Capitalizing on the IT Revolution

An Interview with Dr. Satya Sharma,
Executive Director, Center of Excellence in Wireless and Information Technology at Stony Brook University

EDITORS' NOTE *Dr. Satya Sharma came to Stony Brook University as the Executive Director of CEWIT and a faculty member in the Department of Mechanical Engineering in 2003. Before joining Stony Brook, Dr. Sharma was Senior Vice President at Symbol Technologies from 1995 to 2003, overseeing various divisions of the company including Worldwide Operations, Mobile Computing and Wireless Engineering, and Quality & Process Improvements. Prior to his tenure at Symbol, he was Director of AT&T Power Systems and an adjunct professor at Southern Methodist University. Dr. Sharma has managed technology, led product development, managed marketing and financial functions, led operations and taken a leadership role in organizational transformation. He led Lucent Technologies to win the Deming Prize in 1994, making it the first and still the only American manufacturing company to hold this honor. Dr. Sharma holds a PhD degree in mechanical engineering from University of Pennsylvania and an MBA degree from Ohio State University.*

Satya Sharma

INSTITUTION BRIEF *To best capitalize on the IT revolution, spur economic growth, advance scientific research and develop the technologies of tomorrow, the New York State Center of Excellence in Wireless and Information Technology (CEWIT) was created in 2003 as the anchoring building in SUNY Stony Brook University's Research and Development Park to conduct research and commercialize it. CEWIT (cewit.org) has more than 65 associated faculty members and more than 200 PhD/MS students engaged in research.*

Will you highlight the Center of Excellence in Wireless and Information Technology's (CEWIT) mission?

CEWIT's mission is to conduct first-class interdisciplinary research and development in wireless and information technology; foster new enterprise development; and address the skilled technology worker shortage. It is a next generation research and educational facility to lead, initiate, foster and manage the transfer of technologies from the research laboratory to the marketplace, and to facilitate interaction between companies and university faculty and students.

CEWIT's competencies include:

- Create high quality jobs within New York State – provide students with opportunities to develop hands-on skills and assist companies in developing core competencies and new businesses.
- Maximize the commercial potential of university research – facilitate collaborative research and development programs, generate external support for projects with commercial potential and create and grow startups built on promising technologies.
- Become an authoritative source of knowledge and expertise – a dependable resource for both companies and policy makers and a leader in developing and commercializing cutting edge technologies including, but not limited to, machine learning and artificial intelligence, imaging and visualization, cybersecurity, edge computing and internet of things, and healthcare and biomedical applications.

Will you provide an overview of CEWIT's research areas and provide examples of current projects?

CEWIT has research and development strengths in a wide range of areas that are best aligned with a number of target industry sectors, including healthcare and medical technologies, transportation and logistics, finance and e-commerce, homeland security and national defense, and energy and utilities, among others. To assure growth and job creation in all targeted industry segments, there are certain technologies that are essential for improving the productivity of the companies in these segments and creating growth and job opportunities for people in our region and our state.

Stony Brook University is internationally recognized for its work in the fields of computer vision and visual computing. CEWIT's affiliated faculty and student researchers in these areas are dedicated to research, education and industrial collaboration. CEWIT houses multiple world-class visualization facilities, including the Reality Deck, the largest immersive surround display in the world with 1.5 billion pixels in a 416 tiled-display which provides simultaneous context and details and visual analytics for big data and data science; the Silo, a cylindrical stereo tiled display which is super immersive for 0.6 billion pixels; and Immersive Cabin, a five-surface projector display forming a virtual-reality stereo. Our researchers are also engaged in cutting-edge research and development to deploy virtual reality (VR) and augmented reality (AR) capabilities for advanced mobile applications.

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Machine learning and artificial intelligence (AI) are powering advanced and smart systems such as self-driving cars, voice-activated assistants, real-time translation and personalized social media feeds. Intelligent machines are now becoming an everyday reality that will change all of our lives. Scientific advances on a daily basis coming from academic and industrial enterprises continue to lead to major breakthroughs. CEWIT has established itself as a leader in applied research and technology development in machine learning and AI. Our newly established SMART (Strategic Machine-Learning Acceleration and Ray Tracing) Cluster is a dual use GPU Cluster, for both machine learning and visualization, which is the fastest among New York State academic institutions. It utilizes over 180 NVIDIA RTX6000 GPUs with an aggregate peak performance of 3 Peta FLOPS and 24 tensor Peta FLOPS, which dramatically boosts productivity of deep learning and visualization applications more than ever before. It is the first hardware-accelerated ray-tracing cluster for real-time cinematic-quality of 1.5 billion pixels.

CEWIT's researchers are also developing technologies to support secure, fine-grained management and access control of enterprise scale Internet-of-Things (IoT) systems utilizing modern mobile and cryptography technology. Other areas of expertise include paradigm-shifting data-centric wireless communication that achieves low loss, low latency, one-to-many data exchange critical in edge-computing environments including vehicles, drones and IoT devices, and smart sensing technologies for robust, non-touch, low cost longitudinal monitoring and analysis of vital signs for personalized, precision medicine, especially quality and dignified aging of older adults. With CEWIT's R&D resources and world-class facilities, our project teams are actively collaborating with companies in many of the growth industries of the future such as renewable energy, autonomous vehicles, robotics, blockchain, digital twins and computational medicine.

How critical has it been for CEWIT to build strategic alliances and business partnerships among the academic, scientific, and business communities?

CEWIT's research, development and commercialization efforts are informed and guided by our Industrial Advisory Board which consists of members from leading organizations such as Asurion, Deloitte, Demand Solutions, Feinstein Institutes for Medical Research, Henry Schein, IBM, Northrop Grumman, Magine TV, NY Academy of Sciences, Ringlead, Softheon, and Zebra Technologies. The Advisory Board is chaired by Russell Artzt, who co-founded CA Technologies and served as Vice Chairman and head of R&D for many years.

CEWIT aims to create an ecosystem and culture that will continue to drive innovation through large and small advances derived from joint research programs, cooperative development of platform technologies, reciprocal out-licensing of companies' intellectual property, and through the promotion of leadership skills to foster collaborative relationships. We understand that not only do we need to help our partners with their immediate needs, but also to bring to their attention those emerging, prospective and potential technologies that can influence their long-term survival and growth.

In addition to working with leading enterprises in a wide variety of industries, CEWIT offers unique and much-needed technical assistance and strategic advice to small- and medium-sized companies in the region as well as many startups and incubator companies in our ecosystem. Through the consulting mode of our work, we apply our entire network, often cross-referring contacts among other enterprises. The integration of our Centers' Business Development and Entrepreneur in Residence (EIR) functions has enabled us further to optimize a company's or inventor's experience on the Stony Brook University campus. This experience includes aid in the creation of new businesses and helping entrepreneurs to sort out their operating business model and funding options, their time horizons and viability, and how they can gain leverage by application of SBU's intellectual and material assets. At times, on a temporary basis, we will augment a client's own business development where we can do so on a joint basis for them and for our Centers. Technology companies currently in our incubator program include Akai Kaeru, IPVideo, Intelibs, Mechanismic, Qunnect, Softheon, STS Global, Sunrise Technology, Zebra Technologies, and Zydoc.

How do you measure success of CEWIT's efforts and how critical are metrics to track impact?

CEWIT'S objectives are to assist companies in creating high quality jobs within New York State, assist companies in developing core competencies and new businesses, expand sponsored research and development programs, maximize the commercial potential of university research, provide students with opportunities to develop hands-on skills, and optimize operational efficiency. We measure the economic impact of our services through research and training opportunities for students, jobs created by industry partners, jobs retained by industry partners, and the number of joint projects and outreach activities.

The direct impact of the technical assistance CEWIT provides in developing core competencies and new businesses is measured by increased revenues, increased expenditures, and government funding reported by our partner companies annually. We measure the expansion of sponsored research and development programs through the number of partners attracted, the number of new technology disclosures, and the number of patent applications and issued patents.

In order to maximize the commercial potential of university research, CEWIT works closely with our affiliated faculty and student researchers in a broad range of academic departments at Stony Brook University and builds connections and facilitates collaborations with partner organizations within our ecosystem. We keep track of the number of new partners and licensing agreements, new startups and commercialization projects developed, and entrepreneurial events organized by or hosted at CEWIT (incubator showcase, commercialization conference, Lean LaunchPad, innovation boot camp, robotics camp, etc.). We provide our students with many opportunities to engage in interdisciplinary R&D projects and develop hands-on skills which can be reflected by the vast number of student researchers and interns hired, as well as the extremely popular Hack@CEWIT hackathons and other events and activities we have organized for students.

CEWIT strives to optimize our operational efficiency and, using our advanced tools and following best practices, we closely monitor the percent of on-time completion of projects, the percent of defects resolved and response to new feature requests in projects, timely response to internal and external service requests, and the percent of favorable feedback of events organized by or hosted at CEWIT. ●