IEEE New York Monitor

The monthly newsletter of the NY Section

Advancing Technology for Humanity

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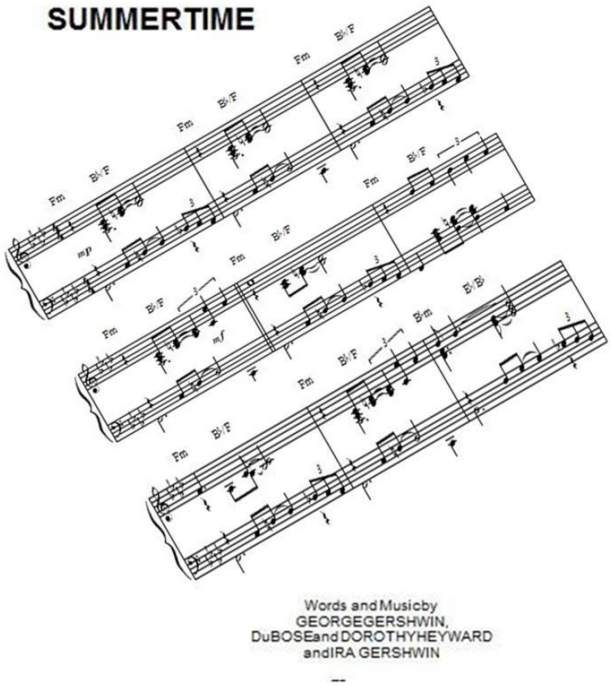

The editor writes:

FINALLY, WE HAVE HIT THE SUMMER. I count and savor the days before the summer solstice as if I would witness a miracle on that day. Then the solstice comes and goes, as it did this year too, leaving me sad to see the days getting shorter again. In the meantime, whenever, I think of summer the first thing that comes to my mind is the music "Summertime" made immortalized by the great lyric writers and composers of this country, Edwin and Dorothy duBose Hayward, and George and Ira Gershwin, in their folk opera Porgy and *Bess*. Their delightful music has moved perhaps millions all over the world and so I thought why not honor them by inserting the opening notes on the cover page of the NY Monitor? Do you mind? But . . . soon the muggy

and hot days will be upon us and we will forget the transitions from winter to spring to summer!

Back from daydreaming! We know that we are late in posting the Monitor of this month. We were waiting until the last moment for inputs from our Chapters and Groups. But we have received only a handful of messages and notifications pertaining to the activities of the NY Section that could be posted. We thank the contributors of those messages. Again, I appeal to you to send your messages and articles in time for each issue of the Monitor. We'll have no Monitor during July and August. Hence, you have plenty of time to think over and submit your items by 1 September (Labor Day) for that month's Monitor.

In the meantime, we have received some harsh complaints re our suggestion of using a "consistent" format for announcing the future events in our calendar. Critics wrote that we were demanding more time from the volunteer leaders of Chapters and Affinity Groups. The contrary is true. This use of a uniform format would make the announcements of all events consistent with one another. Surely, when you plan your day you do not pull out different diaries for different events but look just at only one (*your own*!) where you jot down the important events or actions of each day of the near future. We would like to do the same for the Monitor calendar as well: make the announcements available at one place and in a uniform manner. Would it take up more of your time to send the announcements in .doc format? No. Whatever word processing program you may use for designing your event announcements you can always save an extra file in a .doc or .docx format before taking that leap into pdf. Just send that .doc file to us, text and pictures instead of the .pdf document. That's it. Separate illustrations (if any) should be sent in .jpg format.

There are lots of interesting news and articles in this issue and we hope that you will enjoy reading it.

- Editor, Amitava Dutta-Roy, PhD, Life Fellow

IEEE NY Section officers for 2014

Section chair:	Neil Weisenfeld
Vice chair (Section activities):	Wilson Milian
Treasurer:	Kim K. Smith
Secretary:	Warner Sharkey
Junior past Section chair:	Dr. Shu-Ping Chang
Senior past Section chair:	Balvinder Deonaraine

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Know Thy Peers

@ MESC

Michael Miller, SM and NY Section representative at MESC

The name of this organization was set as the Metropolitan Engineering Societies Council, and is referred to as MESC (pronounced mess-cee). The MESC is an umbrella organization of engineering societies in the New York City metropolitan area.

The objective of the MESC is to promote the profession of engineering within the New York City Metropolitan Area by being an umbrella organization of engineering societies that operate here within our metropolis. This is done by sponsoring meetings, promoting Engineer's Week and associated activities, publishing a combined calendar of events, sponsoring student design competitions, take part in other activities and/or join other organizations which promote the profession of engineering.

Any New York City metropolitan area local section or chapter of an engineering organization, or an independent NYC based engineering organization, may be a member of the MESC.

The **Charter Members** of the MESC are (* indicates founding member):

American Engineering Alliance, Inc.
*American Institute of Aeronautics and Astronautics (AIAA), Long Island Section
*American Institute of Chemical Engineers (AIChE), New York Section *American Nuclear Society (ANS), New York Section
*American Society of Civil Engineers (ASCE), Metropolitan Section
*American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), New York Chapter
*American Society of Mechanical Engineers (ASME), Metropolitan Section
American Society of Plumbing Engineers
American Society of Safety Engineers
Association for the Advancement of Cost Engineering
*Association of Energy Engineers (AEE), New York Chapter
Association for Facilities Engineering
*Illuminating Engineering Society (IES), New York Section
*Institute of Electrical and Electronics Engineers (IEEE), New York Section
Institute of Industrial Engineers
Municipal Engineers Society of the City of New York
National Association of Corrrosion Engineers, New York Section
*The New York Academy of Sciences (NYAS), Engineering Section
New York State Society of Professional Engineers
*Societe des Ingenieurs et Scientifiques de France (ISF), East Coast Section
*Society of Automotive Engineers, Metropolitan Section
*Society of Fire Protection Engineers (SFPE), New York Section
*Society of Women Engineers (SWE), New York Section

@IEEE SMC Society

Ping-Tsai Chung, IEEE Senior member, Chair NY Chapter, Associate Prof., CS, LIU, Brooklyn
Chapter Website - http://ny-ieee-smc.weebly.com/ contact info: ptchung@ieee.org

The Systems, Man, and Cybernetics Society (SMCS) is one of the oldest technical societies of the IEEE. Established in 1970 the SMCS focuses on the interaction of multiple systems, processes, and humans with emphasis on their understanding, modeling, design, and formalization. It includes the study of integration of artificial and biological intelligence as well as the interfacing of complex

systems with humans that fundamental challenges in a wide array of topics in current and emerging research and applications .
papers; publishes technical journals; and through its committees, studies and contributes to the technical and professional needs of its members. For more information please see http:/www.ieeesmc.org
The New York Chapter of IEEE SMCS was established in September of 2012 by the Founding Chair, Ping-Tsai Chung, IEEE Senior member. Since then, the NY of SMCS has offered over twenty technical seminar activities. These seminars covered various topics in the scope of the SMCS. Recent seminars were:

1. *M2M Communications, (May 16, 2014), Dr. Ming-Yee Lai, Co-Founder, Connectlife.*
2. *IBM InfoSphere Streams Computing, (May 6, 2014), Dr. Kun-Lung Wu, IEEE Fellow, Research Manag-*

The objectives of the SMCS are scientific, literary, and educational in character. The SMCS promotes close cooperation and exchange of technical information among its members and to this end holds meetings for the presentation and discussion of technical

er, IBM T. J. Watson Research Center.

3. *RFID Technology and the Internet of Things, (April 4, 2014), Associate Prof. Xinzhou Wei, CUNY.*
4. *The Multi-modality in Human-Robot Interaction, Robot Learning and Humanized Intelligence, (March 20, 2014), Assistant Professor, Chung Hyuk Park, NYIT.*
4. *An Overview of Privacy Preservation for Social Networks, (January 28, 2014), Dr. Leon S.L. Wang, Vice President, National University of Kaohsiung, Taiwan.*
6. *On-road Localization and Data Dissemination in Vehicular Ad Hoc Networks, (December 9, 2013) - Prof. Guiling Wang, Associate Professor, Computer Science Department, NJIT.*
7. *NetFPGA, The Flexible Open-Source Networking Platform – (November 25, 2013) – Ms. Georgina Kalogeridou, Research Assistant, University of Cambridge Computer Laboratory, UK.*
8. *Authentication on Emerging Interface - Exploring alternatives to text based passwords, (November 8, 2013) - Prof. Nasir Memon, IEEE Fellow, Head of Computer Science & Engineering Dept, NYU-Poly (NYU-Polytechnic School of Engineering).*
9. *Data Mining Techniques and Applications, (July 18, 2013)- Prof. Shusaku Tsumoto (Department of Medical Informatics, Shimane University, Japan) and Prof. Katsutoshi Yada (Faculty of Commerce Department of Commerce Department of Management, Kansai, Japan.*

Below please see photographs of some SMC events.

Seminar - An Overview of Privacy Preservation for Social Networks, (January 28, 2014), Dr. Leon S.L. Wang, Vice President National University of Kaohsiung, Taiwan

Left) Prof. Xinzhou Wei, CUNY. Showed RFID nnof Things, (April 4, 2014) videos in the **RFID Technology and the Internet**

Left) Prof. Xinzhou Wei, CUNY. Showed RFID nnof Things, (April 4, 2014) videos in the **RFID Technology and the Internet**

I E E E Day

7 October, 2014

Theme: Leveraging Technology for a Better Tomorrow

IEEE Day 2014 is the 5th time in history when engineers worldwide will celebrate the anniversary if the first time IEEE members gathered to share their technical ideas n 1884. While the world benefits from what's new, IEEE is focused on what's next. We're looking for volunteer nominations from your Section to help:

- Plan and Submit Your Event to our IEEE Day team
- Promote Your Event (Section Newsletter, Region/Section website, local newspapers, student branches, company intra-net)
- Have your event pinned to global map
- Participate in the photo contest
- Member Engagement/Networking through participation
- Partner with your IEEE Day Ambassadors – responsible for increasing motivation to celebrate IEEE Day in your section/ student branch/society/chapter
- Perfect opportunity for Membership Development

IEEE Day Promotion

- $30 off NEW higher grade members that join between 5 October and 11 October using promotion code IEEEDay2014 (not applicable to student membership)

For volunteer nominations or questions e-mail us at ieeeday2014@ieee.org

Follow us on our Social Media sites: https://www.facebook.com/IEEEDay; Twitter and LinkedIn Sites coming soon

Get involved with IEEE Milestone program

The Yankee Network: a joint IEEE milestone?

Gil Cooke, LSM

IS anyone in the NY Section interested in joining the Worcester and the Boston Sections in a joint IEEE Milestone honoring the work of Edwin Armstrong and the Yankee Network? The Yankee Network was the first fm radio broadcasting network. The following historical photographs will illustrate the scope and content of this milestone initiative. The photos were rediscovered in the Armstrong Collection at Columbia University, New York a few years ago. They've been made available, thanks to Jennifer Commins of the Rare Book and Manuscript Library. You may recall similar images in Ken Burns' Empire of the Air. Contact me if interested at gilcooke@ieee.org.

Editor's note: Edwin Armstrong was very much a New Yorker and a graduate of Columbia University
Gil Cooke, a historian of technology is a Life Senior Member of the IEEE (Boston Section) and a frequent contributor to IEEE journals and newsletters

* * *

Forensic Engineering - A brief introduction

James Cohen, PE
Associate Principal, Arup

Editor's note: *It is always wise to read about engineering analyses of crashes that may involve bridges, buildings, aircrafts, trains, control systems or even computer drives. The recent disappearance of the Malaysian Airline's Flight MH 370 is a prime example of the crashes that affect our lives. The crash analyses done by experts in the respective fields make us aware about the causes and effects of such disasters that we, as engineers, should try to avoid. I always read about the reports of the National Transport Safety Board (NTSB) after its engineers scrutinize the minutest of details of any crash involving any mode of transportation. However, the term Forensic Engineering never stuck in my brain until I heard Jim Cohen gave a presentation on the subject at the Imperial College alumni association in New York in 2012. Immediately, I thought that it would be a great to hear him again at one of the IEEE NY Section's PES/IAS/LMAG meetings. Jim was gracious enough to accept our invitation and delivered his lecture on May 28 last. In the following article you can read more about Forensic Engineering straight from Jim's own computer. Jim is a civil engineer and analyzed New York City's horrifying crane crash of 16 March, 2008 at 51st and Third Avenue that killed 4. In that case he was the lead investigator on behalf of the NYDOB and an expert witness for NYCDA's office at the court hearings that followed the crash. Jim's article follows>>>>>>>>>>>>>>>>>>**killed 4. In that case he was the lead investigator on behalf of the NYDOB and an expert witness for NYCDA's office at the court hearings that followed the crash. Jim's article follows>>>>>>>>>>>>>>>>>>killed 4. In that case he was the lead investigator on behalf of the NYDOB and an expert witness for NYCDA's office at the court hearings that followed the crash.*

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SOMETHING goes wrong and there is a perceived failure. First question. What? Second question. What is wrong?
When the "something" or the "wrong" involves technical issues, a forensic engineer may be engaged to answer the question. This brief introduction addresses forensic engineering as it relates to building issues.

What may be defined as a failure?

There are four definitions which I typically consider. The first is the inability to perform as "required". This typically relates to a failure to conform to prevailing law, as may be embodied in building codes and regulations.

The second definition is the inability to perform as intended. For new buildings, intent is embodied in the building design, contracts, specifications and later modifications. For existing buildings, the intent may be contained in public offering statements, disclosure statements, appraisals, condition assessments and similar documents. . Under this definition, the failure may include cost overruns, delay claims, poor construction quality, errors in design and other criteria which can be directly linked to the claims made in the documents supporting the complaint.

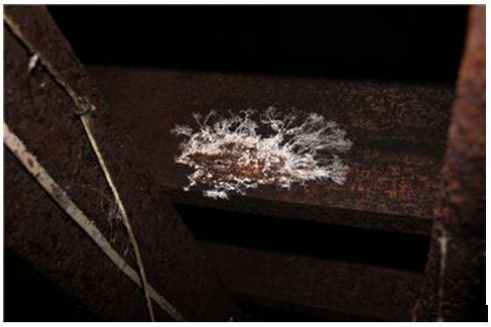
Material sampling and testing. Image shows concrete core removed from an existing building. Testing included compressive strength, chlorides, carbonation and petrographic examination.

The third definition of failure is the inability to perform as anticipated. This may be restated as issues of serviceability, usability, constructability and maintainability. These are issues surrounding what would be expected to be provided from the product, as opposed to compliance with prevailing law, contractual agreements and design documents.

Lastly is the inability to perform as desired and is typically the most difficult failure type to prove. It may relate to the space, profitability, aesthetics, expectations or other anticipated or imagined benefits which were desired by the plaintiff to be provided and have now failed to materialize.

It is important to note that, what may be perceived as a failure under one of these definitions may not be a failure for all. For example, a column claimed to have been located inappropriately may be redundant and unnecessary.

The forensic engineer is first faced with the problem of determining the actual issues, as the initial perception of the problem may be a consequence of the actual failure(s), rather than the proximate cause, or may even be a contributory cause further exacerbated by other failures. Once the issues are correctly identified, there is the question of the validity of the allegations. As alluded to above, a failure to perform may not be a failure to perform as agreed. Should a failure be validated, the cause, the remediation, the cost, and often the "who" of the failure may be asked of the forensic engineer.



Precast building Collapse. Investigation objectives included cause, construction means and methods, material properties and mitigation strategies.

Buildings may "fail" for many reasons. Among these may include any combination of design faults, construction faults, usage, poor maintenance, outside events (such as floods and hurricanes) and simply the unknown. The failure of the Tacoma Narrows Bridge on November 7, 1930, was a result of the properties of wind flow over bluff bodies of the type and shape of the bridge, which were largely unknown at the time of the design and construction of the bridge. The failure of the Hyatt Regency walkway Kansas on July 17, 1981 was a result of the engineer failing to recognize the implications of what appeared to be a minor design change, itself triggered by a constructability issue with the original design.

When permitted by the client's scope and available fees and time, an investigation should thoroughly delve into the multitude of issues surrounding the perceived failure.

- Who are the potentially involved parties? This can include the municipality, the owner(s), the members of the design team, other consultants, subconsultants, contractors, subcontractors, testing agencies, material suppliers and others.

- What are the potentially involved components and systems? This depends upon the failures and issues which have been identified. For the John Hancock building in Boston completed in 1976, several problems arose. Original completion was scheduled for 1971 which lead to contractual issues. During construction, temporary retaining walls failed which was a means and methods issue by the contractor. Building sway affected occupant comfort, which was a largely unknown issue of the time. Windows affected by thermal movement and wind forces fell out, largely attributed to design error. In these various failures, differing components were involved. For the individual glass panels, the entire building behavior contributed to the failure.
- What was the history of the failed component(s), including all non-failed items related to or potentially affecting the failed component(s)? For new construction, acceptance of prior work by ensuing trades often results in failures of later materials due to underlying problems which were not corrected. Historical changes in building layout, loads, materials and building codes and regulations over the history of a structure become important when considering current issues. For example, a precious metals plant in Nutley, NJ, repeated acid spills and floor repairs led to the presence of a completely unreinforced concrete floor with multiple epoxy and other toppings (the acid had, over time, completely dissolved the reinforcement).

When conducting an investigation, the issue of patterns is very important. This may include patterns of any kind related to the failure. Where there are many, perhaps thousands, of similar items, such as windows, statistical analysis may be justified. A pattern to the failure may be related to physical characteristics such as location, type, or age. A pattern may emerge with regard to the individual or company responsible for the installations. There may also be environmental patterns, such as weather exposure. The existence as well as the lack of existence of a pattern is very valuable information to the forensic investigator.

Valuable information may be obtained from written documentation. In addition to the basic design documents, maintenance records, correspondence, diaries, inspection records and other writ documentation can provide insight into the intent, means, methods, changes, etc., of any particular project.

Tools of the investigator may include visual observation, non-destructive testing, destructive testing, sampling, component testing (both in situ and laboratory), full-scale testing, parametric testing, analysis of many different complexities, document review, historical research and other basic research. The actual scope of work will almost always be limited, as both funds and available time are limited. There is therefore always an element of uncertainty in the final opinion, however slight. Hence, most forensic engineering report conclusions commence with the phrase “The following represents my opinion to a reasonable degree of engineering certainty based upon the foregoing activities”. At the end of the report, a phrase such as. “I reserve the right to amend my report based upon further investigation or information, from whatever source” will also typically be included.

Forensic engineering work often includes delegating responsibility for faults and costs once allegations of fault have been validated. This raises the issue of ethics as, at least in the United States, the client most often is or represents an interested party responsible for payment of the forensic engineer’s fees. Maintaining integrity and independence of opinion can be difficult but is essential to credibility, both written and in sworn testimony, and to professional standards of conduct.

This does not mean that all experts will agree if given the same set of facts.

Example 1: All may agree there is an 8 ounce glass with 4 ounces liquid. But, the glass may be half-full, the glass may be half-empty. The glass may have also been poorly designed, leading to wastage of glass. Or, there may be no fault at all, as the requirement was to provide 4 ounces of liquid into the glass provided.

Material degradation. Image shows advanced mold growth on timber. At issue was the structural integrity of a listed building.

Example 2: Water penetration through a building facade may require sealants to have failed, but, for the water to cause damage, it may also have had to pass through the façade, water resistant barrier, building wrap, drainage layer and internal finishes and the actual reason water resulted in damage was that the landscaping unrelated to all issues concerning the building façade design and construction, had blocked the exit path for water at the base of the building envelope.

Building component failure. Image shows failing brick masonry arch, an imminent danger to the general public. Life safety is of paramount importance.

Whatever opinion is developed based upon the available evidence, it must be upon solid technical and scientific grounds. To this end, expert testimony in federal court must be in accordance with the Federal Rules of Evidence Rule 702, Testimony by Expert Witnesses:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
b) the testimony is based on sufficient facts or data;
c) the testimony is the product of reliable principles and methods; and
d) the expert has reliably applied the principles and methods to the facts of the case..

Similar rules apply in other countries.

Lastly, forensic engineers may need to testify as to their opinions under oath. An additional skill, unrelated to the ability of the forensic engineer to investigate and scientifically and impartially determine cause, fault and damages, is the ability to present that opinion in an intelligible and credible manner to an unskilled and largely non-technical audience. Complex concepts need to be discussed in a manner which can be understood by the public. Challenges to the opinion must be successfully answered. Credibility must be preserved. For these reasons, skills in presentation and public speaking are needed, for, without these, the most highly qualified individual with a technically correct conclusion may not be believed.

Author James Cohen is an Associate Principal in the New York office of ARUP where he is the Global Contact and responsible for coordinating Arup's North American activities in expert services, concentrating in engineering investigations and solutions to problems in the built environment. Mr. Cohen is a graduate of Cornell University and Imperial College of Science and Technology and a licensed engineer in New York and other states. With over 35 years' experience, Jim's experience has been diverse, including failure analysis, natural hazard mitigation and response, dynamics, advanced analysis techniques, and instrumentation. He has been involved with leak mitigation, demolition, preparation of codes and standards on wind and seismic loads; vibration and fatigue testing of major structures; cable design; blast analysis, design, analysis and inspection of existing facilities; and, dynamic and impact analysis. He is active in ASTM, ASCE, ICRI and other professional organizations, has published numerous papers on forensic engineering topics and has testified as an expert in court on several occasions.

Members: Remember to Vote

The annual IEEE election is right around the corner

Carrie Loh

This message was first published in June 2014 issue of The Institute

Look for your annual election ballot package to arrive in August via first-class mail. The envelope will contain a paper ballot and a postage-paid reply envelope. Members will also receive an e-mail with instructions on how they can access the ballot electronically, instead of by mail.

Those eligible to vote include new members as of 30 June and those elevated to member or graduate student member grades on or before that date. Associate members are not eligible.

The member grade requires that you be regularly employed in IEEE-designated fields and have a combination of education and work experience of at least six years. You can apply online for transfer to member grade.

To be eligible to vote, student members graduating between 1 January and 30 June must update their education information online to be elevated to member or graduate student member grade.

Log in to your IEEE account to help guarantee you receive the ballot package by confirming your contact information, member preferences, and education information. [Carrie Loh is with the election office, IEEE, Piscataway, NJ.]

Image: Jiri Kabele/iStockphoto

Recommendations for 2014 Sections Congress, 22 – 24 August, Amsterdam, Netherlands

The Region 1 has received recommendations from its 22 Sections and this document shows those that will be presented to Congress for future action. For details: go to: http://goo.gl/Y1Pjn9

Draft of the IEEE Bylaws amendments

For details: go to: http://goo.gl/xH8YwW

IEEE Society changes its name

Technical Management

IEEE HQ has decided to eliminate this functional title and include its functions under an “Engineering Management” banner.
Technology Management Council will be changing to a Society structure and will be renamed as TEMS: Technology and Engineering Management Society, probably effective 2015 with all current subscribers becoming members of the 'new' society.
*Information provided by Dr. Charles Rubenstein, Secretary, IEEE Region 1 and a former director of the Region.

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Machine-to-Machine Communication (M2M) Devices

Networks, and Applications (DNA)

Ming Lai

In this article, we overview the M2M DNA, its mapping to M2M architecture, evolving M2M Gateway capabilities, automation by Composite Device, key M2M business and technical challenges, emerging M2M application store types, and main M2M trends.

While the number of mobile phones used for human-to-human communication exceeds 6 billions today, the number of connected M2M devices that have 2-way communication but limited human interface capabilities is projected to reach 50 billions by 2020. M2M can not only provide convenience, energy savings, improved life quality to end users, but also enables vendors, developers, and service providers high potential of new business and revenues.

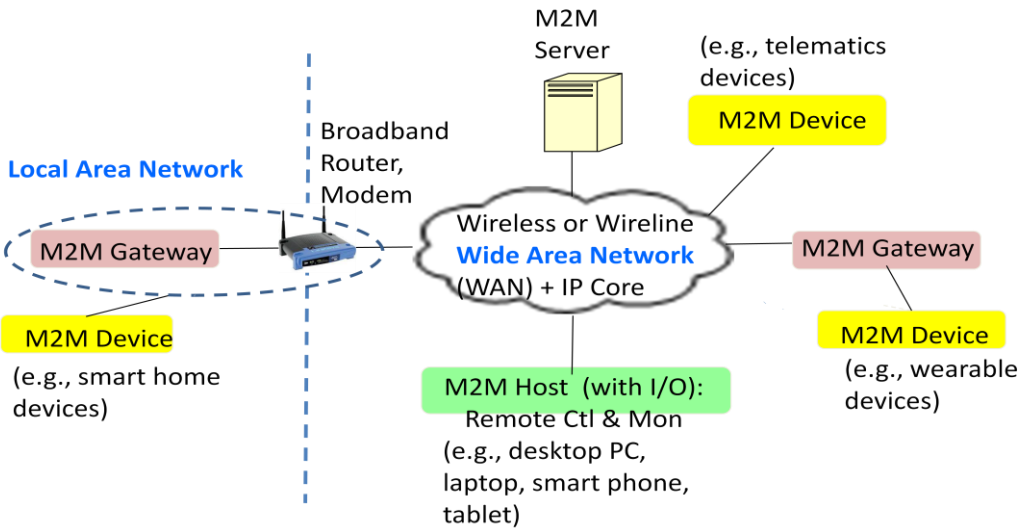
We discuss the three logical pillars of the M2M framework, devices, networks, and applications (DNA), in this article.

A M2M device contains data attributes, receives commands from an application via a network to perform capabilities (e.g., switch on/off, start collecting data), and generates events to the application via the network when the values of some attributes change or responses to commands. The example M2M devices include telematics on-board unit, digital signage in the transportation industry, surveillance camera, building access device in the security industry, smart meter, energy management device in the smart energy industry, vending machine, point of sales device in the payment industry, blood pressure monitor, activity monitor wristband in the health industry, appliance, HVAC control in smart home industry, and TV, HiFi audio in the consumer electronics industry.

A network provides wireless, wireline, or mixed connections in a wide, local, or personal network area. The example wireless networks include 3G/4G cellular and satellite for wide area, WiFi, Z-Wave, Zigbee for local area, Bluetooth, ANT+ for personal area. The example wireline networks include fiber, cable, Digital Subscriber Line (DSL) for wide area and Ethernet, phone line, power line, cable wire for local area.

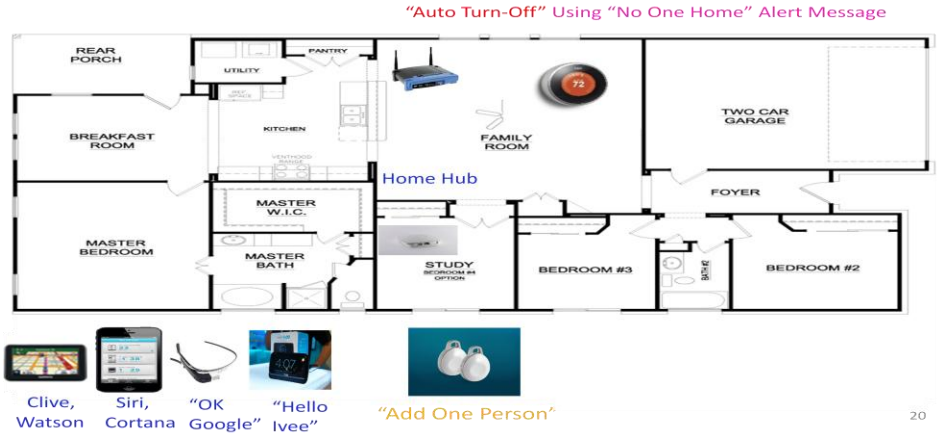
An application is software that issues commands, handles the events, makes sense of received data, and interwork with other software. The software can be located in each of the M2M architecture components described below.

From a system perspective, the M2M architecture consists of M2M Device, M2M Gateway, M2M Server, and M2M Host. A M2M Device is an end device that can be controlled by or interact with an application. A M2M Gateway is a special type of device that interface with a wide area network and the M2M Devices in a local or personal network area. A M2M Server is a server that connects to wide area network (WAN) and hosts M2M applications for services and management. A M2M host is a smart phone, tablet, or PC that can control or monitor the M2M Devices remotely across the network.



Compared with the architecture for connecting computer and communication devices, M2M Gateway is the distinct element in the M2M architecture. A M2M Gateway can be a fixed device connected to or built with a broadband router or a portable device like a smart phone or tablet. Besides the initial capability of connecting M2M Devices without WAN interface for services or management, new and emerging M2M Gateway provide the following advanced capabilities: (a) convert and adapt independently developed or evolving protocols among M2M Devices in a local or personal network, (b) expose and consume Web or M2M Devices in a cloud, (c) automate integrated functions of multiple M2M Devices in a local or personal network, (d) manage homogeneous or heterogeneous M2M Devices in a local or personal network. In (c) and (d), a set of homogeneous M2M Devices is called a Device Group while a set of heterogeneous M2M Devices is treated as a Composite Device.

An example of automating the service and management of a composite device is illustrated below. A smart thermostat with embedded motion detector can automatically turn off the air conditioner when no motion (person or pet) is detected around the thermostat for a period of time. However, if only one such smart thermostat is installed in the living room, the resident staying most of the time around other places in the house may experience unexpected hot condition in the house. A Composite Device solution from one vendor is to use the smoke detectors with embedded motion detector in other rooms that can interwork with the smart thermostat directly without involving a M2M Gateway. Another Composite Device solution involving a M2M Gateway and presence sensors from a different vendor from that of smart thermostat, where the M2M Gateway is programmed to send a message to the smart thermostat to turn off the air conditioner when it detects all the house residents carrying the presence sensor has left the house (with no radio signal present). The M2M Gateway can also be used to configure the Composite Device (smart thermostat and presence sensors) easily with a voice recognition device (e.g., Ivee) that recognizes a user's command "Add one person" and sends a message to the M2M Gateway to add one to the count-down number for turning off the air conditioner via smart thermostat.



The key M2M business and technical challenges include:

1. M2M services take a long time and involve multiple stakeholders to develop and deploy.
2. The business models for M2M services vary and are still changing.
3. A large variety and number of types of M2M Devices come to market quickly.
4. M2M Devices have a long life span, which requires extensible and robust system design to support evolution and enhancements.
5. Some desirable autonomous services require composition of multiple types of M2M Devices from one or more vendors.
6. There are multiple M2M DNA related standards in each vertical market and across markets.
7. Initial provisioning methods for M2M Devices and M2M Gateways vary, and some require networking knowledge.
8. A M2M Device is often "locked in" with a specific application and cannot be used by other applications.
9. There are no standard object/resource models even for the same type of M2M Devices; hard to multi-source a M2M Device type for an existing service.
10. A M2M service may need to manage a large number or group of M2M Devices in sunny and rainy day conditions.
11. M2M Devices may require low power operation, auto charging, smart start/stop, and energy harvesting.

There are an ever increasing number of M2M applications in the market, but no agreed-upon killer M2M applications yet. Instead of searching for killer applications, the success of mobile apps is built on application stores containing the apps developed by 3rd party developers. Just as App store happening to mobile applications for smart phones and tablets, it is worth paying attention to the multiple emerging types of application store for M2M applications. Below are the five types of M2M application store.

M2M Application Store Type	Application Store Owner	Applications in Application Store
1	Smart Phone OS Vendor (e.g., Google Android, Apple iOS, Windows Mobile/8, QNX, Tizen, Firefox OS)	Apps for Configuring and Controlling M2M Devices and Gateways
2	M2M System-on-a-Chip (SOC) Vendor (e.g., MediaTek)	Device Apps Using the Application Programming Interface (API) for SOC
3	M2M Device Vendor (e.g., Jawbone)	Device Centric Connected Apps
4	M2M Gateway Vendor (e.g., SmartThings)	Gateway Based Composite Device Apps
5	Web Service Connect Platform Vendor (e.g., IFTTT)	Web Based Connected Device Apps
6	M2M Service Provider (e.g., Wireless Operators, Telematics Service Provider)	Non-Subscribed Supplemental Apps (e.g., App for the infotainment , remote home control, usage based insurance, or car-to-car connection feature of a telematics service)

There are four main trends in the M2M field. We illustrate these trends using the telematics vertical as an example.

1. Service Internationalization: When a car vendor sells its cars with telematics on-board units (OBU, before market) to multiple countries, the trend is to have the same OBU that can download the service characteristics of the telematics and wireless network service provider the car owner selects using the same over-the-air provisioning method in different countries the car vendor sells. For a portable after-market telematics unit (e.g., OBD-II device with 3G radio) that provides navigation capabilities, the trend is to support the language the driver is familiar with when he/she drives in a foreign country via the cloud that provides voice recognition and language translation.

2. Mobile-M2M Collaboration: Several years ago, there were two major distinct approaches to provide wireless WAN connection in a car: using cell phone brought in by a rider, using the OBU in the car. The trend is to use both in collaboration ways, especially the OBU becomes very powerful computationally that can support tasks such as natural language recognition and speech generation. An example of collaboration is to use the phone to receive calls and messages and pass it over to the OBU to process the calls/messages and support hands-free driving with voice interaction with the driver to reduce distraction.

3. Cross-Vertical Integration: Common service layer software and API enables application integration across multiple verticals, and thus generates many new service features for M2M users and revenue potentials for M2M service providers. As an example, a least-cost charging application for electric cars can be developed to utilize the remaining battery data transmitted over the telematics network and the charging time constraints in the smart meter at home sent over the smart grid network.

4. Standards Harmonization: With many existing M2M related standards, besides natural shakeup and evolution, many major standards bodies and consortia are getting together to harmonize the existing and emerging M2M standards. One example is the standards partnership program for M2M common service layer, OneM2M, which is driven by all the major telecom standards bodies in the world: ETSI (Europe), ATIS, TIA (North America), CCSA (China), ARIB, TTC (Japan), TTA (Korea) and other key alliances, such as Open Mobile Alliance (OMA).

Author Ming-Yee (Ming) Lai received the M.S. and Ph.D. degrees in computer science from Harvard University and B.S. degree from National Taiwan University. He is a co-founder of Connectilife, which focuses on management, integration, and interoperability of M2M devices, networks, applications, and data. Ming was the head for M2M and Broadband Wireless Program, Applied Communication Sciences (ACS), responsible for developing new technologies and business with focus on M2M, broadband wireless services, and mobile data analytics. Ming has over 30 year experience in information and telecom technologies acquired during his work at research labs, of key telecom service providers, equipment vendors, government agencies, and research organizations. In recent years, his R&D focus centers on M2M service platform, device management, portable gateway, and vertical application integration. Ming has over 50 paper publications, book, and patents.

For the slide show accompanying this article please go to http://goo.gl/kvzHY6

Connectilife for IEEE NYC, contact info: mlai@connectilife.com

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- Golf umbrella
- Travel umbrella

Program date ends on 15 August, 2014!

Certainty of Operations: the origins of Reliability engineering in early electrical systems

Gil Cooke,LSM

Dr. William Channing (1820-1901) was the inventor of the world's first electric system for use by the general public. This was the telegraphic fire alarm system developed for the City of Boston over 160 years ago. Channing carefully examined reliability requirements for emergency communications, coining the phrase 'unerring certainty of operations' in reference to system design. He specified reliability requirements, and then worked closely with Moses Farmer (1820-1893) to carry them out. It was critical that the fire alarm system provides 'instantaneous communications of the intelligence of a fire' and that it be capable of striking alarms with certainty and precision. This was especially tricky since multiple church bells were wired to act together in unison, synchronized, striking fire incident location codes that would be understood clearly across town. To increase public confidence in this new innovation, special features were incorporated to guard against circuit interruptions, false alarms, and human errors. Studying Channing's seminal papers published in the American Journal of Science and Arts (1852) and the Smithsonian Institution (1855), you can see how much he wants to achieve certainty of operations: by redundant conductors, separation of circuits, and periodic testing of circuits using clockwork.

Channing was convinced that the 'principal of Double Conductors' be introduced into any system in which absolute uniformity of action is required. He wrote about separation of duplicate wires and running conductors along different routes to guard against common mode failures, a reminder of my engineering days in the nuclear power industry. Channing was on the right track because field wiring was installed outdoors over-head, on poles or rooftops, exposed to ice and snow. Additionally, signals and alarms circuits were further protected by running two conductors instead of one with a ground connection, standard practice in the telegraph industry at the time. Instead of providing very long circuits, he breaks them down into short more manageable lengths to facilitate testing and repairs. Did the system work well? Yes said Channing in 1855 as he addressed the scientific community in Philadelphia. He concluded that the overall design had proved sufficient to make the fire alarm system the 'most certain means of communications which has yet been devised, under all conditions of weather and seasons'. Today, many of Channing's original ideas are still applicable and are imposed by the National Fire Protection Agency – NFPA.
The history of reliability engineering would be incomplete without acknowledging Fred Stark Pearson (1861-1915). Pearson was a great electrical power pioneer but is not well known. He engineered large electrical power systems. He also designed very innovative transportation systems, both in Boston and Manhattan. Later in life he developed hydroelectric projects in Canada, Mexico, Brazil and Spain. Two IEEE Milestones have already been awarded for some of this work. His engineering signature, his motto, was 'take the public point of view with regards to certainty of operations'. Surprisingly, these are the same words spoken by Channing thirty years earlier - certainty of operations. Pearson also applied the same ideas - double conductors - expressed by Channing decades before. There's an obvious link between these two men. Pearson was obviously familiar with Boston's fire alarm system and may have learned about Channing when he was in college. As a student at Tufts, he probably went on field trips with his Professor Dolbear. We know from Dolbear's writing that the curriculum during the 1880s for electrical students included visits to local electrical facilities. The Fire Alarm Office was just a few miles away from campus and visitors were welcomed. Anyway, I'm satisfied with this explanation as to how these individuals connected.

On 25 June 1887, Pearson first formalized the 'double circuit method of running wires' for a new electric street lighting company in Somerville. On that date he introduced double circuitry at a meeting of the board of directors. The initiative was approved for implementation on major circuits. At last! Here was proof of Pearson's redundancy criteria buried deep in corporate records of the Somerville Electric Light Company. Pearson was both general manager of the company and its chief engineer. He was also one of the directors. As such, he introduced the motion, the motion was seconded, and the 'double circuit method' became company policy.

Next in his career, Pearson was appointed chief engineer of Boston's West End Street Railway Company. His attitude towards public safety and continuity of operations are well documented in articles in the Street Railway Journal and other engineering publications. Streetcar tracks were heavier than common practice. Road beds, equipment foundations, walls, support structures were all very heavy and strong. Spacing between supports was closer together than expected. Steam piping and major valves were specially fabricated for heavier wall thickness. Some of the trade catalogs refer to products custom made for the West End. Electrical and piping systems were duplicated throughout. Electrical conductors, terminations, electrical connectors, and so on, are provided with two fasteners. Feeders are duplicated. Photographs of the General Electric switchboards indicate duplicate switches and meters. Because nothing like this had ever been fabricated before, many pieces were field-tested. Reliability through strength, simplicity, and redundancy, contributed to the success of this enterprise. Within a few years, the West End Street Railway Company had transformed its fleet

of passenger cars dragged by 9000 horses into a modern fleet of 1000 electric streetcars.
After completing the mass transit system in Boston, Pearson moved to New York City as chief engineer responsible for the development of the electric conduit for The Metropolitan Street Railway Company. Without going into details, the conduit system was successfully completed and ran for over 30 years. He had followed the same principles that had served him so well on previous jobs, except on a larger more complicated scale. For a complete description of this project, refer to my IEEE paper presented for the 2007 IEEE Conference on the History of Electric Power entitled The Slot in the Road: Manhattan's forgotten underground electric trolley system.

Finally, some readers may have preferred a slide show to jazz things up. I apologize for its absence. Instead, the following on a similar subject is attached. Enjoy the images. For the slides offered by Gil Cooke please go to http://goo.gl/8F5ELz

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The author Gil Cooke is a veteran Life Senior Member of the IEEE (Boston Section). He is a history of technology buff and most eloquently speaks about the history of applications of electrical technology in northeastern USA, especially in New York. From the History Group of the IEEE NY Section we have invited Gil to give us a presentation that will probably be scheduled for September of this year. We'll inform all our members through the customary IEEE notification system. Keep an eye for this notice.

SOME OF THE SECTION EVENTS OF THE RECENT PAST

The events listed in the following is probably not exhaustive. We have given the information we received. If you wish your events to be highlighted please send a short report with, if possible, many pictures. We cannot be present at all events to cover them adequately. Just sending us a couple of pictures without any text doesn't help either. Please collaborate with us to make the Monitor even more interesting. Thank you.

PES/IAS/LMAG Joint Chapters' Meetings

28 May 2014

Introduction to Forensic Engineering

Jim Cohen

(For more on the subject please read the speaker's article in this issue)

25 June 2014

Controlling LEDs to meet customer expectations

The presentation consisted of

1) A short background of LEDs in architectural lighting – both Pro's and Con's
2) Review of LED retrofit lamps vs. LED fixtures
3) Outline of the driver output options for any LED lighting source
4) Review of the dimming control input options to a driver and variables of each
5) Confirm the importance of the driver in providing the smooth, reliable, flicker-free dimming down to 1% measured light output

The speaker Manny Feris has been working with architects, designers, contractors and the lighting community for over 30 years. As part of the Lutron OEM team, he works with lighting fixture manufacturers world-wide on the applications of dimming and LED driver technology. As a LEED-AP, he is focused on the energy-saving capabilities of light control (both daylight and electric light) in the residential and commercial markets, and has taught lighting (on staff at NJIT School of Architecture) and is a member of the Technical Advisory Group of Green Light NYC.

IEEE Tappan Zee Subsection Joint Meeting with Westchester Chapters of ASME & SME

18 June 2014

"Delivering a New NY Bridge for the 21st Century"

The New NY Bridge will carry the New York State Thruway (I-87/I-287) across the Hudson River between Tarrytown and South Nyack, replacing the existing Tappan Zee Bridge. The New NY Bridge project is among the largest transportation design-build projects currently underway in the United States and the largest single construction contract in New York State history. The New York State Thruway Authority is constructing the new crossing through a $3.1 billion design-build contract with Tappan Zee Constructors (TZC) – a consortium including Fluor Enterprises, American Bridge Company, Granite Construction Northeast, and Traylor Bros, with HDR as the lead designer. This presentation described the project scope, design-build procurement, design constraints, environmental compliance, proposed design and construction solutions.

Speaker Brian Conybeare is the special advisor to Governor Andrew Cuomo for the New NY Bridge Project. Brian was appointed by the Governor in July 2012 to lead the project's community outreach team and to help ensure that the New NY Bridge is the most open and transparent infrastructure project in New York State history. Brian has held more than 300 meetings with residents, community groups, business associations, elected officials and other stakeholders. Prior to his appointment, Brian spent 16 years as a reporter and anchor at News 12 Westchester, where he was a three-time Emmy Award winner. He holds a Bachelor's Degree in Communications from the University of Michigan and a Master's Degree in Journalism and Mass Communication from New York University.

Speaker Bob Brunner is the deputy design manager of the HDR team that is leading the design of The New NY Bridge. The HDR design team consists of approximately 200 engineers, scientists and technicians developing all aspects of the design of this iconic project. Bob is a hands-on manager responsible for supervising and leading teams of engineers. His experience includes major New York bridges such as the Tappan Zee, Grand Island, Patroon Island and Castleton Bridges. He was formerly Thruway Authority director of structural design. Bob has been instrumental in applying innovative rehabilitation treatments to extend the life of existing structures and understands the commitment to public involvement while delivering a project on time and on budget.

IEEE NY Section Professional Activities Committee for Engineers (PACE)

11 June 2014

"How Effective Communications Will Turbo Charge Your Career"

As an engineer, you must be able to "sell" your ideas directly to leadership. Companies are getting leaner and flatter and the managerial chain between the technical folks and the decision makers is getting shorter. Many companies, especially technology firms, adhere to Jack Welch's advice: "You've probably gotten to the right level of layers if your company is 50% flatter than you'd like". Prior to de-layering, technology professionals could count on supervisors and managers to serve as buffers and translators between them and executive management, so robust communication skill wasn't a prerequisite to success. As we like to say at C4G, the Killer Wake Up Call (KWUC) is that we (Geeks) just moved up the food chain, and are now in direct line-of-sight to senior managers and the C-Suite. It's a problem for everyone if you as a technical expert can't express yourself, and it's a great opportunity for those who can. In this 45 minute highly interactive seminar, we will use several real world examples to help you develop the skills and perspective to communicate with Director Level and C-Suite Level management.

Speaker Gordon Adelsberg is an experienced management consultant, project manager, corporate trainer, public speaker and serial entrepreneur. He spent several years with DuPont Sustainable Solutions and then left to launch Adelsberg Consulting. Most recently, he accepted the COO role at Communication for Geeks® With over two decades of business ownership and consulting experience, he has seen how a company can get bogged down with inefficiencies, redundancies, insufficient processes and miscommuni-

cation…and also how it can re-focus, retool and redesign into a more efficient, strategically focused and much more profitable organization. He helped companies make this change as the owner of Masterpiece Ice Cream Company, and also as a management consultant at DuPont Sustainable Solutions and Adelsberg Consulting.

At the end of the presentation Gordon's company Communication for Geeks offered a raffle for a one hour "Lunch & Learn" at your workplace. This prize is valued at $1,750.

We are happy to report that the IEEE member Hao Hu was the lucky winner of the raffle. Hao works for Ferric Co. Congratulations, Hao!

IEEE Member Hao Hu (L) with Gordon Adelsberg at PACE meeting

CALENDAR OF EVENTS SPONSORED BY CHAPTERS AND GROUPS AT THE NEW YORK SECTION OF THE IEEE

July

16

SAFESPAN: MULTI-SPAN BRIDGE PLATFORM SYSTEMS

Sponsored by the IEEE New York Section/Consultants' Network & PACE and SAVE International Metro New York Chapter (a dinner meeting)

Presentation: Contractors working in bridge rehabilitation have been experiencing risks associated with conventional platforms including: liabilities associated with limited shielding; lack of access to bottom flanges and beams, bridge bearings, and concrete

piers; and high cost of labor-intensive erections. In response, Safespan has developed a patented, flexible platform design that uses innovative methods for connecting the platform to the structure. This design allows contractors to make adjustments for a desired working clearance, without compromising safety.

The speaker Mr. David Malcolm is the Vice President of Safespan Platform Systems, Inc. He has 20 years of experience in the bridge shielding and access industry. In 1996 he became the National Marketing Director while Safespan was being employed for the first time near the metro New York area on the Fire Island Bridge. He is responsible for marketing the product nationwide and internationally.
Time: 6 pm
Location: 2 Penn Plaza, Room 2602 (Entry on 7th Avenue, between 32nd and 33rd Streets), New York
All welcome! Bring a colleague or friend.
Cost: $10 per person, dinner included. Free for students with valid IDs.

RSVP required for this presentation by 15 July. Please contact: Babu Veeregowda Metro NY SAVE Chapter President (Bveeregowda@vhb.com or 212 695 5858 x 7326) / Marty Izaak , Consultants' Network Chair, IEEE NY Section; Phone: : 646.284.6544

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Getting there from here: from an academic project to a small company

Sponsored by: PES/IAS Chapters and Life Members' Affinity Group of the IEEE NY Section

The academic work at Columbia University, NY work focuses on the use of thin film systems (especially organic semiconductors and recrystallized materials) to create new functionalities that are otherwise unavailable for a variety of applications in sensing, actuation, and energy conversion. While many of the technologies developed are purely of academic interest, there are often opportunities to explore the commercial implications of a project area or in an adjacent space.

Dr. John Kymissis , the speaker, in this presentation, will highlight three projects that have led to the launching of small businesses from his group by former students and post-docs. He will explain how each one of the group got started in the lab, the path each one is taking, and in general, how an engineering research model can help translate research into new high technology companies. The three companies that will be discussed in the presentation are Lumiode, which is developing a high power light engine; Chromation, which is developing a low cost spectral sensor; and Radiator Labs, which is developing an energy efficiency strategy for steam heated buildings. The speaker will also discuss some general principles for evaluating technologies for commercialization using the development and funding approaches developed through this experience. Some resources and assistance programs that can be helpful for launching small companies in the greater New York City area will also be presented. (Full abstract of this presentation will be available later through IEEE e-notification.

Speaker: Dr. John Kymissis, professor, solid-state devices at EE department, Columbia University New York. John graduated with his SB, M.Eng., and Ph.D. degrees from MIT. His M.Eng. thesis was done as a co-op at the IBM TJ Watson Research Lab on organic thin film transistors, and his Ph.D. was in the Microsystems Technology Lab at MIT working on field emission displays. After graduation he spent three years as a post-doc in MIT's Laboratory for Organic Optics and Electronics working on a variety of organic electronic devices and as a consulting engineer for an MIT-based startup which is developing and commercializing a novel light emitting architecture. Dr. Kymissis, former chair of the SSDS/EDS Chapters of the IEEE New York Section. (Photo of Dr. Kymissis: 1st form the right.)

Time: Refreshment and Networking at 5 pm; the presentation at 5.30 pm.
Location: Edison Room, ConEd Building, 4 Irving Place, New York, NY 1003
All welcome! For security reasons RSVP required (to Arnold Wong <preferably to **<wongar@coned.com>)** for admission to the building.
This presentation offers IEEE Continuing Education Units.

22-24

The IEEE Member and Geographic Activities (MGA) Board will partner with Region 8 in hosting IEEE Sections Congress 2014 (SC2014) in Amsterdam, Netherlands, at the Rai Convention Center, Amsterdam, Netherlands.

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PES/IAS/LMAG Joint Meeting

History of NYC Power Utilities

Abstract will be e-mailed at a later date
Speaker: Joe Cuhhingham
Time: Refreshment and Networking at 5 pm; the presentation at 5.30 pm.
Location: Edison Room, ConEd Building, 4 Irving Place, New York, NY 1003
All welcome! For security reasons RSVP required (to Arnold Wong <preferably to <wongar@coned.com>) for admission to the building
This presentation offers IEEE Continuing Education Units.

September

17

IEEE Conference on Security/Cyber Security and Privacy

Organized by NJ Coast Section
Venue: IEEE HQ, Piscataway, NJ 08854
Registration fees apply
More information from: http://sites.ieee.org/njcoast/ & https://meetings.vtools.ieee.org/meeting_view/list_meeting/25959

20-21

Maker Faire

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