

A Decade of Innovation and Collaboration

CEWIT2013

THE 10TH INTERNATIONAL CONFERENCE AND EXPO
ON EMERGING TECHNOLOGIES FOR A SMARTER WORLD
PROCEEDINGS



October 21 & 22 • Melville Marriott



CEWIT 2013 is technically co-sponsored by IEEE Region 1 and its Long Island section.
Peer-reviewed conference papers will be submitted for inclusion in the IEEE Xplore online database and EI.

AGENDA

DAY 1					MONDAY . OCTOBER 21						
11:00 AM					REGISTRATION OPEN IN MAIN LOBBY						
11:30 PM - 7:30 PM					ATRIUM SHOW FLOOR OPEN Exhibitor and Poster Sessions						
1:00 PM - 1:30 PM					BALLROOM: OPENING REMARKS						
TRACK A			TRACK B			TRACK C					
Afternoon Session 2:00 PM - 3:15 PM		Big Data Architecture & Analytics		Smart Grid & Smart Energy		Visual Computing		Entrepreneurship & Venture Capital			
3:15 PM - 3:45 PM					BREAK Atrium Show Floor Open - Exhibitor and Poster Sessions						
Afternoon Session 3:45 PM - 5:30 PM		Big Data Architecture & Analytics		Smart Grid & Smart Energy		Visual Computing		Entrepreneurship & Venture Capital			
5:30 PM - 7:00 PM					INTERNATIONAL RECEPTION Atrium Show Floor with Exhibits and Poster Sessions						
7:00 PM - 7:30 PM					OPENING CEREMONY						
7:30 PM - 9:00 PM					INTERNATIONAL GALA EVENT CELEBRATING CEWIT 10TH ANNIVERSARY						
DAY 2					TUESDAY . OCTOBER 22						
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8:15 AM - 9:15 AM					BALLROOM: KEYNOTE SPEAKERS						
Morning Session 9:30 AM - 10:45 AM		Smart Systems & Applications		Health & mHealth Technologies Panel		Networks, Clouds, & Security		Big Data Architecture & Analytics			
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Morning Session 11:15 AM - 12:30 PM		Smart Systems & Applications		Health & mHealth Technologies Panel		Networks, Clouds, & Security		Big Data Architecture & Analytics			
12:30 PM - 1:00 PM					BREAK Atrium Show Floor Open - Exhibitor and Poster Sessions						
1:00 PM - 2:15 PM					BALLROOM: LUNCHEON AND KEYNOTE SPEAKERS						
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3:30 PM - 3:45 PM					BREAK Atrium Show Floor Open - Exhibitor and Poster Sessions						
Afternoon Session 3:45 PM - 5:30 PM		Smart Systems & Applications		Health Management & Technologies		Medical Devices & Implantable Sensors		Software & Patents, a Good Mix?			
5:30 PM					POSTER AWARDS AND FINAL PRESENTATIONS - SHOW FLOOR POSTER AREA						
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Rong Zhao, CEWIT

Using Data Science for IT Improvement

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Some of the most common uses of Data Science are; a) Isolate and diagnose problems faster, b) resolve problems faster, and c) generate better business centric insights. IT managers spend too much time on troubleshooting problems, users experience the problems before IT operations detect them, IT management tools produce unusable output, current systems require extensive levels of instrumentation and commitment of expert resources, IT users have to spend too much time to define which metrics need to be monitored and how KPIs interact in normal operations, and, IT management systems require extensive dashboard and/or alert rules development.

Data Science can help alleviate these problems at three levels. At the most basic level, Data science can provide simple solutions that can automate thresholding, generate histograms in a real-time manner that can be used to surface the most important problems and use data driven formulas for determining thresholds and baselines. All of the level 1 approaches can be thought of as univariate approaches. At a more sophisticated level, Data science can provide model based solutions that are multivariate. This includes using neural networks for detecting anomalies. These models can adapt over time in an automated fashion without much human interference, and can perform real-time analytics on very large volumes of data. At level 3, Data science can even help IT managers forecast possible problems before they occur using univariate as well as multi-variate methods.

CA's Data Science team has considerable experience in numeric data as well as textual data. For example, the team can look at data generated by service desks along with techniques such as content based filtering to provide service requesters with more appropriate documents to solve their problems and collaborative filtering techniques to show the most useful answers for problems based upon the experiences of other users. This talk will focus on the exciting new ways in which Data Science could transform IT Management.

A Modular Factory Planning Approach using the VPI Platform

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Ying Wang, Daniel Ewert, Daniel Schilberg, Sabina Jeschke, RWTH Aachen University

The continuously increasing complexity of products as well as mechanical and automated production processes makes the analysis and optimization of these processes one of the most challenging tasks in modern factory and production planning. In order to increase the quality and the efficiency in the planning phase of manufacturing plants, model based approaches need to be developed and implemented. Within this process,

a large number of production parameters and multiple scenarios have to be taken into account to optimize the manufacturing process in an appropriate way. In practice, factory planning, which is one of the main applications of production planning, is mostly performed –by dividing the process into several steps. Hereby, the challenges are to integrate the different disciplines of this approach on a more abstract level and to systematize iterative processes. The present paper aims at presenting a modular, holistic factory planning approach.

How Cloud Computing and Big Data Are Changing the Medicines You Use

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The pharmaceutical industry finds itself surrounded by pressures. An aging population is demanding more treatments for lifestyle as well as life-critical conditions. New, targeted treatment and diagnostic pathways are being uncovered. Stringent regulations and public demands for safety are growing. And, of course, pricing pressures continue to force drug companies to reexamine the ways they bring their products to market.

A substantial part of that process – the testing of drugs through clinical trials, which accounts for over \$80 billion yearly – operates pretty much the same way it has since the 1950's, with phase-gate trial processes, departmental silos and legacy patchwork installed computer systems.

A slower adopter of enabling technology than, say, the financial and retail sectors, pharma is only now opening up to the potential for changes to its process. While technology to enable specific activities in the clinical trial process has been used for decades, newer solutions based on cloud computing and big data are being pulled – and pushed – into these companies, leading to a recalibration of their scientific and business models.

The technology itself is significantly contributing to its uptake: the newer SaaS platforms are giving the different members of the research team real efficiencies and performance enhancements. This in turn is opening up measurable process efficiencies and enabling clinical trial redesigns that emphasize quicker go/no go decisions.

Big Data Analytics for Research Libraries

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Research libraries invest millions of dollars in information sources that are no longer physical in nature, but are still needed to support the missions of their host company or institution. With the shift to digital publishing and networked access to content, it has become more important for libraries to assess the value of virtual collections hosted in the commercial publishing environment. Additional information about the cross-discipline relevancy of digital content is also important when considering budgetary decisions which could negatively impact an institution as access to library information is discontinued. This presentation will show how libraries can use analytics to better understand the dependencies and relationships between library collections and the institutions they support. The analytics to be shown will demonstrate how they are captured and how data mining can reveal demographic use data of library collections, assist in improving institutional collection development, and create accountability /transparency of expenditures supporting research, business, and education.

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Correlation Analysis of Structural Metrics on the Topology of the Internet

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We present an experimental study on the linear relationships between a rich set of complex network metrics, to methodologically select a subset of non-redundant and potentially independent metrics that explain different aspects of the topology of the Autonomous System view of the Internet. We followed a data-driven approach based on a correlation study of different properties of evolving Internet networks.

DAY 1 • TRACK B Smart Grid & Smart Energy

Session Chair:

Mitch Maiman, IPS & Sangjin Hong, CEWIT

Smart Green Infrastructure for Innovation and Transform Hosting Environments

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Sanjeev Kumar V Marimekala, IBM

This paper provides an overview on the importance and evolution of Smart Green Infrastructure in Innovation and Transform Hosting Environments. The paper describes how IBM, for its internal data center environments, has been integrating technology areas such as Mobile, Predictive Analytics, Cloud computing, big data such as Hadoop, Monitoring, and Agile environments. The future of Smart Green Infrastructure will depend on how dynamically an IT team can carve out the needs for implementing complex projects in a quick, easy, structured and dynamic environment while focusing in the innovation space using advanced technology. The paper describes how such Smart Green Infrastructures are managed and maintained to promote Green initiatives for Innovation while leveraging the use of predictive analytics in the environment. Case studies are described and include discussions on the challenges faced and lessons learned.

High-level Power Modeling Based on Clock Gating Enable Signals

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A high-level power model based on clock gating enable signals is proposed. Automatic power model generation without knowing the operation details of a target circuit is possible unlike previous approaches. The experimental results show less than 20% of error on average and up to 380 times faster analysis speed compared to the gate-level power models.

Combining Sender- and Receiver-driven MAC Protocols for a Large-Scale Metering System based on Potential Routing

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Smart metering system needs to collect the measurement values of the meter installed in each home as much as possible for a short time. In the past research, we have proposed a multihop wireless network by potential routing as a technique for realizing a large-scale smart metering system. As a MAC protocol, we applied IRDT (Intermittent Receiver Driven Transmission) method which performs receiver-driven type intermittent operation. However, in the area of the around of a center station with heavy load, since there were many nodes holding a transmitting packet, multiple SREQ (Send REQuest) packets collided to an ID packet which the receiver transmitted, and it became clear that there is a problem of increase of delay or decrease of a packet collection rate. In order to solve such a problem, I propose applying a sender-driven type MAC protocol in the heavy load area of the network. That is, the proposal of this research is combining two techniques according to load, and aims at improving network performance.

Effect of Odor Treatment for Discharge Plasma by Using Ceramic Tube

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The odor removal technology in this research is the new technology which emits the discharge plasma in the area of AC, and through the research discharge plasma-ozone-absorption filter is accomplished as process system. In order for this, we combine the advantages of chemical technology, a discharge plasma technology, and ozone absorption filter technology together and emit the plasma on the odor materials that is collected in first step. Through this process, we are able to see that hydrogen sulfide, ammonia, merkaptanryu, trimetalamines and volatile organic compounds, bacteria, etc. which are major cause of various ill odor are removed, and through passing the plasma generator which makes free radicals that is ten times more powerful than ozone sterilizer, the rest of the odor substances is removed by redox reactions. In the third step, the rest of zone is absorbed and emitted into the air by using the absorption filter. The rate of efficiency as the result of this research is 99%, using 5m²/min ceramic tube and applying 15m/sec wind and 360mm/Aq pressure.

Novel Smart Grid and SCADA System Interdependency Network for Future's Clean, Sustainable and Green Energy

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Serap Karagol, PhD, Marwan Bikdash, PhD, Ibraheem Kateeb, PhD, Numan Dogan, Computational Science and Engineering Department-COE, CST-SOT, ECEN-COE, North Carolina A&T State University

An electrical Smart Grid is a critical infrastructure, whose reliability depends on the underlying Supervisory Control and Data Acquisition (SCADA), and telecommunication networks. In the United States the bulk electric Smart Grid is operating ever closer to its capacity limits. It has been widely agreed that there are inseparable inter-dependencies between both networks. Deploying a smarter grid can help us realize the

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great promise of renewable energy sources, such as wind and solar, to help meet our ever-increasing energy appetite. Smart grid technologies will enable higher percentages of centralized and distributed renewable generation to be integrated into the grid efficiently and reliably, so they can become significant contributors to our overall energy platform. Renewable power can become as mainstream as coal is today, thereby reducing carbon emissions, natural resource depletion, and dependence on foreign oil -ultimately helping us improve our energy security.

Today's infrastructure is unable to maximize the benefits of renewable resources. Wind and solar resources are connected onto the grid as "one-off" solutions that are neither integrated with other generation nor optimized as a reliable first-tier energy source. Grid congestion can act as a barrier to full utilization, and renewable variability can cause reliability challenges at relatively high levels of penetration.

Our novel Smart Grid and SCADA interdependency network which we are developing will survive even under any emergency failures, vulnerability or attacks situation. We are developing this model using MATLAB, Simulink PSAT interface. Our novel Smart grid and SCADA interdependency network will enable the optimization and use of high percentages of renewable power and prepare the grid to integrate widespread distributed generation using concept of Microgrid. Microgrid can share large portion of the load and it will reduce pressure of main power grid. Thus it will provide better economical solution. Novel network will reduce carbon footprint which will provide efficient and sustainable energy solutions. Our novel network will provide integrated infrastructures for active network operation. Thus our novel Smart Grid and SCADA interdependency network will act as future's clean, sustainable and Green energy model.

Multi-Channel Routing for Wireless Mesh Networks of Event Driven Visual Sensors

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We propose a new method of multi-channel allocation and routing for wireless mesh networks where each node generates event-driven visual sensor data. Today, wireless surveillance cameras are increasingly adopted in high-security CCTV market and home security consumer market. Most of today's wireless cameras use WiFi based on IEEE802.11 standards with an access point system operating in infrastructure mode. However, such wireless networks have many restrictions. Their video data rates are limited because a single channel is shared by all nodes in the infrastructure network. Their wireless range is small because each node talks to only an access point. The number of cameras is limited because they interfere with each other in a crowded infrastructure network. A promising solution to these problems is to use a wireless mesh network with each camera acting as each node. To reduce the RF interference and traffic congestion, and to enhance the video data rate, multi-channel routing schemes can be used.

DAY 1 • TRACK C Visual Computing

Session Chair:

**William Grosky, University of Michigan &
Steve Greenspan, CA**

Image Authenticity Implementing Principal Component Analysis

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The paper addresses the application of finding key features within an image utilizing the process termed the Principal Components Analysis (PCA). Understanding this technique is critical for researchers within biometric fields and the larger cyber security field. Research, found in ASEE 2011 Conference Proceedings, titled "Edge Detectors in

Engineering and Medical Applications," develops the identification of edges within an image. That paper and this paper give the user two alternate approaches for comparing images. The PCA method was selected for analysis because it requires the use of many mathematical and statistical processes, such as means, standard deviation, variance, covariance, and eigenvalues, leading to a feature vector to compare images. The plan is to identify images, which will be termed authentic images and imposter images. Then the authentic and imposter images will be measured by the Euclidean norm to determine their authenticity. Developing software engineers and/or applied mathematicians using eigenvalues of a matrix can identify the authenticity of an image via that of an imposter image. This paper develops the key mathematical requirements to fulfill this result.

Sematic Video Abstracting for Video Selection Management

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Till von Wenzlawowicz, Martin Stommel, Peter Ludes, TZI University

Video streams generate the better part of the internet traffic due to platforms such as YouTube and Youkou in China. But in contrast to highly sophisticated search engines for texts (and partly for images) there are no tools to select videos with some content searched for except by their names or (arbitrary) tags. This is primarily brought about by the yet unsolved problem to automatically analyze the visual content and the sound track of arbitrary videos. A novel genre-specific solution is presented in this paper benefitting from an interdisciplinary approach combining image and sound processing features from Pattern Recognition with high-level concepts from Mass Communications. It is shown that it is possible to automatically analyze videos for bundles of syntactical features which represent semantic high-level concepts which are typical for certain genres. In this way, semantic concepts called "Key Visuals" [Lud11] as well as generic semantic concepts with obvious relevance to certain genres can be identified and classified in videos. Once identified it is possible to use the video shots assigned to these semantic concepts to automatically create video abstracts which can serve the purpose of

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trailers to inform prospective viewers through a “trailer” about the content of videos. In this paper we describe the underlying concepts as well as examples of a system capable of generating quite convincing video trailers automatically for some important genres by using audio and video processing algorithms, combined with context-based knowledge and a rule-based system for a dramaturgically built synthesis of video shots.

Voice Driven User Interface Design

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There is a growing opportunity in both the consumer and commercial product markets for wearable computing technology. In addition, there is a growing trend towards voice-enabled applications. These trends are manifesting themselves in many ways. This presentation will present some of the challenges IPS observed in creating a totally voice and head gesture driven user interface and application. In addition, examples and guidance will be offered in how to create an efficient application optimized for a head mounted computing system.

Detecting Data Visualization Preferences Using Games

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In visualizations of large multivariate data sets, discrete data can be effectively represented using glyphs. Glyphs have the advantage of allowing for rapid visual comparison, using differing visual dimensions to represent the different variables in the data. Some types of glyphs accommodate even more variables by using shape to represent the data. Yet the characteristics of these shapes may have underlying perceptual meanings. The purpose of this study was to determine whether certain shape characteristics are commonly viewed as good or bad. We conducted a study using two methods to gather data: a traditional survey, and a casual game. The results of this study strongly suggest that there are certain shape characteristics that are generally perceived as positive/negative, although they are not necessarily what might be expected.

Accelerating Differential Phase Contrast Imaging for NSLS-II Data Analysis

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Wei Xu, Hanfei Yan, Li Li, Yong S. Chu and Dantong Yu,
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A highly robust approach to Differential Phase Contrast (DPC) imaging based on Fourier-shift fitting was proposed recently. This method is effective in reconstructing the buried nanoscale interfacial structures due to the high sensitivity of the phase signal to structural and compositional variations. However, the intensive computation at each scanning spot, in particular, non-linear fitting and Fourier transformation operations, results in a time-consuming algorithm, which makes it hard to keep up with pixel-wise scanning. To enable its full potential for real-time data processing, we provided three implementations in Matlab, Python and C++ and compare their speed performance. Experiments

show that the C++ version is about one order of magnitude faster than the Matlab version and nearly two orders of magnitude faster than the Python version. In addition, we designed a parallel algorithm to divide the reconstruction task to a number of independently running routines executing on a batch-queue based multi-core server cluster and achieved almost another two orders of magnitude improvement.

Gestural Interfaces for the Reality Deck

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Arie Kaufman, Stony Brook University*

The Reality Deck is the world’s first immersive gigapixel resolution display. Sporting a vast 33’ by 19’ by 11’ high workspace, 416 LCD displays at 2560 by 1440 resolution and an 18-node visualization cluster, the Reality Deck offers an aggregate resolution of more than 1.5 billion pixels, several times larger than the next largest system. Additionally, the displays are arranged in a 4-wall immersive manner, providing users with a 360 immersive field of view. The large workspace and super-high resolution encourage physical navigation, walking up to a display to “zoom-in” or walk away to get an overview of the data.

Traditional user interfaces (keyboards/mice/joypads) can be used to control the Reality Deck, but they force the user to be tethered to a desk, negating the ability to physically navigate the space. We have been developing natural user interfaces that allow the user to interact with the visualization while enjoying full freedom of movement. A pair of gloves equipped with retro-reflective markers at the fingertips and on the backs of the palms are tracked within the large immersive space using a 24 camera infrared tracking system. From the tracking system data we extract two pieces of information, rigid body positions and orientations for the user’s hands and full point clouds that include unregistered fingertip positions. We utilize an SVM-based classifier to correlate point clouds with predetermined hand poses that are recognized by the system and allow the user to trigger different interaction modalities (such as 3D navigation with multiple degrees of freedom, panning on a fixed 2D plane and “air multi-touch” interactivity). Additionally, we track the trajectories of the user’s hands through time. This information is fed to an activity recognition classifier that operates over a sliding window of time. Backed by an SVM classifier trained on a user-invariant feature, this recognizer allows the detection of gestures (such as swipes or poses) that can also be used to trigger interactions with the system. Combined, these two interaction techniques allow for both direct manipulations of the visualization (such as panning a map or flying through a 3D model) and one-off action triggers (e.g. switching from a CT to an MRI version of a patient’s data).

Our gestural interface is deployed in the Reality Deck display and runs in real-time on commodity hardware. Since it is enabled by an IR tracking system and passive retro-reflective markers, it does not encumber the user during interaction and can be deployed in the vast majority of immersive systems. In this work, we discuss the formulations behind our machine-learning algorithms that enable our system as well as various technical details and insights gathered during the development and deployment on the Reality Deck display.

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Smart Education for 21c Student in Korea

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Recently because of introduction of smart technology and its convenience, smart media applies to teaching & learning method and systems known as “Smart Education” In South Korea, smart education is a national project which is expanding through elementary, middle and high school as. Using smart device and introducing digital textbook, teachers motivate students to participate activities in classrooms. Smart education is a study to improve fruits of education through cooperative learning method, interaction, union of convention study and non convention study. By using smart device and their application, students find a phenomenon through self-directed learning ability and strength their ability to do their original works. Also through smart education and social network service, students can cooperate and commutate other peers. These activities can help students to share ideas, to improve social relation network, to strength fellowship among peers to achieve their goals. Especially having social network service, smart learning environment contain potential merits of social network such as swift delivering educational lessons therefore teachers can expect increasing intimacy between teachers and students.

EmoteControl

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Tony Scarlatos, Stony Brook University

EmoteControl is an interactive multimedia application that provides established exercises and simulations to relieve stress, while capturing brain wave activity for subsequent analysis and assessment. Users see a representation of their emotional state displayed in real-time in the interface as they engage in the stress management activities. The application invites players to use this feedback to modulate their stress levels.

The EmoteControl project seeks to determine the impact of real-time feedback in moderating stress levels in college students; to also provide data on the efficacy of various stress management techniques; and to determine if the effects extend beyond the use of the software.

DAY 1 • TRACK D

Entrepreneurship and Venture Capital

**Moderated by Steven Cohen,
Empire State Development**

Special panel feature focused on entrepreneurship principals for technology start-ups. The panelists, prominent Long Island-based investors and IP lawyers, discuss the best uses for venture capital, what investors look for in start-ups seeking funding, and how to best position your company.

Panelists

Dr. Robert M. Brill, Newlight Management

David L. Calone, Jove Equity Partners, LLC

Andrew Hazen, LaunchPad Long Island

Lori Hoberman, Chadbourne & Parke

ABSTRACTS

DAY 2 • TRACK A Smart Systems & Applications

Session Chairs:

Anwar Walid, Bell Labs &

Yanmin Zhu, Shanghai Jiao Tong University

Searching for Fun

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Haim Levkowitz, University of Massachusetts, Lowell

During internet searches, users often have difficulty finding and re-finding high-quality results that address their search goals. Research from Feild and Allan found that 36% of queries submitted in search sessions end with users being moderately to extremely frustrated [3]. Likewise, Shah and Marchionini found that there is a high overlap of queries for a given task between users, as well as a high percentage of query reuse by individual searchers for themselves in re-searching tasks [9].

Previous research by the authors presented a framework and prototypical system called Conceptual Mile Markers (CMM) that addresses the findings outlined by the aforementioned research [1]. Our research focused on a metaphor and approach to reduce the “time to value” for a search session by matching user queries with existing search paths (which we call “roadmaps”) that have been captured during previous searches. While effective, this approach suffers from the “cold start” problem: there must be a critical mass of roadmaps in the system for users to find the system useful.

In this abstract, we describe early research that builds on our previous work with CMM by integrating elements of Gamification into our framework. We propose to encourage user participation and contributions by utilizing game elements to spur greater user engagement. Gamification is a term that originated in digital media to describe the use of video game elements to improve the overall user experience and engagement factor for non-gaming applications [2]. Zichermann and Cunningham [12] propose that Gamification utilizes a subset of game mechanics and game design to address problems and engage users. We use Gamification within CMM to incentivize the desired behavior of contributing roadmaps by attempting to raise the enjoyment factor for user interaction during search.

Towards an Interoperable Mobile Wallet Service

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Kuntal Dey, Vinod Mankar, Sougata Mukherjea, IBM Research India

Advancement in mobile technology, coupled with a market wide growth in mobile subscriber base, is encouraging financial, telecom and even third party operators to offer mobile payment services. In presence of a plethora of such services, an imminent problem is lack of interoperability across them. In this work, we address the challenge of interoperability by designing a wallet service built upon a concept of token. A token encapsulates a payment instruction, which can be of different types, such as instant, dated or installment payment. A token is represented by a Info-

Matrix code, viz. Quick-Response (QR) code, thereby bringing in additional advantages in terms of user interactions with the wallet service. We present the lifecycle management of a token, beginning with token generation on user request, transfer of token, and acknowledged receipt and encashment of a token. This work presents an architecture for interoperable wallet service, along with the implementation of a system that demonstrates the use of QR-codes as standardized tokens for transactions.

MAC Protocol in Device-to-Device Networks for Proximity-Based Services

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D2D communication is evolving into an alternative communication method for novel proximity based applications. In order to support the proximity based services, it is necessary to implement a distributed MAC protocol to control the interference from thousands of devices. In this paper, we propose a wireless device-to-device (D2D) MAC protocol that can provide a high scalability for proximity based service. The proposed MAC protocol uses multiple data channels for resource allocation and adopts a control signaling scheme that enables signal to interference ratio (SIR) based distributed scheduling. The proposed MAC protocol can provide efficient resource allocation, leading to a significant gain over a conventional D2D MAC protocols by exploiting multichannel diversity. We analyze the protocol using an analytical model based on queueing analysis and obtain the steady state probability for MAC layer performance, such as the average packet delay and system throughput. Moreover, simulation results show that the proposed protocol provides an improvement of the spatial reuse and is more stable for bursty traffic arrivals of the proximity D2D services.

Enterprise Mobile Operating Systems

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The worldwide smartphone market is expected to top 918M units in 2013, growing +27% and following +46% growth in 2012. The primary market for such platforms is consumers, yet increasingly such platforms are being adopted and customized for mission critical line-of-business enterprise applications. During this session we discuss the overall mobile operating system market landscape. We compare and contrast current consumer offerings such as Android against legacy operating systems such as Microsoft CE and Windows Mobile. Key enterprise value propositions are reviewed including Mobile Device Management (MDM) and Security. We review mobile security best practices and regulatory mandates facing government, healthcare, critical infrastructure, and retail mobile point of sale. Finally we review challenges facing this new paradigm of consumer influence on enterprise platforms.

ABSTRACTS

DAY 2 • TRACK A Smart Systems & Applications

Session Chairs:

Lorrain Herger, IBM &
Yuanyuan Yang, CEWIT

Product Authentication at the Consumer Level

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The counterfeiting of articles of commerce is a global problem on a grand scale. Counterfeiting accounts for about five to seven percent of all world trade, is approaching close to 1.2 trillion dollars per year, and continues to grow at a rate of 15% per year. If viewed as an independent economy, counterfeiting would rank in the top 15 largest economies in the world and as the fastest growing economy in the world. Virtually all products and transactions worldwide are impacted by counterfeiting, with concomitant dwindling public trust in product and transaction authenticity while also affecting the lives, health, and safety of consumers. Counterfeited items span diverse sectors, including pharmaceutical drugs, luxury goods, electronics products and components, food products, alcohol products, financial documents, and other official documents (to name just a few). Average consumers find it difficult to distinguish between these counterfeit products and authentic products since their outside appearances look the same.

An Efficient Packet Processing Protocol based on Exchanging Messages between Switches and a Controller in OpenFlow Networks

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Taekkyeun Lee, HongJin Yeh, Manpyo Hong, Ajou University

The OpenFlow is one of emerging technologies which can provide a communication protocol between two separate functions: a packet forwarding function and a control function in the network switches. With the OpenFlow, it is possible that a controller directly connected to switches is able to manipulate the routing paths by software driven by the controller. The controlling by software can make it possible to manipulate switches regardless of manufacturers. Also, through the separation of the packet forwarding function and control function in the switches, the controlling by software in OpenFlow can provide more precise traffic management than Access Control List (ACL) and routing protocols used in the existing network devices. Furthermore, OpenFlow provides a more simple and easy configuration to add new features or update than the existing network manipulation technologies.

Polyglot: Distributed Word Representations for Multilingual NLP

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Building multilingual processing systems is a challenging task which

typically involves language-specific preprocessing to calculate intermediate representations that will serve as features for later stages. Each language added to such a system adds more requirements and frequently requires an individual who has familiarity with the language under consideration.

Recent advancements in unsupervised feature learning present an intriguing alternative. Instead of relying on expert knowledge, these approaches employ automatically generated task-independent features (or word embeddings) which are created from large amounts of plain text. Unfortunately training these models requires a significant computational cost, and most of the work in the area to date has focused on English models.

In this work we present Polyglot, a publicly available repository of word embeddings we have generated for more than 100 languages using their corresponding Wikipedias. Polyglot represents a valuable resource for those seeking to build multilingual systems, allowing their models to take advantage of pretrained features which have been generated consistently across languages.

In order to quantitatively demonstrate the utility of our word embeddings, we use them as the sole features for training a part of speech tagger for a subset of these languages. We find their performance to be competitive with near state-of-art methods in English, Danish and Swedish. We also observe a marked increase in the performance of models using our embeddings versus equivalent models trained without them. Additionally, we perform a qualitative investigation of the semantic features captured across languages by our embeddings through the proximity of word groupings. Here too we find promising results.

Radar Network Node: Performance Analysis and Visualization in Indoor Environment

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Keun Myoung Lee, CEWIT Korea

We present a performance evaluation of the inexpensive security or surveillance system. The system consists of a radar network that creates a virtual fence or invisible barrier. The main focus of this paper is on testing a prototype of the radar network node hardware and software in cluttered indoor environment. The radar network node operation is a combination of remote sensing by commercially available automotive radar and target detection/ranging techniques. The goal is to explore the limits of current technology and perform analysis of postprocessing techniques for target detection and localization. A basic idea of the detection is a storage of current signal 'image' in memory and comparison of the signal with 'no-intrusion' signal. We investigate how to deal with challenging problem of signal processing when multipath clutter signals may exceed a level of target signals, and clutter rejection technique. The software with flexible scripting capabilities was created that dramatically simplifies the testing and data analysis. Various experimental measurements show the performance of the radar in range estimation, efficiency of the post-processing algorithms and open up new possibilities for future improvements.

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Mobile Health Monitoring of Human Behaviors in the Field – Opportunities and Challenges

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Recent advances in mobile technology have opened up enormous opportunities to improve patients' health and well being. Mobile devices are usually continuously with an individual and have the sensing and computational capacity needed to collect and analyze health related data in real time to infer behavioral states such as stress, conversation, and addictive behaviors. A mobile device that is aware of an individual's health status and environment can be used to deliver just in time interventions to improve healthy behaviors. This talk will describe recent advances in inferring stress, smoking, and conversation from physiological measurements collected using wireless wearable sensors. It will then highlight some major challenges facing the field and conclude by discussing emerging technologies such as contactless physiological sensing.

Multipath TCP Algorithms: Theory and Design

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Multi-path TCP (MP-TCP) is a congestion control which can improve application performance by using multiple paths transparently. MP-TCP allows mobile devices to advantageously use available access interfaces, e.g. 3G, 4G/LTE and WiFi to improve throughput, reliability and energy efficiency. MP-TCP can also improve delay performance of computing tasks in datacenter networks by utilizing the inherent multipath structure of the switching topologies. We propose a model for a large class of MP-TCP algorithms and identify design criteria that guarantee the existence, uniqueness, and stability of system equilibrium. We characterize design tradeoffs and propose a new MP-TCP algorithm and illustrate its superior overall performance.

Capacity-Constrained Replication for Data Delivery in Vehicular Networks

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Given the unique characteristics of vehicular networks, specifically, frequent communication unavailability and short encounter time, packet replication has been commonly used to facilitate data delivery. Replication enables multiple copies of the same packet to be forwarded towards the destination, which increases the chance of delivery to a target destination. However, this is achieved at the expense of consuming extra already scarce bandwidth resource in vehicular networks. Therefore, it is crucial to investigate the fundamental problem of exploiting constrained network capacity with packet replication. This talk will present our work on addressing this challenging problem. We first conduct extensive empirical analysis using three large datasets of real vehicle GPS traces. We show that a replication scheme that either underestimates or overestimates the network capacity results in poor delivery performance, and we further reveal that the packet queue length can be a good indicator of the network capacity for adjusting the replication strategy in a vehicular network. Based on the observations, we propose a Capacity-Constrained Replication scheme or CCR for data delivery in vehicular

networks. The key idea is to explore the residual capacity for packet replication. We introduce an analytical model for characterizing the relationship among the number of replicated copies of a packet, replication limit and queue length. Based on this insight, we derive the rule for adaptive adjustment towards the optimal replication strategy. We then design a distributed algorithm to dictate how each vehicle can adaptively determine its replication strategy subject to the current network capacity.

Flawed Transparency: Shared Data Collection and Disclosure Challenges for Google Glass and Similar Technologies

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Current privacy law and best practices assume that the party collecting the data is able to describe and disclose its practices to those from and about whom the data are collected. With emerging technologies such as Google Glass, the information being collected by the wearer may be automatically shared to one or more third parties whose use may be substantially different from that of the wearer. Often, the wearer may not even know what information is being uploaded, and how it may be used. This paper will analyze the current state of U.S. law and compliance regarding personal information collection and use, particularly the self-regulatory disclosure model, and examine how Google Glass and similar technologies may conflict with legal obligations and best practices. It will then suggest potential methods, both legal and practical, to alleviate the issues and improve transparency for networked, wearable data gathering devices.

Agent-based Planning and Control for Groupage Traffic

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Till Von Wenzlawowicz, Martin Stommel, Peter Ludes, TZI Bremen

In this research and technology transfer project, the planning and control processes of the industrial partner Hellmann Worldwide Logistics GmbH & Co. KG are analyzed. An agent-based approach is presented to model current processes and to exploit the identified optimization potential. The developed system directly connects the information flow and the material flow as well as their interdependencies in order to optimize the planning and control in groupage traffic. The software system maps current processes to agents as system components and improves the efficiency by intelligent objects. To handle the high complexity and dynamics of logistics autonomous intelligent agents plan and control the way of represented objects through the logistic network by themselves and induce a flexible and reactive system behavior. We evaluate the implemented dispatching application by simulating the groupage traffic processes using effectively transported orders and process data provided by our industrial partner. Moreover, we modeled real world infrastructures and considered also the dynamics by the simulation of unexpected events and process disturbances. The results show that the system significantly decreases daily cost by reducing the required number of transport providers and shifting conventional orders to next days, which need no immediate delivery. Thus the system increases the efficiency and meets the special challenges and requirements of groupage traffic. Moreover, the system supports freight carriers and dispatchers with adequate tour and routing proposals. Computed tours were successfully validated by

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human dispatchers. Due to the promising results, Hellmann is highly interested in transferring the prototype to an application that optimizes the daily operations in numerous distribution centers. Finally, provide further research perspectives, and emphasize the advantages of the developed system in Industry 4.0 applications.

A Traffic Classification Strategy for the Provision of QoS in Content-Centric Networking

Byeong-hee Roh, Ajou University

The key concept of Content-Centric Networking (CCN) is the use of cache in all CCN routers. However, cache replacement process occurs inevitably due to limited cache size. Normally CCN uses Least Recently Used (LRU) or Least Frequently Used (LFU) as cache replacement algorithm. But both algorithms are only focused on the usage time or hit count of content not their popularity and characteristics. Because of this problem, advanced cache replacement algorithms are introduced by adding weighted value or age of the content. Both algorithms aim that more popular contents can live in the cache longer for better efficiency but have limitations. Firstly, they do not focus on the characteristic of contents but only focus on survivability of contents in the cache. As a result, some contents cannot give any chance to store when all the contents in the cache have higher weight value. Furthermore, when the contents are distributed as a response of client, their priority can be changed due to requesters' preferences. However, current algorithms cannot consider dynamic weight value not just in the content server but in the cache from routers.

Locating and Tracking Data Center Assets Using Active RFID Tags and a Mobile Robot

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Robert Calio, Michael Frissora, Jonathan Lenchner, John Miller, IBM

We describe an approach to completely automated asset tracking in data centers using a vision-based mobile robot in conjunction with active RFID tags. Typically, active RFID tags are tracked using fixed readers. The granularity with which one can localize tags is based on the number of these fixed readers, each of which is not inexpensive. In large data centers, the cost of such a solution can therefore become excessive. We describe the use of a mobile robot, utilizing a single RFID reader and a variety of algorithms for locating the plethora of RFID tags one can encounter in such data centers. These approaches are validated through experiments performed in a production industrial data center.

Multi-Dimensional Production Planning Using a Vertical Data Integration Approach

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Tobias Meisen, Daniel Schilberg, Sabina Jeschke, Institute for Information Management in Mechanical Engineering, RWTH Aachen University

Due to the continuously and fast increasing complexity of products and production processes, manufacturing companies have to face more and more challenges to survive on a competitive market. Thus, in modern planning scenarios of the manufacturing process, the goal is not only to achieve the most efficient low-cost production, but also to take into account the interests of the customer. Especially the increasing impact of the customer on the market leads to rapidly changing boundary conditions and thus different requirements concerning the production process. As a consequence, the production has to be designed more flexible and adaptive to changing circumstances. In order to reach the desired flexibility, the production as well as the communication management within the factory has to be designed on the basis of a modular planning approach.

This requires vertical exchange of information through all levels of the company, from the management layers and the Enterprise Resource Planning (ERP) to automation and shop floor layers, where the information is needed to optimize the production. The connection of these corporate layers can only be achieved by using an information model that serves interoperability between these mostly heterogeneous systems. The processing and visualization of ERP data using an integrative information model enables a continuous optimization of the production systematics. Through the information model, cross-linked data structures of the production monitoring and automation can be connected and thus be integrated and consolidated into a consistent data basis.

In the current work, such an information model will be introduced and validated by making use of an optimization algorithm that is carried out through the layout planning phase of a factory. The use-case scenario presented aims for serving a flexible and dynamic optimization of the production structure of a manufacturing enterprise. During the optimization, the algorithm takes into account historical data taken from the ERP level of the company as well as time constraints to design multi-dimensional process chains for multiple manufacturing scenarios.

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DAY 2 • TRACK B Health & mHealth Technologies Panel

Digital Health Panel - Past Experience and Future Hopes

**Moderated by Ronit Bendori, MD,
General Partner, Evergreen Venture Partners**

With Billions of cellphone users, broad band 3G availability and the constant requirements of the Medical sector, borders between information technology and Medicine melt down. Experts from the Communication arena, the Medical Industry and from the Academy will discuss the digital revolution of Medicine. We will review past experience and will discuss future development and its impact on our life.

Theranostics and Mobile Health Systems

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Theranostics represents the merging of diagnostic and therapeutic modalities into one integrated system. This system, in the context of point-of-care devices and mobile health, will integrate point-of-care therapy with point-of-care diagnostic tools. This is a promising approach to the management of chronic diseases that require adjustment of therapy based on the individual's condition. Theranostic mobile systems can operate without the direct intervention of a physician or medical professional but even when direct intervention is not required it will be necessary to integrate the theranostic information about diagnosis and therapy into the patient's medical record. In addition, patient specific information and expert information from practitioners or decision support expert systems may be needed at the point of care. The integration of information can be achieved with wireless communication. The advent of big data initiatives, electronic health records, wireless communication of medical information to the point of care, and validated point-of-care diagnostic tools provides a platform for the development of theranostic systems. Two potential applications are the closed-loop control of blood glucose and blood pressure. NIBIB supports the development of point-of care diagnostic tools that are capable of providing actionable information that will advance the development of theranostic systems.

Cognitive Computing and Healthcare

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There is a world-wide consensus that there have to be some fundamental changes in healthcare. The rising cost of healthcare, coupled with wide dissatisfaction with the quality of healthcare, creates an imperative for transformation. Whether it is the World Health Organization or the Institute of Medicine in the United States, adverse events, inefficiency, limited access and waste are of concern. The breadth of challenges is extensive, ranging from providing care in parts of the world where there is a dearth of trained providers to regions where there are issues about possible overuse of expensive technologies or other unnecessary interventions. For example, a recent article suggests that 1/3 of what is spent on healthcare in the United States is for things of no value.

There are a few core goals for the transformation of healthcare. One is called personalized or precision healthcare. Learn enough about a patient so that you are more likely to make a decision that will benefit that individual. Many decisions are made now using information derived from studies performed in a broad mix of people. Such studies obscure differences that may exist about individuals and, so, do not necessarily apply to a specific patient. The result can be a choice that is ineffective or dangerous for the person. That leads to waste and possible avoidable adverse outcomes. Personalized healthcare requires analyzing information relevant to the individual to help understand that patient's needs and preferences. If we are successful in personalizing healthcare we also will be better at controlling cost, because we won't waste money unhelpful interventions.

Achieving personalized healthcare requires making better decisions. Making better decisions, sometimes called evidence-supported decisions, requires making better use of all the information we have at our disposal. That data exists in many forms – written, free-text documents, numerical information such as in laboratory reports, and images, such as x-rays and MRIs. The amount of health data that exists in the world is huge. We are working closely with CEWIT and the NSF Big Data Center at Stony Brook on these issues.. It is a challenge because such large volumes and variety of data can overwhelm our ability to use it. It is often referred to as “Big Data,” characterized by four Vs - volume, velocity (a lot of data coming at you rapidly), variety (different kinds of data) and veracity (data that may be inconsistent, incorrect or flawed). It is data that is not very readily handled by conventional computer systems as researched by CEWIT investigators. Big Data demands a new era of computing called “Cognitive Computing,” where the computer systems can “think” and address conflicting information, make decisions about relevance of information to a decision, and even ask questions. Watson, the IBM supercomputer that successfully played the television quiz game “Jeopardy!” to years ago, is an example of cognitive computing. Watson is now being developed to help clinicians use one component of Big Data, text-like data such as in journal and research articles and guidelines, to make more personalized decisions for their patients.

New Directions and Innovations in Healthcare and Medical Imaging

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Provide some of the GE view on this space and some of the innovative ways we are looking to build collaborations and partnerships.

Challenges & Innovations in Connected Healthcare

Gerard Grundler, Verizon

ABSTRACTS

Designing Information Computer Technology for a Global Market

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The objectives of this presentation is to address challenges and opportunities of the many needs of the world's priorities to deliver high impact interventions that will improve health outcomes for their citizens while strengthening health systems. Under this concept I will focus on the entire continuum of life (birth – death) through the use of technologies that will address the economics, education, social and health needs of citizens residing in both developed and developing countries. Topics include electronic health record, maternal and child health, chronic disease, home-care, rural health care as well as present and future technologies. I will address the major role for ICT in the public health arena (e.g., mobile technology) and its ability to offer health interventions, education and preventive strategies that can address the global challenges of the digital divide (those who have and those who do not) now and in the future. An example of how products that were designed for the developed countries can offer the same benefits for developing countries with simple variations of the product. Examples of newly developed products will be described along with their impact on society.

E-Health Enabling Better Patients' Engagement

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With the vision of engaged patients having better compliance, better outcomes and better health, digital platforms are looked upon as potentially becoming the backbone of a strategic revolution in the way medical services are provided. There is currently a hype of health apps, most of which are short lived and appeal only to the early adopters' community. The use of e-health and especially various telemedicine tools is spreading, but the reality is that most of those are pilots never to become commercially viable.

Implementation of an e-health solution, especially on large scale, is never a technology issue. The author argues that those solutions cannot survive as standalone systems or tools, but rather should be either integrated into or "enveloped" by the healthcare system in which they operate. This Hybrid Envelope is the critical long-run key success factor for the implementation of e-Health and m-Health platforms and allows the coordination of care and also the continuum of care, so needed to ensure quality.

The presentation will focus on a real ongoing e-health implementation in one of the world's biggest health care provider organizations (Clalit Health Services in Israel) and will define the core building blocks within the conceptual framework.

DAY 2 • TRACK B

Health Management & Technologies

Session Chairs:

**Victor Levy, E Physicians Office Inc. &
Wei Lin, Stony Brook University**

Triple Challenge for the Healthcare Industry: Sustainability, Privacy, and Cloud-Centric Regulatory Compliance

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Nina S. Godbole, IBM India*

The healthcare sector is emerging as an important sector globally. Although the relative carbon footprint of healthcare is not overwhelmingly large compared to other industries, there are ensuing concerns for the sector arising from many quarters. Much has been written about 'mMedicine', 'mobility in Health', 'remote delivery of healthcare services', 'eHealth', and tele(health)care, and the industry is looking to reap the benefits of emerging technologies such as mobile computing and cloud computing. These technologies are needed in order to grapple with ever growing operating cost problems. The challenge looms large since the healthcare sector is under heavy pressure due to regulatory compliance mainly for protecting the privacy of PHI (protected health information), as well as its contribution to sustainability through 'GREEN' practices in its IT infrastructure. Keeping such a wide mix in mind, this paper aims to build a framework for research investigation into the possible barriers for GREEN IT practices in the healthcare sector as well a discussion about adoption of cloud based application architectures in the healthcare sector.

The Intersection of Medical and Telecom in the Smartphone Era

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The proliferation of Smartphones have made accessible to the masses mobile computing at a scale unimaginable only a few years ago. Smartphones have gone beyond the simple communication tasks (voice, text, email) to becoming portable tools for entertainment, computing and – lately – for healthcare and wellbeing. With this in mind NTT DOCOMO in cooperation with Omron created in July 2012, DOCOMO Healthcare, Inc., a Joint-Venture with business centered on the management, use and sharing of physical, health and medical data. DOCOMO Healthcare is aiming to introduce mobile services that will collect body data, such as your step counts and blood pressure, from your smartphone or other devices and to provide useful advice for a healthier life. In addition, we will develop this into a total wellness solution covering users' diet, exercise, sleep and healing as well as medical treatment and insurance needs.

ABSTRACTS

Real Time Data Streaming in Wireless Healthcare Device Using Real Time Operating System

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The advances in wireless technology have enabled the patients to perform routine activities during medical care. It greatly enhances the healthcare quality through the real time surveillance of vital physiological signals to catch abnormalities that could be missed during office visits. Wearable devices are the key players in the wireless healthcare applications. Their basic requirements are low cost, small footprint, light weight and energy efficient. Thus, microcontrollers are the best choice for the embedded computer for the wearable devices. One of the major challenges in the wearable device design is the software capability of real-time data streaming. FreeRTOS is an open source real time operating system with higher time consistency and less jittering compared to other operating systems. In wireless applications, the microcontroller communicates with the wireless module via a serial port. Our study evaluated the efficacy of FreeRTOS in real time data streaming using Freescale HCS12 microcontroller with a serial connection with a laptop computer. A data frame was designed for reliable data transmission. The effective data streaming rate was measured using LabVIEW code under various serial port baud rates, frame payload size and processing load, which was simulated as the software delay. The data showed that the sustainable data rate can reach 90 kbps at the baud rate of 128 kbps and a frame payload of 256 bytes without any processing load. When 10 ms delay were introduced as the processing load per frame, the data streaming rate dropped to around 60 kbps. If one channel of ECG signal is sampled at 200 Hz at the 16-bit resolution, the data rate is 3.2kbps. Thus, the result demonstrated that the FreeRTOS can easily support more than ten channels of physiological signals with modest preprocessing.

MedPod Concept- Public Virtual Primary Care on Demand

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Socioeconomic changes around the world in general and the USA in particular are affecting the way medical care needs to be delivered. The cost of healthcare is rising, while the population is aging and living longer than ever. At the same time there is the existing shortage of medical staff, which is expected to get even worst. Possible strategies to deliver efficient medical care while controlling health costs at the consumer level are:

- Adopting IT and wireless technologies in healthcare.
- Upgrading and implementing advanced patient monitoring technologies.
- Expanding the telemedicine reach and recognizing the cost control benefits.

The MedPod project implement the above strategies, through a network of publicly located telemedicine “kiosks” connecting “walk-in” patients with remotely located physicians via high definition video, while utilizing the most advanced IT and medical technologies to examine a patient, and to access his medical data and history. While the “walk in” clinic model with on premises physicians is currently deployed at the certain

public (e.g. pharmacies) high traffic locations, it is not cost effective to be deployed only at most venues as a dedicated on premises physician is a very expensive resource. Low traffic at most venues and seasonality of healthcare consumption prevent wide roll out of the concept. This is in particular true in rural areas where access to professional care is difficult. The MedPod concept doesn't require a dedicated on premises physician. The physicians are a pooled resource accessible on demand via video, which makes them a much more effective resource. MedPod personnel consist only of a low cost nurse assistant (or equivalent) and the setup complies with “meaningful care” concept making the medical services furnished reimbursable by insurance companies. Cost analysis indicates that MedPod profit breakeven point at less than 8 visits per day.

Multivariate Probabilistic Algorithms within an E-infrastructure, Functionalized by Large Scale Automated EMR Mining, for Real Time, Actionable Clinical Decision Analysis

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The field of data analytics has recently garnered significant attention as a means of improving service, outcome and cost in healthcare. Health informatics tools to date are largely rules-based, static in knowledge-gathering capability, and are not well incorporated within standard clinical processes.

We introduce a multivariate analysis tool, built at the user-client interface, directly from data extracted from thousands of EMRs, for automated decision making. The predictive algorithms created to date have been implemented in a variety of clinical scenarios, including ER triage of chest pain, selection of optimal diagnostic testing, and management of chronic illnesses.

This technology has now been applied to prediction of patient compliance with scheduled appointments in a medical specialty clinic. Approximately 16% of scheduled VA patients do not show for their scheduled appointments for Gastroenterology clinic. This results in misallocation of provider resources and inefficiencies in health care delivery.

The Bayesian probabilistic model so created, web based and automated, allowed the researchers to predict the likelihood of the outcomes of showing or not showing for an appointment, based on independent clinical/administrative data points in EMRs that were populated in real time and extracted and aggregated from EMRs of multiple participating VA medical centers. 6,176 data sets were extracted from CPRS/VISTA, representing all GI clinic appointments over a one year period. A number of data sets were deemed unsuitable for inclusion. The remaining 4,774 sets, representing 669 no shows and 4,105 shows, constituted the study data base.

The data sets were divided into a “training” phase for functionalizing the tool, comprised of a random 50% of the “no show” patients and an equal number of “show” patients (334/334), and a “test” phase, comprised of 25% “no show” patients added to a number of “show” patients that mirrored the overall clinic proportion of 1:6 no shows: shows (168/1008), for a total of 1176 patients. The remaining 25% of no show data sets were reserved for a further “validation” phase.

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Utilizing the unique functionality of the software, the data sets were randomly parsed again and again, at the user-client interface, as separate “runs”, into training and testing sets.

For each test run, interpretive statistical results were generated and immediately displayed on-line. Such instantaneous iterative functionality enables the user client to select a “threshold” which maximizes the number of no shows classified accurately, while minimizing the total number of patients meeting that particular threshold, thereby optimizing sensitivity and specificity.

At the designated threshold, a small segment of scheduled appointments, reflecting approximately 1/3 of the total number of appointments, contained almost 2/3 of the no show appointments.

This application allows for construction of a process, based solely on EMR data, by which only a minority of patients require direct contact by clinic personnel prior to their appointments to reinforce compliance.

The improvement in quality of care, patient outcomes and cost, related to almost 25,000 no show appointments per quarter in the Upstate NY VA region alone, is potentially immense.

Supporting Clinical Guidelines Using DL-Temporal Reasoning

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For many years various clinical guidelines have been developed to support and improve medical care for different types of diseases. Although it has been recognized for long that following these guidelines improves the success rate of clinical care, implementation of guideline recommendations in daily clinical routine remains an open question. This gave rise to a series of works to formalize clinical guidelines in a computable model. These approaches focus in particular on encoding the workflows underlying these guidelines in terms of corresponding languages like flow charts or petri nets. However, in many cases there is no single workflow for an entire medical care but there is a wealth of workflows covering only individual periods or particular aspects of the medical care. While medication is initialized at some point in a general workflow of medical care, it soon constitutes a workflow on its own as an iterated process having restrictions on its duration, on the total amount of drugs to take, or the condition to stop it prematurely (e.g. occurring contra-indications). In this paper we describe our framework and the corresponding SHIP-Tool for orchestrating heterogeneous processes operating on a logical representation (Description Logic) and the implementation of significant parts of a clinical guideline for the management of acute coronary syndromes in this framework.

BT-Viz: Brain Tractography Visualizer

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We present a novel topological visualization technique to segment and register multiple fiber bundles across multiple brain datasets. More specifically, we use fiber bundle theory to map the brain tracks onto a torus and segment out the fiber bundles using distance and curvature similarity metrics. For the purpose of this work, we ignore the short and self-intersecting tracks, which constitute the artifacts of the specific imaging techniques. Once the segmentation of the fiber bundles is done, we evaluate the quality of our segmentation by checking the end-points of the tracks on the brain cortical surface and seeing whether the segmented fiber bundles consist of all fiber tracks that have end-points on the same regions. For the purpose of this work, we are using Mindboggle-101 brain dataset that comprise of manually-labeled brain features which can be used to aid in the segmentation and evaluation of our technique. After the segmentation, we can register multiple fiber bundles by mapping the segmented fiber bundles from different brain datasets to the torus. Our framework can also be used to co-register structural and functional data, captured from multiple modalities. Due to the intricate 3D structure of the brain tractography, we also plan to visualize the data on our 1.5 billion pixel immersive visualization facility, the Reality Deck.

Computational brain connectivity is an emerging field that is rich with important and interesting problems. It constitutes the study of efficient algorithms, models, and tools for exploring, understanding, and characterizing brain connectivity. Fusion and multimodal analysis of brain connectivity data (structural, functional, and causal alike) acquired from different sources at different scales, however, will be the most important challenge in the field in years to come. The work presented here, a slice from this new field, establishes that characterizing patterned structures of diffusion MRI-derived brain connectivity improves exploration of the brain connectivity space and provides measures quantifying normal and pathological variation in the brain.

Continuous Brain Monitoring

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Continuous brain monitoring can benefit a number of mild to severe brain pathologies. Such monitoring has to be comfortable, and easy to use, so that it can be worn at home and put on by an elderly patient. Single EEG electrode data appears suitable for that. We have developed advanced signal processing techniques which extract more information from single electrode EEG data. In this talk, we shall present some of the capabilities of brain monitoring with a single electrode. In particular, we shall look at cognitive task monitoring, emotional and sleep monitoring.

ABSTRACTS

Key Establishment Protocol for a Patient Monitoring System Based on PUF and PKG

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A body sensor network (BSN) is a network with internal wireless communication placed on a person's body that can monitor their physiological functions. In some areas, such as health, the security of the transmitted information is of vital importance to the attention of a patient. One of the major problems for a monitoring application is the key establishment between the diverse entities in these systems. The generation of cryptographic keys using physiological functions can provide security communication in a BSN as an intra-BAN. The addition of Physical Unclonable Functions (PUF's) extends security to the destination information in the medical center placed beyond-BAN. This paper presents a new protocol using both technologies to establish a cryptography key and provide security at different levels of communication. Acceptable results are shown as a proof of concept in order to test the architecture.

Medical Volume Rendering on the Gigapixel Reality Deck

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We have developed a novel visualization system based on the reconstruction of high resolution and high framerate images from a multi-tiered stream of samples that are rendered framelessly. This decoupling of the rendering system from the display system is particularly suitable when dealing with very high resolution displays or expensive rendering algorithms, where the latency of generating complete frames may be prohibitively high for interactive applications. We specifically address the application of medical volumetric rendering on a gigapixel display, where the traditional visualization pipeline cannot produce complete images at interactive framerates.

DAY 2 • TRACK C Networks, Clouds, & Security

Session Chairs:

Dave Mesecher, Northrop Grumman Corporation & Susan Frank, IEEE

Threat Motivation

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The traditional formula used by security practitioners $RISK = THREAT \times VULNERABILITY$ is meant to show that risk is the effect of a threat exploiting a vulnerability in the system. When building a security architecture the primary focus is on reducing vulnerabilities. Many times the threat information provided is vague so engineers are forced to assume that a threat can exploit any known vulnerability. In-depth knowledge of threats allows for better allocation of monies toward specific mitigations, as opposed to trying to fix every vulnerability in the system.

This paper provides a novel approach to dealing with threat motivations, and offers a look at a system from a combined threat and vulnerability perspective instead of a vulnerability only viewpoint. The author defines an ontology of threat motivations and their relation to system attacks. Threats can come in multiple forms, with different resource levels which affect the ability to launch a successful attack. The threat is not a nebulous entity, but can be characterized by the elements that comprise its ability to affect a target system. On the system side, vulnerabilities must be understood and categorized. The software, hardware and everything in between must be organized as part of a comprehensive security architecture, so that threat elements can be mapped to known vulnerabilities within the system. The author describes how the mapping can be done manually and suggests future work that can be done to automate this.

Understanding the attack motivation and elements of a threat allows engineers to optimize mitigation placement and identify pieces of the system require extra protection. In the current world economy, funding is scarce and so it is critical for security engineers to apply the most effective mitigations with an emphasis on affordability. This paper provides a new approach to defining the interplay between threats, the system, and security mitigations. This method is offered in order to reduce the attack surface and provide a security posture best suited to a system's potential threat environment.

ABSTRACTS

Day in the Life: a Method for Documenting User Experience in Complex Environments

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We study complex work environments to enable innovative improvements. In this paper we report on a technique we have created to depict the complex work environments of operators in IT operations control centers, developed after a 3-day field study in a large operations center. Because of security issues and tight time constraints on the operators' work, this environment is not accessible to software teams. The technique is a Day-in-the-life scenario, which extends on the work of personas and scenarios. The scenario has two forms: a narrative, and a diagram. Our narrative captures typical daily events in the life of the operator and conveys the gist of their day in terms of attentional focus and tensions between and within their activities. The Day-in-the-life diagram uses the UML sequence diagram notation to depict the narrative visually, bringing important details of the day to the fore. These techniques especially capture the many activities of operators and the subsequent demands on an operators' attention.

Optical Security System Employing Shifted Phase-Encoded Joint Transform Correlation and Orthogonal Code

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With the tremendous growth of digital technologies, unfortunately the problems with fraud and counterfeiting are also increasing significantly. Security threats to our confidential and valuable information have attracted significant research interest over recent years. Cryptographic techniques are being developed with an objective of restricting any and all unauthorized access to information or information system. In addition, the security technique needs to be reliable and faithful in reproducing the information to its authorized users only, operate fast and involve simple architecture. Optics-based security techniques have been of great interest because of their very fast operation and reliable performance. Several optical security techniques have so far been proposed in the literature, including double phase-encoding scheme, polarization encoding, multiplexed minimum average correlation energy phase-encrypted filter, exclusive-OR encryption, fractional Fourier transformation and multi-layer encoding scheme. However, majority of these techniques have been observed to be not as successful in providing with robust performance and strong security against unauthorized access. Joint transform correlation (JTC) technique has been observed to overcome the requirements of complex optical architecture and adjustments of optical axes. However, the classical JTC technique suffers from poor discrimination between the decrypted information and noises in the correlation plane.

The objective of this paper is to develop an efficient optical security system utilizing a modified design of JTC technique and orthogonal encoding scheme. Multiple information are orthogonally encoded independently and then are combined together to save storage space and transmission bandwidth. The encoded and multiplexed image is then encrypted employing phase-shifted and phase-encoded reference-based fringe-adjusted joint transform correlation (SPFJTC) technique. The encryption key is first phase-encoded using a random phase mask and then fed into two processing channels where one channel introduces an additional 180 degree phase shifting. The image-to-be-encrypted is introduced to both the channels along with the encryption key and then Fourier transformed to obtain two joint power spectra (JPS) signals. The difference of the two JPS signals is phase-encoded and then inverse Fourier transformed to yield the encrypted image. For decryption purpose, the encrypted image is filtered using a fringe-adjusted filter. Individual orthogonal codes are employed to decode the respective information. The proposed optical security system is expected to make the confidential information absolutely inaccessible to any unauthorized intruder, while to allow retrieval of the information to the respective authorized recipient without any distortion. The technique will be investigated through computer simulations under different practical conditions in order to verify its overall robustness.

DCIM - Impact on Data Center Availability and Efficiency

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Session focusing on the latest trends in DCIM - Data Center Infrastructure Management and its impact on the availability and Operational efficiency. Also the influence of Information Technology on the physical infrastructure such as power and cooling environment and how these technologies utilize advanced analytics, reporting, alerting and control to gain higher energy and compute efficiencies.

ABSTRACTS

DAY 2 • TRACK C Networks, Clouds, & Security

Session Chairs:

Dave Mesecher, Northrop Grumman Corporation &

Susan Frank, IEEE

Mining Attribute-Based Access Control Policies from Role-Based Policies

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Role-based access control (RBAC) is very widely used but has notable limitations, prompting a shift towards attribute-based access control (ABAC). However, the cost of developing an ABAC policy can be a significant obstacle to migration from RBAC to ABAC. This paper presents the first formal definition of the problem of mining ABAC policies from RBAC policies and attribute data, and the first algorithm specifically designed to mine an ABAC policy from an RBAC policy and attribute data.

The Challenge of Mobile Computing in the Enterprise

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Flexibility in working styles, venues, and global organizations has led to an extremely rapid change in how employees tackle their work, and their expectations as to how the enterprise will support them. Employees expect to use smart phone and tablets within the enterprise in the same way in which they use these devices in their personal lives – to message, search, talk, participate in social media, and to share data. This complexity of the consumerization of enterprise IT is amplified by the proliferation of mobile devices which many enterprises struggle to accommodate. Sharing data with colleagues is of most concern to the enterprise, since these devices are hard to secure and often are lost. How can a company allow employees to use these devices without compromising the security of the enterprise, incurring an increased number of security incidents, or causing the leakage of confidential and sensitive information? This talk will focus on describing how IBM, a company with ~400k employees, of which approximately 35% are now mobile-enabled with the full spectrum of devices, is solutioning the consumerization of enterprise IT challenge. The focus will be on both the processes and governance that IBM has developed, as well as the innovation and technologies developed in support of the IBM 21st century workforce.

WebID4VIVO: Implementing Universal Identity and Authentication for the Web

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WebID4VIVO: Implementing Universal Identity and Authentication for the Web
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Abstract A WebID is a way to uniquely denote a person (or other agent like software or groups) with

a URI in order to create a web-scale, distributed identity, and passwordless single-sign on authentication system. It is an open-standard being developed by the W3C WebID Community Group with initial focus on a WebID-TLS implementation. It provides a decentralized secure authentication protocol by crossing ITU Telecommunication Standardization Sector (ITU-T) X.509 public key authentication with World Wide Web Consortium (W3C) Resource Description Format (RDF) linked data. WebID is not dependent upon commercially created digital certificates thus reducing costs and complexity. Although WebID is currently a pre-standard, multiple implementations for WebID authentication and provisioning are available. VIVO, is a software tool to enable discovery of research and scholarly information about people and resources across various institutions. VIVO was originally developed and implemented at Cornell University. It was further developed jointly between Cornell University, University of Florida, and Indiana University and funded by a 12.2 million dollar National Institutes of Health (NIH) stimulus grant and is installed at over 100 institutions worldwide. VIVO is an open-source, web-based, RDF linked data-driven platform that provides a solid foundation in which to implement both WebID authentication and WebID provisioning capability. We propose that VIVO and WebID are obvious partners and, in this paper, we document and discuss the software implementation details of both WebID authentication and WebID provisioning capabilities for VIVO (WebID4VIVO) as a modular java servlet that integrates with the VIVO core software code. Further, we discuss future directions with WebID and VIVO including implementation of the W3C WebAccessControl Ontology for linked data-based distributed access control between VIVO installations, Web of Trust for improved identity verification, Open Annotations Ontology, and the W3C Linked Data Platform.

Security Considerations for USB 3.0 “PC on a Stick” for Hybrid Cloud and Distributed Computing Applications

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The rapid evolution of high density, cost effective flash memory, its associated controllers, and complementary technologies including USB 3.0 compliant Windows-to-Go and LINUX based “PC-on-a-Stick” architectures has presented the mobile force with a confluence of features making a portable platform-independent user environment and “personal cloud” a demonstrable reality. Moreover, the personal cloud, which today can consist of up to ½ Terabyte or more of high performance SSD quality flash memory in a USB “stick” form factor, can be linked to “big data” in the “big cloud” to create a hybrid cloud architecture. The high performance localized storage and execution environment can not only provide a schema for personal “in-memory” data analytics, but facilitate the collaboration of a widely distributed user base without the requirement for persistent connectivity or reachback to a central site. The convenience of a portable user environment has its own challenges, not the least of which are information security, particularly when gigabytes of highly confidential or sensitive data are stored in a mobile device. SPYRUS, Inc., will briefly describe some leading edge scenarios for information assurance in distributed computing applications, including hybrid cloud security, touching on the benefits and challenges of software, hardware, and hybrid encryption in the USB 3.0 based personal cloud, including the importance of authentication for synchronization between the personal cloud and the “back office” cloud. Additional leading edge concepts will include the use of the distributed environment for real time analytics tai-

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lored to particular operational scenarios, secure non-repudiable information sharing between members of today's in transient, highly mobile workforce. We will also briefly describe novel means of authentication including Identity Based Encryption, to illustrate the need for new dimensions in authentication between datastores and functionality between ad hoc communities of interest, where members can literally be "unmanned" or elements of the "Internet of Things".

DAY 2 • TRACK C Medical Devices & Implantable Sensors

Session Chairs:

Samuel Moskowitz, Hebrew University of Jerusalem & Milutin Stanacevic, Stony Brook University

Mobile-based Volume Rendering Pipeline for m-Health

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The role of mobile ubiquitous computing has grown significantly over the past few years. Current mobile devices such as smartphones or tablets have a number of unique characteristics that make them suitable platforms for medical applications. Their configuration, computing capability, display quality and resolution are comparable to desktop counterparts available few years ago. Yet their portability and always-on connectivity allows a medical doctor or health care provider to conduct the diagnostic process and follow up without being constrained to the workstation computer in the hospital facility.

We introduce a pipeline for medical visualization of Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) data that is uniform for a variety of applications, such as CT angiography, virtual colonoscopy, and brain imaging. In our work we concentrate on two main architectures for volumetric rendering of medical data: rendering of the data fully on the mobile device, when the data is already transmitted to the device, and a thin-client architecture, where the entire data resides on the remote server and the image is rendered on it and then streamed to the client mobile device.

The need for maintaining a system with dual rendering pipelines arises from the nature of the applications. While the mobile market offers a variety of devices that could potentially launch a rocket to the moon several decades ago, for medical volume rendering performance and wireless bandwidth can still be of concern. Here we have to consider the size of the medical imaging data that is produced by current CT and MRI scanners with respect to the complexity of the volumetric rendering algorithms. For example, the resolution of CT Angiography (CTA) data reaches 512^3 and spanning over the time domain while capturing the heart beating. At 16-bit precision from a 64-slice CT scanner, given 10 snapshots of the images, a single data set can easily reach 2.5 gigabytes in size and up to 6 gigabytes for a 320-slice CT scanner. This explosion in

data size makes data transfers to the mobile device unrealistic, and even if that were achieved, the rendering performance of the device would remain a bottleneck.

In our system we maintain the mobile device rendering for processing of smaller data sets under the conditions of low connectivity or complete absence of a network access. In the thin-client architecture model we utilize the display and interaction capabilities of a mobile device, while performing the interactive volume rendering on servers that are capable of handling large datasets. Upon the user's request the volume is rendered on the server and encoded into an H.264 video stream. We have chosen this format as it is widely supported on mobile devices and depending on the profile it can even be hardware accelerated, which allows for faster compression on the server and lowers the power requirements on the mobile device while still allowing for higher resolution video to be streamed. The choice of low-latency CPU- and GPU-based encoders is particularly important for our system to accommodate interactivity.

As mobile devices have been establishing new ways of interaction, we explore and develop 3D User Interfaces for interacting with the volume rendered visualization. These include touch-based interaction for improved exploration of the data. In this work we describe the scheme of our implementation and compare the results of two approaches to volumetric rendering on a mobile device. We also demonstrate an application of work to CTA visualization on a commodity tablet device.

A Feasibility Study on Noninvasive Blood Glucose Measurement Using Amplitude Modulated Ultrasound and Infrared Technique

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Diabetes is a metabolic anarchy characterized by surplus of glucose in the blood and tissues of the living human body. Healthy supervision of blood glucose is mandatory to avoid long-term diabetes related complications to vital organs of the body. This paper presents a new methodology for noninvasive blood glucose measurement using Amplitude Modulated Ultrasound and Infrared Technique. Amplitude modulated ultrasonic waves are used to excite the test site, as a result different constituent molecules vibrates at their specific response frequency depending upon their physical properties, these specific vibrations are detected using infrared light, the output response signal is in the form of modulated light signal, that carries information about the concentration of different constituent molecules. Infrared light detector is used to collect the amplitude modulated ultrasonic waves based light signal and distinctively processed to determine the information about blood glucose concentration level in different subjects.

ABSTRACTS

Wireless Power Transfer for Small Size Implantable Medical Devices

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Implantable microsystems have long been utilized in a variety of important biomedical applications. The impact of these devices on the health care has been significant and the emerging technological innovations could lead to further breakthroughs in combating wide range of disorders. After the great success of pacemakers and cochlear implants, the next generation of the implantable devices that interface the nervous system will have an extremely powerful impact on understanding neural pathways and neurological diseases. Implantable devices typically have stringent constraints on size and power consumption. Furthermore, these devices have to operate in a highly unpredictable environment where the human physiology has a considerable effect on the overall operation of the device. An implantable device should therefore be sufficiently robust to compensate for these variations. Thus, device size, robustness to noise, and energy efficiency remain as the three primary challenges for next generation implantable microsystems.

In the design of implantable devices, providing the wireless power to the device and data communication link are the critical parts of the system design. RF power harvesting and telemetry through inductive coupling are common techniques. While in the larger implants, like pacemakers, the inductive coupling is used to charge implantable rechargeable battery, in the case of the deep brain implant, the small form factor prohibits the use of the batteries and leads to a need for constant supply of wireless power. The power harvesting through inductive coupling is based on two inductor coils, with a primary coil external to the body and a secondary implanted coil. The constraints on the design of the secondary coil are more severe due to requirements on size and biocompatibility.

We have previously demonstrated an inductive coupling system with two spiral coils implemented using the winding wire at 10 MHz frequency. Other examples of the implantable coils include a microstrip patch antenna and a small dipole antenna. The size requirements in the range of new applications permit an implantable coil area on the order of mm², which leads to the on-chip coil implementation. Assuming air as the transmission medium, the optimal transmission frequency for these coil dimensions is on the order of GHz. However, due to increased parasitic capacitance in the on-chip implementation compared to the other implementations, the self-resonating frequencies leads to lower optimal transmission frequency. We will present a study of the wireless power link with the square coil for the implantable receiver of the fixed size, 3mmx3mm. We investigated the optimum link frequency and size and number of turns of the transceiver coil for the power transfer system under different situations with two different design goals for the system: the high power transfer efficiency, which is commonly used standard in transcutaneous power transmission study and the maximum voltage at receiver coil terminal, which is import for energy-starving devices like deep brain implants. We demonstrate the dependence of the optimum link frequency on the distance between the coils, as well as the medium between the coils.

Neurological Brain Technology for Learning

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This study examines the neurological dynamic cycles of the brain during spontaneous and comprehension levels of abstraction development, which consists of abstract mappings, abstract systems, and systems of abstract systems. Methods: We performed electroencephalography (EEG), event-related potential (ERP), and event-related synchronization/de-synchronization (ERS/ERD) experiments on 19 scalp locations of 24 subjects between the ages of 19 and 24 years. Coherence analysis is conducted as a measure of brain activity to prove Fisher's dynamic cycles of the brain development of abstractions in the long-to-short distance for the right hemisphere and the short-to-long distance for the left hemisphere. Event-related potential measure using the E-prime program is analyzed by P300, P600, and N400 components; in addition, theta ERS/ERD and alpha ERS/ERD analyses are performed to examine neurological brain dynamics during the learning of abstract development. Results: Neurological cycles of the brain development of abstractions are hypothesized to begin at the right hemisphere and then move to the left hemisphere in each abstract development. This study investigated the development of abstract systems (A3) that start at the right hemisphere and move to the left brain; however, it did not show the distance wise matching cyclic variation. The spurt learning hypothesis was tested for abstract systems with a spontaneous and comprehension version in each abstract system that proved the optimal age by coherence, ERP and ERS/ERD experiments. Conclusion: Rhythmic coherence, ERP, and ERS/ERD oscillations are investigated for brain development at all levels of abstractions for optimal age and neurological explanation in neurological learning in abstractions. The results of this study are consistent with an ordered hemispheric formation that occurs in cycles toward abstract systems.

The Programmable Wheelchair

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Many people, who are paraplegic, have undergone spinal cord injury, convalescing, or those who are elderly with lower limb atrophy, depend on manually-driven wheelchairs for their local means of transportation. These conveyances frequently cause joint pain and shoulder fatigue resulting from repetitive application of a torque under hand pressure exerted on the wheel rim. The physiological condition is exacerbated by movement over rough terrain since abnormal forces are transmitted through wheelchair structure, torso, hand, wrist, elbow, arm, and shoulder. Reactions during the relaxation phase of the work-stroke, in particular, may strain muscles and tendons beyond normal limits. The purpose of this paper is to utilize a wireless Java-based mobile device, in conjunction with an Internet server, as a street route planner which when traversed mitigates the effect of fatigue. We deal with functional requirements of the wireless device and a mathematical model of wheel dynamics.

ABSTRACTS

Medical Robotics

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Imagine robots performing surgery, not robot assisted surgery where a surgeon controls every movement of the robot as a tool, but rather having an automated system to perform the entire procedure. What follows describes the thought experiments of one Physician proceduralist (Interventional Radiologist) who is also a former Engineer and Computer Scientist.

Computers that can beat grand masters at chess have been well known for some time and there was much hoopla when the IBM computer Watson finally won the game show Jeopardy. Now Watson has turned its attention to Medicine as Artificial Intelligence Researchers have turned their attention to face recognition. As the pace of technological advancement continues proceduralists in the United States eager to protect their "turf" seem unconcerned: "A computer may be able to replace an Internist, Nurse, or Family Practitioner in performing cognitive tasks such as ordering and interpreting history, physical examination and laboratory data, but a robot would need skill to perform surgery". I emphatically disagree since one could easily envision designing a robot to hit a baseball (which requires skill) then by extension a robotic system trained to perform surgery seems feasible.

Consider the task of flying military drone airplanes. One may envision trained (and skillful) pilots in a remote location controlling the drone's takeoff, flight mission, and landing, but in actuality many of these tasks can (and are) automated. The drone operator (or pilot) is a skilled operator intently observing the automated process and able to take over from the computer in a difficult or unforeseen situation such as for example if a flock of geese knocks out the engines and an emergency landing on the Hudson River is required. This may be analogous to how surgeons of the future will practice. Clearly surgeons will continue to need to be trained in their art and craft so as to be the ultimate arbiters of a procedural success, complications and failures. Since advances in modern medicine are more often driven by the pharmaceutical industry and medical equipment manufacturers so too will advances in the field of Medical robotics.

The largest obstacles to the adoption of these disruptive technologies (especially in the arena of Medicine in the United States) are cultural. Old time surgeons will resist the first iteration of this technology as they will rightfully perceive their skills as superior. As younger surgeons with less experience find creative ways to incorporate the robots into their practice and as further iterations in the technology (perhaps developed by the military- in theatre - or in third world countries where the availability of a trained robot will be superior to what is currently offered) are developed the technology will begin its proliferation. From proof of concept, to proof of safety, to first adopters, to saving money for the government and improving the lives of its taxpaying and insurance paying citizens a new generation of surgeons will be born, ones steeped not in the traditions of cut and sew but rather with technical savvy in regards their electronic assistants.

Glucose Induced Voltage Amplitude Variation in Intralipid Samples of Healthy and Diabetic Subjects Using Amplitude Modulated Ultrasound with Infrared Technique

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In the treatment of diabetes, noninvasive blood glucose monitoring has long been envisioned to serve as an important tool. In this paper, the use of amplitude modulated ultrasound and infrared technique for noninvasive glucose detection is proposed and investigated. The experimentation was carried out to detect glucose induced voltage amplitude variation in Intralipid phantoms and human serum mixed Intralipid phantoms of healthy and diabetic subjects. Amplitude modulated ultrasonic waves are used to excite the samples, as a result different constituent molecules vibrate at their specific response frequency depending upon their weight, shape & size, these specific vibrations are detected using light, the output response signal is in the form of modulated light signal, that carries information about the concentration of different constituent molecules. This modulated light response signal is collected using photo-sensor, and suitably processed using signal processing algorithm to extract the information about glucose concentration level in different types of Intralipid phantoms. As a result it is concluded, in relation with glucose concentration can be principally utilized for measurement of blood glucose concentration and hence, for the design of non-invasive blood glucose meter.

Feature Selection and Classifier Performance in Computer-aided Diagnostics for Breast Ultrasound

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Wilfrido Gómez-Flores, Cinvestav-IPN; W. C. A. Pereira and A. F. C. Infantosi, COPPE/UFRJ, Federal University of Rio de Janeiro*

We propose a feature selection method for classifying breast ultrasound (BUS) images based on mutual information technique and statistical tests. Twenty-two morphological features were evaluated in terms of area under ROC curve (AUC). The results pointed out that the AUC values were 0.952 and 0.953 for the reduced (with seven features) and complete sets, respectively. Hence, dimensionality reduction was reached while maintaining the classification performance.

Bluetooth Low Energy Technologies for Applications in Health Care: Proximity and Physiological Signal Monitor

*Helmut Strey, Stony Brook University
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Paul Richman, Stony Brook School of Medicine*

Bluetooth Low Energy (BLE) is an exciting technology for health care applications. The big advantage over previous wireless technologies are its explicit low power design that allows deployment of such devices over many months or even years without the need to change batteries. This is especially critical in home health monitoring where compliance can often not be assumed. Here we describe the design of two Bluetooth Low Energy devices based on the BLE112 module from BlueGiga.

ABSTRACTS

An Intelligent System for Segmenting an Abdominal Image in Multicore Architecture

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Neeraj Sharma, Shiru Sharma, Indian Institute of Technology

Image Segmentation is the key process in medical imaging which produces different ROI (Region of Interests) as per needed by the medical practitioner, who uses it for further treatment planning. Fast processing of the medical image is a major requirement in today's scenario. In the case of abdominal CT Scans images due to the dimension and the presence of multiple regions like liver, kidney, spleen etc fast processing is very much required. This paper proposed a method to implement parallel processing rather than sequential processing to handle multiple regions like Spine, Kidney, Liver of Abdominal image in order to produce efficient and prompt result. All the activated cores of a particular processor are responsible to handle their individual region. The main approach of the proposed system is the allocation of spine as a land mark for coordinate reference in a particular core. This is more reliable to identify kidney region seed point identification while moving towards on the axis of centroid of spine. Kidneys region can be easily identify on different cores for faster execution. A new core is activated for liver segmentation for this we have used prior knowledge of the image. This proposed method is the efficient way to assign particular abdominal region to particular core in available Multicore Architecture processor to execute speedy and efficient result rather than the existing parallel implementation. Proposed method demonstrate that the parallel implementation of region wise segmentation of abdominal CT image results in a speed-up a propos 250% compared with sequential implementation on a core i3 processor, while a speed-up a propos 550% on Intel Xeon Processor.

DAY 2 • TRACK D Big Data Architecture & Analytics

Session Chair:

**Tom Caruso,
University of North Carolina & Ari Kaufman, CEWIT**

Self-Generated Health Information Big Data

*Thomas Caruso, University of North Carolina
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A Self-Generated Health Information (SGHI) Consortium Steering Committee is developing a plan for a pilot project that will create an open SGHI Exchange Market and an associated secure SGHI Big Data Cloud. The SGHI Exchange Market will be designed to share SGHI among individuals, healthcare providers and researchers. The information will be sourced from health and wellness devices such as activity trackers, remote monitoring weight scales, blood pressure cuffs, and mobile health applications. While being a market maker for SGHI, the Consortium will ensure the privacy and security of the information in this SGHI Exchange Market, and facilitate exchange of SGHI with healthcare providers and researchers. One of the major challenges of this effort is the provision of adequate privacy and security, as well as specific bene-

fits to individuals who might use this Exchange for sharing their information. This paper will address strategies to provide individuals with requests for access to that information (i.e. consent requests), record-level control of their information, monitoring of access to that information, and offers of specific benefits, like coupons and even cash rewards.

Integrating Mobile Technologies to Optimize Datacenter Controls, Creating the “Smarter Datacenter Manager”

Drew Wyskida, IBM

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Bob Calio, Michael J. Frissora, IBM Research

With the increasing demand for datacenter optimization, efficiency and limited service down-time, accompanied by the always present need to manage the growing cost of operation, today's datacenter managers are faced with new challenges each day. Not only does the datacenter manager need to address the customary IT challenges, they also need to understand what the affect of adding a new IT service will have on datacenter facilities. In order to be successful a datacenter manager needs to have insight to all IT and facilities related resources in realtime before adding an asset to the environment. Whether it is a request for necessary power, network or the availability of space, relevant information needs to be accurate and available on demand. This paper will discuss the design and proof of concept work of providing the appropriate information a datacenter manager needs on their mobile device as they traverse the datacenter. The proof of concept will take into account the need for secure access, location based decision points and the integration of information feeds from all aspects of the datacenter.

Structural Representations of Documents for Genre Detection

William Grosky, University of Michigan

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In this paper, we demonstrate the efficacy of various forms of structural representations for genre detection, one based on HTML tag spatial placement for web pages and the other for concept spatial placement in text documents. For this problem, we use a technique we have previously developed for point-based features in the environment of image content-based retrieval.

Natural Language Processing Adaptable Pipeline

Paul Fodor, Stony Brook University

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We will describe our adaptable natural language processing (NLP) UIMA pipeline with pluggable annotators. We developed annotators for classical NLP operations, like tokenizing, parsing, entity-name detection, spelling correction in XSB Prolog and connected them to the Unstructured Information Management Architecture (UIMA). Our current work includes an evaluation of the impact of multiple entity-name annotation databases on a question analysis system. Future works will include annotators for statistical NLP tasks and applications in detecting fake reviews on sites like Amazon, HotelReviews, TripAdvisor, sentiment analysis and detection of sarcasm in political polls and controversy for news Web sites. We also work on developing an open source system to respond to Jeopardy! clues like the IBM Watson project.

ABSTRACTS

Big Data Based Diagnostic Technology

*Minoru Yonezawa, Toshiba America Inc.
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Historically, diagnosis was made by doctors and experts using their unique knowledge and experience. Recent years have seen dramatic advancements in data mining as well as database and high performance computing. This has enabled the possibility to generate sophisticated diagnoses in real-time through machine learning, Big Data and other technologies. Toshiba seeks to apply such sophisticated diagnosis technology into all of our hardware systems and services. This presentation will review the three types of Big Data Diagnosis objectives adopted by Toshiba. The first objective is to realize efficient systems at reduced cost. Big data based diagnosis enables greater efficiency through a reduction of both false-negative and false-positive values. The second objective is an improvement in safety and reliability via diagnosis-based prediction, planning and control. Big Data enables a highly dependable decision-making support system, thereby improving safety and reliability. Finally, the third objective is an adaptive user experience, tailored to each consumer, based on the recognition of specific usage data. Big Data analytics are extracted from the individual systems and adapted for the comfort and functionality of each individual consumer. Within this framework, the presentation will introduce specific diagnosis technologies and applications from Toshiba.

Practical Application for Improving the Customer Experience

*Lou Boudreau, Verint Systems
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Big data has become an agenda topic for many weekly executive meetings. At the C-level, the discussion transitions from managing big data to making big data actionable. How do we use big data to improve operations and fulfillment, marketing, sales and support, etc.? Even more importantly, how do we make big data actionable to improve the customer experience, customer satisfaction and customer loyalty?

Much industry discussion on big data has been around technological concepts; scaling existing relational database technologies and leveraging cloud infrastructures; all valid points, and yet we can also view big data in a very simple way: customers are the personal embodiment of big data. Think about customers in a similar way to how scientists think about the efforts to map the human genome. Using big data to understand your customers through a scientific and analytical approach, these are, in some ways, cut from the same cloth. Science is getting closer to determining the specific combination of genes that determine eye color, for instance. This comes from a basic knowledge of heritage and how it connects to a detailed scientific understanding. While we're not as far down the path, big data has the potential to allow organizations to map specific customer behavior at a very detailed and accurate level; to improve the customer experience.

Developing Troubleshooting Systems Using Ontologies

*Reza Basseda, Stony Brook University
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Michael Kifer, John P. Kane, Steven Greenspan, Rong Zhao,
Paul I. Fodor, Stony Brook University*

Development of troubleshooting software is an attractive area of research for agent based system developers. In this project, we attempt to use ontologies extracted from different textual resources to automatically construct a troubleshooting virtual expert. In our solution, we verify the information about the structure of the system extracted from the textual document, then generate a conversation with the user in order to identify the problem and recommend appropriate remedies. To illustrate the approach, we have built knowledge base for a simple use case. A special parser generates conversations that can help the user solve software configuration problems.

DAY 2 • TRACK D

Software & Patents: A Good Mix?

**Moderated by Frank Chau,
F. Chau & Associates LLC**

A multi-panelist discussion on the controversial relationship between technology and law including a debate on patent eligibility for software as well as the impact of AIA, and the differences between patenting and copyrighting your software products.

Panelists

*Seth M. Cannon, Carter, DeLuca, Farrell & Schmidt, LLP
Joseph B. Gross, F. Chau & Associates LLC*

Panelists take opposing positions on two core issues: Do patents on software help or hurt the software industry and developers? Whether seeking patent protection for software products is worth their costs, and what are the considerations when making such decisions?

*Robert R. Rando, ESQ, The Rando Law Firm P.C.
The Impact of the New Patent Law (AIA)
on Software Inventions and Products*

*Elizabeth Collard Richter, Collard & Roe
The Differences between Protecting Software Products with Patents
and Copyrights*

Anthony R. Curro, Hoffmann & Baron, LLP

ABSTRACTS / PANELIST BIOS

KEYNOTE ABSTRACTS

Patient-Centric Technology Leadership

Jim Harding, Senior Vice President and Chief Technology Officer, Henry Schein, Inc.

While technology continues to accelerate the pace of change in our world, technology-driven advances in health care touch all of our lives. As the leading provider of health care products and services to office-based dental, medical and animal health practitioners, Henry Schein has a unique perspective on these advances, and is helping to drive adoption of new health care technology in the markets it serves. Like the health care practitioners that Henry Schein serves, the company is patient focused. It recognizes that technology solutions must deliver real patient benefits, enabling providers to operate more efficient and profitable practices and provide higher quality care to patients.

The Amplification of Informatics Challenges in the Era of Genomic Medicine

Edward H. Shortliffe, Professor of Biomedical Informatics & Senior Advisor, College of Health Solutions, Arizona State University

Although research in biomedical informatics has addressed issues in clinical medicine and public health for 50 years, with a resulting health information technology industry that today is burgeoning, many of the systems, methodologies, and processes are facing new challenges in the era of genomic medicine. These new issues must be addressed through the evolution of entrenched systems (e.g., electronic health records), decision-support capabilities (e.g., guidance in the use and interpretation of genetic testing), interoperability and unification of systems (e.g., data integration not only among populations of patients but between clinical and genomic datasets), data policies (e.g., mandates regarding patient data confidentiality), and data analytic methods (e.g., methods for managing much greater volumes and complexity of data relevant to clinical care and public health). This talk will review some of these issues in the context of the evolution of the field of biomedical informatics and its relationship to translational bioinformatics, “big data”, and the future of patient care and public health.

The Intelligent Enterprise

Paul D. Steinberg, Senior Vice President and Chief Technology Officer Motorola Solutions

The traditional shopping experience is changing. Retailers are looking to optimize their customers' experiences and improve store operations by keeping associates informed and connecting shoppers to the products and information they need. The Intelligent Enterprise can lead to a better customer experience through personalization and by maximizing the omni-channel experience. With smart infrastructure, today's manual processes will become automated events. Retail associates will be informed about their customers and the retail environment will respond to customers in real time. Inventory and asset location information in stores will be captured automatically via edge devices. Composite data analytics will be automatically delivered to associates to improve communication with customers. Managers will have access to instant employee information such as assigned tasks and capabilities. Workloads will be coordinated automatically, in real time. In this session, you will learn about emerging technologies that will connect the enterprise, communicate key information, lead to the right decisions and enable actions to ultimately enhance the customer experience.

Health & mHealth Technologies Panel

Moderated By:

Dr. Ronit Bendori
General Partner
rbendori@evergreen.co.il

Dr. Ronit joined Evergreen in mid 2000 as a General Partner, focuses on Evergreen's investments in the healthcare sector. Ronit is a former Vice President of Pharmos Ltd. (NASDAQ: PARS). Prior to that Ronit held senior positions as an expert in technology transfer at InterPharm Ltd. (Israel) and Ares-Serono (Switzerland). As one of its most experienced figures, Ronit is an active promoter of Israeli health care industry. She was an adviser to former Chief Scientists at the Israeli Ministry of Industry and Trade on biotechnology issues. On behalf of the chief scientist she headed the Monitor Survey of the Israeli Biotechnology. Currently, she is a member of the advisory board of the Israeli Scientific American and on the advisory board of the Center for Women's Health at Hadassah Hospital, Jerusalem. Ronit has taught Industrial Aspects of Biotechnology in various institutions, including the Weizmann Institute of Science. She has a PhD in molecular and cellular biology from the Weizmann Institute of Science. Ronit initiated and was responsible for Evergreen's investment in Colbar, which was sold to Johnson & Johnson for \$160M. Ronit was Colbar's Chairperson and worked with the company from its early days till the successful acquisition. Ronit represents Evergreen on the boards of following medical device companies: Transpharma, CorAssist, Activiews, Niti, Peer Medical, Notal and Nephra. In addition she is the chairperson of Orsan, Medical Technologies

PANELIST BIOS

Entrepreneurship & Venture Capital Panel

Organized By:

Lawrence Weber, PhD
Business Development Manager for NYSTAR Programs at Stony Brook University, Center for Advanced Technology in Diagnostic Tools and Sensor Systems, Center of Excellence in Wireless and Information Technology

Lawrence.Weber@stonybrook.edu

Moderated By:



Steve Cohen
*Senior Vice President and Deputy Commissioner
Empire State Development*

Steve Cohen is Senior Vice President and Deputy Commissioner at Empire State Development (ESD), where he heads the Department of Community Economic Development. Since joining ESD, Mr. Cohen has led efforts to create, implement and refine important programs and initiatives to support small business development, increase access to capital, and improve the economic climate in communities throughout New York State.

New programs and resources include the State's \$50MM Small Business Revolving Loan Fund and the Innovate NY Fund - the State's new \$45 million seed stage equity capital fund. Over the past year, department programs facilitated the creation of hundreds of new businesses, hundreds of millions of dollars in capital investments in small businesses and community development projects, and the creation and retention of thousands of jobs.

Panelists:



Andrew Hazen
*Co-Founder,
Launch Pad Long Island*

Andrew is a successful serial entrepreneur with 15+ years experience providing individually tailored internet marketing solutions including Domain Investing & Domain Name Development, Search Engine Optimization (SEO), Paid Search (PPC), Email Marketing and Social Media Marketing. In both 2007 & 2008, Prime Visibility, the company he founded, was listed on the INC List of Fastest Growing Companies in the US. Thereafter, Prime Visibility was sold in 2007 to private investors and again in 2011 to a public company.

@AndrewHazen is an angel investor, serial entrepreneur, attorney, author and admitted domain name & startup addict!

In 2012, Andrew founded Angel Dough Ventures, which is a startup accelerator: a place where new business ideas and opportunities are identified, internally developed, and new products & services are launched. Angel Dough Ventures presently has ten Portfolio companies.

Having a very strong passion for startups, Andrew founded LIStartups.com, which was founded to help entrepreneurs, startups and early-stage companies achieve their true potential! Our process is simple: educate and provide mentors who have successful experience founding, growing and selling their companies! Andrew is also a Board member at LISTnet.org and the Long Island Angel Network (www.LIAngels.net) and CollegeStartup.org.



Dr. Robert M. Brill
*Co-Founder & Managing Partner,
Newlight Management*

Dr. Robert M. Brill is co-founder and managing partner of Newlight Management. Newlight, headquartered in Jericho, L.I., manages venture capital funds that focus on early stage technology companies. Newlight also manages a hedge fund that invests primarily in public technology companies. Prior to co-founding Newlight, Dr. Brill was a general partner of Poly Ventures, a Long Island based venture capital fund. Newlight and Poly Ventures have collectively invested in over 60 private companies including Long Island based Fatwire, Invision and Globecom. He is on the Board of Directors of L.I. Angel Network. He has served on the Board of Directors of multiple public and private companies.

Prior to joining Poly Ventures, Dr. Brill was a successful turnaround CEO at both private and public companies. He served as General Manager of Harris Corporation's CMOS Semiconductor Division where he was responsible for launching the world's first two commercial 16-bit CMOS microprocessors. He also held various technical and management positions at IBM's semiconductor operation.

Dr. Brill holds a Ph.D in nuclear physics from Brown University and a B.A. and a B.S. in Engineering Physics from Lehigh University. He is a member of Phi Beta Kappa and Tau Beta Pi. He is a founding member of the Technical Advisory Board of the Semiconductor Research Corporation. He holds multiple patents and invention disclosures.

PANELIST BIOS



David L. Calone
*CEO,
Jove Equity Partners LLC*

David L. Calone is the CEO of Jove Equity Partners LLC, a venture capital firm that helps build technology companies in the internet, software, digital media, energy, real estate, transportation and health care industries. He serves as a director of eight privately-held companies located throughout the country and is a co-inventor on fifteen issued U.S. patents. He helped organize the recently formed bipartisan Congressional Caucus on Innovation and Entrepreneurship in the U.S. House of Representatives through which he has been a leading advocate for federal policies that promote the creation and development of start-ups and other small businesses. He is the co-founder of the newly launched Long Island Emerging Technologies Fund which creates and provides seed funding for early stage technology companies on Long Island. Since 2008, Mr. Calone has served as the Chairman of the Suffolk County Planning Commission where his efforts were recognized with a National Association of Counties' 2012 National Achievement Award. He is also on the board of directors of Accelerate Long Island, the Long Island Angel Network, United Way of Long Island and the Community Development Corporation of Long Island. Previously, Mr. Calone served as a federal prosecutor at the U.S. Department of Justice where he received the national "Attorney General's Award" for prosecuting terrorism and international crime, and as a Special Assistant Attorney General in the NY State Attorney General's Office where he prosecuted health care fraud and helped negotiate the largest Medicaid settlement in state history. He is an honors graduate of Harvard Law School and has an economics degree from Princeton University where he was named a USA Today College Academic All-American,



Lori S. Hoberman
*Partner,
Chadbourne & Parke LLP*

Lori S. Hoberman is a Partner in the NY office of Chadbourne & Parke LLP, where she chairs the Emerging Companies / Venture Capital practice. Her practice emphasizes venture capital, private equity, and general corporate counseling for emerging as well as later stage and publicly traded companies in a broad range of industries, including mobile, biotechnology and life sciences, social networking, consumer products, cleantech, Internet search and advertising, gaming and other media. She is a co-founder of Mojiva Inc., a mobile advertising network and platform. She is a frequently-quoted news source and panelist on the subject of entrepreneurship and venture capital and currently chairs the NYC Chapter of the MIT Enterprise Forum.

Software & Patents, a Good Mix?

A multi-panelist discussion on the controversial relationship between technology and law including a debate on patent eligibility for software as well as the impact of AIA, and the differences between patenting and copyrighting software products.

Organized & Moderated By:



Frank Chau
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Frank Chau is the founding member of F. Chau & Associates, LLC, an intellectual property law firm founded in 1998 and recognized by Intellectual Asset Management and Ocean Tomo in 2013 as the No. 1 New York law firm in securing the highest quality patents in consumer electronics for its clients. Mr. Chau is a graduate of NYU – Polytechnic University with a Master degree in Electrical Engineering and holds a Juris Doctorate from Seton Hall University.

Mr. Chau has for each of the past five years achieved AV Preeminent, the Highest Possible Martindale-Hubbell® Peer Review Rating. He advises Fortune Global 100 companies and large and small local business clients in complex patent litigations, licenses, opinions, and patent and trademark procurement. His practice concentrates in software-based technologies, electronics, semiconductors, and telecommunications. Mr. Chau is a member of the New York and New Jersey Bars, and is registered to practice before the U.S. Patent & Trademark Office. Mr. Chau has served as Special Advisor to CEWIT since 2010.

Panelists:

Seth M. Cannon
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Seth M. Cannon is a patent attorney having experience in all aspects of patent and trade secret litigation; foreign and domestic patent prosecution; due diligence, clearance, and patentability investigations; counseling; and licensing. Mr. Cannon has experience in a wide variety of technical areas including medical systems and devices, telecommunications, computer networking, analog and digital electronics, optics, digital signal processing, consumer electronics, software, business methods, and semiconductors. Mr. Cannon received his J.D. from Case Western Reserve University Law School and his M.S. and B.S. in Electrical Engineering from Brigham Young University. Prior to law school, Mr. Cannon developed hardware and software for a robotics lab at Brigham Young University and worked for a successful startup company as a computer programmer. He is admitted to practice law in New York and Massachusetts, and is registered to practice before the United States Patent and Trademark Office. Mr. Cannon is a member of the American Bar Association and the New York Intellectual Property Law Association.

PANELIST BIOS



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Joseph B. Gross is a member of F. Chau & Associates, LLC and a practicing patent attorney. He is admitted to the bars of New York State and Connecticut and is registered to practice before the United States Patent and Trademark Office. Mr. Gross is also admitted to the U.S. District Courts for the Southern and Eastern Districts of New York. Mr. Gross received a B.S. in Physics from the University of Rochester and a J.D. from Boston University School of Law, where he graduated cum laude. While in law school, Mr. Gross was a third-year editor of the Boston University Journal of Science and Technology Law. Prior to entering law school, Mr. Gross was a manufacturing and test engineer for Etac, an Applied Materials Company.



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Elizabeth Collard Richter is a partner at Collard & Roe, where she specializes in patent prosecution, licensing and litigation. She has extensive experience in prosecuting patents in all technical areas, including chemistry, mechanical and electrical engineering and business methods and designs. She represents clients of all types and sizes, ranging from large international corporations to individuals. Liz is a member of the New York Intellectual Property Law Association, the American Bar Association and the Nassau County Bar Association. She is a graduate of Cornell University and New York University School of Law, where she was a member of the Moot Court Board. Prior to joining Collard & Roe, Liz was an associate at a major New York City intellectual property law firm, where she specialized in litigation, interferences and patent prosecution. She is a past chair of the Intellectual Property Committee of the Nassau County Bar Association, and has had many articles published in the Nassau Lawyer, The Attorney of Nassau and the New York State Bar Journal.

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Mr. Curro is a patent attorney at Hoffmann & Baron, LLP and has a background in software development including emulation, file-sharing clients, and database solutions in Java, C++, and SQL programming languages. Previously, he worked as an Examiner in a Computer Networking Art Unit of the United States Patent and Trademark Office as well as an associate attorney with IP boutiques in New York City and Northern Virginia. Mr. Curro is a graduate of Tulane University School of Law, J.D., 2005 and was a member of the Tulane Law Review and Nanotechnology Law & Business Journal. He is admitted to the bars of New York, New Jersey, and the District of Columbia, and admitted to practice before the United States District Courts for the Southern District of New York, and the District of New Jersey. Mr. Curro is also registered to practice before the United States Patent and Trademark Office. He specializes in patent prosecution and litigation.



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Ms. Merlino is a patent attorney at Hoffmann & Baron, LLP with an extensive background in various technologies including e-commerce/Internet technologies, various business methods, fiber optics, signal processing, wireless technology, semiconductors, laser diodes, LEDs, medical devices, compression technologies including DVD, MPEG-2, MPEG-4 Visual, VC-1, and AVC. Previously, she worked as an associate in the Patent Law Group at Proskauer, LLP for over 10 years specializing in high compression technologies and managing several licensing programs. Ms. Merlino is a graduate of Fordham Law School, J.D. 1995, admitted to the bar of New York, US District Courts, Eastern and Southern Districts of New York and registered to practice before the United States Patent and Trademark Office. She has an undergraduate degree in B.S.E.E., Electrical Engineering and Computer Science, Cum Laude, from Polytechnic University, 1991. She has over 17 years of experience in various areas of intellectual property practice including licensing, prosecution, transactional and due diligence, patent counseling, opinion work, multi-party licensing programs, patent litigation, trademark prosecution and copyrights.

POSTERS

1. **Mohammad Ruhul Amin, Stony Brook University**
Collation Algorithm for Bengali Strings A Small Scale Bengali Text Retrieval Engine
2. **Kwangkue An, Ajou University**
Processing and Negotiation of Packet Traffic on Software Defined Network Controller
3. **Nicholas Andriano, Rockhurst University**
Wind Engineering
4. **Sumeet Bajaj, Stony Brook University**
CorrectDB: SQL Engine with Practical Query Authentication
5. **Mirza Basim Baig, Stony Brook University**
Cloud Tracker: Cloud-wise Policy Enforcement with Real-Time VM Introspection
6. **Reza Basseda, Stony Brook University**
Designing Troubleshooting Agents Based on Ontology and Description Logic Flexible Access Control Policies Using Defeasible Reasoning
7. **James Bouker, Stony Brook University**
BrainRank
8. **Erich Bremer, Stony Brook University**
RDF Logging: Getting Linked Data from Apache Web Server Logs
9. **Eralda Caushaj, SUNY Empire State College**
BYOD: Security and Privacy Issues in 4 Smartphone Platforms
10. **Ayon Chakraborty, Stony Brook University**
Radio Environment Mapping with Radio Devices in the TV White Space
11. **Qing Chang, Stony Brook University**
MRI Scanning Process Efficiency Improvement
12. **Hao Chen, Stony Brook University**
Neural Network Models in High Frequency Trading
13. **Ming Chen, Stony Brook University**
Network Data Storage: Performance and Security
14. **Chandrasekar Dharuman, SriSeshaa Technologies**
Leveraging Technology to Achieve Accountable Care
15. **Moussa Eshan, Stony Brook University**
LiPS: A Cost-Efficient Data and Task Co-Scheduler for MapReduce
16. **Seyed Kaveh Fayabakhsh, Stony Brook University**
Less Pain, Most of the Gain: Incrementally Deployable ICN
17. **Paul Fodor, Stony Brook University**
ETALIS Complex Event and Stream Processing System
18. **Jinmiao Fu, Stony Brook University**
Application of EIV in platform comparison and DEG detection
19. **Jie Gao, Stony Brook University**
Complex Contagion in Preferential Attachment Models
20. **Dawei Gong, Stony Brook University**
Channel Assignment in 802.11n WLANs
21. **Zhiyang Guo, Stony Brook University**
High-Speed Multicast Scheduling for All-Optical Packet Switch
22. **Krishna Gurijala, Stony Brook University**
Monte Carlo Based Real-Time Shape Analysis in Discrete Mesh Surfaces
23. **Iegveniiia Gutenko, Stony Brook University**
Volumetric Segmentation of Coronary Arteries from Computed Tomography Angiography
24. **Eyra Huang, Stony Brook University**
Integrated Analysis of Microrna and Messenger RNA Expression Profiles of Essential Thrombocytosis
25. **Kan Huang, Stony Brook University**
Bounded Stretch Geographic Homotopic Routing in Sensor Networks
26. **Jiayu Huang, Stony Brook University**
Constrained Functional Linear Model for Multi-Loci Genetic Mapping
27. **Jesmin Jahan Tithi, Stony Brook University**
Dynamic Programming Using Pipeline Parallelism
28. **Abhishek Kumar, Stony Brook University**
HIFS: History Independence for File Systems
29. **Bo Li, Stony Brook University**
4D Space Deformation for 3D Visual Enhancement
30. **Hao Li, Stony Brook University**
Stream Direction Aware VM Placement for Energy Saving in Data Centers
31. **Ji Li, Stony Brook University**
A Novel Energy Replenishment and Data Gathering Mechanism in Wireless Rechargeable Sensor Networks
32. **Ying Li, Stony Brook University**
Dynamic Cost-Aware Provisioning of Cloud Services
33. **Zhenhua Li, Stony Brook University**
A Deterministic Routing for Multicast in Fat-trees
34. **Guyui Liu, Stony Brook University**
Application-aware Virtual Machine Migration Scheme
35. **Adnan Mahmud, Arizona State University**
Design and Development of Microfabrication Processes for Fabrication of Thick Parylene C Based High Throughput Microarray Devices
36. **Sharon Martino, Stony Brook University**
Physical Activity Assessment of the Overweight/Obese Child
37. **Arjun Menon, Stony Brook University**
Improving the Specification and Implementation of EHR Policy Rules
38. **Koosha Mirhosseini**
Machine Learning Framework for Brain Parcellation

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39. **Napoleon Monroe, New Directions Technology Consulting, LLC**
Medication Management, the Opportunity
40. **Mohsen Mosleh, Stevens Institute of Technology**
Optimal Allocation of Excess Generation in Microgrid Networks
41. **Chien-Chun Ni, Stony Brook University**
Capacitated Wireless Base Station Allocation in Mobile Networks by Optimal Transportation Theory
42. **Ji Hwan Park, Stony Brook University**
Photo Visualization: Representation of Data in a Photo
43. **Kaloian Petkov, Stony Brook University**
Fusion of GIS and Procedural Modeling for Driving Simulation in New York Interactive Immersive Visualization of Computed Microtomography Data
44. **Teresa Piliouras, Center for Advanced Research on Educational Technologies**
K-12 Data Collection Systems: Will Your Child's Data End Up on Google?
45. **Zafar Qazi, Stony Brook University**
SIMPLE-fying Middlebox Policy Enforcement Using SDN
46. **Puripant Ruchikachorn, Stony Brook University**
Self-Illustrative Visualizations: Morphing Visualizations to Demonstrate New Visual Languages
47. **Bowen Song, Stony Brook University**
A Feasibility Study of High Order Volumetric Texture Features for Diagnosis of Colon Lesions via CT Colonography
48. **Grace Tang, SCN Lavalin**
Smart Grid Interoperability: Smart Real-time Power System Data Management and Control
49. **Jingfang Tang, Stony Brook University**
Analytics Using Tele-health to Reduce Re-admission
50. **Tatiana Tchoubar, Stony Brook University**
Multimedia Information Management, Processing and Utilization by a College Community
51. **Magda Tsintsadze, Iv.Javakishvili Tbilisi State University**
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