

UNIVERSITY AT BUFFALO  
**ENGINEERING**  
**TODAY**

• Harvey G. Stenger Jr. • Vipin Chaudhary • Michael W. McKittrick • Kwang Wook Oh  
• Sheldon Park • Michalis Petropoulos • Puneet Singla • Marina Tsianou • Yong-Kyu Yoon

**New faculty**  
builds on UB's  
**strategic strengths**

## New life adds potential for greatness


**THE INITIATIVE IS UB 2020**, a visionary plan for taking the University at Buffalo—already a school with a formidable reputation in research—into the top echelon of the country's research institutions over the next fourteen years. I'm proud to say that UB Engineering—a school that deserves to be among the top engineering programs—is already well on its way toward that ultimate goal.

On the following pages, you'll meet new faculty members in our school who not only add breadth to our mission, but also add critical mass to the university's strategic strengths as identified in the UB 2020 plan. These include bioinformatics, extreme events, information and computing technology, and integrated nanostructure systems.

The new members enhance an already sterling faculty with a growing reputation for breakthrough research and discoveries. The new insights they bring add considerably to our school's national renown and heritage of quality.

Of course, I, too, am proud to be among the recent arrivals. As UB Engineering dean, I am excited about the new prospects and potential of the school's future. I hope to adapt my experience as dean of the private engineering college at Lehigh University into the best practices of this public institution. This includes building on the school's foundation of excellence.

And so, the welcome mat is out as you meet the new members of our faculty who will help our school continue to advance into the top ranks of programs in the country. The potential for greatness that they offer is significant.

  
**Harvey G. Stenger Jr.**  
Professor and Dean



## Fueling research and a school's initiative

**HARVEY G. STENGER JR.**

*Professor and Dean*

SCHOOL OF ENGINEERING AND APPLIED SCIENCES

**H**AILED FOR HIS PROGRESSIVE ATTITUDE toward research and education, combined with a track record of team-building and encouraging industry partnerships, Harvey G. Stenger Jr. became dean of UB's School of Engineering and Applied Sciences in August 2006.

Stenger's vision for UB Engineering focuses on raising its national rankings—already in the top 15 percent of the nation's 350 engineering schools—by fusing research with education and community outreach, so that professors, students, staff members, and alumni feel a sense of pride from their work at the school.

An expert on synthetic fuels processing, fuel cell systems, and emission control, Stenger's research areas include hydrogen production, selective catalytic reduction of nitrogen oxides, mercury reaction pathways, catalytic destruction of chlorinated hydrocarbons, and fuel cell modeling and optimization.

Stenger joined the Lehigh University faculty in 1984 and received several university-wide teaching awards. After becoming dean of engineering in 1993 at Lehigh, he helped reinvigorate freshman engineering courses and secure a \$27.5 million alumni gift for the school.

He has been principal or coinvestigator in excess of \$4.4 million in research grants and contracts from government agencies and industry. A prolific author, his work has been published in more than 65 engineering journals.

Stenger graduated with a BS in chemical engineering from Cornell University in 1979. He earned his doctorate in chemical engineering from the Massachusetts Institute of Technology in 1983.



## High-performance computer medicine

**VIPIN CHAUDHARY**

*Associate Professor*

COMPUTER SCIENCE AND ENGINEERING

**V**IPIN CHAUDHARY joins the Computer Science and Engineering faculty after spending several years at Wayne State University where he was the director of the Institute for Scientific Computing and associate professor of computer science, electrical and computer engineering, and biomedical engineering. He currently maintains an adjunct position at Wayne State University in the Department of Neurological Surgery.

In 2005, he founded Micass, LLC, which is focused on computer-assisted surgery systems. Earlier he was the senior director of advanced development at Cradle Technologies, Inc. where he was responsible for advanced programming tools and architecture for multi-processor chips.

His current research interests are in the area of grid and high performance computing and its applications in computational biology and medicine, embedded systems architecture and applications, computer-assisted diagnosis and surgery, and sensor networks and pervasive computing.

Chaudhary has been the principal or copincipal investigator on approximately \$10 million in research projects from government agencies and industry and has published more than one hundred papers. He was awarded the prestigious President of India Gold Medal in 1986 for attaining first rank among graduating students of the Indian Institute of Technology (IIT). Other honors include the National Science Foundation Research Initiation Award in 1993 and multiple teaching awards at Wayne State University.

Chaudhary received the BTech (Honors) degree in computer science and engineering from IIT in 1986. He earned his MS in computer science, and PhD in electrical and computer engineering from the University of Texas-Austin in 1989 and 1992, respectively.



## Designing catalysts that work with light

**MICHAEL W. MCKITTRICK**

*Assistant Professor*

CHEMICAL AND BIOLOGICAL ENGINEERING

**A**FTER GRADUATING from Virginia Commonwealth University in 2000 with bachelor's degrees in chemical engineering and chemistry, Michael W. McKittrick joined the chemical engineering department at the Georgia Institute of Technology as a graduate student.

At Georgia Tech, where he received his PhD in 2005, his major focus was on developing novel methodologies for supporting organometallic complexes on silica surfaces. In particular, his research led to a supported ethylene polymerization catalyst that was very well defined and significantly more reactive than previous materials. In addition, he developed a spatially isolated aminosilica surface that has subsequently been used in catalysis, adsorption, and separation applications.

Shortly after completing his doctorate, McKittrick joined the University of Colorado-Boulder as a postdoctoral research associate. His research focus was the development of novel methacrylate monomers for use in photopolymerizations, specifically for dental restorative applications. His other main research interest was the incorporation of porphyrin complexes into a polymer matrix through the use of thiolene photopolymerizations.

McKittrick's research at UB will focus on the development, synthesis, and characterization of novel photofunctional materials. Specifically, he will be looking at successfully immobilizing porphyrin complexes on a variety of supports, from rigid silica supports to more flexible polymeric materials. The end applications of these materials will be in wastewater treatment, biomaterials (anticancer, antiviral, antibacterial agents), and in small molecule transformations (e.g., pharmaceuticals).



## The big picture on nano- and microtechnology

**KWANG WOOK OH**

*Assistant Professor*

ELECTRICAL ENGINEERING

**K**WANG W. OH received his bachelor's degree with high honors in physics from Chonbuk National University, South Korea, in 1995. He earned his master's and doctoral degrees in the fields of optical and bio micro-electro-mechanical systems (MEMS) in electrical and computer engineering from the University of Cincinnati in 1997 and 2001, respectively.

Prior to joining UB Engineering, he worked as a senior research engineer in the bio lab at the Samsung Advanced Institute of Technology, South Korea, where he was responsible for microfluidics in developing lab-on-a-chip platforms for clinical diagnostic applications.

He has strong R&D skills for problem solving in many microfluidic systems such as micro-polymerase chain reaction, on-chip sample preparation, and magnetic particle-based electrochemical detection, with wide knowledge of bio-assay/device miniaturization, micro/nanostructure device design and fabrication, and bio-instrument integration and automation. In addition, he has consulting experience and excellent knowledge of statistics as a certified six-sigma black belt leader at Samsung.

At UB, he has already initiated a multidisciplinary course in BioMEMS and Nano-biosensors and a new research lab (SMALL–nanobio Sensors and MicroActuators Learning Laboratory). His main research activity in his SMALLab is small (nano and micro) technology, including sample-to-answer nano/microfluidic systems; nanobiosensors and microactuators; world-to-chip interfacing and packaging; and single cell manipulation, sorting, and detection. He will use small technology to answer various science and engineering questions from life sciences to defense, telecom to transportation.



## Engineering novel protein molecules

**SHELDON PARK**

*Assistant Professor*

CHEMICAL AND BIOLOGICAL ENGINEERING

**S**HELDON PARK graduated from the University of California-Berkeley in 1991 with bachelor's degrees in math and physics before pursuing his MS in high-energy nuclear physics at the Massachusetts Institute of Technology. He subsequently received his PhD in biophysics from Harvard University in 2000. At Harvard he worked on elucidating the molecular details of the interaction between protein molecules involved in T-cell activation using biochemical and spectroscopic techniques.

From 2002 to 2006, he worked at the University of Pennsylvania as a postdoc, splitting his time between two labs in chemistry and chemical engineering.

His principal research focus during this time was an application of computation and experiment to study structural and functional properties of protein molecules. In one study, he successfully combined molecular simulation, structural bioinformatics, and X-ray crystallography to investigate the relationship between protein and solvent molecules, demonstrating the highly specific structural roles played by a buried water molecule. He has also used simulation and a fluorescence-based activity assay in yeast to correlate protein dynamics with the strength of protein-DNA interaction.

Park's research at UB will include the engineering of novel protein molecules, biophysical characterization of protein-carbohydrate interaction, and the development of a high throughput assay to identify novel ligands against G-protein coupled receptors, which are the molecular targets of the majority of therapeutic drugs.



## Integrating, interfacing a wealth of Web scenarios

**MICHALIS PETROPOULOS**

*Assistant Professor*

COMPUTER SCIENCE AND ENGINEERING

**W**ITHIN A PRIMARY RESEARCH AREA where databases and Web technologies intersect, Michalis Petropoulos is particularly interested in enabling publishing and integration scenarios through the use of user-oriented and agent-oriented Web-based interfaces to databases. Such scenarios involve semi-structured and XML data, mediation systems, Web services, visual query interfaces, rewriting queries using limited interfaces algorithms and schema-level integration. He is also working on design methodologies for database-backed Web applications and their connection with workflow specifications.

Petropoulos has significant industrial experience gained during internships at IBM Almden Research Center, Microsoft Research, and Bell Labs. He also worked for two years at Enosys Software Inc., which developed a commercial XML-based data integration platform, currently part of the BEA AquaLogic platform.

Petropoulos earned his diploma in electronic and computer engineering from the Technical University of Crete in Chania, Greece. He received his PhD and MS in computer science at the University of California-San Diego.

In 2006, Petropoulos coauthored a paper titled "Interactive query formulation over Web service-accessed sources," which was awarded an honorable mention among the top three finalists in the Special Interest Group on Management of Data 2006 Best Paper Award competition. This work is part of his broader research on tools that facilitate the task of data integration on the Web.



## The configuration of space

**PUNEET SINGLA**

*Assistant Professor*

MECHANICAL AND AEROSPACE ENGINEERING

**P**UNEET SINGLA'S RESEARCH includes work in a variety of areas that include autonomous and intelligent systems, adaptive control, approximation theory, distributed and redundant actuation, and nonlinear dynamical systems. In his short professional career, he has demonstrated engineering ability ranging from basic theory to the design of the algorithms, and notably, to applications, design, and experiments that have flown successfully on space missions.

His studies have included attitude estimation, dynamics and control, celestial mechanics, adaptive control, distributed parameter systems modeling and control, and approximation theory, including a novel method for solving n-dimensional PDEs such as Fokker-Plank equations. Singla has made a number of contributions in these diverse areas and has been especially successful in crossing boundaries of some previously disjointed areas to develop unified approaches for broad classes of problems. In some cases, very significant new results emerged from this unified approach to approximation in engineering and applied science.

His work in attitude estimation included algorithms supporting a successful star-tracker technology experiment, the StarNav-I payload, that flew on the STS-107 mission. He is currently coauthoring an upcoming book, *Multi-Resolution Methods for Dynamical Systems and Control*.

Singla received his bachelor's degree in aerospace engineering from the Indian Institute of Technology, Kanpur, in 2000. He earned his MS and PhD in aerospace engineering from Texas A&M University-College Station in 2002 and 2006, respectively. Prior to his arrival at UB, he held a postdoctoral research associate position at the department of aerospace engineering of Texas A&M.





## Novel materials inspired by biology

**MARINA TSIANOU**

*Assistant Professor*

CHEMICAL AND BIOLOGICAL ENGINEERING

**M**ARINA TSIANOU'S INTERESTS are in the area of molecularly engineered materials, addressing products and processes relevant to chemical and biological engineering that ultimately improve the quality of life by contributing to advanced materials, improved health, or a cleaner environment. Basic elements for such products and processes are molecules and nanoparticles of synthetic or biological origin.

After serving as a technical specialist/project manager at Xerox Corporation, Tsianou joined UB as principal research scientist and research assistant professor, with research and teaching activities in the areas of polymers, colloids, and materials.

In her new position at UB, Tsianou will direct her efforts toward the study of intermolecular and interpolymer complexes for nanoscale patterning, the development and utilization of crystallization control by the local/confined environment, and the incorporation of biological motifs into self-assembly–biomimetic self-assembly. She also plans to continue and expand interactions and collaborations with colleagues in Europe and at the NIST Center for Neutron Research.

Tsianou received her PhD in 2000 from Lund University, Sweden, where she carried out research on polymer physical chemistry at the Center for Chemistry and Chemical Engineering. She earned an MS degree in chemical engineering in 1995 from Tufts University, and holds a diploma in chemical engineering from National Technical University, Greece.



## A nano world of skin and tissue engineering

**YONG-KYU YOON**

*Assistant Professor*

ELECTRICAL ENGINEERING

**Y**ONG-KYU "Y-K" YOON'S RESEARCH INTERESTS are in the multidisciplinary fields of MEMS/nanotechnology and RF/microwave engineering, with specialties in the development of three-dimensional (3-D) micro-electro-mechanical systems (MEMS) technology; design and implementation of low GHz RF components, millimeter-wave antennas, and waveguides; bio/microfluidic systems for the lab-on-a-chip; nanofabrication and its bio/chemical applications; microsensors and actuators; electronic and MEMS packaging; and ferroelectric material study and its RF/optical applications.

His recent research efforts in nanotechnology and nanofabrication include micro/nano scale thermal ablation of human skin for transdermal drug delivery, organic nanofiber research for microelectronics and tissue engineering applications, nano-nozzle/channel design and fabrication for a gas flow system, and RF MEMS research on millimeter wave antenna and waveguides.

Yoon received his MS in electrical engineering from the New Jersey Institute of Technology in 1999. He earned his BS and MS degrees in electrical engineering from Seoul National University, South Korea, and obtained his PhD in electrical and computer engineering from the Georgia Institute of Technology in 2004. From May 2004 to August 2006, he was a postdoctoral fellow in the Microelectronics Research Center of Georgia Tech. He also served as an integrated MEMS circuit/layout designer with New Jersey Microsystems.

He has authored or coauthored twelve journal papers and forty conference papers and presentations in MEMS, microwave, mechanical engineering, and chemical engineering societies.