



**NM**  
STATE  
UNIVERSITY

# 2004-2005: A Year in Review

College of Engineering



## A Message from the Dean

This annual report coincides with the completion of my first year as dean of the College of Engineering at New Mexico State University. It has been rewarding, educational and challenging. My excitement and pride for the accomplishments of the college are as fresh today as they were when I began this adventure.

We are developing a strategic plan that expounds on the land-grant based ideals of access through recruitment, retention and outreach, excellence in teaching and research and service to our various constituents. This is already an excellent college as evidenced by the high demand for our graduating students and the production of leading-edge technology in our research laboratories. However, we have set our sights high, aspiring to the goal of joining the most elite programs in the country by 2015.

In our effort to anticipate industry needs and prepare our students for the future, we began laying the groundwork for an aerospace engineering degree program during 2004-2005. The program has been approved and was offered to students in the fall 2005 semester. It is our hope that our students will be prepared upon their graduation for employment in the aerospace industry that is so rich in southern New Mexico.

Our faculty members are the foundation for our successes. They continue to foster our students' education through their own leading-edge research and making themselves accessible to all students. Many

of them have distinguished themselves and have received awards for teaching and research.

Our supporters are also largely responsible for the achievements and successes of the college. Their support ensures that our programs attract the best and brightest students through scholarships and help us retain the finest faculty.

The following pages provide an overview of the successes that reflect the nature and makeup of our college. More importantly, the stories contained herein reflect the human element that makes the NMSU College of Engineering truly a unique and wonderful place to live, learn and thrive.

I hope you enjoy reading about some of the highlights of the year. I look forward to the challenges and opportunities that await the college and I assure you, I will do my best to build on an already great institution.

Sincerely,

A handwritten signature in black ink that reads "Steven P. Castillo".

Steven P. Castillo  
Dean, College of Engineering  
NMSU Regents Professor

# College Profile

## Degrees Offered

Aerospace Engineering  
 Chemical Engineering  
 Civil Engineering  
 Electrical and Computer Engineering  
 Engineering Physics  
 Engineering Technology (Civil, Electronics and Computer, Mechanical)  
 Industrial Engineering  
 Information and Communication Technology  
 Mechanical Engineering  
 Surveying Engineering

## Accreditation

The Civil, Chemical, Electrical and Computer, Industrial, Mechanical and Surveying Engineering programs are accredited by the Accreditation Board for Engineering and Technology (ABET). The Engineering Technology programs in Civil, Electronics and Computer and Mechanical Engineering are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). The Information and Communication Technology degree program is not designed to be an engineering technology program, and therefore, is not accredited by TAC/ABET. The Engineering Physics program is seeking ABET accreditation.

**Commission of the Accreditation  
 Board for Engineering and Technology**  
 III Market Place, Suite 1050  
 Baltimore, MD 21202-4012  
 Telephone 410-347-7700

## Research Centers

### BRIDGE RESEARCH PROGRAM

For more than 25 years New Mexico State University has researched techniques to solve technological problems with bridge systems. The Bridge Research Program is an important resource for bridge evaluation, bridge inspection training, and broad-based research and development.

### CARLSBAD ENVIRONMENTAL MONITORING AND RESEARCH CENTER

Established in 1991, CEMRC conducts environmental research, provides specialized analytical services and technology development, and disseminates information for federal, state and private sponsors.

### CENTER FOR SPACE TELEMETERING AND TELECOMMUNICATIONS

NMSU was designated as a Telemetering Center of Excellence by the International Foundation for Telemetering to conduct the study of telemetry systems, advanced communications, advanced modulation, coding, data transport and equalization techniques.

### MANUFACTURING TECHNOLOGY AND ENGINEERING CENTER

M-TEC supports economic development in New Mexico by providing quality education, engineering technical and other extension services to constituents both internal to NMSU as well as throughout the state.

### NEW MEXICO SPACE GRANT CONSORTIUM

Since its designation in 1989, NMSU has led the New Mexico Space Grant Consortium in its mission to encourage all New Mexicans to participate in the economic, educational and scientific benefits of space exploration.

### SOUTHWEST TECHNOLOGY DEVELOPMENT INSTITUTE

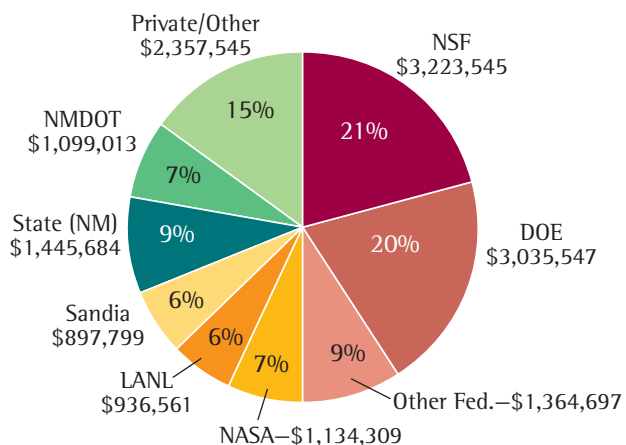
The Southwest Technology Development Institute was established in 1977 as an applied research and development center for renewable energy technologies. It is today recognized for its engineering research in energy and environmental systems.

### WERC: A CONSORTIUM FOR ENVIRONMENTAL EDUCATION AND TECHNOLOGY DEVELOPMENT

WERC's mission is to develop human resources and technologies to address environmental and human-health related issues through education, public outreach, and technology development and deployment.

## Research

Research Expenditures	\$15,545,396
New Awards or Renewals (240)	\$17,696,386
Proposals Submitted	196

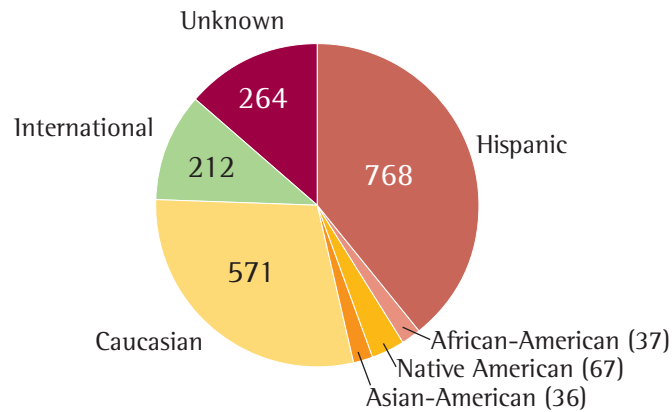


Total: \$15,545,396

## Enrollment

Total College Enrollment (fall 2004)	
Undergraduate Enrollment	1,579
Graduate Enrollment	376
Female	337
Male	1,618
Minorities	908
Graduates (fall 2004 and spring 2005)	
Bachelor's Degrees	248
Master's Degrees	77
Doctoral Degrees	8

## Fall 2004 Student Ethnic Breakdown



Total: 1,955

## Scholarships

Scholarships Awarded	
Current Use	86
Endowment	181

Total Scholarships Awarded	
Current Use	\$167,222
Endowment	\$207,413

## Development

Current Scholarship and Other Endowments	\$6.47 million
Chairs, Professorships and Lectureships	\$4.77 million
Total Gifts Made during Reporting Period	\$1.6 million

## Staff

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Tenured Faculty	59
Tenure-Track Faculty	18
National Science Foundation Career Awardees	7
Endowed Chairs and Professorships	12
Research Faculty and Staff	28

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Ranking for Federal Engineering R&D Expenditures  
by National Science Foundation in 2003: 13<sup>th</sup>

*Our imagination is the only limit to  
what we can hope to have in the future.*

*—Charles F. Kettering (1876-1958)*

## Current College of Engineering Leadership

**Steven P. Castillo**, Dean

**Krist Petersen**, Associate Dean of Academics

**Rudi Schoenmackers**, Associate Dean of Research and Director,  
Southwest Technology Development Institute

**Patricia A. Sullivan**, Assistant Dean of Development and External  
Relations

**Rola Idriss**, Co-Director, Bridge Research Program

**Martha Mitchell**, Chemical Engineering Department Head

**Ken White**, Civil Engineering Department Head and Co-Director,  
Bridge Research Program

**Stephen Horan**, Electrical and Computer Engineering  
Department Head and Director, Center for Space Telemetering  
and Telecommunications

**Sonya Cooper**, Engineering Technology Interim Department Head

**Edward Pines**, Industrial Engineering Department Head

**Thomas Burton**, Mechanical Engineering Department Head

**Steven M. Frank**, Surveying Engineering Department Head

**Jim Conca**, Director, Carlsbad Environmental Monitoring and  
Research Center

**Anthony M. Hyde**, Director, Manufacturing Technology and  
Engineering Center

**Patricia C. Hynes**, Director, New Mexico Space Grant Consortium

**Abbas Ghassemi**, Director, WERC: A Consortium for Environmental  
Education and Technology Development



The Interstate 10 Bridge over University Avenue in Las Cruces incorporates “smart bridge” technology that helps engineers assess its condition.



NMSU’s Rola Idriss is developing bridge technology that may become the standard for bridge construction in the future.

## Research Highlights

### Building Better Bridges

Motorists passing through Las Cruces, New Mexico on Interstate 10 are driving over University Avenue on a newly installed bridge. While this bridge may look like any other highway bridge, it isn’t.

It is among the first interstate highway bridges in the nation to be fitted with “smart bridge” technology – a technology that will allow engineers to continually monitor the safety of the bridge using fiber-optic sensors within its structure. The monitoring system will show the performance of the bridge under load, and any damage or deterioration that may occur over time.

“Traditionally, bridge inspections have relied primarily on a visual inspection of the exterior of the bridge,” says Rola Idriss, a professor of civil engineering who is leading NMSU’s “smart bridge” research. “This monitoring system can provide information on the effects of stress long before signs of fatigue begin to show visibly, allowing engineers to address potential problems before they become serious and costly.”

NMSU researchers used this technology to develop the world’s first “smart bridge” in 2000. This smaller bridge was installed over the Rio

Puerco west of Albuquerque, New Mexico. It was monitored for a year following construction, and the technology proved to be a success.

Depending on the research results of the I-10 Bridge over University Avenue, Idriss says that “smart bridge” technology might become standard in the construction of bridges in the future.

In June 2004, NMSU received a \$400,000 grant to install smart bridge technology on a new bridge to be constructed on Interstate 25 at the village of Doña Ana, New Mexico from the Federal Highway Administration. The new bridge is being built as part of a \$5.7 million project to reconstruct the I-25 interchange at Doña Ana slated to begin in August 2005.

In April 2005, NMSU received a Federal Highway Administration Highway Quality Award for the innovative design of the Interstate 10 Bridge over University Avenue.

“I am very happy with the way the research is going,” said Idriss. “We’re getting very important information about the bridge, its design and materials that is relayed to the (New Mexico) Department of Transportation.”

## NMSU Researcher Creates Innovative Method for Purifying Water

A New Mexico State University chemical engineering professor is developing a low-cost method for removing salt from water that will be tested at the Tularosa Basin National Desalination Research Facility near Alamogordo, New Mexico.

Because much of New Mexico's water contains salt, the need for an effective, low-cost desalination process is crucial.

Chemical Engineering Professor Shuguang Deng's research offers the promise of a low-cost process that will overcome several problems associated with current desalination methods. The project is funded by WERC: A Consortium for Environmental Education and Technology Development.

Currently, reverse osmosis is the method of choice for removing salt from water. Reverse osmosis uses pressure to force saltwater through a membrane. Salts are left behind, producing fresh drinking water. Though cost-effective, reverse osmosis is not powerful enough to treat water with a high salt concentration and can use a lot of energy.

Thermal distillation is another process of water purification. Water is boiled to create water vapor leaving impurities behind; the vapor is cooled to create pure water. This process of desalination is expensive due to the energy used to boil the water.

Deng's project combines reverse osmosis with a new technology called membrane distillation. Membrane distillation involves the transport of water vapor through a membrane, separating two liquid solutions. Because the membrane is hydrophobic, it rejects liquid water and does not let it pass through. The water is heated to create water vapor, which passes through the membrane, leaving the salts behind. The water reverts to liquid form on the other side as condensation occurs at a cooler temperature.

The project requires significantly less energy than thermal distillation. It utilizes the advantages of reverse osmosis and membrane distillation to produce high-quality freshwater, overcoming the lack of efficiency in reverse osmosis while reducing energy costs.

"This process is energy saving," Deng said. "We don't need to spend a lot of money and we don't need a large space."

Deng is developing a scale model; the project will be applied on a larger scale using water provided by the Tularosa Basin National Desalination Program. The Tularosa Basin National Desalination Research Facility promotes the study and development of desalination technologies to establish an effective process to produce an abundant supply of freshwater. The Tularosa Basin has a large deposit of saltwater, making the area a prime site to test the reverse osmosis-membrane distillation process.

With improved technologies, the abundance of saltwater in New Mexico could potentially be purified and used as a freshwater supply for residential, agricultural and industrial uses.



Shuguang Deng, assistant professor of chemical engineering at New Mexico State University, is developing a low-cost method for removing salt from water. His technology could help New Mexico convert its large deposit of salt water in the Tularosa Basin to fresh water.



*An investment in  
knowledge always  
pays the best interest.*

*—Benjamin Franklin*

M-TEC Design Engineers Ryan Herbon, left, and Wesley Eaton with the chile thinning prototype they designed and built.

## Thinner Will Help Farmers

In the spring, farmers typically plant more seedlings than they need to withstand unforeseen wind, salt, insect or disease damage. But as a result, plants are often too crowded by mid-season for available water, light and soil conditions. Farmers then have to hire thinning crews, usually at a high price.

In response to the high cost of hiring thinning crews, New Mexico State University's Manufacturing Technology and Engineering Center (M-TEC) developed a mechanical chile thinner that will save farmers time and money. The prototype was made in collaboration with the New Mexico Chile Task Force.

"Right now, the thinning process is done by farm hands in the field with a hoe," said Wesley Eaton, a design engineer with M-TEC. "The crews are becoming harder to find and the cost has increased up to \$100 an acre to have a crew come in and thin."

The thinner will provide uniform, flexible and timely treatments, and will cost an estimated \$35 per acre, Eaton said. It also will help farmers get more yield out of their fields.

The machine is user-friendly. A farmer can punch in the desired blade spacing, cutting depth and sensor height on the computer screen

of the prototype. The machine then makes the required adjustments.

The thinner was under a provisional patent for about a year and NMSU has submitted the necessary paperwork for a full patent. The patent will be shared by the university and the inventors – Eaton; Ryan Herbon, a design engineer with M-TEC; and Vincent Hernandez, a member of the Chile Task Force.

"We are going to take the existing machine and make a few upgrades to it," Eaton said. "We also are going to look at what other market possibilities the thinner may have."

NMSU's College of Business Administration and Economics is assisting M-TEC in finding a New Mexico manufacturing company to produce the machine.

The chile pepper, considered the state's signature crop, is found everywhere from roadside stands to large fast-food chains such as Pizza Hut and Papa John's. In 2001, more than 17,000 acres under cultivation produced 81,000 tons of chile, mostly in the four-month span between July and October.

Once picked and processed, the chile is the state's most valuable vegetable, raking in more than \$200 million annually.



## NMSU Students Developing Autonomous Helicopter

Ask anyone who has flown a helicopter, and they will tell you it is not an easy job.

A team of students at New Mexico State University has taken on an even more daunting task: developing a helicopter that can fly on its own.

The project is the brainchild of Ram Prasad, an associate professor in the Klipsch School of Electrical and Computer Engineering at NMSU who has a longstanding interest in helicopters.

Work on the helicopter began last semester as a capstone design project. White Sands Missile Range (WSMR) is funding the project and Lockheed Martin, which has a helicopter research facility at WSMR, is a collaborating partner. Prasad said Lockheed Martin plans to build a full-scale model of the NMSU prototype once it is completed.

The prototype is about three-feet long and one-foot tall. It can be commanded to take off, hover, go up and down, go around in circles, or follow any prescribed pattern of motion towards a destination, and return.

Eventually, the helicopter will be programmed so that it could do the kind of things a human operator would do during the course of navigation, such as avoiding collisions with objects coming at it, and moving safely within a maze of stationary and mobile objects.

“Remote-controlled vehicles have to be within sight for an operator to control them,” Prasad explained. “An autonomous helicopter could be out of sight and still accomplish its mission.”

Prasad said an autonomous helicopter would have many potential uses, including performing rescues in the ocean or going into an area where radiation has been released.

The autonomous helicopter is being built in NMSU’s RioRoboLab, a NASA-funded laboratory that is working on a variety of projects that combine robotics and artificial intelligence systems. Prasad said the technology that students are developing for the helicopter has a variety



Electrical engineering students Matt Pendergraft and Steven Roberts work on the autonomous helicopter in NMSU’s RioRoboLab under the direction of Professor Nadipuram Prasad (right).

of other applications, such as space exploration and medicine. It could be used, for example, to design artificial limbs that could learn how to mimic the gait pattern of the user.

In 2001, Prasad was selected out of nearly 2,000 faculty members nationwide to spend a year at the NASA/Jet Propulsion Laboratory as a NASA Faculty Fellow under the NASA Administrator’s Fellowship Program. “It was a life-changing experience” he said.

## Computer Model to Help Water Utilities Meet New Arsenic Regulations

Researchers at New Mexico State University are creating an engineering economics model that will be used nationwide to help communities select the most cost efficient and effective technologies to remove arsenic from their public water systems.

WERC: A Consortium for Environmental Education and Technology Development, headquartered at New Mexico State University, is part of the Arsenic Partnership Program that also includes Sandia National Laboratories and the Awwa Research Foundation (AwwaRF). Established by Congress in 2003, the partnership is charged with providing domestic and municipal water utilities, particularly those serving small and rural communities, with cost-effective solutions for complying with new regulations lowering the limits for arsenic from 50 parts-per-billion (ppb) to 10 ppb. It is estimated that more than 2,000 public water systems across the nation will have to implement new processes to comply with the new regulation by 2006.

“There are many communities that simply don’t have the resources to evaluate and acquire the appropriate technology that is needed,” said WERC Executive Director Abbas Ghassemi. “Our goal is to provide them with a tool that will help them make the most informed decision.”

Toward that end, Civil Engineering Professor Fernando Cadena is developing an economic analysis tool that will be accessible via the Internet. Administrators from public water utilities will be able to enter specific information about their community, such as population and the number of gallons of water supplied, and their water chemistry properties, such as pH level and arsenic content, into the model. The

model will provide them with a comparison of commercially available technologies and the relative cost of each in their particular community.

AwwaRF is conducting bench-scale testing of new arsenic removal technologies. Those that show promise are being pilot tested by Sandia National Laboratories. Pilot units have been deployed in several communities in New Mexico for field testing. The data derived from these tests will be added to the computerized economic analysis model. As new technologies emerge and are tested, information will be incorporated into the model. Once the model has been fully developed and tested, it will be made available worldwide at no cost to users.

Cadena likens the model to a consumer report, allowing people to compare items and look at the economics.

“It will allow these communities to make more savvy decisions about how to best meet their needs,” he said. “In the end, the public will benefit from this selection process.”



Graduate student Frank Juarado, III (right) and Civil Engineering Professor Fernando Cadena work on a new method to remove arsenic from drinking water. Cadena is also working on an Internet-accessible computer model to help communities select the most efficient technologies for arsenic removal.

## Researchers Trying to Improve Human-Performance Measurement

In the world of manufacturing, productivity, quality and safety are frequently affected by employee performance. The question for managers becomes how to empower human performance to enhance these factors.

One technique would be to collect “real-time” measurements of employee performance.

Two faculty members and students from New Mexico State University are embarking on a research project that could speed the introduction of such measurements into the workplace.

The project is being led by Julieta Valles-Rosales, an assistant professor in the Department of Industrial Engineering, and Jeanine Cook, an assistant professor in the Klipsch School of Electrical and Computer Engineering. The two received a grant from the National Science Foundation’s ADVANCE Program at NMSU to support the project.

The first step in the research project will be to study employees at a local factory who perform repetitive tasks. The researchers will identify performance metrics such as posture, steadiness, response speed, memory and range of motion.

Another part of the project will be to develop a sensor that can measure the metrics that the researchers identify. This sensor might be mounted on workers’ bodies or could be located in their work area. Cook will be responsible for identifying or developing this sensor.

The researchers then will use this sensor to collect data at the selected site for a period of time. After that, they will analyze their data and develop a decision-making model to be used in real time.

Cook said researchers are looking at applying scheduling techniques from the area of parallel computing to re-schedule workers from one task to another when their performance declines.

Valles-Rosales said she believes factory managers will support use of such models as long as they don’t lose money. She believes monitoring and measurement of human performance could be particularly valuable in “cellular” manufacturing environments, where 8-10 people produce a product from start to finish.



Drs. Jeanine Cook (left) and Julieta Valles-Rosales study a manufacturing facility model that is used in their study of human-performance measurement.

“It is well known that the performance of people working in a manufacturing facility can degrade during a regular working day,” Valles-Rosales said.

Traditionally, Valles-Rosales said, managers have made staffing decisions based on “off-line” observed data such as absenteeism, turnover and accident rates. She said real-time decision making will enable employers to place workers according to their skills and to take immediate actions to maintain human performance. She said employees could benefit from such a system because employers typically offer higher pay to employees performing more stressful activities.

Valles-Rosales said she hopes data gathered from this study will enable the researchers to compete for funding to conduct further studies on human-performance measurement.



Reduced Gravity Student Flight Opportunities, sponsored by the New Mexico Space Grant Consortium, allow students to propose, design, fabricate and evaluate a reduced-gravity experiment to be conducted aboard NASA's KC-135 "weightless wonder" airplane at NASA's Johnson Space Center in Houston, Texas.

## New Mexico Space Grant Receives Extension, Excellent Rating by NASA

In August 2004, the New Mexico Space Grant Consortium (NMSGC), led by New Mexico State University, was granted a five-year program extension following an excellent rating during its 15<sup>th</sup>-year evaluation by NASA.

NMSGC, directed by Patricia C. Hynes, was among 12 space grant programs in the country to receive an excellent rating, out of 52 programs nationally. The consortium was evaluated on program performance and results, network participation and responsiveness and an affiliate survey.

NMSGC is a member of the congressionally funded National Space

Grant College and Fellowship Program, administered by NASA since 1989, which provides opportunities for faculty and students in space-related research, education and public service programs.

NMSGC awards \$100,000 in scholarships statewide each year to New Mexico's students who are studying science, engineering, education and technology. Scholarships allow students to participate in NASA-related research with NMSU faculty.

## CEMRC Contracts Renewed

The Carlsbad Environmental Monitoring and Research Center (CEMRC) is contracted by the U.S. Department of Energy to provide environmental analyses for the Waste Isolation Pilot Plant (WIPP), a deep geologic repository for radioactive waste located 2,100 feet below the surface in Carlsbad, New Mexico. The contract was renewed for \$1,200,000 per year with an option for renewal each year for the next 10 years. In addition, Los Alamos National Laboratory renewed its WIPP contract with CEMRC for \$840,000 with an option for renewal each year for the next five years. Washington TRU Solutions (the WIPP Management and Operations contractor) and Sandia National Laboratories also renewed contracts with CEMRC for support of the WIPP program totaling \$700,000 to be renewed yearly as needed.

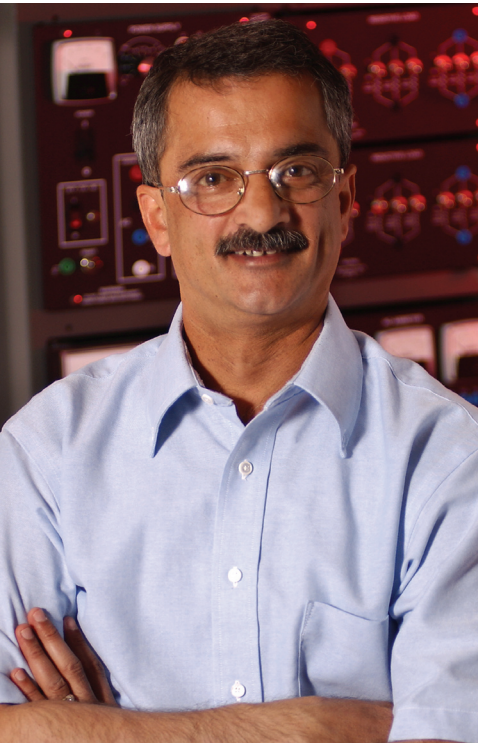
CEMRC monitors people, air, water and soil for transuranic radionuclides, such as plutonium, uranium and americium, and volatile organic compounds (VOCs) in the underground air supply. WIPP has been designed and constructed for the long-term disposal of transuranic (TRU) waste and TRU mixed waste generated by the U.S. Department of Energy defense programs. Some of the waste to be placed at WIPP contains VOCs and monitoring is necessary to measure the concentrations of VOCs in the working environment for worker safety as well as for performance assessment as part of the licensing of the repository.

In addition to ongoing monitoring activities, CEMRC will perform two studies to characterize and develop a chemical "fingerprint" for the repository. The studies will differentiate between TRU radionuclides in ordinary atmospheric fallout that has occurred since WWII from the TRU radionuclides contained in the waste disposed at WIPP.

CEMRC is a division of the NMSU College of Engineering and is directed by James Conca.

## Solar Research Improving the Power Grid

Professor Satish Ranade, program director of New Mexico State University's Electrical Utility Management Program, and his graduate



Satish Ranade is conducting research that may lead to safer, more reliable and lower-cost energy.

students are teaming with professionals from the Southwest Technology Development Institute (SWTDI) to improve the safety of photovoltaic (solar) systems in the Public Service Company of New Mexico grid. With more than three decades of partnerships with utility companies, the program has a role in New Mexico's commitment to increased use of alternate power technologies.

One safety issue associated with photovoltaic systems feeding a utility grid is known as islanding, which occurs when the photovoltaic systems continues to run through a main grid that has lost power. This creates a potential danger for repair crews.

Highly sensitive monitoring instrumentation, selected by SWTDI engineers, has been installed on distribution transformers at six residential and six industrial sites to record line voltage, frequency, and changes in line response, load and effective weather conditions.

The resulting data will aid in developing models to determine the probability of islanding in practical application and to simulate the performance of anti-islanding devices effectively shutting down the photovoltaic system. This information will be valuable to manufacturers and users of various types of distributed generation systems and may lead to safer, more reliable and potentially lower-cost energy for the entire nation.

## Evaluating Stress on Healing Bones

Surgical implants are a tremendous help to the body's ability to repair broken bones, particularly by supporting mobility during the healing process. Researchers have determined that broken bones and related muscles heal stronger and faster when the patient can remain active rather than immobilized as believed best in the past. Unfortunately, problems can begin to develop after only a year. Healing conditions are influenced by the thickness and flexibility of the implant used.

Ed Conley, professor of mechanical engineering, and a team of his students have created actual simulations based on artificial femurs with the variety of breaks experienced by human bones, and subjected them to the stresses involved in walking as part of an ongoing effort to improve bone implants. The copies are molded with ceramic and glass materials.

Previous research concentrated on the direct upward and downward forces on the femur while the current research incorporates more realistic, multidirectional ambulatory forces.

Conley and his students, supported by Texas Tech Medical Center, work in close collaboration with the medical community and implant manufacturers.



Mechanical Engineering Professor Ed Conley has developed a method to simulate stresses imposed on healing bones.



A corn field maze designed by surveying engineering students each year helps to fund scholarships.

## Surveying Engineering Students Create a Las Cruces Tradition

Each year since 1999, a 10-acre maze cut into a corn field in Las Cruces, New Mexico becomes the project of survey engineering students. The students use satellite surveying technology to lay out designs that are cut into the field, creating a maze through which people can walk. The maze is open from mid-September through the end of October each year and is a popular visit for children, especially around Halloween.

The corn is planted late in the season, usually in July. Students and volunteers use Real Time Kinematic Global Positioning System satellite surveying technology to lay out the design. The best time to lay out the design is when the corn is between ankle and knee high. On occasion, delays in laying out the design have meant working in hot, humid, shoulder-high corn.

The first year, the maze was cut by hand. The maze only covered about three acres of land and students were only involved with designing and surveying the maze. The following year, the size of the maze was expanded to almost 10 acres.

The first year celebrated the 150<sup>th</sup> anniversary of Las Cruces with the Sesquicentennial maze. In subsequent years, the maze took the form of a curly cow, the map of the United States, a cornucopia, a scarecrow, and a cowboy scene.

Some of the profits are used to fund the Mesilla Valley Maze Scholarship, a \$500 scholarship given to a New Mexico State University Surveying Engineering student each fall. Other profits are being used to build up the scholarship fund so that eventually it can become endowed as a permanent scholarship at NMSU.

## ICT Program Attracts a Diverse Audience

Students from throughout New Mexico and even as far afield as Idaho and Texas are joining their peers on campus at New Mexico State University each week to participate in ICT 377, Computer Networking, via the Internet. They are pursuing degrees in Information Communication Technology (ICT), a course of study that during its one year of existence has become one of the fastest growing engineering disciplines on campus.

The students enrolled in the ICT program, part of the Engineering Technology Department, come from backgrounds as diverse as their locations. Many are students who are currently employed and are pursuing their studies through distance education, accommodating a diverse student population: a lead automation technician for a gas plant, an English instructor, computer system support personnel at national laboratories and at White Sands Missile Range, recent graduates from the Doña Ana Branch Community College, and traditional students on NMSU's main or satellite campuses.

The ICT program was launched during the 2004 fall semester, and although students have yet to graduate from the program it has grown in enrollment and also in the quality of students, said Interim Engineering Technology Department Head Sonya Cooper.

The ICT curriculum prepares students to design, implement and manage a variety of computer-based information systems. Graduates with these skills are highly employable and sought after.

"We believe that the ICT program has gained popularity so quickly because it fills a much needed niche for workers who have been hired by high tech employers and need a bachelor's degree to advance," said Lynn Kelly, associate professor and program coordinator. "I think

they've been waiting for a program like this where they can get their degrees through distance education. It's the only program like it in the state."

ICT is a completion program, in that students fulfilling certain prerequisites from other departments can take junior- and senior-level ICT courses to earn the bachelor's degree. This program is well suited to students with associate degrees in computer and technology related programs, as well as freshmen and sophomore students who can prepare for the ICT program with a variety of course combinations, including computer technology, business information systems, computer graphics, computer assisted design, and engineering technology. This flexible course of study is reflected in its student projects, from building web sites to tracking computer crime and terrorists through computer forensics.

## Student Accomplishments

### Mechanical Engineering Student Receives General Motors Award

Felicia Guerrero, a mechanical engineering student at New Mexico State University, is one of eight students nationwide selected by General Motors to participate in a program designed to foster social responsibility in the workplace.

The GM Sullivan Fellowship Program is named for the late Rev. Leon Sullivan, who was the first black man to serve on the GM board of directors. In 1977, Sullivan developed the Sullivan Principles as a code of conduct for companies operating in South Africa. In 1997, these principles were expanded as a means to improve human rights, social justice and economic fairness in countries throughout the world. Today, the Global Sullivan Principles of Social Responsibility are embraced by hundreds of companies around the world.

Guerrero observed how General Motors has applied the Sullivan Principles to its workplace during a summer internship at GM's research facility in Warren, Mich. Upon returning from her internship, Guerrero began work with Ed Pines, head of the department of industrial engineering, and Bobbie Green, an assistant professor of accounting and business computer systems, to develop a course at NMSU about the Sullivan Principles. The course, titled "Ethics, Leadership and Technology," is expected to be ready for the spring 2006 semester. It will be offered jointly by the College of Engineering and the College of

Business Administration and Economics.

NMSU has received a \$5,000 grant from GM to develop the new course and Guerrero has received a \$5,000 scholarship for her work on the project.

Guerrero, a junior at NMSU in spring 2005 when she received the award, hopes to pursue a career in automotive or aerospace engineering.

## Engineering Student Wins Research Award from NASA

New Mexico State University student Joe Fronczek of Las Cruces has been chosen to receive the NASA Institute for Advanced Concepts (NIAC) Student Fellows Prize, an award given to only five students in the nation who possess an extraordinary potential for developing advanced concepts in aeronautics, space and the sciences.

Fronczek, a junior majoring in chemical engineering, received the award in May 2005 to fund his research project titled "Bio-Inspired Sensor Swarms to Detect Leaks in Pressurized Systems." He wrote the proposal with his adviser Nadipuram Prasad, an associate professor in the Klipsch School of Electrical and Computer Engineering at NMSU.

The research was conducted in the Rio Grande Institute for Soft Computing (Riosoft) RioRoboLab, a NASA-funded laboratory that is working on a variety of projects that combine robotics and artificial intelligence systems. Prasad is director and founder of the laboratory.

"I have always loved astronomy and space, and I consider myself very lucky to be able to conduct groundbreaking research in such an exciting field here at NMSU," Fronczek said. "This award will be an important stepping stone for me in realizing my career goals and dreams."

Fronczek is a Crimson Scholar and on the dean's list. He is a member of the Omega Chi Epsilon Chemical Engineering Honor Society and the Tau Beta Pi Engineering Honor Society. He has recently completed his first co-op tour at the NASA Johnson Space Center in Houston, Texas and is currently on his second tour at White Sands Testing Facility.



New Mexico State University student Joe Fronczek is a recipient of the NIAC Student Fellows Prize.

## New Mexico State University Student Named Goldwater Scholar



Marzyeh Ghassemi was one of 320 students nationwide awarded the Goldwater Scholarship for the 2005-2006 school year.

New Mexico State University student Marzyeh Ghassemi has been awarded the prestigious Goldwater Scholarship, a \$7,500 award that recognizes students for their academic merit in the areas of engineering, mathematics and science.

The scholarship, named for U.S. Sen. Barry M. Goldwater, is designed to encourage outstanding students to pursue careers in the fields of mathematics, the natural sciences and engineering. In 2005, 320 students were chosen for the award out of 1,091 nominees.

"This scholarship will open up terrific opportunities for Marzyeh," said Jason Ackleson, associate director of the NMSU Honors College and director of the Office of National Scholarships. "The Goldwater is one of the most competitive undergraduate awards in the nation."

Ghassemi is a 19-year-old senior pursuing degrees in electrical engineering, computer science and mathematics and will graduate in fall 2005. She plans to attend graduate school and medical school and is

looking into the University of Houston or Rice University.

Ghassemi is involved in the Institute of Electrical and Electronics Engineers and the Association for Computing Machinery.

Ghassemi initially began pursuing a degree in electrical engineering. While taking a programming class as part of her major, she enjoyed it so much that she declared computer science as a second major. She

then found out she would only need a few more classes to have a mathematics degree, so she added it as well.

"I would really like to become a biomedical engineer because it involves problem-solving and applying concepts to human problems," said Ghassemi. "This scholarship will help me achieve my goal of doing research that will help people and have a social benefit."

## College Support

### Klipsch Gift Increases Scholarships for First-year Engineering Students

A \$300,000 gift from Valerie Klipsch made in November 2004 has enabled the New Mexico State University College of Engineering to offer additional scholarships to first-year students.

Klipsch is the wife of the late Paul W. Klipsch, a 1926 graduate of NMSU who founded a successful business manufacturing Klipschhorn audio speakers.

Since her husband's death in 2002, Mrs. Klipsch has continued his tradition of giving back to the NMSU College of Engineering. One-third of her most recent gift was added to an endowment she established last year honoring former Engineering Dean Jay Jordan and his wife, Lya. This endowment funds scholarships for first-year students studying electrical and computer engineering.

Another \$100,000 of her gift was added to an endowment she established the previous year honoring Engineering Assistant Dean Joe Creed and his wife, Priscilla. The endowment honoring the Creeds provides scholarships for first-year students studying chemical engineering, which was Joe Creed's major when he was a student at NMSU.

The additional funds allow the college to offer six more scholarships a semester.

The final \$100,000 of the gift established an endowment in honor of Steve Castillo, dean of the College of Engineering. This endowment will fund scholarships for students interested in studying electrical and computer engineering. The first scholarship will be offered in the fall of 2005.



## Grants Provide Scholarships for NMSU AMP Students



The Bridge to Doctorate program provided support to 13 graduate students in 2004 through the Alliance for Minority Participation program.

In August 2004, the New Mexico Alliance for Minority Participation (AMP) received a \$395,992 grant to provide scholarships for New Mexico State University students interested in studying computer science, engineering and engineering physics.

The grant provided for Computer Science, Engineering and Mathematics Scholarships (CSEMS) to be awarded to a total of 30 transfer students and incoming freshmen. The students were also provided with opportunities to participate in tutoring, academic and professional workshops, faculty mentoring and research projects. Additional students may receive scholarships in fall 2005.

CSEMS is a cooperative effort between a network of community colleges across New Mexico and NMSU's College of Engineering and Engineering Physics and Computer Science Departments.

Additionally, in July 2004, funding was received from the National Science Foundation (NSF) for the NMSU Bridge to the Doctorate (BD) Program. The BD program is designed for AMP students who have completed the B.S. degree in a science, engineering or mathematics discipline, and have identified the Ph.D. as their educational goal.

The 2004 funding supported a cohort of 13 graduate students in engineering, chemistry, physics, mathematics, geology, and computer science. The first Bridge to the Doctorate cohort of 11 engineering students was funded in July 2003. The third cohort, funded in July 2005, will support 12 engineering and science graduate students. The NMSU Bridge to the Doctorate program is one of 16 nationwide and recruits students from all NSF Alliance for Minority Participation programs. Each cohort provides two years of student support, and collectively, the three cohorts represent nearly \$5.5 million in funding.

## General Motors Gift Benefits Two Colleges

New Mexico State University received the second portion of a \$225,000 gift from General Motors, the world's largest vehicle manufacturer, in May 2005.

The \$75,000 portion went to the College of Engineering, the College of Business Administration and Economics, Placement and Career Services and the Special Projects Fund.

The College of Engineering received \$51,625 to support the following: Society of Hispanic Professional Engineers, Capstone Design Project, Mini Baja projects, New Mexico BEST (Boosting Engineering, Science and Technology) program, RASEM (Regional Alliance for Science Engineering and Mathematics-Squared) summer program, Las Cruces Pre-freshman Engineering Program, Society of Women Engineers Student Chapter, college student ambassadors, scholarships and recruitment and retention.

*The beginning of knowledge  
is the discovery of something  
we do not understand.*

—Frank Herbert (1920 - 1986)



At a ceremony announcing an ongoing donation of surveying equipment are (left to right) Stan Mahler, president of Surveyors Service Co., and Steve Frank and Kurt Wurm from the Department of Surveying Engineering.

## Albuquerque Company Donates Equipment to Surveying Engineering

Students studying surveying engineering at New Mexico State University are benefiting from a new program developed by Surveyors Service Co. of Albuquerque.

Under this program, Surveyors Service Co. has provided NMSU with the latest instrumentation, valued at approximately \$240,000, to use on an annual basis at no cost. In addition to conventional surveying equipment, the donation included six pieces of surveying equipment with Global Positioning System (GPS) technology as well as two pieces of radio-controlled “robotic” surveying devices that require only one operator instead of the usual two.

“This equipment will allow us to put state-of-the-art technology in students’ hands even in our most basic surveying courses,” said Steve Frank, head of the Department of Surveying Engineering. Currently, Frank said, equipment with GPS technology has been available only to

students enrolled in upper-level classes.

Surveyors in New Mexico also will benefit from the new program. At the end of one year, this equipment will be made available for sale to the New Mexico surveying community at a discounted price, and a new set of the latest equipment will be provided to NMSU. Thus, NMSU will continue to have the latest state-of-the-art instrumentation on an ongoing basis.

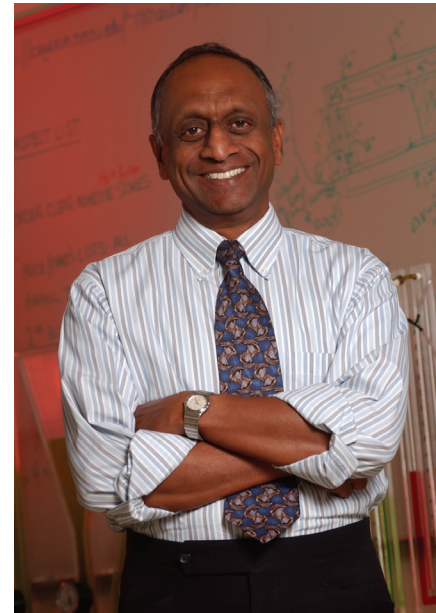
NMSU offers the only surveying engineering program in New Mexico. About 35 students are enrolled in the program.

## John Clark Endowed Professorship Established

In October 2004, alumni and friends of the Civil Engineering Department established an endowed professorship. Those funds were matched by the Department of Education Title V program to honor the many contributions of John W. Clark.

Clark was a professor in the department from 1953 until his death in 1978. Clark served as head of the Civil Engineering Department from 1961-1962 and as director of the Water Resources Research Institute from 1971-1976. He was widely recognized for his expertise in water and water treatment and organized the first New Mexico Water and Sewage Treatment Short Course.

Civil Engineering Professor Nirmala Khandan, a member of the faculty since 1989, was named the first holder of the John Clark Endowed Professorship. It is the first endowed professorship in the Department of Civil Engineering at New Mexico State University.



Civil Engineering Professor Nirmala Khandan was named the first recipient of the John Clark Endowed Professorship established by alumni and friends.

# College of Engineering Advisory Board

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*The real voyage of discovery  
consists not in seeking new  
landscapes but in having new eyes.*  
—Marcel Proust (1871 - 1922)



New Mexico State University  
College of Engineering  
MSC 3449  
P.O. Box 30001  
Las Cruces, NM 88003-8001

505.646.2911  
[www.engr.nmsu.edu](http://www.engr.nmsu.edu)



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