Clockwise from the top:
First place city, Esperanza — Valley Middle School (Oakland NJ)
Fifth place city, Springsun — FMG Middle School (Springfield NJ)
Third place city, Super-Sub Aquus — Great Neck South Middle School (Great Neck NY)
For more information see: On the cover, bottom of page 2.
The IEEE Monitor

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- Contact person name, e-mail address & phone number
- Name of society or group(s) that sponsor the event
- Name of event
- Date of event (indicate tentative or firm)
- Time of event
- Location (FULL address)
- Location directions (subway, etc.)
- Presenter details (if applicable)
- Event abstract (if applicable)
- Registration/EVSF requirement and instructions
- Cost to attendees (if any)
- CEU/FH credits & cost information (if applicable)
- Refreshments
- Society/group website location for further information
- E-mail information to: nymonitor@ieee.org

Submission deadlines

<table>
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Note: Announcements that are submitted too late for the print version, and last minute changes to events (please get them to us as soon as possible), will be included in the e-mail notice that is posted at the start of the month of publication.
MESSAGE FROM
STANLEY KAROLY
(stkar@ieee.org)

At our December 13, 2006 New York Section Executive Committee Meeting we were fortunate to see a presentation on IEEE Membership Development given by Mr. Ron Tabor, Region 1 Membership Development Chair. Ron, the Executive Committee thanks you.

I have been an IEEE member for over thirty-seven years. I became a student member during my undergraduate junior year at Pratt Institute. When I went to college you declared your major at the end of the sophomore year. I believe this is still the practice. Anyway, I remember that my electrical engineering professors encouraged all EE students to join the IEEE. I cannot specifically recall the particular reasons why professors encouraged us to become IEEE members, but I’m sure that one reason was to instill a sense of pride in studying to become an Electrical Engineer and being proud to be included in an organization devoted to electrical engineering. Taking pride in what you do professionally and who you are professionally goes a long way to satisfy your individual development needs.

If you are reading this article my guess is that you are a member of the IEEE and that you already know what the benefits of being an IEEE member are, and I don’t have to repeat them here. If you know individuals who are eligible to become an IEEE member encourage them to do so. If you know of individuals who once were IEEE members but who have let their membership lapse, please encourage them to renew their membership. If you are teaching electrical engineering, invite your students to one of the NY Region presentations and encourage them to join as student members.

You might ask who is eligible to become an IEEE member. The IEEE 2004 Annual Report (inside cover) states: "The IEEE is the leading organization for the advancement of technology. Our global association consists of members who are engineers, scientists, and allied professionals, and their technical interests are rooted in the electrical and computer sciences and in engineering and related disciplines."

Also, in the 2007 IEEE Membership Application under Item 2 - attestation it states: "I have graduated from a three-to-five year academic program with a university level degree", and it further defines that "This program falls within Engineering, Computer Sciences and Information Technologies, Physical Sciences, Biological and Medical Sciences, Mathematics, Technical Communications, Education, Management, Law and Policy, other (please specify)."

As you can see the IEEE is an organization encompassing a wide and varied range of educational and professional endeavors. Anyone interested in IEEE membership can go to www.ieee.org/join to get details.

I’d like to say that I became a member of the IEEE more than thirty-seven years ago because I was proud to become an Electrical Engineer. I remain an IEEE member because I am proud to be an Electrical Engineer.

As always the New York Section welcomes your comments and input. ■

Stanley Karoly
MESSAGE FROM THE EDITOR

Dr. Mary Lanzerotti, the recipient of the 2007 WIE Engineer of the year award, was the speaker at the well attended January 23 WIE event. She introduced the Professional Development Guide. The guide is produced by the Committee on Careers and Professional Development of the American Physical Society. During Dr. Lanzerotti’s presentation I realized that no matter which profession you choose, writing is one of the most important skills you can develop. One of the benefits of being a member of the IEEE is that you have access to a myriad of useful resources, but it can be quite overwhelming to find the resource you are looking for. The Professional Development Guide does an admirable job in organizing and categorizing them, leaving you with a solid list to go to on when you are working on your plans for the future. See our staff bookmarks section for the URL of the guide and find out for yourself.

Dr. Lanzerotti’s take-home message was a simple yet powerful one. Always be prepared to talk about your work or current project with a set of three presentations. The first one is the 30 second elevator statement, which you use when you find yourself stepping into an elevator with someone whom you would like to know what you do. The second is the two minute VP speech and, the third one is a five minute presentation. She gave us her own five minute presentation while we waited for the network problems to be worked out at the start of her presentation. I would like to hear your experiences with this topic.

I welcome your submissions to the NY Monitor. I think writing for publication is another step in honing your writing skills because the editing process often requires rewriting and trimming sections of an article, sometimes only because there are space restrictions. I encourage all IEEE undergraduate students to register for the paper contest held by the 2007 Region 1 Student Conference. See page 10 for submission deadlines.

This issue has another article by Thomas K. Cheriyan Jr., describing the electronic chessboard he invented. Amelie Gong reviews the end of year EMS presentation by Dr. Mendola. In this issue we launch a software review section with a review by Life Member Amitava Dutta-Roy. As global warming is very much in the headlines these days we were glad to receive an article by Krishnamurti Raghunandan about “green energy.” We have a total of four posters, two for upcoming Tappan Zee Subsection events, one for an upcoming COMSOC event, and on the back cover the upcoming LISAT 2007 conference announcement which will take place at Farmingdale State College on Long Island in May. As event notices do not always reach us in time for publication, make sure you also look at our online page www.ieee.org/nymonitor, where you not only find the current issue and all back copies of the NY Monitor in PDF format, but also links to events that came in after we go to print. We thank you for reading the NY Monitor; we welcome comments and suggestions for improvement. Please send e-mail to nymonitor@ieee.org.

STAFF BOOKMARKS

The twelve sections in this professional development guide are: Introduction, Follow Current Events, Learn Basic Skills, Give Presentations, Prepare a well-thought-out CV, Don’t Procrastinate, Set Goals, Identify Potential Employers and Relevant Jobs, Do Your Own Thinking, Learn Soft Skills, Join Professional Organizations, and ends with a link to an open letter by James. D. Patterson titled: An Open Letter to the Next Generation. Each section has links to useful references. (Marlen Waaijer)

www.asktheheadhunter.com
A site with lots of information for job hunters. You can sign up for a weekly e-mail newsletter that is send every Tuesday. Nick Corcodilos, the website’s host is the author of the book. “The Headhunter: Reinventing the Interview to Win the job.” (Jean Redmond)
CALENDAR OF EVENTS
(mark your calendar)

Saturday, March 3, 2007 10:am - 3:00pm
USGBC-NYC Career Fair
Location: AIA Center for Architecture 436 LaGuardia Place, NY, NY 10012
Further Information: www.egbny.com

Tuesday, March 6, 2007 6:00 pm
The Institute of Engineering & Technology (IET) New England Network, an IEEE Sister Society
"IPTV (Television over IP)" by Alan Young, Chief Technology Officer of SES Americom
Location: Faculty Lounge of Cooper Union, Cooper Square, New York, NY 10003
Further information: Contact Tony McGrail at tonymcgrail@theiet.org

Thursday, March 15, 2007 6:30pm - 8:00pm
Tappan Zee Sub Section Meeting: Dr. John R. Vig, "Quartz and Atomic Clocks"
Location: Polytechnic University, Westchester Campus, Rm. 23, 40 Saw Mill River Rd, Hawthorne, NY 10532
For updates go to: www.ewh.ieee.org/r1/new_york/tz

Thursday, March 15, 2007 at 6:30pm
The Skyscraper museum & the New York Academy of Science mixedgreens lecture series:
Helmut Jahn, President and CEO, Director of Design, Murphy/Jahn “Archi-Neering”
Location: New York Academy of Sciences headquarters: 7 WTC (250 Greenwich Street) 40th Floor, New York, NY 10038
Cost: $10.00 Adults, $5.00 Students & Seniors. Free for members of NYAS and the Skyscraper museum
Further information: 212. 945.6324 or www.skyscraper.org/mixedgreens & www.nyas.org/mixedgreens

Friday March 16 — Sunday, March 18, 2007
New York City FIRST Robotics Competition & Technology Career Fair
The 2007 competition will include sixty-three FIRST Robotics teams from New York City, the metropolitan region, and as far away as Brazil, Israel, and the United Kingdom. New York City/ New Jersey FIRST is proud to announce their first-ever science and technology career fair! Twenty major New York City and New Jersey corporations will be on-hand to inform FIRST team members about how science and technology are used in their companies. Students will be able to get information about summer jobs, internships, co-op positions, and other employment opportunities in science and technology.

Tuesday, March 20, 2007 - 6:00pm - 8:00pm
'Signals' Networking Mixer - WIE/GOLD:
Meet IEEE NY Executive Committee members and colleagues
Location: The Village PourHouse, 64 Third Ave, New York, NY 10003
RSVP: k.t.chen@ieee.org

Wednesday, March 21, 2007 - 6:00pm - 7:30pm, Refreshments at 5:30pm
IEEE Communication Society (ComSoc) NY Chapter Meeting:
"Mission Critical Communications" by Chapter Chair Warner Sharkey, Project Engineer with New York State Technology Enterprise Corp. (NYSTEC)
Location: MTA, 2 Broadway, New York, NY 10004 No walk-ins allowed for security reasons!
CEU credits (pending approval)
Registration required by March 16, 2007: www.comsoc.org/~nyc or rsicilia@ieee.org
Further information: Contact Warner Sharkey at cruisingsailor@ieee.org or visit http://www.comsoc.org/~nyc

Thursday, April 5, 2007 at 6:30pm
The Skyscraper museum & the New York Academy of Science mixedgreens lecture series:
Ken Yeang, Principal, Llewleyn Davies Yeang: "Designing the Green Skyscraper"
Location: New York Academy of Sciences headquarters: 7 WTC (250 Greenwich Street) 40th Floor, New York, NY 10038
Cost: $10.00 Adults, $5.00 Students & Seniors. Free for members of NYAS and the Skyscraper museum
Further information: 212. 945.6324 or www.skyscraper.org/mixedgreens & www.nyas.org/mixedgreens

Thursday, April 12, 2007 - 6:30pm - 8:00pm
Tappan Zee Sub Section Meeting: Dr. Wenli Huang
"Analysis and Design of Error Diffusion Neural Networks for Digital Halftoning".
Location: Polytechnic University, Westchester Campus, Rm. 23, 40 Saw Mill River Rd, Hawthorne, NY 10532
For updates go to: www.ewh.ieee.org/r1/new_york/tz

Saturday, April 28, 2007
2007 Region1 Student/Gold Conference — Register for Student Paper Contest by April 1, 2007
Location: Fairleigh Dickinson University, NJ
Further information: www.ieee.org/r1sac

Friday, May 4, 2007 9:00am - 5:00pm
LISAT 2007: Third Annual Conference on Long Island Systems, Applications & Technology
Location: Institute for Research & Technology Transfer, Lupton Hall, Farmingdale State College State University of New York
Further information: www.ieee.li/lisat
Quartz and Atomic Clocks

Dr. John R. Vig
IEEE Fellow

Our speaker, Dr. John R. Vig will review the applications and fundamentals of quartz and atomic clocks. Emphasis will be on aspects that are of greatest interest to users – as opposed to designers.

The discussion will include:
• Applications of clocks in GPS, communication systems, etc.
• Resonator and oscillator basics
• Markets for commercial and military clocks
• Characteristics and limitations of temperature compensated crystal oscillators (TCXOs), oven controlled crystal oscillators (OCXOs) and atomic clocks.
• Guidelines for oscillator comparison, selection and specification
• References for further study

Thursday, March 15th 2007 — 7:00 pm
(refreshments will be served at 6:30 pm)

Polytechnic University, Westchester Campus
40 Saw Mill River Road, Room 23
Hawthorne, NY 10532

ALL ARE INVITED

COLUMBUS CIRCLE STATION COMPLEX REHABILITATION
By Amelie Gong (agong@ieee.org)

On December 14, 2006, IEEE Engineering Management Society (EMS) New York Chapter hosted a presentation by Mr. Joseph Mendola, P.E., Lead Construction Manager for the Columbus Circle Station Complex Rehabilitation Project. The title of the presentation was “Rehabilitation NYC Transit Subway Station from Design through Construction.” The capacity crowd of forty people jammed the conference room of Urban Engineers of New York, PC on the 60th floor of the Empire State Building.

After the attendees settled down, Mr. Martin Izaak, the chair of EMS New York Chapter, introduced Mr. Mendola and his impressive background. Mr. Mendola graduated from Cooper Union with a Bachelor of Science in Engineering degree and received a ME from Manhattan College and a MBA from Adelphi University. In addition, he holds a JD degree from Fordham Law School. He has been with New York City Transit (NYCT) since 1995. Prior to joining NYCT, he worked at Con Edison of NY, Inc. for sixteen years. Throughout the presentation, Mr. Mendola illustrated how his work experiences and his technical knowledge in various industries helped to shape his management style and helped him to choose the best solutions when dealing with the utility companies, government agencies and the owners of the surrounding real estate.

Mr. Mendola started his presentation with a short visual history of the Columbus Circle Station. Pictures showed that Columbus Circle Station was first constructed above ground in the beginning of last century. In its current state, the station is underground and many parts of the city’s infrastructure are now above the station, hidden in the street bed. The Time Warner Center, the Trump International Hotel and Tower and other skyscrapers erected in the area imposed numerous technical, political, economical and social challenges to this project.

A big challenge was maintaining the traffic flow at Columbus Circle while the project was in progress. Because Columbus Circle is a major connection between uptown and midtown at the west side of Manhattan and is located in the middle of many famous New York City parade routes, it is impossible to close the area for the construction on a long-term basis. However, some of the tasks required opening of the roadbed. Mr. Mendola solved this problem by collaborating with the Department of Transportation to close one lane at a time within a strictly defined timeframe. Meanwhile, he hired a number of traffic police officers to control traffic at the intersections during the day. Moreover, he obtained agreements with the utility companies and contractors to ensure that these projects would be completed before the deadlines to avoid possible penalties imposed by government agencies.

Mr. Mendola repeatedly emphasized the importance of safety and quality of engineering work and shared some of the work related tragedies he witnessed during the course of his career. He stated that a solid project starts with careful planning. An excellent and complete design prevents potential damage and minimizes danger.

When doubt was raised about a contractor’s qualification, Mr. Mendola did not just rely on documentation, but paid an inspection visit to the contractor’s facility to observe their work procedure. He wanted to be sure that the contractor he signed was the best he could find for the job. But once the contracts were signed and the job began, Mr. Mendola became a partner in the endeavor and did everything in his power to make the job go forward. Some of the contractors who attended the presentation agreed that Mr. Mendola is difficult to please, but they were proud of the work they delivered.

Another story Mr. Mendola told demonstrated his persistence about safety and quality of his projects. Instead of following the traditional method to use a steel structure for the temporary supporting frame around a main steam pipe, he insisted on using a concrete structure, which created a surge in the budget. He told us he just did not want to take changes with the infrastructure and the historical artifacts in the station and that he selected the concrete for its superior structural quality. Even under pressure, he refused to give in and challenged anyone to find an alternative with equal quality.

Mr. Mendola’s action proves that he is determined “to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to promptly disclose factors that might endanger the public or the environment;” as stated in the first statement of IEEE Code of Ethics. Mr. Mendola is a manager who is very involved with the day to day progress of the project. His office is at 59th street and he can be seen daily working on site. He always gives credit to members of his team for doing outstanding work. He reminded the audience that the consequences of putting anything above safety and quality when doing our job can be fatal.

Amelie Gong has been an IEEE member since college. She is currently the IEEE New York Section Awards and Recognition Chair. She works for the New York City Transit Authority as an Assistant Electrical Engineer.
PROJECT TIRESIAS
AN ELECTRONIC CHESSBOARD FOR BLIND CHILDREN
By Thomas K. Cheriyan Jr. (tkcheriyan@gmail.com)

Introduction
In the United States there are about 1.3 million people who are classified as legally blind. Out of these 1.3 million Americans, about 55,200 are children. Giving these children the same quality of education that other kids get is difficult. It has been scientifically established that children who start playing chess in 5th grade can greatly increase their IQ, spatial aptitude, perceptive speed, reasoning skills, creativity, and their general intelligence.

While working with blind children in my church I found it very difficult to teach chess because using a regular chessboard it is hard for blind children to figure out all the pieces, their position and the movements across the board. Though they can easily distinguish individual pieces and differentiate between a knight piece and a pawn piece, it is tricky to feel all these pieces in relationship to each other by “observing” the whole chessboard at “a glance.” It is inevitable that pieces are knocked over, but even if they are secured to the square or block on the chessboard, it is still hard for a child to figure out where and how to move a piece compared to the other pieces on the board.

Picture 1 shows what a typical chessboard designed for blind people looks like:

You can imagine how awkward it must be for a blind person to try and feel every piece on the board and try to think strategically how to make the next move. This is why I designed an electronic chessboard which I like to call the Tiresias Chessboard. It is my ultimate goal to see my invention being used in schools for the blind and also being used as a recreational device. So far the world hasn’t seen a blind Chess Master yet, but maybe with the help of an electronic chessboard it will.

Technology Used in an Electronic Chessboard
Before I get into how the electronic chessboard runs and operates, it is important to talk about the different types of technologies that will be used and incorporated into the electronic chessboard. By understanding how these technologies work, you can fully appreciate and understand how the electronic chessboard will operate.

Refreshable Braille Display
Picture 2 shows you what a typical current Refreshable Braille Display (RBD) looks like. A RBD is an electro-mechanical device used to display braille characters by raising pins through holes in a flat surface.

The reason I want to incorporate RBD’s into the electronic chessboard is because (1) it will be easier for children to read braille that represents each chess piece instead of physically handling each piece and (2) it will allow children to feel all the pieces on the board, and their relationship to each other, at a much faster rate. Therefore, they can comprehend the state of the game much better and concentrate on their next move instead of being bogged down by the “clutter”.

The Piezoelectric Effect
What makes the dots raise and lower themselves is a specific type of electrical method called the piezoelectric effect. Piezoelectricity is the ability of certain piezoelectric materials to generate a voltage in response to applied mechanical stress. The word Piezoelectric is derived from the Greek piezein, which means to squeeze or press. The
The piezoelectric effect is also reversible in that piezoelectric materials, when subjected to an externally applied voltage, changes its shape by a small amount. The deformation, about 0.1% of the original dimension, is in the order of nanometers or millimeters. This type of technology is useful for the production and detection of sound, generation of high voltages, electronic frequency generation, ultra fine focusing of optical assemblies, or in the case of this paper, the ability to make a RBD.

**CPU, Microcontroller, and Memory**

The CPU, microcontrollers, and the memory will serve as the heart and brains of the electronic chessboard. The software written to control the refreshable braille dots will be the main component of the electronic chessboard because it acts as the AI of the game; it will know chess fundamentals such as check, checkmate, castling, and so on. It will check every move to ensure that the move is valid.

**The Tiresias Chessboard**

Keeping down the cost of the Tiresias chessboard is important because who wants to buy an electronic chessboard for $1000? It is important that the electronic chessboard fulfills its main purpose and is marketable so that the average consumer can afford to buy it.

The chessboard is designed so that two blind people can play against each other or a blind person can play against a computer. In the future it will be possible for sighted people to play as well, but for now, they will have to read the braille symbols. More about how sighted people can play near the end of this report.

On picture 4, you can see how each piece is represented in braille for both Black and White pieces. This will be the “standard” for representing chess pieces in braille if approved by the American Foundation for the Blind. It is not possible to use the first letter of each piece in braille because (1) you would need at least two braille cells in each block to differentiate between white and black pieces. And(2) there would be no way to differentiate between the King piece and the Knight piece.

Picture 5 depicts the top view shot of the chessboard. You can see the four hexagon shaped speakers at the corners of the chessboard. An electronic voice gives instructions and prompts you on how to start a one or two player game, whose turn it is, if you made a valid move or an invalid move.

You will also notice the four pushbuttons on each side of the chessboard. The pushbuttons as shown in Picture 5 respectively are “Start, 1 Player, 2 Player, Off.” The Start Button turns the chessboard on and initiates the start of the game. After the board is turned on a voice prompts you to select which game mode you want to play. For
single player mode, you would push “1 Player”. For two players, both you and your opponent have to push “2 Player”. After pressing the appropriate game mode, another voice prompt tells you and your opponent to press the “Start Button” to start the game and the game is on.

The board is user friendly. You can see in Picture 5 that all the blocks on the chessboard are beveled; the board is actually an 8x8 keyboard. To move a chess piece from one block to another, you simply push down on the piece (block) you want to move from and push down the block you want to move your piece to.

During game play, it should be noted that each braille piece has a specific orientation. All the pieces are oriented in the direction of the active player. When that player makes a move, all the chess pieces “flip” over so that it they are oriented towards the opponent.

Additional Features
In order to make the chessboard more appealing and useful I am working on the following additional features. The ability to play online. Using a wifi connection or through an Ethernet port, a person can use the electronic chessboard to play with other users online who also have an electronic chessboard. You would also be able to play with regular users on the internet who can play using a GUI (Graphical User Interface) similar to such sites such as the chess game found on www.yahoo.com.

Another feature that will be added later is to create a representation system for the pieces that are better suited to sighted people so they can play as well. I am considering the use of Light Emitting Diode (LED.) The LEDs can be used to show an image of a chess piece on each block (space will be limited to the amount of LEDs per block but it is possible).

Conclusion
It is my dream to have blind people play one of the oldest and respected universal games with the least amount of difficulty. An electronic chessboard such as this will allow blind people to play almost as efficiently as sighted people. The learning curve I believe to play well with this chessboard is decreased dramatically then using a regular chessboard. The technology that is being incorporated into the electronic chessboard such as using interactive voice prompts and RBD’s to represent each chess pieces will make it more efficient and easier for a blind person to play.

Developing an electronic chessboard will help blind children learn the game more easily and also will help them in their regular studies. And one day, the world just might find the next Bobby Fisher among the visually impaired.

I am looking for people who want to help me pursue this idea and bring it to market or who want to help me develop some of my other unique ideas and inventions, please email me at tkcheriyan@gmail.com My website is blowupthebox.com.

2007 REGION 1 STUDENT PAPER CONTEST
All undergraduate IEEE Student members are eligible to participate. Register intent of participation by April 1, 2007 at the Conference Registration Site www.ieee.org/r1sac
Submission deadline is April 20, 2007

USGBC-NYC CAREER FAIR
Saturday, March 3, 2007
10AM - 3PM
AIA CENTER FOR ARCHITECTURE
536 LA GUARDIA PLACE
NEW YORK NY 10012

http://www.egbny.com
Info: fut@jbb.com
NEW YORK CHAPTER MEETING

Keynote for 2007: Mission-Critical Communications

Theme for this year’s technical sessions is Mission-Critical Communications. This session, presented by the Chapter Chair Warner Sharkey, will set the stage for the year by discussing the design and implementation of a large hypothetical E 9-1-1 system in the context of this theme. The speaker will focus on design issues and solutions for the many subsystems involved in responding to a 911 call, and will walk the audience through the process by answering the question: “what happens when you dial 911?”. Special attention will be given to design considerations to achieve system reliability, availability and robustness. Announcements of follow-up sessions for 2007 will be made at the end of this presentation.

Warner Sharkey, a Senior Member of IEEE, has had a long and successful career in project management, engineering and implementation of mission-critical communications systems, particularly in the Public Safety arena. He designed and in some cases implemented E9-1-1 systems for Indianapolis/Marion County; NYPD; and the Cities of Baltimore, Phoenix and Chicago. In some cases these included the development of every subsystem required: telephony, radio (voice and data), dispatch consoles, computer-assisted dispatch, message switching through to systems integration, acceptance testing and commissioning. He recently completed a consulting assignment to implement a call center in support of the Pentagon’s Command Communications Survivability Project (CCSP). He is now Project Engineer with New York State Technology Enterprise Corp. (NYSTEC), and as such is consulting on an 800 MHz Public Safety radio system for the Port Authority of New York and New Jersey.

Wednesday, March 21st 2007, 6:00 pm
(refreshments will be served at 5:30 pm)

MTA Building 2 Broadway @ Bowling Green — Room D2.10 A&B
by subway: Bowling Green station (4,5) -or- Whitehall Street. (R,W)

Registration is required by Friday, March 16 2007
RSVP by visiting http://www.comsoc.org/~nyc or email rsicilia@ieee.org
No walk-ins allowed for security reasons! Photo ID required

Free to all - non-members and students are welcome

For more info http://www.comsoc.org/~nyc or e-mail: Henry Bertoni at hbertoni@duke.poly.edu
Analysis & Design of Error Diffusion Neural Networks for Digital Halftoning

Dr. Wenli Huang
Associate Professor at the Department of Electrical Engineering & Computer Science
U.S. Military Academy, West Point, NY

Halftoning can be thought of as an image compression technique whereby a continuous-tone image is printed or displayed using only binary-valued pixels. The goal is to create an image that human eyes perceive as a continuous tone image due to the limited spatial frequency response of the human visual system. Error diffusion is one method of achieving digital halftoning in which the error associated with a nonlinear quantization process is diffused within a local region by filtering methods. The talk will address the advantages of using an error diffusion neural network to eliminate the artifacts caused by the classic error diffusion. Our recent development on color halftoning using three-dimensional neural network interconnects will be presented.

Thursday, April 12th 2007 — 7:00 pm
(refreshments will be served at 6:30 pm)

Polytechnic University, Westchester Campus
40 Saw Mill River Road, Room 23
Hawthorne, NY 10532

ALL ARE INVITED

GREEN ENERGY — NEXT FRONTIER FOR ELECTRICAL ENGINEERS?

By K. Raghunandan, Senior Member

ALTHOUGH GLOBAL WARMING AND ALTERNATE ENERGY SOURCES ARE MAKING HEADLINES, THE BASIC ALTERNATIVES FOR CONVERTING NATURAL/REUSABLE RESOURCES TO ELECTRICAL POWER, ARE NOT NEW. BUT SINCE THE PRIMARY ALTERNATIVE SOURCE IS LIKELY TO BE NON-CONTIGUOUS (WIND, SOLAR OR OTHER) THE USE OF BATTERIES FOR STORAGE IS INEVITABLE. AND WHILE THE FUNCTIONALITY OF BATTERIES IS NOT IN QUESTION, THEIR EFFICIENCY LEAVES A LOT TO BE DESIRED. LET US REVISIT THIS CENTURY OLD CONCEPT OF CHARGING A BATTERY (OR A CAPACITOR) - TO SEE WHERE WE ARE IN TERMS OF STORAGE AND REUSE.

The commonly used battery types are:

- **Lead acid** — now comes in maintenance free packs, yet the weight of the casing and contents makes it limited in both capacity and usage. Its charge/discharge efficiency has remained around 45% - 65% and is not likely to change. Primary market — current automotive use (except hybrid cars). This battery is therefore not a useful candidate to consider, due to its lower possibility of further improvement.

- **Lithium Ion** — while Hybrid cars are looking for Lithium Ion batteries, due to public awareness and concerns on this volatile chemical technology there is still a significant entry barrier in the automotive industry. However, for fixed location applications, this may not be a bad choice for alternate energy storage.

- **NiMH** — seems to be a mature technology coming up well and capable of handling about 1200 W/kg. Therefore, it may be a good light-weight alternative for green energy applications. Although original price tags made it harder, alternative sources from Asia (mainly China and Japan) make this an attractive technology. It also seems to have good life-time (well over 5 years). This could be good choice for both automotive and fixed location markets of alternate energy storage.

Design of lead acid batteries is primarily driven by the automotive market and therefore batteries may be available at affordable prices. The Lithium Ion or NiMH batteries will be efficient and have a long life (less maintenance) making them excellent candidates for large-scale public use.

In addition to working on the storage problem the challenge for electrical engineers continues to be — improving conversion efficiency of solar, wind and other natural sources. Solar cells have improved but rather slowly (from conversions efficiency of 10% to 15% over one decade). Windmills of the standard propeller design have efficiencies of about 60% and can be improved further.

The main objective of this article is to start a discussion on “green energy” and what we as engineers can do. The question is “should the Big Apple look at alternatives to support urban needs such as lighting, WiFi networks, and kiosks etc., given its position as a global leader in financial, art and fashion markets”?

Should New York take the lead in harnessing the enormous wind that flows through our streets and avenues? Similar to California’s solar initiative, would it make sense for New York City to create a wind initiative? Can electrical engineers take the lead? Given the wind that blows through the streets (average of about 10 mph), should we install small wind-mills on street light poles (sufficient to power that street light)? These are some of the questions to ponder. We could set the stage in small but deliberate steps to create a technological base to address the green energy challenge.

For example, the current NY state wind incentive program supports generation units in the 500W – 10 KW in the minimum range. What about installations smaller than 500 W? If mini wind mills and solar panels take care of streetlights, the WiFi hotspots and perhaps cameras, should this not be considered for incentives? We could certainly look at possibly 100W to 500W as the lowest range and this may be worth the effort since there are thousands of these items across the city. This initiative can transform streets and avenues as energy highways - specific areas of the city could be used for trials and later all boroughs of the city can deploy them. After all, energy efficiency means getting the same amount of work out of a device without having to use as much energy.

In a follow up on this article, I will explore different natural sources and how to improve their efficiency, or perhaps think of out-of-the box solutions.

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**Diskeeper®, A Software Utility**  
By Amitava Dutta-Roy, Ph.D. Life Fellow (a.dutta-roy@ieee.org)

The reason for the sluggish performance of your computer is most likely the number of fragmented files on the hard disk. Diskeeper® is a software that can fix this problem.

The processes of reading and writing of files on the hard disk of a Windows-based PC are controlled by Microsoft’s New Technology File System or NTFS, an integral part of its operating system. The smallest unit of space on a hard disk recognized by NTFS is known as a cluster that can accommodate 4kB of data. A file known as the Master File Table (MFT) keeps track of the contents of all files under NTFS. Whenever a new file is to be written on a hard disk the NTFS commands the read/write/delete head to start writing in the first available cluster that is free of data. If more space is needed to write the file the head is commanded to move to the next cluster left free by the deletion of a previous file and the second cluster may not be contiguous to the first. This process of the heads jumping to data-free clusters on the hard disk and writing in them is continued until the entire file is saved albeit it may be fragmented in two or more sections. Over time, as files get increasingly fragmented they are randomly scattered all over the hard disk. Consequently, the read/write/delete heads must reposition themselves many times just to access one file. Not only does this shorten the life of the mechanical parts of the hard drive assembly, it also noticeably slows down your computer.

Laboratory tests conducted by WindowsITPro of Loveland, Colo., showed that loading a baseline 30MB MS Word file (in contiguous clusters) took 17.7 seconds. However the time needed increases to 18.4s to 28.3s to as much as 50.9s with low, medium and high fragmentation respectively. Saving, on the other hand, of a 30MB MS Word file on a disk can take 2.9s (baseline) to 5.4s to 23.5s to 46.1s respectively under similar fragmented conditions. Initial formatting of your hard disk allots about 18 percent of the capacity to the MFT and if you work with a large number of files, constantly writing and deleting, it may cause even the MFT itself to fragment and spill over. This would increase the access times even further. The remedy is to keep the hard disks always defragmented.

Defragmentation consists of detection and consolidation of the free clusters, and then shifting the clusters of respective files as near to each other as possible. This requires a clever algorithm of reading, shifting and rewriting all clusters of data on your hard disk. Obviously, some free space on the hard disk is required to implement the algorithm, and more the free space better and faster is the defragmentation. The industry’s “best practice” requires that about 20 percent of your hard disk is devoid of any data for the use of the defragmentation process.

Instead of using the built-in defragmentation feature that the Windows operating system provides I find it more convenient to use a third-party software known as Diskeeper®, created by Diskeeper Corporation of Burbank, California. Diskeeper can proactively consolidate fragmented files on your computer. I have used various reincarnations of Diskeeper and I find that it maintains my file system very well. The patented algorithm of Diskeeper® optimizes the read/write/delete/shift processes. The WindowsITPro tests showed that defragmentation with Diskeeper® can reduce the times for loading and saving documents on your hard disk by about 60 to 90 percent and I really feel that my machine runs much smoother with defragmentation.

Diskeeper Corp. has been in business since 1981 and they are still busy launching new versions of their software. This for me is a litmus test for the public recognition of a good product.
Diskeeper® 2007 shows much improvement over the previous editions. It is now possible to schedule the defragmentation any time of the day and night, and also to indicate which disks are to be defragmented. On my PC (Windows XP Home Edition), with a little assistance from Diskeeper’s unique Intelligent File Access Accelerating Sequencing Technology (I-FAAST™), I can conveniently schedule the defragmentation of my three mechanical disk drives: a regular 180GB hard drive which is partitioned into two logical drives, an IOMEGA 80GB hard drive, and a 250MB IOMEGA Zip drive.

Multitasking features of today’s powerful CPUs and Windows’ operating systems enable Diskeeper® to run in the background in a continuous mode. You don’t have to interrupt your computer activities while Diskeeper® straightens out your files and keeps your hard drive in good shape. Its developers call this their InvisiTasking™ feature.

I found Diskeeper® 2007 is reasonably easy to install. The software CD includes a 15-minute virtual tour (tutorial) and an exhaustive array of FAQs. The screen is easy to read. The result of an “Analyze” command shows the degree of fragmentation of the selected (highlighted) disk. Bar charts show the degradation of access times compared with the optimum values for the host system (see the illustrations). Reports of the defragmentation process are viewed at the touch of the mouse and may be printed out. Diskeeper® is useful not only to individual users but also to enterprises. It is marketed in five flavors: Professional, Professional premier, Server, Enterprise server and Administrator to cater to all possible environments, from a home-office to a large enterprise. You can read more about the product at the company’s website: http://www.diskeeper.com.

This review is independent of any financial interests. The author only wishes to share with the readers his curiosity and obsession for proper maintenance of his computer and his experience with Diskeeper®.
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