Center of Excellence
WIRELESS AND INFORMATION TECHNOLOGY
AT STONY BROOK UNIVERSITY

NEWSLETTER
DECEMBER 2015

CEWIT is an unparalleled resource, advancing the science and technology underlying the next epoch of the information revolution.

SAVE THE DATE:
CEWIT2016
NOVEMBER 2 & 3, 2016

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The 13th Annual Conference & Expo on Emerging Technologies for a Smarter World (CEWIT2016) is the premier international forum on the applications of emerging technologies in infrastructure, healthcare, and energy, three of the most critical components of a smarter global environment.

CEWIT2016 returns to the Melville Marriott Long Island on November 2 & 3, 2016.

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BY THE NUMBERS

- 475 Attendees
- 12 Countries
- 40% CEO-Director Level
- 3 Keynotes
- 83 Presenters
- 13 Sessions
- 45 Exhibitors
- 40+ Student Research Posters
- 175 Participating Organizations
- 50 Co. Delegation from Israel & Korea
- 150 B2B Meetings

DECEMBER COVERAGE: IoT Explained · Long Island Innovation Highlights · Research News & Business Development · 2016 Events

Closing out the year, Long Island showcases its strides in academic research, industry excellence, and IT potential. Innovation hot spots and hubs gain momentum, and economic development across the region illustrates the value and continued success of our many shared alliances, strategic partnerships, and university and industry networks alike.

Ambitiously 2016 brings the return of the CEWIT Conference, November 2 & 3, 2016, greater opportunities for entrepreneurs, a worthwhile roster of workshops and events, and a new wave of research achievements at Stony Brook University and beyond.

As our tech community strengthens and partnerships grow yearly with both new and longtime colleagues, the CEWIT team wishes each of you a very happy holiday season! May the days be well celebrated and the new year bring greater heights of success and prosperity.

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THE IOT EXPLAINED BY CONNECTED COFFEE
By Mitch Maiman, President and Cofounder, Intelligent Product Solutions

The hottest buzz phrase these days is Internet of Things (IoT). While the consensus among the tech crowd seems to be that this is an interesting and worthwhile development, what the phrase means is actually very ambiguous. Broadly speaking, IoT is shorthand for smart, networked devices utilizing applications to communicate all manner of information. Through a concept called Connected Coffee, the full end-to-end nature of IoT can be readily understood.

While not all IoT creations provide value to the users or to the companies providing such solutions, when the right value propositions are understood and realized, companies can incubate or grow. With high value solutions, consumers can greatly benefit from the connected nature of such products. Here is a clarifying example. I will leave it to the reader to decide whether or not this is a good product idea.

Problem Statement: Consumer
Almost everyone loves a fresh hot cup of coffee or tea. In the midst of your day, imagine a system where you can always be provisioned with a fresh, hot cup of Joe and you don't even need to leave your desk to get it; no running to the office kitchen to make a cup of coffee, no interruption of your heads down work. What you receive is just a cup of coffee arriving as if by magic, prepared with your preferences in mind to satisfy your thirst for caffeine (or decaf). Sound good?

Problem Statement: Provider
Your customers arrive in the city and come in every morning to quickly grab a cup of coffee on their way into the office. Sometimes, they may stop in for a 2nd cup at lunch time or when taking a break in the afternoon. You know your customer would like to drink coffee more often but how do you service that customer?

The Value Proposition for Consumer and Provider
The consumer would like to get coffee more frequently if it could happen in a less disruptive manner. The coffee provider would like to get you a cup of coffee more often – maybe even get you a donut or bagel once in a while. Here is the IoT solution:

Account Creation
Imagine a smart, connected coffee mug that is yours upon subscribing to a service provided by the local deli or cafe. As part of this monthly subscription, you get use of this mug and automatic delivery of a fresh hot cup of your favorite beverage based on your consumption. Via your smartphone, you create a Connected Coffee account (like you would an Uber account). You enter your profile which includes your name and credit card information. You enter your office location which then displays a map showing you the Connected Coffee providers within some radius of your office. You select one as your default provider. You then enter the specifications for how you like your coffee (what kind of coffee you prefer, cream or milk or black, sugar or sweetener). You might also select the tasty treat you might like to accompany your coffee on occasion (donut? bagel? roll? muffin?).

Connected Coffee providers can be any local deli or coffee shop or barista. Sign-up involves registering with Connected Coffee and agreeing to terms where Connected Coffee gets paid on commission.

The Uber Coffee Mug
It all starts here: the smart, connected coffee mug. This is the key to getting regularly replenished coffee anticipating your needs. It is a mug that includes sensors to determine the amount of coffee in the cup and possibly even the temperature. That's the smart part. When the coffee level gets low or cold, a message goes out to the

Connected Coffee cloud server indicating that it is time for a refill.

Fulfillment
The refill message triggers, locating a provider within a radius of the coffee drinker. The signal is routed to the providers in the area who have subscribed. If the coffee drinker has preference for a provider, they get the message but a map is always available on the client's smartphone indicating the location of other providers and their customer satisfaction ratings. The coffee drinker also gets to indicate whether or not they want their order extended beyond just the coffee. How about a bagel? The provider is given the location and pertinent profile information to fulfill the order. The provider is compensated either by the cup or via a monthly unlimited subscription service.

Feedback
The coffee drinker is notified that a cup is on the way. If they elect, they can cancel or delay the order via their smartphone app. At their leisure, the coffee drinkers can review and provide feedback on the coffee provider – just like the Uber car service.

The scenario for Connected Coffee is facetious (though someone might make a go of this). However, this example shows the breadth of what is required in an IoT solution:

- A value proposition to the customer. One where the benefits exceed the cost.

- A value proposition to the service provider. In this case, the value proposition is compensation for coffee service. In other cases, the value could be brand recognition or reinforcement or other benefits indirectly tied to revenue.

- A means for sensing the need for the service.

- A means to communicate the results of the sensing to a cloud based service.

- Cloud based aggregation of sensor data with other cloud based data along with analytics to drive actionable next steps.

- Communications from the cloud based system to the point of activity. In this case, it is feedback to the coffee drinker and a trigger out to the provider to prepare the coffee and make the delivery.

- Closed loop feedback whereby the coffee drinker provides a review of the coffee provider.

- Ability to add products to the system to enhance the coffee experience (for example a connected machine in the office capable of fulfilling various customer profiles).

In summary, a properly designed and implemented IoT solution starts with user needs and, in most cases, a business value proposition. Information needs to be acquired, processed and communicated to a remote server. That information needs to be further aggregated with other web or server based information, analyzed and processed into actionable downstream information. Lastly, the actionable information needs to be communicated out to the point of activity. In this case, it was a coffee provider. However, it could just as readily have been a machine controller in an M2M (machine to machine) application. Through this example, you can see that a robust IoT solution is about much more than creating a widget. It is a holistic system for satisfying needs or wants.

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Mitch is the President and Co-Founder of **Intelligent Product Solutions (IPS)**, a Long Island-based company that delivers a new model for software and hardware product development, integrating the full spectrum of design and engineering disciplines as a single source solution. Always espousing a hands-on approach to design, he holds a portfolio of United States and international patents and has more than 30 years of product design experience. IPS is a longterm CEWIT industry partner and avid supporter of Stony Brook University R&D. For more information visit intelligentproduct.solutions.

LONG ISLAND
INNOVATION HOT SPOT · BIOSCIENCE HUB
Entrepreneurship through Partnership

HOT SPOTS PROGRAM HOT STUFF FOR STARTUPS

Stony Brook University on Friday officially launched the region's Innovation Hot Spot program, a state initiative that offers tax breaks, mentoring, education and business development help for startup companies housed in, or affiliated with a half dozen of the Island's incubator programs.

Administered by Empire State Development and run locally by Stony Brook University, the program exempts participating companies from state corporation and sales taxes for five years and provides reduced-rate patent services, help with grant writing and investor pitches and assistance in leaping the many other hurdles facing startup entrepreneurs.

To qualify, a startup must be less than five years old and affiliated with a recognized incubator or accelerator program. On Long Island, the list includes the Entrepreneurial Technology Innovation Center at NYIT, the LaunchPad Long Island chain of co-working spaces, Broad Hollow Bioscience Park at Farmingdale State College, the Morrelly Center in Bethpage and LISTnet's COMETS mentoring program.

SBU's incubator programs in Stony Brook and Calverton are also included, as are virtual programs run by any of the designated Hot Spots. Touro Law School and the business and law programs at Hofstra University have agreed to support the Hot Spot program's education and mentorship goals.

Unlike Startup NY, participating companies don't have to be physically located in a designated facility as long as they participate in Hot Spot programs, and the benefits are portable should a startup decide to move, even to other parts of the state.

"These are the companies that we think hold the best hope for Long Island's economic future," said Ann-Marie Scheidt, Stony Brook's director of economic development and the force behind the local program. "The Hot Spot program is designed to support starting entrepreneurs who have the heart, the vision, the dreams and are willing to work their tails off to make that future a reality."

While the corporate tax break may not prove to be a big boost for startups with little or no revenue, the sales tax exemption could offer a significant financial boost for participants investing in equipment or using taxable services.

Aaron Foss, founder of telemarketer-busting technology firm Nomorobo, one of five startups already accepted into the Hot Spot program, said his firm's annual $600,000 phone bill includes tens of thousands of dollars in sales tax he'll now be able to use to further expand his business.

"That's a huge savings," he said. "You can imagine how valuable that is to a company like mine."

Peter Goldsmith, the LISTnet chairman and president, also noted that the program connects schools, business, government and the not-for-profit sector.

"We are working hard to create a tech ecosystem in which everyone is focused on the common good," he said. "The Hot Spot program will allow startups to get the right mentoring and support they need to grow and then remain on Long Island. This is a very important piece that also brings together the universities and industry. It's really another feather in Long Island's cap."

INNOVATE LI · DEC 2015

BIOSCIENCE HUB: ANNOUNCING NEW ENTREPRENEUR'S IN RESIDENCE, FUNDING AWARDS AND OPPORTUNITIES

The Long Island Bioscience Hub is a partnership between the Center for Biotechnology (CFB), a New York State Center for Advanced Technology, in collaboration with Stony Brook University, Cold Spring Harbor Laboratory, and Brookhaven National Laboratory, with additional support provided by the National Institutes of Health REACH initiative (Research Evaluation and Commercialization Hub), Research Foundation for SUNY, and Empire State Development, designed to foster the development and commercialize the technologies of therapeutics, preventatives, diagnostics, devices and research tools emerging from LIBH

partner institutions that address diseases within the NIH's mission.

Thirteen grants totaling $900,000 have been awarded by the Long Island Bioscience Hub in its first-ever funding round with plans to award $8.1 million total in grants.

The **first awardees** were selected from 38 applications from researchers at the three member institutions. Hub staffers vetted the proposals and made choices, which were then reviewed by an external screening committee – featuring executives from Pfizer, GE, Novartis and Canon, among other tech and biotech firms – and reviewed again by the NIH. The three funding initiatives include Feasibility, Proof of Concept and Commercialization awards. Of the thirteen grants awarded, eight were Feasibility awards and five were Proof of Concept Awards.

"We are excited to see such a robust and diverse portfolio of early stage technologies supported through the LIBH and NIH-REACH consortium," said Clinton T. Rubin, Ph.D., Distinguished Professor, Chair, Department of Biomedical Engineering, and Director, Center for Biotechnology. "We are hopeful that this investment by the federal and state government, as well as SBU, CSHL and BNL, will foster and accelerate the translation of these technologies from the bench to the bed side, and help attract further investment from the industrial and financial sectors."

The next Request for Proposals is open. Submissions are due January 7, 2016.

LIBH also recently selected its third Bioentrepreneur-In-Residence, entrepreneur Derek Brand, to join an impressive roster of seven B-EIRs that was expanded in November to include Drs. Brian McCarthy and Gian Luca Araldi. Dr. McCarthy has an extensive background as an investment analyst and as the President and CEO of the startup Influmedix while Dr. Araldi has had a distinguished career in drug discovery within the pharmaceutical industry and as the Founder and Principal of US Pharma Services.

Mr. Brand most recently served as Vice President of Business Development at Enumeral Biomedical Corp., which licensed a single cell immunology platform out of MIT and is now a publicly traded biotechnology company with a pipeline of novel immunotherapies in oncology.

LIBH B-EIRs are tasked with identifying technology or technologies from within the partner institutions that will create the foundation for licensing and company formation. B-EIRs will have the support of the LIBH business and technology development staff, along with external industry advisors to develop successful commercialization strategies, and position the company for SBIR/STTR grant opportunities, and Angel and VC investment.

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BUSINESS DEVELOPMENT AT CEWIT
CHARMTECH LABS SETS ITS SIGHTS ON THE MAINSTREAM

Interactive software designed to make digital content accessible to the vision- and learning-impaired may soon change the way everyone surfs the web.

It's the natural evolution of many high-tech products, noted Yevgen Borodin, a research assistant professor in Stony Brook University's Computer Science Department: A cutting-edge product establishes a niche audience first, then swims into the mainstream.

That's the plan at **Charmtech Labs LLC**, which Borodin cofounded in 2010 with SBU computer science professor I.V. Ramakrishnan. Based in the university's Center of Excellence in Wireless and Information Technology, Charmtech markets the Capti Narrator, software that makes digital content more easily consumable for those who might otherwise struggle with it – and may prove to be the next big thing for the online universe at large.

Capti Narrator, which became commercially available in 2013, has already established itself as an assistive technology – an umbrella term for assistive, adaptive and rehabilitative devices for people with disabilities – and in the English as a Second Language, or ESL, market. Many early adapters came from the education market, which according to Borodin is bulging with potential.

"The English language learning community and the assistive technology community account for at least 20 percent of students in the United States," he told Innovate LI. "That's at least 50 million students who are learning English or have some kind of difficulty reading, such as dyslexia."

Capti Narrator is a cross-platform technology enabling Apple and PC consumers to listen to news, documents, e-books and more in a selection of natural-sounding voices. Hands-free voice controls are meant to assist users who are visually impaired or can't otherwise understand the digital content. The "text-to-speech" technology has been honored repeatedly, including an MIT Technology Review Innovator Under 35 award this year for Borodin and a 2014 FCC Chairman's Award, honoring "advancements in accessibility," for Charmtech Labs. The startup has also been well-funded by government agencies. Borodin, who earned a Ph.D. (2009) and a master's degree (2005) in computer science at SBU, has personally collected nearly $4 million in federal research grants, including roughly $2.4 million earmarked specifically for Charmtech Labs.

Among the bigger scores: $150,000 in Charmtech seed grants from the U.S. Department of Education and the National Science Foundation; $200,000 through multiple grants from the National Eye Institute, part of the National Institutes of Health; and more than $1.3 million in innovation-research funds from the National Institute for Disability and Rehabilitation Research, including a recent $500,000 grant to support development of new assistive technologies for the vision-impaired.

"Think about speaking to your web browser," Borodin noted, "and having the web browser speak back."

That research harkens to Borodin's earliest work on data access for the sight-impaired. His first federal grants, awarded before Charmtech Labs existed, funded computational models exploring how blind people interpret and interact with websites; they also supported development of early software designed to help such users skim text more effectively.

"A sighted person looks at a webpage and quickly runs through the content, picking out what's important," Borodin said. "The brain isolates certain things – what's bold, what's capitalized – and gets a sense of what you're skimming through, like speed reading. "But blind people cannot selectively choose," he added. "They have to listen to everything." So Borodin worked on methods of "picking out what's important" – programs that not only summarized digital content, but gave the user enough flexibility to hear more content of interest.

While not all of Borodin's research has infused Charmtech Labs – he's also tinkered with unrelated "tactile gloves" that allow blind users to "feel the structure of a webpage" – much of it has. And with new features in the final stages of development, Capti Narrator's commanders are now eyeing bigger targets.

To make the flagship product more useful for educators in general, Borodin and his staff have worked with local teachers to learn how to best adapt Capti Narrator for instructional uses. One recent innovation involves a flash-card game for ESL students and teachers. Another advancement, slated to go live in January, will give teachers the ability to create and share playlists, "a valuable teaching resource," Borodin noted.

Charmtech Labs' R&D should be further bolstered by the startup's acceptance into Empire State Development's new Innovation Hot Spots program. Managed locally by SBU, the state initiative offers tax breaks, mentoring, continuing education and business-development assistance to startups affiliated with Island incubator programs like CEWIT.

The plan for 2016 is to bring an enhanced Capti Narrator to larger audiences, starting with "a Siri for web browsing specifically for the assistive technology market," Borodin noted.

From there, the company – which employs about 20 people, including 10 full-time researchers and programmers – will look to appeal to all web surfers. Text-to-speech programs are applicable to "anybody who's busy or moving a lot," Borodin said, "any professional, anyone who's driving or flying or exercising or commuting, any busy parent who needs to look after the kids but still wants to read, anyone for whom it just makes more sense to speak out loud to their assistant.

"Niche markets are usually the early adapters for new technologies," he added. "But we want everything we develop to be universally accessible. Some groups of people might benefit from it more, but we want everybody to be able to use it."

CEWIT, STONY BROOK UNIVERSITY RESEARCH NEWS
CEWIT FACULTY TEAM WITH STONY BROOK UNIVERSITY RESEARCHERS: STUDY REVEALS ENVIRONMENT, BEHAVIOR CONTRIBUTE TO SOME 80 PERCENT OF CANCERS

A team of researchers from Stony Brook University, led by Yusuf Hannun, MD, the Joel Strum Kenny Professor in Cancer Research and Director of the Stony Brook University Cancer Center, have found quantitative evidence proving that extrinsic risk factors, such as environmental exposures and behaviors weigh heavily on the development of a vast majority (approximately 70 to 90 percent) of cancers. The finding, reported in the December 16 online issue of Nature, in a paper titled "Substantial contribution of extrinsic risk factors to cancer development," may be important for strategizing cancer prevention, research and public health.

Inspired by a January 2015 research paper in **Science**, which concluded that the majority of the variation in cancer risk among tissues is due to "bad luck," the Stony Brook team used the same data to assess what leads to the risk of developing cancer. The interdisciplinary team of researchers from the Departments of Applied Mathematics and Statistics, Medicine, Pathology and Biochemistry, concluded the opposite – that most cancers are the result of external risk factors.

"Many scientists argued against the 'bad luck' or 'random mutation' theory of cancer but provided no alternative analysis to quantify the contribution of external risk factors," explained Song Wu, PhD, lead author of the paper, Assistant Professor in the Department of Applied Mathematics and Statistics and CEWIT faculty affiliate, Stony Brook University. "Our paper provides an alternative analysis by applying four distinct analytic approaches." (**Read More**)

STONY BROOK UNIVERSITY PROFESSOR LONG LU IS LEADING THE CHARGE AGAINST CYBER CRIMINALS: NSF GRANT FOR PROJECT MALDIVES

As Internet-based crimes become increasingly prevalent in today's society, Stony Brook University's Professor Long Lu is leading the charge against cyber criminals. His research project, known as MALDIVES, is aiming to obtain a better understanding of malware delivery mechanisms that are currently used to spread malicious and dangerous materials online.

Professor Lu's latest award was given as part of the National Science Foundation's (NSF) Secure and Trustworthy Cyberspace program, also known as the SaTC Program. Researchers at Stony Brook University collectively received the most awards this year from this program, with all of their awards combining to total over $1.4 million. Over his career as a researcher, Long Lu has also totaled just over $1.4 million in grants and awards after this latest addition of $400,000.

This new project has its sights on developing a new technology to provide deeper insights into how certain malware distribution systems are used, how they function, and how they interlink with open web sources. Through a sequence of five attack observation lablets known as ATOLLS, the project will acquire an in-depth understanding each step in current malware dissemination mechanisms.

Long Lu has been dedicated to stopping online security threats since he was an undergraduate at Shanghai Jiao Tong University in China, where he majored in information security. He went on to receive his PhD in Computer Science at the Georgia Institute of Technology, and did his thesis on Securing Systems and Software Against Attacks Targeting Unwary Users.

Here at Stony Brook, Lu is an Assistant Professor of Computer Science and conducts research focusing on continually thwarting these cyber threats. The MALDIVES project began on October 1st, and is expected to be completed in 2019. More information can be found on his website **www.longlu.org**.

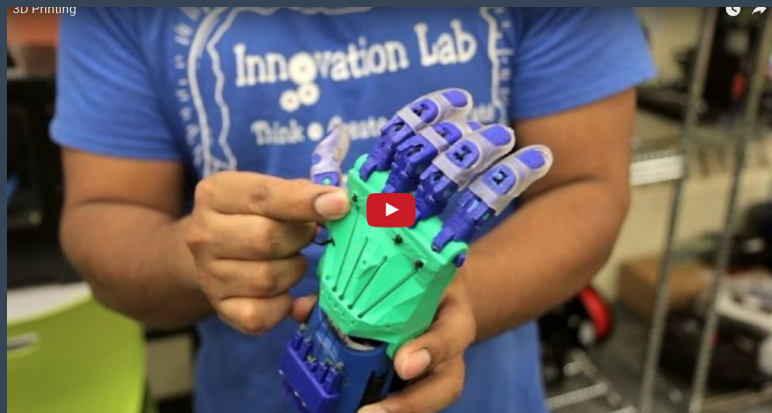STONY BROOK UNIVERSITY · NOV 2015

STUDENT FOCUS

CEWIT, CEAS PARTICIPATE IN IITP CAPSTONE PROGRAM

CEWIT and the **College of Engineering and Applied Sciences** mentor visiting international IITP students on an array of IT projects including two CEWIT applications, Multi-User Asynchronous Music App and IT Operations Management App. The Institute for Information & Communications Technology Promotion (IITP) is a South Korean government institution that manages ICT R&D under the Ministry of Science, ICT, and Future Planning.

Students share their final projects with faculty teams and CEAS Dean, Dr. Fotis Sotiropoulos, on December 4, 2015 at CEWIT.

INNOVATION LAB: CREATING MEDICAL DEVICES OF THE FUTURE

3D printing has made huge waves in the health and wellness space of late. In the past year alone, a cancer patient has received a 3D-printed rib cage, the FDA approved the first-ever 3D-printed epilepsy drug, and a baby still in the womb had its head 3D-printed to facilitate a smoother, safer delivery. All of these 3D printing stories have one thing in common: They were all created inside of a lab, where teams of researchers worked with 3D printers worth thousands of dollars. In addition to these advanced labs, there are other labs where students are working to revolutionize healthcare through affordable 3D-printed medical devices. Stony Brook University's **Innovation Lab**, is one of these labs.

FROM ALL OF US AT THE CENTER OF EXCELLENCE IN WIRELESS AND INFORMATION TECHNOLOGY

HAPPY HOLIDAYS

The CEWIT team wishes each of you a very happy holiday season! May the days be well celebrated and the new year bring greater heights of success and prosperity.

Learn more about our mission and working with us in the new year.

UPCOMING EVENTS:

January 19, 2016 · Tech Together Happy Hour

February 11, 2016 · Stony Brook University Computer Science/Information Tech Career Fair

February 12, 2016 · Stony Brook University Engineering Career Fair

April 21, 2016 · Long Island Business Expo

April 25-29, 2016 · Hannover Messe 2016

April 21 & 22, 2016 · Advanced Energy Conference (AEC2016)

November 2 & 3, 2016 · CEWIT2016

OUR COMMUNITY:

The Advanced Energy Center

The Center for Advanced Technology in Diagnostic Tools and Sensor Systems (Sensor CAT)

The Center for Biotechnology

The Center for Corporate Education and Training at Stony Brook University

The Center for Dynamic Data Analytics (CDDA)

The College of Business at Stony Brook University

The College of Engineering and Applied Sciences at Stony Brook University

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