

ENGINEERING

challenges

2006

See the future through the eyes of an engineer

Engineering Challenges is a showcase for innovative projects developed at the School of Engineering

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Freshmen Showcase LEGO Robot Creations

Over the years, millions of people have created their own personal masterpieces out of LEGO blocks, but few have had the opportunity to craft their own "LEGO" piece. That was precisely the task put before freshman engineering students this spring at Western New England College.

Freshman teams in the Introduction to Engineering course were challenged to build a robot out of LEGO blocks that could find a light source in a pair of obstacle courses. The team with the shortest combined time through each course would be declared the winner. Extra credit was given to any group who could create a new piece that could interface with the existing LEGO pieces and assist in the completion of the task.

The team of Eric Kettunen of Brookfield, CT; Nicole Lemieux of Pelham, NH; Jason Norton of Sunderland, MA; and Nadia Slivka of Westfield, MA, came up with a creative piece that improved the functionality of their robot.



L to R: Jason Norton '09 (ME), Nadia Slivka '09 (ME), Nicole Lemieux '09 (ME), and Eric Kettunen '09 (ME).

"We basically tried to figure out what kind of part would help us the most," said Eric.

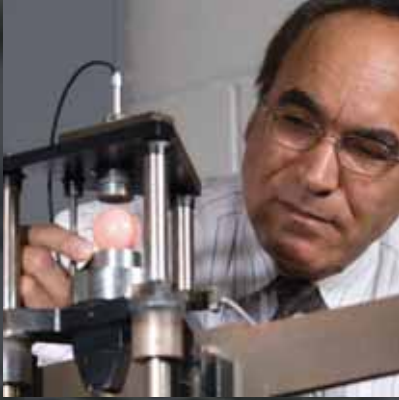
Knowing that their robot's sensor was experiencing difficulty locating the light source as it traversed the varied terrain of the obstacle courses, the team realized its creation would have to overcome this line-of-sight barrier.

"We created a piece to hold the sensor that hung from the robot's axle," explained Jason. "This allowed the robot to find the light source in the obstacle course as the elevation changed."

Using the School of Engineering's Rapid Prototyping machine, a technology that takes a three-dimensional computer model from design software and constructs a three-dimensional part by depositing multiple layers of ABS plastic, the team members were able to manufacture their new block that they had designed using SolidWorks CAD software. Their robot ran to a top-10 showing in the race to the finish line. Σ



Professor Develops Software to Add Length to Golf Shots




Dr. Mohammad Khosrowjerdi, a Western New England College faculty member since 1981, has worked in the Mechatronics consulting field on the local and national level for over two decades. In that time, he has completed projects for such organizations as GE, Remington, and the United States Navy. One of Dr. Khosrowjerdi's most instrumental creations applied to the sporting goods industry is the interactive Computer-Aided Dimple Design (SCADD) software for golf balls he developed for Spalding, a division of Russell Corporation.

"In the past, engineers had to draw dimple patterns by hand, which was extremely time-consuming and very inefficient," said Dr. Khosrowjerdi. "SCADD allows engineers to move a dimple, change its size, depth, or shape—all with the click of a button."

Spalding's engineers used Dr. Khosrowjerdi's software to optimally design spherical and nonspherical dimple patterns. SCADD can project the flight and trajectory of a ball based on the modifications made to the dimple alignments.

"The whole purpose of dimples is to create turbulence around the ball," explained Dr. Khosrowjerdi. "When you have a turbulent flow, the air resistance is very small."

Dr. Khosrowjerdi's software has saved Spalding engineers hundreds of hours in development time and thousands of dollars in design costs. 



Senior Design Projects 2006

Project Designs Chip to Reduce Elevator Wait Time

EE Major Brian Romanik '06—*Millville, NJ*

Waiting for the elevator is an annoying part of many people's daily lives that can waste valuable productivity. Fortunately, Brian Romanik's Senior

"Here you get one-to-one attention with your advisors," said Brian. "If you have a question, you can just go and talk to them. And the best thing is they know your name."

Brian is pursuing a career in electrical or computer engineering.

Design Project may have developed a system to help significantly reduce their wait time.

Working in conjunction with the Otis Elevator Company, Brian created a real-time clock chip to regulate the destination of elevators. The clock informs the elevators to return to the ground floor when not in service during peak hours of the workday (morning, lunchtime, and afternoon).

"The chip keeps real time, the current hour, minute, second, date, and can even account for leap years," explained Brian. "A building manager can preset the chip for the times and days he or she wants the elevator to report to the ground floor and the chip will send an alert to the elevator at those specified times."

Brian credits his success with this project with the individual attention each student receives from the faculty at Western New England College.



EE major Brian Romanik '06 with Senior Design Project Advisor Dr. Stephen C. Crist, professor of electrical engineering.

Fashion Technology Applied to Medicine

BME Major Jennifer Perez '06—*Maplewood, NJ*

The fashion and the medical industry are two fields that do not traditionally influence one another. But Jennifer Perez attempted to bridge the gap between these two vastly different industries with her Senior Design Project.

Perez evaluated potential uses of the VITUS Smart Body Scanner, a laser scanner used to acquire data for made-to-measure clothing production, for application in creating three-dimensional surface topographies for pre- and post-surgical analysis of patients with chest wall deformities and scoliosis.

"The VITUS Smart Body Scanner is currently only used in the fashion industry," said Jennifer. "There are no medical applications—except for this one."

Sponsored by the Shriners Hospitals for Children and supported with a \$4,700 grant from the American Society for Quality, Biomedical Division, Jennifer tested the accuracy, resolution, and repeatability of the VITUS Smart Body Scanner.

"It's going to be used for children who have chest wall deformities where either their sternum is rotated inward and their chest wall has a concave or a convex shape to it, when it's rotated outwards" explained Jennifer.

The success of her project earned Jennifer the third place award for undergraduate research at the 32nd annual Northeast Bioengineering Conference,

Student Takes on Difficult Project from FloDesign

ME Major William Dionne '06
—Yarmouth, ME

William Dionne took on a challenging task from FloDesign, Inc., for his Senior Design Project. FloDesign is a contract engineering and product development company specializing in Fluid Dynamic Products, Machine Design, and Data Management Systems. FloDesign has provided product development for such companies as General Dynamics, Textron Lycoming, and United Technologies Corporation, as well as research for NASA Langley and NASA Lewis.

William was tapped to design a fluidic oscillator that is capable of alternating flow between various ports without the assistance of moving parts.

"Currently we are attempting to get a leaf blower to alternate," explained William. "But there are various applications for this project—both militarily and commercially."

The research proved so promising that FloDesign is looking to begin a new venture based on it, according to Stanley Kowalski III, ME '92 and Professor Emeritus Walter Presz, the industry advisors William worked with for this Senior Design Project.

William also completed a Senior Design Project last semester. He worked with a team of students



ME major William Dionne '06 with Senior Design Project Advisor Dr. Bart Lipkens, associate professor of mechanical engineering.



to design a fishing pole for quadriplegics for the American Society of Mechanical Engineers (ASME) competition.

"I think Western New England College does a great job with hands-on work," said William. "The senior project is the student's turn to step up and show what they can do. Companies like to see you doing the work, taking the steps to lead, and accomplishing something."

CDI-Aerospace in Windsor Locks, CT, which serves the commercial/military aerospace and satellite industries, hired William immediately after graduation.

Engineering Symposium Focuses on Workplace Safety

Last March, the Western New England College School of Engineering hosted an Applied Engineering Symposium at Sleith Hall on the benefits of ergonomics in the workplace.

Repetitive stress injuries affect over five million workers every year costing American companies more than \$60 billion annually in workers' compensation. Jack Popp, vice president of engineering, and Joe Kessler, project engineer and ergonomics specialist, at Hasbro in nearby East Longmeadow, MA, spoke about the essentials of ergonomics for his company.

Popp and Kessler emphasized the importance in controlling costs associated with ergonomics and work-related injuries for American companies like Hasbro.

While many of the solutions come from employees themselves, Hasbro utilizes an ergonomics team comprised of workers and managers to combat this problem. Some of the initiatives Hasbro has instituted include distributing free shock absorbing insoles for employees' shoes, reducing the impact of working all day on acres of cement flooring; increasing the use of automated systems for sorting, wrapping, loading, and lifting; and reducing the amount of bending, stretching, and reaching done by employees.

Since 1997, the School of Engineering has offered an annual symposium which brings members of industry to campus to discuss engineering issues and learn about areas of research. This provides an opportunity to strengthen our bonds with companies throughout the region who may serve as Senior Design Project sponsors, potential internship sites, or future employers of our graduates. The companies benefit by learning about how the School can serve as a resource to them. Σ

April 1-2, 2006, at Lafayette College in Easton, PA, and the real-world benefits of her research could influence the lives of many.

"For young children, the radiation exposure from other types of scans is potentially harmful," said Jennifer. "This laser scanner is safe to the eye, scans in a little less than 11 seconds, and does not require patients to hold their breath."



BME major Jennifer Perez '06.



Improving Efficiency and Ergonomics of Furniture Assembly

IE Major Mike Schnepf '06—Feeding Hills, MA

IE Major Keith Maurer '06—Delmar, NY

Not every engineering project results in a physical object. Many times the most valuable innovations come from improving upon processes already in existence. That is exactly what seniors Mike Schnepf and Keith Maurer accomplished with their project for Columbia Manufacturing.

“We didn’t give them a new product per se, we just showed them a better way to do what they were already doing,” said Mike.

Founded in 1877 and originally known as a leading producer of bicycles, Columbia Manufacturing has been a top maker of school furniture for dozens of years.

Mike and Keith analyzed Columbia’s assembly line and determined areas where lost time could be eliminated from the process while improving the ergonomics of the operations involved in the construction of its school chairs.



IE majors Mike Schnepf '06 and Keith Maurer '06

“We shortened the assembly time by moving one part of the assembly process to an early point,” explained Mike.

Keith credits the intense work ethic required by engineering students at Western New England College for his success in this endeavor.

“I came to school here because of the small classes,” Keith said. “The workload was more than I anticipated, but I have definitely seen the fruits of my labors through our Senior Design Project.”

Sargent Lock in New Haven, CT, hired Mike upon graduation while Keith is investigating prospective educational and professional avenues. Σ

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