaher Dawy, Joachim Hagenauer, and Jakob Mueller, *Information and Communication Theory in Molecular Biology*, Electrical Engineering Series, Springer Series, vol. 90, no. 2, Dec. 2007.

[9] Pavol Hanus and Joachim Hagenauer, "Information Theory helps Historians," *Information Theory Society Newsletter*, vol. 55, no. 3, Sep. 2005.

[1] It should be noted that in this, and all of the mathematical aspects of the course, only discrete alphabets were considered, even though most of the students were conversant with calculus.

[2] Now accepted as one of the earliest, perhaps the first, use of the binary number system.

New Books

Raymong Yeung

Principles of Digital Communication,
by Robert G. Gallager. Cambridge University Press, 2008, 422 pp., $75.00, ISBN 978-0521879071.
Contents:
Introduction to Digital Communication; Coding for Discrete Sources; Quantization; Source and Channel Waveforms; Vector Spaces and Signal Space; Channels, Modulation, and Demodulation; Random Process and Noise; Detection, Coding, and Decoding; Wireless Digital Communication.

Modern Coding Theory,
by Tom Richardson and Reudiger Urbanke. Cambridge University Press, 2008, 592 pp., $85.00, ISBN 978-0521852296.
Contents:
Introduction; Factor Graphs; Binary Erasure Channel; Binary Memoryless Symmetric Channels; General Channels; Turbo Codes; General Ensembles; Expander Codes and Flipping Algorithm.

Information Theory and Network Coding,
by Raymond W. Yeung. Springer, 2008, 600 pp., $64.95, ISBN 978-0-387-79233-0.
Contents:
The Science of Information. Part I: Components of Information Theory -- Information Measures; The *I*-Measure; Zero-Error Data Compression; Weak Typicality; Strong Typicality; Discrete Memoryless Channels; Rate-Distortion Theory; The Blahut-Arimoto Algorithm; Differential Entropy; Continuous-Valued Channels; Markov Structures; Information Inequalities, Shannon-Type Inequalities; Beyond Shannon-Type Inequalities; Entropy and Groups. Part II: Fundamentals of Network Coding -- Introduction; The Max-Flow Bound; Single-Source Linear Network Coding: Acyclic Networks; Single-Source Linear Network Coding: Cyclic Networks; Multi-Source Network Coding.

Fundamentals of Digital Communication,
by Upamanyu Madhow. Cambridge University Press, 2008, 518 pp., $80.00, ISBN 978-0521874144.
Contents:
Introduction; Modulation; Demodulation; Synchronization and Noncoherent Communication; Channel Equalization; Information-Theoretic Limits and Their Computation; Channel Coding; Wireless Communication.

Algebraic Codes on Lines, Planes, and Curves: An Engineering Approach,
by Richard E. Blahut. Cambridge University Press, 2008, 576 pp., $99.00, ISBN 978-0521771948.
Contents:
Sequences and the One-Dimensional Fourier Transform; The Fourier Transform and Cyclic Codes; The Many Decoding Algorithms for Reed-Solomon Codes; Within or Beyond the Packing Radius; Arrays and the Two-Dimensional Fourier Transform; The Fourier Transform and Bicyclic Codes; Arrays and the Algebra of Bivariate Polynomials; Computation of Minimal Bases; Curves, Surfaces, and Vector Spaces; Codes on Curves and Surfaces; Other Representations of Codes on Curves; The Many Decoding Algorithms for Codes on Curves.

MIMO Wireless Communications,
by Ezio Biglieri, Robert Calderbank, Anthony Constantinides, Andrea Goldsmith, Arogyaswami Paulraj, and H. Vincent Poor. Cambridge University Press, 2008, 342 pp., $89.00, ISBN 978-0521873284.
Contents:
Introduction; Capacity Limits of MIMO Systems; Precoding Design; Space-Time Coding for Wireless Communications: Principles and Applications; Fundamentals of Receiver Design; Multi-User Receiver Design.

Network Coding: An Introduction,
by Tracey Ho and Desmond Lun. Cambridge University Press, 2008, 184 pp., $60.00, ISBN 978-0521873109.
Contents:
Intoduction; Lossless Multicast Network Coding; Inter-Session Network Coding; Network Coding in Lossy Networks; Subgraph Selection; Security against Adversarial Errors.

Wireless Communications Security,
edited by Hideki Imai. Artech House Publishers, 2006, 202 pp., pounds 49.00, ISBN 1-58053-520-8.
Contents:
Cryptography; Security Features in Wireless; Authentication / Authorization / Accounting; Security in GSM; Security in 3G Systems and 4G Systems; PKI in Wireless (WPKI); Wireless Application Protocol (WAP).

WiMAX Handbook,
edited by Syed A. Ahson and Mohammad Ilyas. CRC Press, 2007, Volume 1: WiMAX Applications, 240 pp., $79.95, ISBN 978-1-4200-4547-5; Volume 2: WiMAX: Standards and Security, 280 pp., $79.95, ISBN 978-1-4200-4523-9; Volume 3: Technologies, Performance Analysis, and QOS, 288 pp., $79.95, ISBN 978-1-4200-4525-3.

OFDMA for Broadband Wireless Access,
by Slawomir Pietrzyk. Artech House Publishers, 2006, 270 pp., pounds72.00, ISBN 1-59693-044-6.

Wireless Ad Hoc and Sensor Networks: Theory and Applications,
by Xiang-Yang Li. Cambridge University Press, 2007, 600 pp., pounds 45.00, ISBN 978-0-521-86523-4.

Iterative Receiver Design,
by Henk Wymeersch. Cambridge University Press, 2007, 328 pp., pounds45.00, ISBN 978-0-521-87315-4.

High-Speed Wireless Communications: Ultra-wideband, 3G Long Term Evolution, and 4G Mobile Systems,

by Jiangzhou Wang. Cambridge University Press, 2008, 350 pp., pounds 45.00, ISBN 978-0-521-88153-1.

Wireless Ad Hoc and Sensor Networks: Protocols, Performance, and Control,
by Jagannathan Sarangapani. CRC Press, 2007, 536 pp., $139.95 / pounds 79.99, ISBN 978-0-8247-2675-1.

Performance Optimization of Digital Communications Systems,
by Vladimir Mitlin. Auerbach Publications, 2006, 224 pp., $99.95 / pounds 56.99, ISBN 978-0-8493-6896-7.

Wireless Security Handbook,
by Aaron E. Earle. Auerbach Publications, 2006, 366 pp., $79.95 / pounds 48.99, ISBN 978-0-8493-3378-1.

Physical Principles of Wireless Communications,
by Victor L. Granatstein. Auerbach Publications, 2007, 288 pp., $99.95 / pounds44.99, ISBN 978-0-8493-3259-3.

Mobile WiMAX: Toward Broadband Wireless Metropolitan Area Networks,
by Yan Zhang, Hsiao-Hwa Chen. Auerbach Publications, 2007, 449 pp., $99.95 / pounds 56.99, ISBN 978-0-8493-2624-0.

Principles of Mobile Computing and Communications,
by Mazliza Othman. Auerbach Publications, 2007, 216 pp., $89.95 / pounds 44.99, ISBN 978-1-4200-6185-1.

WiMAX: A Wireless Technology Revolution,
by G.S.V. Radha Krishna Rao, G. Radhamani. Auerbach Publications, 2007, 368 pp., $69.95 / pounds 39.99, ISBN 978-0-8493-7059-5.

Millimeter Wave Technology in Wireless PAN, LAN, and MAN,
by Shao-Qiu Xiao, Ming-Tuo Zhou, Yan Zhang. Auerbach Publications, 2007, 464 pp., $129.95 / pounds 74.99, ISBN 978-0-8493-8227-7.

Distributed Antenna Systems: Open Architecture for Future Wireless Communications,
edited by Honglin Hu, Yan Zhang, Jijun Luo. Auerbach Publications, 2007, 496 pp., $99.95 / pounds 56.99, ISBN 978-1-4200-4288-7.

Wireless Ad Hoc Networking: Personal-Area, Local-Area, and the Sensory-Area Networks,
edited by Shih-Lin Wu, Yu-Chee Tseng. Auerbach Publications, 2007, 664 pp., $89.95 / pounds 49.99, ISBN 978-0-8493-9254-2.

MIMO System Technology for Wireless Communications,
edited by George Tsoulos. CRC Press, 2006, 400 pp., $129.95 / pounds 74.99, ISBN 978-0-8493-4190-8.

Genomic Signal Processing and Statistics,
edited by Edward R. Dougherty, Ilya Shmulevich, Jie Chen, and Z. Jane Wang. Hindawi Publishing Corporation, 2005, 449 pp., $119.00, ISBN 978-9775945075.

Wireless Security and Cryptography: Specifications and Implementations,
edited by Nicolas Sklavos, Ximiao Zhang. CRC Press, 2007, 416 pp., $89.95 / pounds 49.99, ISBN 978-0-8493-8771-5.

IEEE Information Theory Society Board of Governors Meeting

Allerton House, Illinois, September 26, 2007

João Barros

Attendees: João Barros, Matthieu Bloch, Giuseppe Caire, Daniel Costello, Anthony Ephremides, Dave Forney, Marc Fossorier, Andrea Goldsmith, Frank Kschischang, J. Nicholas Laneman, Steven W. McLaughlin, Urbashi Mitra, Prakash Narayan, David L. Neuhoff, Bixio Rimoldi, Anant Sahai, Anand Sarwate, David Tse, Venugopal V. Veeravalli, Aylin Yener, Ken Zeger.

The meeting was called to order at 18:22 by Society President Bixio Rimoldi, who welcomed the members of the Board.

1. Board members were encouraged to look at the agenda and other materials online at the Society development server.

2. The Board unanimously approved the agenda of the meeting.

3. The Board unanimously approved the minutes of the previous meeting (Nice, France, June 24, 2007).

4. The President presented his report and miscellaneous announcements.

   The President thanked all those that helped the Servetto family after the accident of Sergio Servetto.

   The President thanked Nick Laneman and the web committee for their efforts in putting together a comprehensive proposal.

   The President also thanked the organizers of ISIT, ITW Bergen, ITW Lake Tahoe.

   The President reported on the status of Membership in the Society in comparison with other IEEE Societies. The number of student members decreased by 11.5% within one year. The Board discussed possible strategies to counter this negative evolution. As a possible incentive, Andrea Goldsmith suggested limiting participation in student events and access to travel grants to Student Members of the Society.

   Frank Kschischang was elected Second Vicepresident of the Society.

   Giuseppe Caire, Dan Costello, Urbashi Mitra, Venu Veeravalli and Ken Zeger have reached the end of their term as members of the Board. The President thanked them for their service and dedication to the Society.

   The next meetings will take place at the following venues:
   - BoG Meeting 1: ITW in Porto
   - BoG Meeting 2: ISIT in Toronto
   - BoG Meeting 3: Allerton

5. The Board discussed ways of organizing the participation of IT-SOC representatives at IEEE meetings such as TAB in a way that enables a sustained contribution to IEEE strategy and activities. The President informed that Tony Ephremides agreed to represent the Society in a committee which helps in IEEE's strategic planning.

6. The Board thanked Bixio Rimoldi for his service as President of the Society.

7. The Treasurer reported on the financial status of the Society. The current situation is stable. Anant Sahai also presented an update on the surplus intended for new initiatives and explained that a rush to spend this amount is not justified. The Treasurer recommended that the Society keeps the mandatory surplus with respect to Society conferences, so as to ensure that there are enough reserve assets to counter difficult times.

   Steve McLaughlin asked how publications affect the revenue of the Society. Anant Sahai explained that at the moment this impact is difficult to estimate, because IEEE has changed its policies.

   The Treasurer expects there to be significant fund available next year for additional Society activities.

8. The Web Editor, Nicholas Laneman, reported on the efforts of the Web Committee in writing a proposal to improve the Society's internet presence.

   The Members of the Board were encouraged to read the committee's short proposal and the detailed version available on the Society's document server.

   The Society now has several mailing lists for fast dissemination of information. The needs of the members of the Society were assessed via a survey. Nicholas Laneman explained the concept of content management system and how it could be used to implement some of the envisioned features. Detailed workflows were presented to several possible developers. Several cost estimates and related documents are available on the Society's document server.

   David Neuhoff asked for more information on the maintenance costs. Nick Laneman explained that these costs should be considered jointly with the costs of hosting the website. Possibilities include distributing the load over several servers at different universities or hiring a service provider.

   As a comparison, Giuseppe Caire described the costs of implementing the webpage for ISIT 2007.

   Andrea Goldsmith raised the issues of ease of use, participation and content contribution, once a strong investment in the website's development has been carried out.

   Nicholas Laneman explained that these are important issues that have been incorporated in the proposal.

The Board decided to vote on the web development proposal independently of the other initiatives.

A motion was made to approve a budget of up to 60 000 USD to implement the proposal made by the web committee. The Board unanimously approved the motion.

9. The Board discussed a proposal by Gadiel Seroussi for the Society to provide a grant to help promote Information Theory in Uruguay.

   A motion was made to provide a grant of 10000 USD in support of research activities in IT in Uruguay, mainly travel grants for participation of Uruguayan researchers in workshops and symposia organized by the Society. These travel grants should be awarded exclusively to members of the Society. The Board encourages the creation of a Uruguay Chapter where these funds could be located.

   The motion was unanimously approved.

10. Aylin Yener presented a proposal by herself and Gerhard Kramer on behalf of the Student Committee for an annual School of Information Theory to be held in North America, taking inspiration from the Winter Schools that have taken place in Europe.

    Funding is to be requested from external sources such as NSF and DARPA, and from the IT Society. In the general discussion, it was pointed out it would not be acceptable for the Society to restrict support of such schools to North America on a continuing basis, although a start-up grant would probably be acceptable. Aylin Yener made a motion for a grant of $20,000 to support travel by IT Society members to a first School of Information Theory at Penn State in 2008, to be dedicated to the memory of Sergio Servetto. A motion to amend the amount to $10,000 was made by Daniel Costello and approved. The amended motion was approved.

11. Steven W. McLaughlin presented a proposal for the Society to make a donation to the Servetto family fund.

    The Board discussed the implications of this donation. Suggestions were made to increase the amount of private donations, including inserting paypal in the fund's web announcement and adding an option to donate via the online conference registration forms of the Society's main conferences.

    Steven W. McLaughlin will present a motion to be discussed and voted on via email.

12. Andrea Goldsmith presented a report on the activities of the Student Committee.

    Following the unexpected passing of Sergio Servetto, the Student Committee organized a tribute to his life to take place at Allerton on September 27, 2007.

    Andrea Goldsmith believes that the Student Paper Award at ISIT 2007 was a success.

    The Board discussed concerns raised in a letter to the Board signed by Amos Lapidoth, in particular with respect to the impact of the selection procedure on the relationship between advisors and students.

    The Board discussed whether the Student Paper should be continued every year at ISIT.

    There was a motion to have the ISIT Student Paper Award every year. The Board approved the motion unanimously.

13. Daniel J. Costello presented the report of the conference committee. All conferences are on track.

    There was a motion to approve a loan of 40000 USD for the organization of ISIT 2009.

    The Board approved the motion unanimously.

    Anant Sahai presented a motion for the approval of loans up to 10% of the budgeted receipts for ITWs and ISITs to be at the discretion of the Treasurer and the Conference Committee, after the conference and its budget has been approved. The motion was unanimously approved.

    Anthony Ephremides reported on the status of the proposal for ISIT 2011 in St. Petersburg.

    The Board unanimously approved a motion to hold ISIT 2011 in St. Petersburg.

    A guideline document for organizers of ISIT is now available on the Society's document server.

14. Steve McLaughlin described the composition and the role of the Nomination and Appointments Committee. There will be a solicitation by email to find two new members.

15. David Neuhoff described the constitutional amendments to be taken under consideration, among which adding the Editor in Chief of the Transactions as a voting member of the Board. Another proposal adds a one term limit, as recommended by the TAB Periodicals Review Committee after the Society's Five Year Review.

    The Board unanimously approved the proposed amendments.

16. The discussion of the last point of the agenda, which concerned funding issues, was postponed at the request of Venu Veeravalli.

17. There was no new business.

18. The next Board meeting will be held in Porto, Portugal, in May 2008.

19. The meeting was adjourned at 23:41.

IEEE Information Theory Society Board of Governors Meeting

Palacio da Bolsa, Porto, Portugal, May 4, 2008

João Barros

Attendees: Behnaam Aazhang, João Barros, Ezio Biglieri, Daniel Costello, Michelle Eros, Anthony Ephremides, Dave Forney, Andrea Goldsmith, Tor Helleseth, Gerhard Kramer, J. Nicholas Laneman, Hans-Andrea Loeliger, Muriel M edard, David L. Neuho , Bixio Rimoldi, Anant Sahai, Shlomo Shamai, Amin Shokrollahi, Aylin Yener.

The meeting was called to order at 14:00 by Society President G. David Forney, who welcomed the members of the Board.

1. Board members were encouraged to look at the agenda and other materials online at the Society development server.

2. By consent, the Board unanimously approved the agenda of the meeting.

3. By consent, the Board unanimously approved the minutes of the previous meeting (Allerton, Monticello IL, September 26, 2007).

4. By consent, the Board approved technical co-sponsorships for the following conferences:
   - 2009 Workshop on Network Coding, Theory, and Applications (NetCod 2009),
   - International Conference on Information-Theoretic Security,
   - XII International Symposium on Problems of Redundancy in Information and Control Systems.

5. The President presented his report and miscellaneous announcements.

   The President noted that the Society is in very good nancial shape, with surpluses that are beyond expectation.

   The President thanked Bixio Rimoldi for his contributions as President of the Society, and Andrea Goldsmith for attending the forthcoming TAB meetings.

6. The Board members expressed their condolences to the Society's precious collaborator Nela Rybowicz on the death of her husband, and sent her their heartfelt sympathy.

7. Ezio Biglieri presented the report of the Editor-in-Chief.

   An Author Gateway will be introduced by IEEE in 2008. The goal is to provide a means for an author to follow the status of a paper. A plagiarism detection tool is also planned.

   An Ad Hoc Committee approved by IEEE TAB in 2006 has set the goal of a mean submission-to-publication time of one year for 80% of papers.

   The Editor-in-Chief described the status of the IEEE Transactions on Information Theory.

   The mean submission-to-publication time was 64 weeks in 2006 and 2007, whereas the median was 86 weeks. The Board discussed ways of improving timeliness. Michelle Effros noted that di erent Associate Editors and Editor-in-Chiefs have di erent ways of approaching the review process. Muriel M edard suggested assigning a staff person to usher the papers from submission to publication, as is done by other Societies. The Editor-in-Chief mentioned that he plans to work on a best-practices document.

8. Ezio Biglieri presented the following motion:
   1. There will be no more Correspondence section in the Transactions.

   2. No submission in the Correspondence category will be accepted as soon as the new policy is posted on the IT society web page and mentioned in the Transactions, and the appropriate changes are made in the Pareja submission procedure (this should take about three months after BoG approval). The remaining submission categories will be denoted: Paper; Correction; Other.

   3. As of January 2009 (by that time, most of the Correspondence items in the editorial pipeline should already have been printed), the Correspondence section will disappear from the Transactions, and all manuscripts (except Corrections, and possibly Others) will have the same size and pagination.

   4. While we accept a diverse range of papers in terms of scope and length, we do expect that papers' length will be proportional to ther scope.

      The Board approved the motion unanimously.

9. Ezio Biglieri presented a second motion:

   Starting in 2008, the Annual Index of the Transactions will not appear in print. Only an electronic version will be generated, to appear in IEEE Xplore and on the web site of the Society. The triennial index will be discontinued.

   The Board approved the motion unanimously.

10. Regarding self-plagiarism policies, the Editor-in-Chief suggested waiting for a year to see the impact of the elimination of Correspondence items before implementing stricter rules.

11. Dan Costello presented the conference committee's report. ITW 2007 Bergen, ISIT 2007 Nice and ITW 2007 Lake Tahoe are closing successfully. The following conferences are on track:

    - ITW 2008 Porto

- ISIT 2008 Toronto
- ISIT 2009 Seoul
- ISIT 2011 St. Petersburg

ISIT 2009 organizers were not able to register the domain name isit2009.org, and suggest that a solution be found for the domain name of future ISITs. Nicholas Laneman pointed out that the problem will be solved automatically when ISITs are hosted on the IT web site.

Anthony Ephremides will visit St. Petersburg to continue preparation for ISIT 2011.

12. Anthony Ephremides presented a proposal to hold a ITW in 2009 in Volos, Greece during June 10-12, 2009, to be devoted to Networking and Information Theory. The General Co-chairs will be Bruce Hajek and Leandros Tassiulas. Venkat Anantharam and Yannis Kontoyannis will be the Technical Program Committee Co-chairs.

    Daniel Costello presented a motion to approve this proposal. The Board approved the motion unanimously.

13. Ezio Biglieri presented a proposal to hold a second ITW in 2009 in Taormina, Sicily during October 11-16, 2009. The General Co-chairs would be Ezio Biglieri and Emanuele Viterbo. The Technical Program Committee Co-chairs would be Dan Costello and Alex Grant.

    Some members of the Board expressed concerns that the registration fee may be too high.

    A final proposal will be presented at the next Board meeting.

14. Behnaam Aazhang presented a proposal to hold ISIT 2010 in Austin, Texas (June 12-18, 2010), with General Co-Chairs Costas N. Georghiades and Behnaam Aazhang, and Technical Program Co-Chairs Robert Heath, Krishna Narayanan, and Michael Gastpar. Dan Costello presented a motion to approve this proposal. The Board approved the motion unanimously.

15. Muriel Médard presented a proposal for a concerted e ort from our Society to enhance women's participation in a way that is inclusive and bene cial to all members of the Society. This e ort will be led by Bob Gray, Muriel Médard and any others who are interested. The proposal, which was motivated by a request by IEEE for the Society to contribute to the Women in Engineering program of the IEEE, included a request of an initial $3000 from the Society for such e orts. The proposal was approved unanimously by the Board.

16. The President reported on the nancial status of the Society. Due mainly to large revenues from IEEE Xplore, the Society currently has a large surplus. The President discussed various methods that the Society could use to reduce or eliminate this surplus.

    The Treasurer presented a strategic view of the 2008 budget. There will be approximately 560K available for spending this year. About 100K should be viewed as a structural surplus that can be spent on a program that is likely to be ongoing. The Treasurer recommended that the Board decide rst what the net result should be before deciding how to spend the surplus.

    Muriel Médard suggested that some investment be made in improving the submissionto-publication time, e.g., by using dedicated sta (perhaps part-time). Andrea Goldsmith proposed measures to increase membership. Nicholas Laneman noted the initiatives of the theoretical computer science community to advocate for funding support for research projects.

    The President presented a motion to
    (a) Freeze all dues and fees at their present levels | i.e., do not raise member fees, fees for member print copies, or non-member subscription fees.

    (b) Change our guidance to conferences to allow them to budget on a breakeven basis.

    (c) Increase level of Society expenses.

    The Board approved the motion unanimously.

    Concrete proposals will be discussed in Toronto.

17. Andrea Goldsmith presented the report of the Awards Committee. Three awards were discussed: the IT Paper Award, the Joint IT/Comsoc Paper Award (decision will be made next week), and the IT Student Paper Award (the decision is to be made soon).

    One of the issues to be considered is whether a paper can get both prizes (IT and Joint). A recommendation has been made to ComSoc to extend the award window to two years. The Bylaws require that the publication committee submit 9 nominations, which has not been done in the past. Andrea Goldsmith will ask for inputs, and possibly suggest a bylaws change.

    The IEEE Awards Board has recently decided to recommend discontinuing the Baker Award for the most outstanding paper in any IEEE publication in a given year on the grounds that nding the right criteria and the right people for the awards committee is too hard, despite interest expressed by IT and several other societies in funding and staffng this award. Andrea Goldsmith proposed to convey the Society's disappointment in this outcome at the IEEE TAB meeting in June.

18. Aylin Yener presented the report of the Student Committee. Special events have been arranged at CISS 2008 (round table event for students only) and ISIT 2008 (round table research and panel discussion, both at lunch time). The students will receive free T-shirts at the panel event at ISIT 2008. New initiatives include (a) moving the Student Committee web site to a content-based system and (b) increasing the number of volunteers. The preparation for the Summer School on Information Theory are well under way, with over 150 applicants (more than twice what was predicted).

Consequently the budget has had to be revised.

Aylin Yener presented a motion for an additional $10K from the society to cover School expenses and provide travel grants for attendees. The Board approved the motion unanimously.

19. The President reported on an IT Society proposal for an endowment by the widow of Michel Goutmann to be combined with a matching fund by the Society for a Goutmann Servetto travel grant for the School. Mrs. Goutmann declined this proposal in favor of a proposal from the Signal Processing Society for a student paper award honoring Dr. Goutmann.

20. Daniel Costello presented the report of the Fellow Committee. The Committee has addressed the following questions from the officers:

    (a) Are we getting enough Fellow nominations? If not, what can we do to improve?

    (b) Some concern has been voiced that it seems to be harder to become a Fellow via the IT Society than via some other societies. Is there any hard evidence for or against this proposition? If so, is there anything we can do about it?

    The number of nominations has dropped, in line with the decline in Society membership.

    The Chair believes that the Society is probably not getting enough Fellow nominations, and suggests making an announcement in the newsletter. The Board discussed whether we should be more proactive with respect to Fellow nominations.

    Andrea Goldsmith urged that the Society should improve its support of the career advancement of its members.

    Daniel Costello will make more speci c suggestions at the next meeting.

21. The Online Editor, Nicholas Laneman, presented the report of the Web Committee.

    The committee decided to change developers, and the project is now moving at a satisfactory pace.

22. There was no new business.

23. The next Board meeting will be held in Toronto, Canada, on July 6, 2008.

24. The meeting was adjourned at 18:40.

News from the Board of Governors Meeting in Toronto

The Information Theory Society Board of Governors (BoG) has approved the phase-out of the Correspondence section of the IEEE Transactions on Information Theory. All papers will now be considered to be regular papers. As always, however, the length of a paper will be expected to be proportional to its scope.

Two Information Theory Workshops have been approved for 2009: one in Volos, Greece, June 10-12, 2009, and one in Taormina, Sicily, Italy, October 11-16, 2009.

The 2012 IEEE International Symposium on Information Theory will be held at MIT in Cambridge, MA, USA, during July 1-6, 2012. A preliminary proposal has been made to hold the 2013 ISIT in Istanbul. (The 2009 through 2011 ISITs will be held in Seoul, Austin, and St. Petersburg, respectively.)

In view of the success of the first School of Information Theory in North America at Penn State in June, the Society will support making this School an annual event. Support for the established Winter School in Europe and possible Schools in other parts of the world will also be considered.

The BoG approved the following slate of candidates for the forthcoming BoG election: Helmut Bölcskei, Ning Cai, Suhas Diggavi, Abbas El Gamal, Meir Feder, Alex Grant, Ioannis Kontoyiannis, Gerhard Kramer, Paul Siegel, Emina Soljanin, Venugopal Veeravalli, Sergio Verdú, Pramod Viswanath.

The financial outlook of the Society for 2008 and 2009 continues to be good.

The final BoG meeting of 2008 will take place at 3:00 pm on Tuesday, September 23 in Champaign, IL.

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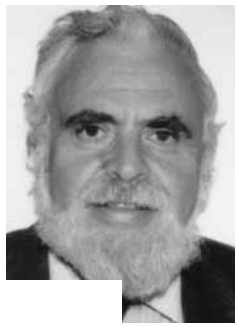
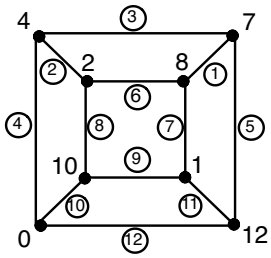
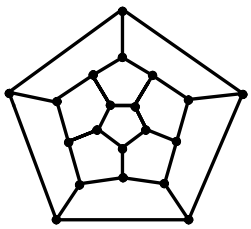
Solomon W. Golomb



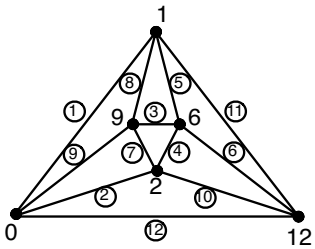
1. Here are the six graphs you were asked to number.



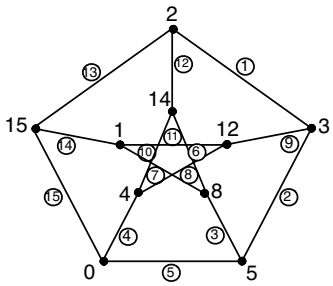
(The Cube)



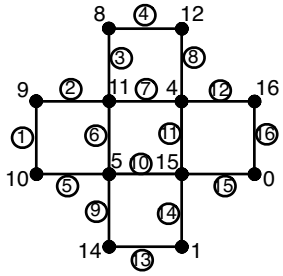
(Graceful numberings for this dodecahedron are known. Did you find one?)



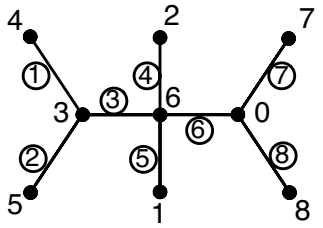
(The Octahedron)



(The Petersen Graph)



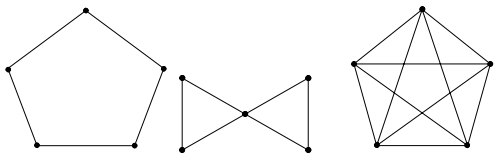
(The X-Pentomino)



(A typical caterpillar)

2. Suppose Γ is a graceful graph with an Euler circuit, with n nodes and e edges. Let $\{a_1, a_2, a_3..., a_e, a_1\}$ be the sequence of node numbers, from the graceful numbering, that trace out the Euler circuit. (These node numbers may be repeated in tracing the circuit.) Then the edge labels $|a_1\text{-}a_2|$, $|a_2\text{-}a_3|$, $|a_3\text{-}a_4|$,...,$|a_{e-1}\text{-}a_e|$, $|a_e\text{-}a_1|$ must be some permutation of $\{1,2,3,...,e-1,e\}$, and thus the edge labels sum to $\sum_{k=1}^{e} k = \frac{e(e+1)}{2}$, which is *odd* if and only if $e \equiv 1 (\text{mod } 4)$ or $e \equiv 2 (\text{mod } 4)$. Reducing all the edge labels modulo 2, since $+t \equiv -t (\text{mod } 2)$, we have $|a_{i+1} - a_i| \equiv a_{i+1} - a_i (\text{mod } 2)$ and thus the sum of the edge labels, modulo 2, is $(a_2 - a_1) + (a_3 - a_2) + (a_4 - a_3) + ... + (a_e - a_{e-1}) + (a_1 - a_e) \equiv 0 (\text{mod } 2)$. Since $1 \not\equiv 0 (\text{mod } 2)$, we cannot have a graceful numbering of a graph with an Euler circuit and e edges if $e \equiv 1, 2 (\text{mod } 4)$. □

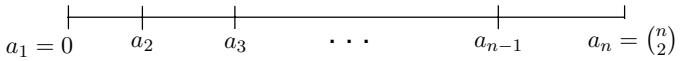
3. The three non-graceful (simple, connected) graphs on 5 nodes are



(e=5) , (e=6) , (e=10) .

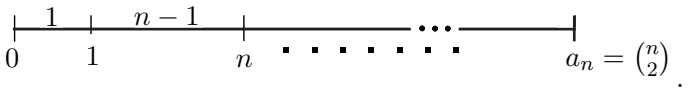
In each case, a graceful numbering is ruled out by the Theorem in problem 2.

4. Here is the simplest proof I know that K_n is not graceful for $n > 4$.
Suppose K_n has a graceful numbering. Let the n node numbers be a_1=0, a_2, a_3,...,a_n=$\binom{n}{2}$, (in ascending order). Mark these along the real line, starting at 0 and ending at a_n=$\binom{n}{2}$:



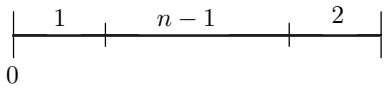
Since these were the node numbers of a graceful graph, the set of numbers $a_j - a_i$, for $i < j$, must be all the positive integers from 1 to $e = \binom{n}{2}$, and these differences ("distances measured by the ruler") must all be distinct. There are $n-1$ *intervals* (a_i, a_{i+1}) with i from 1 to $n-1$, and these have lengths $a_{i+1} - a_i$, which must all be distinct, and must sum to the length of the line, which is $\binom{n}{2}$. But since 1+2+3+...+ $(n-1)$ = $\binom{n}{2}$, these $n-1$ intervals must have lengths {1,2,3,..., $n-1$} in some permuted order. (Otherwise, their total length will exceed $\binom{n}{2}$, the total length of the "ruler".)

Next we consider the location of the interval of length 1. If it is next to an interval of length k, then $1+k$ will be a "measured length" along the ruler (and hence an edge number of the graph K_n); but all the lengths from 1 to $n-1$ already occur as lengths of intervals, and measured lengths cannot be duplicated, so the only possible value of k is $k = n-1$, so that $1+k = n$ is a new measured length. Since the interval of length 1 has only one possible neighbor, it must be at one end of the ruler, say:

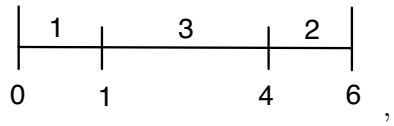


.

But then, where is the interval of length 2? If it has a neighboring interval of length l, then $2+l$ cannot duplicate any other measured length. We have intervals of every length from 1 to $n-1$, and now length n is also measured (from the "left end" of the ruler, as shown), so $2+l > n$, $l > n-2$, so the only allowed interval length l is $l = n-1$, and this is the only possible interval neighbor for the interval of length 2. So 2 is also at an end of the ruler, and is also next to the interval of length $n-1$. Thus, if $n > 3$, the entire ruler must look like

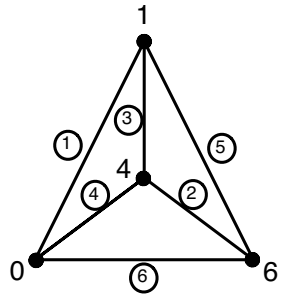


with only 3 intervals, and $n = 4$, giving the ruler



,

corresponding to the graceful numbering of K_4:



So we have proved that for $n > 4$, K_n cannot be graceful. □

Note. Although K_5 could (also) not be graceful because it has an Euler circuit with $e = 10 \equiv 2 (\mathrm{mod}\ 4)$, K_6 has no Euler circuit; so "K_6 is not graceful" is a consequence of the theorem about K_n, but not a consequence of the theorem about Euler circuits.

References

[1] A convenient reference is the chapter "Golomb's Graceful Graphs", Chapter 15 in Martin Gardner's book *Wheels, Life and Other Mathematical Amusements*, W.H. Freedman and Co., New York, 1983. (This book is a collection of some of Gardner's *Scientific American* columns.)

[2] "How to Number a Graph" by S. Golomb, from *Graph Theory and Computing*, Academic Press, © 1972, pp.23-37.

Guest Column: News from the National Science Foundation

Sirin Tekinay, Program Director for the Communications Program, and Cyber-Enabled Discovery and Innovation Program

Dear reader,

This is the twelfth quarterly guest column in this series. I'm thrilled to see this space continue to serve its purpose of enabling our interaction on all that impact us as professionals in the communications community as I write about relevant NSF programs and news.

New and Upcoming Programs

I am happy and proud to announce, as a result of continued efforts, both communications and network theory portions of our Theoretical Foundations Program have grown into bigger scopes, hopefully to obtain the bigger resources we deserve:

Our Communications Program has become its own "Cluster;" i.e., we are no longer a "program element" under Theoretical Foundations, rather, a full blown program called "Communications and Information Foundations (CIF)" as part of the Computing and Communications Foundations Division. This program will continue to serve the Communication, Information Theory, and Signal Processing communities. CIF is part of the coordinated CISE solicitation 2009 [1], with its ongoing research foci, in addition to new frontiers in quantum information theory and foundations of secure communications.

The network theory portion of Theoretical Foundations, we endearingly called "SING" the last three years, is now part of the directorate-wide cross-cutting program "Network Science and Engineering (NetSE)" [2]. NetSE is one of three large cross-cutting, directorate wide programs.

I continue to serve as the lead for the Cyber-Enabled Discovery and Innovation (CDI). We are thrilled to be on a fast-convergence path to the first award portfolio of this NSF-wide program. Two hundred and four full proposals, by invitation based on the review of their associated preliminary proposals, arrived on April 29. We held the full proposal review panels the first week in June. Among the invited, then recommended proposals, our community is well represented. Please continue to stay involved in CDI!! At this time, the CDI solicitation is going through a revision, so please stay tuned for revised timelines and other administrative changes. The scientific scope of the program is not likely to change in 2009.

News on the Communications Program

The Theoretical Foundations 2008 Program Solicitation (TF08) which closed on March 19, 2008 prompted six panels focused on communications, theory of communication networks, and signal processing for communications. The panels were held from end of April till mid-June. Due to ambiguities in our budget, the decision process is delayed, and at the time of writing, we are converging on the awards, after iteratively sending out regrettable declination decisions. All awards have to be made by the well-respected mid-August deadline in order to facilitate funding out of Fiscal Year 08 budgets.

We just received the CAREER proposals, and as usual, I am excited to see an innovative bunch. The CAREER panel for Communications will be held early October.

NSF People

In every column, I introduce some of the people I work with; who embody the culture and spirit of NSF. This time I would like to introduce two new division directors in CISE:

Our division, Computer and Communication Foundations, got a new director, Dr. Sampath Kannan. Sampath's detailed bio can be found on the proud CISE/CCF announcement [3] so I will write about the group's impressions of him during his first month here. We, the program directors in CISE/CCF division, held a professionally facilitated transitional meeting with our departing Division Director, Dr. Mike Foster, and our incoming division director. Sampath had to take the hot seat and answer blind questions that were posted on the walls before he came in. Not to mention the difficulty, and in some instances, bluntness, of these questions! Some were even borderline personal. Sampath's smile, easy going yet insightful answers that day reassured us all that we got ourselves a fine, fine administrator. Since then, he's still smiling, and during the heated budget reallocations and all else that goes with the intense fiscal year close-out craze, this is a major feat. Sampath has recently graciously accepted to serve as the CISE-CDI contact division director also.

The "Social Scene"

The whole summer, especially end of summer, is a busy time at federal agencies. While in the academia we're mostly used to revving up preparations for the new academic year, in the funding circles, this is a time to wrap things up. This theme of completion extends beyond the work, into rotators' terms at the NSF. We have had retirements, appointment terms coming to their end, and departures… All this is marked by farewell parties, get-togethers, well-wishing cards, and organizing group gifts. It's a bitter sad time when you know you have a friend for life, whom you will no longer see every day any more.

On a Personal Note

The end of summer 2008, the twelfth quarterly guest column, fourth batch of CAREER proposals, all mark the end of my third year here at the NSF. Between the academic and fiscal calendars' milestones in September, NSF and NJIT are still negotiating whether I will stay on to continue my work here at NSF or go back to NJIT. I was recently "interviewed" for the permanent version of the position I have held as a rotator the last three years. It is a difficult decision process for me, as I feel at home at both places.

True to tradition, I have completed this installment on the train from New Jersey. The train is pulling into the beautiful Washington Union Station, so I will ask you once again:

… Till next time, dream big, and keep in touch!

Sirin Tekinay
Program Director
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Arlington VA 22230
USA

stekinay@nsf.gov
http://www.nsf.gov/staff/staff_bio.jsp?lan=stekinay&org=CCF&from=staff

REFERENCES:

[1] http://www.nsf.gov/pubs/2008/nsf08577/nsf08577.htm

[2] http://www.nsf.gov/pubs/2008/nsf08578/nsf08578.htm

[3] http://www.nsf.gov/cise/news/sampath.jsp

Correction to the March edition of Golomb's Puzzle Column

Solomon W. Golomb

There was an error in Problem 2 of the March, 2008 Puzzle Column, and in its solution published in the June, 2008 issue.

It is true (as in Problem 1) that for all odd prime values of p, the Stirling numbers of the two kinds, S(p,k) and s(p,k), are divisible by p for all k with $1 < k < p$. However, it is not necessarily true (as asserted in Problem 2) that p will also divide S(2p,k) and s(2p,k) for all values of k with $1 < k < p$ and $p < k < 2p$. (Problem 2 was an attempted generalization of my Problem 1, hastily contrived under deadline pressure, whose "proof" I failed to assess rigorously. The orbits of the 2p elements under cyclic permutation have more possible sizes than I had improperly assumed.) I am grateful to Thomas D. Howell for pointing out this error.

IEEE Fellow Program

For (s)he's a jolly good (IEEE) Fellow!

Do you know an IEEE colleague who has made outstanding contributions to the electrical and electronics engineering profession? If so, consider nominating him or her as an IEEE Fellow. The deadline for receipt of complete IEEE Fellow nominations for the Class of 2010 is 01 March 2009.

At the time the nomination is submitted, a nominee must be an IEEE Senior Member whose membership is current and who has completed five years of service in any grade of membership. *Note: IEEE affiliate membership does not apply.* The nominee can come from any field, including academia, government and industry.

Any person, including a non IEEE member, can nominate an IEEE Senior Member. The Nominator cannot be a member of the IEEE Board of Directors, the IEEE Fellow Committee, an IEEE Technical Society / Council Fellow Evaluating Committee Chair, a member of IEEE Technical Society / Council Fellow Evaluating Committee reviewing the nomination, or IEEE Staff.

The nominator is responsible for:

- Preparing the IEEE Fellow Grade Nomination Form
- Soliciting at least five, but no more than eight references capable of assessing the nominee's contributions. The references must be an IEEE Fellow in good standing. References cannot be members of the IEEE Board of Directors, the IEEE Fellow Committee, IEEE Technical Society / Council Fellow Evaluating Committee reviewing the nomination, the Nominator or IEEE Staff. *Note: References will be accepted if a reference is an IEEE Senior Member in good standing and the nominee they are serving as a reference for resides in Region 9.*
- Identifying an IEEE Society / Council whose evaluating committee will assess the nominee's technical qualifications and contributions
- The option of soliciting no more than three Endorsements that can attest to the nominee's field of technical accomplishments. Endorsements cannot be members of the IEEE Board of Directors, the IEEE Fellow Committee, IEEE Technical Society / Council Fellow Evaluating Committee reviewing the nomination, the Nominator or IEEE Staff.

The process consists of two reviews. The first evaluation is completed by the IEEE Society / Council that the Nominator identified on the nomination form. The Technical Society / Council evaluation is extremely important, because it is an impartial and even-handed view of the nominee's merit, by persons who are familiar with his or her work. Once the Technical Society / Council review is completed, their comments are given to the Fellow Committee.

All nomination materials are forwarded in confidence to the IEEE Fellow Committee, consisting of 52 members, who are all IEEE Fellows selected to represent the 10 IEEE Regions, and have expertise in the technical areas represented by IEEE Technical Societies / Councils.

The Fellow Committee recommends nominees to the IEEE Board of Directors, according to the following criteria:

- Significant contributions as Application Engineer / Practitioner, Educator Research Engineer / Scientist or Technical Leader.
- Evidence of technical accomplishments
- Evaluation by the IEEE Technical Society / Council selected by the nominator
- Confidential opinions of references and endorsements
- Service within IEEE and / or other professional engineering organizations
- Total years in the profession

The Fellow Committee submits its nominees to the IEEE Board of Directors during the 3rd Quarter, and the Board acts upon those recommendations at its year-end meeting.

According to IEEE Bylaw I-306-8, the total number of Fellow recommendations in any one-year must not exceed one-tenth of one percent of the voting membership on record as of 31 December of the year preceding.

For additional information, nominations instructions, forms and more please visit http: / / www.ieee.org / fellow

Call for Award Nominations

Call for Nominations:
IEEE Information Theory Society 2009 Paper Award
The Information Theory Society Paper Award is given annually for an outstanding publication in the fields of interest to the Society appearing anywhere during the preceding two calendar years.

The purpose of this Award is to recognize exceptional publications in the field and to stimulate interest in and encourage contributions to fields of interest of the Society. The Award consists of a certificate and an honorarium of US $1,000 for a paper with a single author, or US $2,000 equally split among multiple authors. The award will be given for a paper published in the two preceding years.

NOMINATION PROCEDURE: By March 1, 2009, please email the name of the paper you wish to nominate, along with a supporting statement explaining its contributions, to the IT Transactions Editor-in-Chief, Ezio Biglieri, at <ezio.biglieri@gmail.com>.

Call for Nominations:
IEEE Joint Comsoc/IT 2009 Paper Award
The Joint Information Theory/Communications Society Paper Award recognizes one or two outstanding papers that address both communications and information theory. Any paper appearing in a ComSoc or IT Society publication during the year 2008 is eligible for the 2009 award. A Joint Award Committee will make the selection.

NOMINATION PROCEDURE: By March 1, 2009, please email the name of the paper you wish to nominate, along with a supporting statement explaining its contributions, to IT Society First Vice President, Frank Kschischang at <frank@comm.utoronto.ca>.

Call for Nominations:
IEEE Awards
The IEEE Awards program has paid tribute to technical professionals whose exceptional achievements and outstanding contributions have made a lasting impact on technology, society and the engineering profession.

Institute Awards presented by the IEEE Board of Directors fall into several categories:

Medal of Honor	(Deadline: July 1)
Medals	(Deadline: July 1)
Technical Field Awards	(Deadline: January 31)
Corporate Recognitions	(Deadline: July 1)
Service Awards	(Deadline: July 1)
Prize Papers	(Deadline: July 1)
Fellowship	(Deadline: November 15)

The Awards program honors achievements in education, industry, research and service. Each award has a unique mission and criteria, and offers the opportunity to honor distinguished colleagues, inspiring teachers and corporate leaders. The annual IEEE Awards Booklet, distributed at the Honors Ceremony, highlights the accomplishments of each year's IEEE Award and Medal recipients.

For more detailed information on the Awards program, and for nomination procedure, please refer to http://www.ieee.org/portal/pages/about/awards/index.html.

Call for proposals for the Banff International Research Station 2010

The call for proposals for BIRS for 2010 has just been issued. The BIRS conferences are fantastic and an excellent way to have low budget, intense, and productive workshops in a gorgeous location. Accepted proposals get full lodging and food funded, participants need only come up with their own travel money (or have the PIs seek travel funding for students and colleagues who need it from the NSF or other funding agencies).

The Banff International Research Station for Mathematical Innovation and Discovery (BIRS) is now accepting proposals for its 2010 programme. The Station provides an environment for creative interaction and the exchange of ideas, knowledge, and methods within the mathematical, statistical, and computing sciences, and with related disciplines and industrial sectors.

Full information, guidelines, and online forms are available at the website http://www.birs.ca/.

BIRS is hosting a 48-week scientific programme in 2010. Each week, the station will be running either a full workshop (42 people for 5 days) or two half-workshops (20 people for 5 days). As usual, BIRS provides full accomodation, board, and research facilities at no cost to the invited participants, in a setting conducive to research and collaboration.

The deadline for 5-day Workshop and Summer School proposals is September 29, 2008.

In addition BIRS will operate its Research in Teams and Focused Research Groups programmes, which allow smaller groups of researchers to get together for several weeks of uninterrupted work at the station. September 29, 2008 is also the preferred date to apply for these programmes. However, proposals for projects involving Research in Teams or Focused Research Groups can be submitted at any time -- subject to availability-- they must be received at least 4 months before their requested start date.

Proposal submissions should be made using the online submission form.

Please use https://www.birs.ca/proposals/.

Nassif Ghoussoub, FRSC
Scientific Director, Banff International Research Station
Distinguished University Scholar, University of British Columbia
Adjunct Professor, University of Alberta
http://www.birs.ca/~nassif/

Call for Papers

2009 IEEE International Symposium on Information Theory (ISIT2009)

COEX, Seoul, Korea / June 28-July 3, 2009 / http://www.isit2009.info

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The 2009 IEEE International Symposium on Information Theory will be held at COEX (Convention & Exhibition) in Seoul, Korea, from Sunday June 28 through Friday July 3, 2009. Seoul, the capital of Korea for more than 600 years, boasts its unique, dynamic mixture of tradition and modernity, offering a wide spectrum of activities for travelers.
Previously unpublished contributions across a broad range of topics in information theory are solicited, including (but not limited to) the following areas:

- Channel and source coding
- Coding theory and practice
- Communication theory and systems
- Cryptography and security
- Data compression
- Detection and estimation
- Emerging applications of information theory
- Information theory and statistics
- Network and multi-user information theory
- Pattern recognition and learning
- Quantum information theory
- Sequences and complexity
- Signal processing

Submitted papers should be of sufficient detail for review by experts in the field. In addition to submitting new results in areas that form the core of information theory, researchers in related fields and researchers working on novel applications of information theory are encouraged to submit contributions. Final papers will be five pages in length. The submission deadline is **January 7, 2009**. Detailed information on paper submission, technical program, tutorials, travel, social programs, and travel grants will be announced on the ISIT 2009 web site: http://www.isit2009.info.

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For general inquiries, please contact the General Co-chairs.

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2009 Information Theory Workshop on Networking and Information Theory -- Call for Papers

Volos, Greece, June 10-12, 2009

The 2009 IEEE Information Theory Workshop on Networking and Information Theory (ITW 2009, Volos) will take place on June 10-12 in Volos, Greece. Located on the Aegean coast, midway between Athens and Thessaloniki, Volos is easily reachable by car and rail. It is surrounded by numerous seaside and mountain attractions of unique beauty, while the Sporades Archipelago islands are within a short high speed boat ride from Volos port.

Its purpose is to be a forum for technical exchange among scientists and engineers working on fundamentals of networking and/or other areas of information theory, and, in particular, to promote cross-fertilization between those with interests primarily in networking and those with interests primarily in other parts of information theory.

There will be both invited and contributed sessions. Papers for the contributed sessions are solicited, but not limited to, the following areas:

Topics in networks:	*Other Information Theory:*
Algorithms	Coding theory and practice
Biology	Communication theory
Coding	Cryptography
Cross-layer optimization	Detection and estimation
Delay-distortion	Information theory and statistics
Game theory	Multiterminal information theory
Peer-to-peer systems	Pattern recognition and learning
Security	Shannon theory
Stability	Source coding

Contributions spanning networks and other areas of information theory are particularly encouraged, and authors not ordinarily attending information theory conferences are especially welcome.

Abstracts up to 5 pages should be submitted by **December 16, 2008**, following the guidelines on the workshop webpage. Authors will be notified of acceptance decisions by February 28, 2009. The final version, to be published in the workshop proceedings, will be due by April 5, 2009. Information will be posted on the workshop website at: **www.itw09.org**.

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ITW 2009 - Taormina, Sicily

IEEE Information Theory Workshop - October 11-16, 2009

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The ***2009 IEEE Information Theory Workshop*** (ITW 2009) will take place on ***October 11-16, 2009*** in Taormina, Sicily, Italy. Taormina is a world-famous tourist resort, endowed with a rare charm and atmosphere, whose fame is strictly related to the strong peculiarity of its setting. The main reason is the numerous stratifications of civilizations that have followed each other here since the VIII century B.C.
Taormina is about 50km from ***Catania International Airport,*** which offers direct flight connections to many Italian and European cities. The conference venue is the ***Hotel Villa Diodoro*****, located near the Greek theatre.

The sessions of the workshop will cover the following topics:

- Source coding
- Distributed source and channel coding
- Joint source and channel coding
- Coding for wireless systems
- Coding for sensor and ad-hoc networks
- Coding and biology
- MIMO and space-time coding
- Graph-based codes and iterative decoding
- Cooperation in wireless systems
- Sequences and coding
- Cryptography
- Compressed sensing
- Coding applications

Tentative deadlines

Submission:	***March 29, 2009***
Decision:	***July 12, 2009***
Final submission:	***August 9, 2009***

Further information regarding the technical and social programs, workshop registration, and hotel accommodations will be posted on the workshop website at: **http://www.deis.unical.it/itw2009**

UNIVERSITÀ DELLA CALABRIA
Dipartimento di ELETTRONICA, INFORMATICA E SISTEMISTICA

Institute for Information Transmission Problems RAS
IEEE Information Theory Society
Saint-Petersburg State University of Aerospace Instrumentation

XII international symposium on problems of redundancy in information and control systems
25 - 30 May, 2009
St. Petersburg, Russia.

First Call for Papers

The XII Symposium "Problems of redundancy in information and control systems" will be held on the board of the comfortable cruise ship. Previously unpublished contributions from a broad range of topics in information theory will be solicited, including (but not limited to) the following areas:

— Information theory;
— Coding theory;
— Communication systems;
— Cryptography;
— Combinatorics;
— Software systems;
— Computational systems and networks.

Submitted papers, not to exceed five pages, should be of sufficient detail for review by experts in the field. Survey, tutorial, and expository papers are also welcome. For more information and general inquiries please visit http://k36.org/redundancy2009/ or send your requests to redundancy2009@vu.spb.ru

The Organizing Committee:

Eugene Krouk, General Co-Chair
Martin Bossert, General Co-Chair
Sergei Fedorenko, General Vice Chair
Anthony Ephremides, Member

The Program Committee:

Volodia Blinovsky, Program Chair

Important dates:

March 1, 2009: deadline for extended abstract submission (http://k36.org/redundancy2009/)
March 1, 2009: deadline Registration Form submission (e-mail: redundancy2009@vu.spb.ru)
April 1, 2009: notification of acceptance
April 16, 2009: final paper upload deadline

CALL FOR PAPERS: Special Issue of the IEEE Transactions on Information Theory on Molecular Biology and Neuroscience

Recently, information theory has gained significant attention in various areas of life sciences, most prominently in bioinformatics, computational molecular biology, and neuroscience. But despite the fact that information theoretic methods were successfully employed for predicting the correlation between DNA mutations and disease, identifying protein binding sequences in nucleic acids, analyzing neural spike trains and higher functionalities of cognitive systems, many more problems at the interface of information theory and biology remain unsolved.

In order to address such problems – including quantifying the information content of shapes, complex patterns, and self-organizing networks, determining spatio-temporal firing codes of neurons, and formalizing the notion of information context – new information-theoretic techniques and analytical frameworks are required.

As natural sciences are becoming more diverse with respect to their number of fields and specialties, a paradigm of union and cooperation between these fields and information theory would represent a major breakthrough. Information theory has the potential to galvanize the field of bioinformatics and biomedical sciences, and these two disciplines can bolster each other towards new insight and discoveries.

The goals of the special issue are to provide the reader with an overview of the most important problems in molecular biology and neuroscience, the state of the art applications of information theory in this field, and to compile a collection of new research results on this subject. The special issue will consist of a mixture of invited and contributed papers. In the former case, leading experts in the area of bioinformatics and neuroscience will be invited to provide the interested reader with comprehensive, yet highly approachable introductions to the biological fields of interest. In the latter case, possible topics for the special issue include, but are not limited to:

- Statistical and information-theoretic analysis of DNA and protein sequences. DNA and protein sequence compression. Motif finding, DNA sequencing, and tandem mass spectrometry data analysis.
- Coding theoretic problems in design and analysis of DNA, CGH, SNP, and tissue microarrays. Modeling and analysis of gene regulatory networks, small-sample gene expression classification and clustering.
- Evolutionary and genomic distance measures. Channel models for DNA mutations and information transfer.
- New information-theoretic measures for analyzing shapes, complex networks, and spatio-temporal maps.
- Information embedded in timing and neuron spiking activity analysis.
- Control and information transfer in sensory systems.

IMPORTANT DATES

Paper proposal submission deadline: November 1st, 2008
Paper submission deadline: January 2009
Completion of first round of reviews: April 2009
Final review and selection of papers: August 2009
Final manuscripts to IEEE: October 2009
Publication of the Special Issue: December 2009

INSTRUCTIONS FOR MANUSCRIPT PREPARATION:

In order to ensure the highest quality of published papers, authors will be asked to submit first a paper proposal, not exceeding 5 pages in length. The proposals will be reviewed by experts in life science and information theory, and only those papers deemed relevant to both areas will be accepted for review.

GUEST EDITORS (IN ALPHABETICAL ORDER)

- **Gil Alterovitz,** Harvard Medical School/Massachusetts Institute of Technology
- **Gerard Battail,** Ecole Nationale Supérieure des Télécommunications, Paris
- **Todd P. Coleman, Sean Meyn, Olgica Milenkovic, and Nathan Price**, University of Illinois at Urbana-Champaign
- **Joachim Hagenauer,** Technisches Universität München
- **Marco Ramoni,** Harvard Medical School
- **Ilya Shmulevich,** Institute for Systems Biology, University of Washington, Seattle
- **Wojciech Szpankowski**, Purdue University

Conference Calendar

DATE	CONFERENCE	LOCATION	CONTACT/INFORMATION	DUE DATE
September 1 – 5, 2008	**2008 International Symposium on Turbo Codes and Related Topics**	Lausanne, Switzerland	http://www.turbo-coding-2008.org/	March 27, 2008
Sept. 15–19, 2008	**2008 International Castle Meeting on Coding Theory and Applications (ICMCTA 2008)**	Valladolid, Spain	http://wmatem.eis.uva.es/2icmcta/	May 15, 2008
Sept. 24–26, 2008	**The Annual Allerton Conference on Communication, Control and Computing (Allerton 2008)**	Monticello, IL, USA	http://www.comm.csl.uiuc.edu/allerton/	July 1, 2008
Oct. 6-10, 2008	**Workshop: Coding Theory Days in St. Petersburg**	St. Peterburg, Russia	http://k36.org/codingdays/	June 1, 2008
October 26 – 29, 2008	**The Asilomar Conference on Signals, Systems, and Computers (Asilomar 2008)**	Monterey, CA, USA	http://www.asilomarssc.org/	June 1, 2008
Nov. 30- Dec. 4, 2008	**2007 IEEE Global Communications Conference (GLOBECOM 2008)**	New Orleans, LA, USA	http://www.comsoc.org/confs/globecom/2008/	March 31, 2008
Dec. 7 - 10, 2008	**2008 International Symposium on Information Theory and its Applications (ISITA 2008)**	Auckland, New Zealand	www.sita.gr.jp/ISITA2008/	May 7, 2008
April 19-25, 2009	**IEEE INFOCOM 2009**	Rio de Janeiro, Brazil	http://www.ieee-infocom.org/	August 29, 2008
May 10 - 15, 2009	**The 2009 International Workshop on Coding and Cryptography (WCC 2009)**	Ullensvang, Norway	http://wcc2009.org/	TBA
May 15-30, 2009	**XII International Symposium on problems of redundancy in information and control systems**	St. Petersburg, Russia	http://k36.0rg/redundancy2009/	March 1, 2009
June 10-12, 2009	**2007 IEEE Information Theory Workshop (ITW 2009)**	Volos, Greece	http://www.itw2009.org	Dec. 16, 2008
June 14-18, 2009	**IEEE International Conference of Communications (ICC 2009)**	Dresden, Germany	http://www.comsoc.org/confs/icc/2009/	Sept. 8, 2008
June 28 - July 2, 2009	**The 2008 IEEE International Symposium on Information Theory**	Seoul, Korea	http://www.isit2009.info	January 7, 2009
Oct. 11-16, 2009	**2007 IEEE Information Theory Workshop (ITW 2009)**	Taormina, Italy	http://www.deis.unical.it/itw2009	March 19, 2009

For other major ComSoc conferences: http://www.comsoc.org/confs/index.html