II.H. Major Research and Public Service Activities

R&D EXPENDITURES: Fiscal Year 2012
Institution: New Jersey Institute of Technology

	Amount (Dollars in thousands)
Federally Financed Academic R&D Expenditures	54,785
Institutionally Financed Academic R&D Expenditures	28,776
State, Industry & Other Financed R&D Expenditures	18,288
Total Academic R&D Expenditures	$101,849

Note: Draft Audit results to be reported to the National Science Foundation (NSF) on Form #411
(Survey of Research and Development Expenditures at Colleges and Universities).

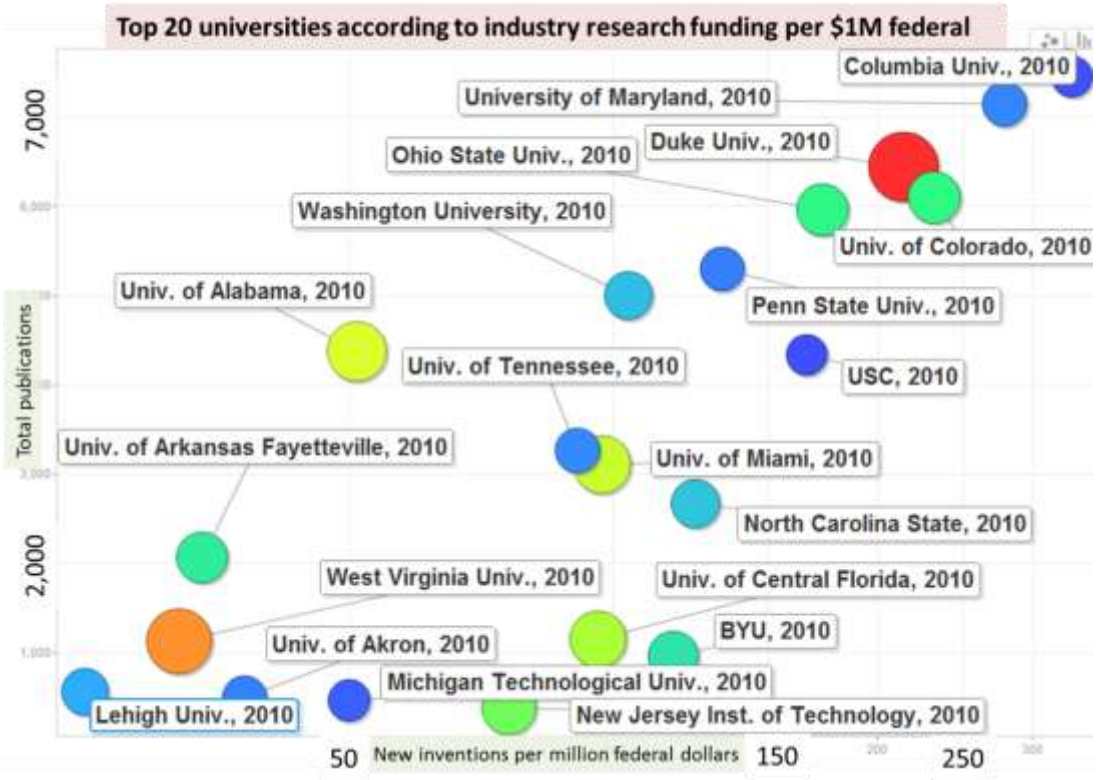
NJIT continues to grow its research enterprise. It completed a record year in FY2012, with research expenditures of over $100M, including a 12% increase in Federal funding to an all-time high of $55M. Based on FY2009 data, the most recently available public rankings, NJIT placed fifth in the United States for research expenditures among all polytechnical universities. The top 10 of the full list are shown in the table below. The growth in research of $10M since then makes it likely that this position will remain unchanged through the 2012 rankings.

R&D expenditures at all polytechnical universities and colleges without a medical school, ranked by all R&D expenditures, by source of funds: FY 2009

Rank	Institution	All R&D expenditures	Federal government	State and local government	Industry	Institution funds	All other sources
	All institutions	2,906,768	1,787,933	191,988	274,495	474,384	177,968
1	MA Institute of Technology	736,102	532,618	655	102,894	7,875	92,060
2	GA Institute of Technology all campuses	561,631	322,452	10,727	43,885	167,766	16,801
3	VA Polytechnic Institute and State U.	396,681	148,411	100,217	20,444	105,525	22,084
4	CA Institute of Technology	342,455	305,682	1,630	8,756	5,398	20,989
5	NJ Institute of Technology	92,891	42,656	5,006	4,659	31,394	9,176
6	NM Institute of Mining and Technology	81,742	61,178	5,798	10,094	4,607	65
7	TX Tech U.	80,011	24,184	22,093	6,353	24,056	3,325
8	Rensselaer Polytechnic Institute	77,890	48,216	8,966	5,119	13,094	2,495
9	Northeastern U.	61,309	38,178	761	12,169	10,201	0
10	U. TX Dallas	61,214	25,651	14,183	11,474	9,906	0

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2009.

NJIT's research has been accorded other accolades recently for productivity in leveraging federal research dollars. NJIT was cited as 12th among all universities in the country for the proportion of industrially sponsored R&D to federally funded R&D expenditures in a Triple Helix Innovation article using 2010 Association of University Technology Managers (AUTM) data. In the same article, NJIT was ranked 4th among all US universities for the number of inventions disclosed per dollar of federally funded research and development. No other New Jersey located university was in the top 20 in either of these metrics.



Source:http://triplehelixinnovation.com/who-does-it-best-comparing-universities-by-number-of-papers-inventions-and-industry-research-funding/2883

NJIT's research brings together faculty from across the disciplines to explore issues and address problems of critical concern to New Jersey and the nation. NJIT's new strategic plan organizes its research initiatives around three thematic areas that form a strong applications agenda, in which investigators seek responsible solutions to society's problems. These topical areas are inter-disciplinary and each involves participation from virtually every college within the university. The three thematic areas are: Sustainable Systems; Convergent Life Science and Engineering; and Digital Transformation. These themes serve to unify faculty research efforts across the campus and connect to many real-world, campus wide demonstration environments that will enhance our student learning experience and attract industrial collaboration. Examples of current efforts in some of these areas appear below.

II.H.1 Sustainable Systems

There can be no greater challenge of our time than to seek a sustainable balance to preserving the natural environment while providing the expanding global population all the benefits and conveniences of a modern, technology rich society. From the creation of energy without reliance upon finite natural resources to providing civil infrastructure that is both reliable and secure, NJIT researchers are creating solutions for tomorrow.

CdTe Thin Film Solar Cell Technology

NJIT received from Apollo Solar Energy, Inc. a three-year, $1.5 million grant to establish a solar research center, led by Physics Professor Ken Chin. The company, based in Chengdu, the People's Republic of China, mines and tellurium (Te) and refines high-purity tellurium-

based metals for specific segments of the global electronic materials market. The new solar research center focuses on improving the applications of Cadmium Telluride semiconductor materials for use in thin-film solar cells. Solar arrays using thin-film technology have already proven to reduce the cost per watt to one-third of the cost of conventional systems. Through diligent improvement in the production process, research can solar power a legitimate contender for much more than the small percentage of global need that is now projected for photovoltaics.

Silicon Photovoltaic Manufacturing

Nuggehali Ravindra is professor and director of the joint NJIT-Rutgers applied physics program. He is working on making more efficient silicon based solar cells. These cells convert sunlight into electricity by photovoltaic effect. His PhD is from the University of Roorkee, India. His academic interests are silicon interface, silicon oxide interface, advance metallization, etc. Solar technologies use the sun's energy to provide light and electricity. The sun is renewable resource of energy which makes a solar cell efficient in extracting more energy. He is working with National Renewal Energy Laboratory to develop these solar cells.

Carbon Nanotube Solar Cells

Researcher Somenath Mitra, PhD, professor and chair of NJIT's Department of Chemistry and Environmental Sciences at New Jersey Institute of Technology (NJIT) has developed an inexpensive solar cell that can be painted or printed on flexible plastic sheets. "Fullerene single wall carbon nanotube complex for polymer bulk heterojunction photovoltaic cells," featured as the June 21, 2007 cover story of the Journal of Materials Chemistry published by the Royal Society of Chemistry, details the process.

The solar cell developed at NJIT uses a carbon nanotubes complex, which is a molecular configuration of carbon in a cylindrical shape. Scientists estimate nanotubes to be 50,000 times smaller than a human hair. Nevertheless, just one nanotube can conduct current better than any conventional electrical wire. Mitra and his research team took the carbon nanotubes and combined them with tiny carbon Buckyballs (known as fullerenes) to form snake-like structures. Buckyballs trap electrons, although they can't make electrons flow. Add sunlight to excite the polymers, and the buckyballs will grab the electrons. Nanotubes, behaving like copper wires, will then be able to make the electrons or current flow.

Understanding the Sun

NJIT's solar physicists are working on a range of technologies to better understand the behavior of the sun, and its connection to our conditions on Earth that affect everything from weather patterns to wireless communications. Professor Phil Goode directs the Big Bear Solar Observatory at Big Bear Lake, CA. He recently completed construction of the world's largest ground-based, optical solar telescope and continues to phase in advanced image processing technologies for further image clarity. The images of the Sun's surface already produced are by far the highest resolution pictures ever recorded. They have produced new insights to the dynamics of the Sun's magnetic fields and the origins of solar flares.

A bit farther north from BBSO at Owens Valley, Prof. Dale Gary is constructing the pilot for the world's largest array of radio telescopes for solar observation. The Frequency Agile Solar Radiotelescope (FASR) is concept for a multifrequency (0.03 - 30 GHz) imaging array

composed of many (~100) antennas designed specifically for observing the Sun. Under ARRA funding, a $7M construction project will create a smaller, demonstration array that will still yield the most detailed insights to the sun's upper atmosphere.

Professor Andrew Gerrard's primary research focus is in upper atmospheric physics and space sciences. The US Air Force Office of Scientific Research recently awarded Gerrard an $820,000 grant to lead a collaborative effort involving Clemson University, Cornell University, the University of Illinois at Urbana-Champaign, and the Geophysical Institute of Peru to study the ESF development in South America. The effort will focus on developing and operating a one-of-a-kind, Fabry-Perot Doppler imager designed for 24-hour observations of thermospheric and mesospheric winds and temperatures in a campaign spanning South America. Gerrard is also involved with a multi-institutional project in Antarctica led by NJIT Distinguished Research Professor Louis Lanzerotti, a former Bell Labs researcher. The effort accounts for much of the U.S. involvement in space weather research at high latitudes.

Research Professor and National Academy of Science Member Lou Lanzerotti has been principal investigator or co-investigator on a number of NASA Earth-orbiting, interplanetary and planetary missions including IMP, Voyager, Ulysses, Galileo, and Cassini. He is currently a Principal Investigator for instruments just launched from Cape Kennedy in August 2012 on NASA's Radiation Belt Storm Probes mission in Earth's magnetosphere (RB-SPICE). This is a $100M satellite development program in conjunction with Johns Hopkins Advanced Physics Lab (APL). The scientific mission of this twin probe effort is expected to begin in October 2012 and last for two years. The data on the Van Allen Radiation Belts is invaluable as all geo-stationary satellites used for GPS and telecommunications applications orbit in this difficult environment.

Professor Haimin Wang Solar physics and phenomena of the atmosphere of the Sun and solar-like stars, including solar/stellar flares, sunspots, active regions, filaments and prominences, quiet Sun network. His Space Weather Laboratory focuses on measurements of physical parameters of the solar atmosphere, such as magnetic fields, density, temperature, and energy distribution of electrons and ions in the photosphere, chromosphere and corona.

Sustainable Building Design

Deane M. Evans, FAIA, a research professor and executive director of the Center for Building Knowledge in the College of Architecture and Design is an accomplished architect with more than 25 years of experience in architectural design, construction technology, and building performance research. Evans, who has had experience in both private practice and the federal government, has dedicated his career to creating innovative ways to improve the built environment -- through better design, through the development and use of better technology, and through the creation and dissemination of new knowledge. His current focus is on high-performance, sustainable buildings, particularly housing and schools. Evans, who also is vice chairman of the Sustainable Buildings Industry Council (SBIC), has served as an instructor for workshops sponsored by the council on high-performance schools.

Evans' team and Building Media Inc. (BMI), a DuPont subsidiary, will lead one of 15 research and deployment partnerships to help dramatically improve the energy efficiency of American homes ─ the Building America Retrofit Alliance (BARA). The 15 teams, appointed by the U.S. Department of Energy (DOE), will receive a total of up to $30 million for the initial 18 months to deliver innovative energy efficiency strategies to the residential

market and address barriers to bringing high-efficiency homes within reach of all Americans. Each team will receive between $500,000 and $2.5 million depending on performance.
NJIT partnered with Rutgers University in the first-ever New Jersey entry to the US Department of Energy's biannual Solar Decathlon in Washington, DC in September 2011. ENJoy: A Generation House, has been more than a two-year collaborative effort to design, build, and operate solar-powered homes that are cost-effective, energy-efficient, and attractive. The all-concrete, beach-inspired eNJoy house featured an inverted-hip roof design for rainwater collection to support irrigation and grey water systems, an 8.2kW photovoltaic system that allowed the house to be completely powered by the sun, and the application of universal design principles, which will allowed the house to be accessible to people of all ages and levels of mobility. More than a dozen-plus graduate and undergraduate students from NJIT's College of Architecture and Design (COAD) and Rutgers-The State University of New Jersey labored on the project.

Bio-renewable Materials
Michael Jaffe, a research professor of biomedical engineering at NJIT, has developed a suite of technologies for replacement of petro-chemicals using natural sugars. One of these new materials is a derivative of isosorbide and may be able to replace bisphenol A (BPA) in a number of consumer products, including the lining of tin cans. Jaffe has been developing the material in conjunction with the Iowa Corn Promotion Board (ICPB) in an effort to promote and create new, commercially attractive, sustainable chemistries from wider uses of corn. This new sugar derivative can be obtained from corn. Much attention has recently focused on BPA, which has been known to have estrogenic properties since the 1930s. BPA is widely used in processes that result in the lining for tin cans and key ingredients in plastics ranging from baby bottles to nail polish.
The new invention is an epoxy resin. These are polymers widely used as adhesives, paints and as coatings to protect food in cans. This invention describes a renewable resource epoxy, derived, for example, from isosorbide, a sustainable chemical that can be synthesized from corn starch. Both components of the epoxy—the resin and the hardener—are from water-soluble, plant-derived chemistries. The epoxy is cured by baking at an elevated temperature.

Evaluating Brownfields
Sites in Newark, Carlstadt, Carteret and Elizabeth were the focus of in-depth case studies by the Brownfields Economic Development project. The project, directed by the National Center for Transportation and Industrial Productivity and the York Center for Environmental Engineering and Science, evaluates abandoned industrial sites - Brownfield - in northern New Jersey to determine their potential for freight-related redevelopment.
The Brownfields Project is also assisting the New Jersey Meadowlands Commission in developing an area-wide assessment approach for characterizing 40 acres of brownfields at the Paterson Plank Road Redevelopment sites and the City of Trenton in performing a Triad based site characterization of the Assunpink Creek Brownfield Project.

Coastal Water Quality
Establishing remote sensing as an operational management tool in assessing the quality of New Jersey's near shore waters is the focus of research under a NASA Airborne Oceanographic LIDAR (light detection and ranging) remote sensing data acquisition over the

East Coast. The program remotely measures biological and chemical substances in the world's oceans and coastal zones, using sensors that are flown in aircraft to make measurements. The research supports satellite measurements of water quality parameters important in global warming, carbon flux and climate change research. In conjunction with the mission the data collected over New Jersey during the flight is being used to calibrate bio-optical models developed in a related National Science Foundation project.

Improving New Jersey's Drinking Water

The New Jersey Applied Water Research Center has been established by NJIT in partnership with the American Water Works Association to unite industry, government and academia in a common effort to research and improve the state's drinking water. Researchers from NJIT and the Water Works Association, a non-profit group dedicated to providing the state with safe drinking water, expect to have a significant impact on the state's water infrastructure. The center's emphasis on applied research specific to New Jersey will fill in the gaps that national research programs have not addressed. Researchers will also work to assure that the region's water supply is safe from bio-terrorist attacks, developing monitoring systems to identify biological agents deposited in the water infrastructure.

Other aims of the center include investigating methods for combating drought; encouraging state utilities and universities to conduct drinking water research; providing state agencies with research ideas on water supply; and establishing a public service center that will inform residents about research on water supply.

Protecting the Power Grid

Microscopic sensors that will prevent disruptions in electrical power are the focus of a project in the Microelectronics Research Center. A joint effort between the New Jersey MEMS (microelectromechanical systems) Initiative and Public Service Enterprise Group, the project is developing fiber optical MEMS devices that will alert utilities of irregularities or deterioration within the power grid that may signal a system failure. The research partnership will submit a funding proposal to the U.S. Department of Energy to support a project that will expand the utility application of MEMS devices and demonstrate the concept of a "smart" utility.

Monitoring Emissions in Real Time

A new technique has been invented by researchers for on-line monitoring of toxic chemicals, such as solvents and organic vapors, in air emissions at very low levels. The new device is an automated instrument for continuous monitoring of NMOC - the non-methane organic carbon analysis - which is a measure of all carbon emissions except that for methane. Monitoring occurs real-time and can be carried out at the site of contamination.

The key element in the device is a "microtrap" that gathers organics from the air stream in a sorbent. Rapid (1 to 1.5 seconds) electrical heating of the microtrap releases the chemicals in a concentrated pulse that serves as an injection for the detector. The technique works much faster than any conventional monitoring systems and increases sensitivity by two or three orders of magnitude, allowing analysis of very low concentrations.

Toward Smart Coatings

Smart paints and coatings, enriched with nanomachines to perform functions like changing color or repairing corrosion, are the focus of a large-scale, multidisciplinary research project.

Funded by the U.S. Department of the Defense, the futuristic coatings are intended for use on military vehicles and weapons systems. The Army seeks technology that will:

- Sense deterioration or breaks in the surface or device cover by the coating and make repairs without any human intervention.
- Change color and patterns to create active camouflage by projecting the images of the surrounding area as collected through continuous videotaping. Such a property would render a truck or tank virtually invisible.
- Render pyrotechnics or explosives inactive while the coating remains on them.
- Selectively and easily remove coating with proper "orders."

A joint program with Clemson University and Picatinny Arsenal, the smart coatings project draws on NJIT's expertise in device physics, nanotechnology and MEMS, polymer engineering, chemistry and environmental engineering, and materials characterization. NJIT researchers have background in polymeric coatings, microsensor fabrication, large-area circuits, nanostructures and nanocomposites that provide a foundation for the development of this new generation of coatings.

Analyzing Freight Movements

Developing a freight planning support system for northern New Jersey is the goal of research of the International Intermodal Transportation Center. In addition to overall assessment of such factors as congestion, mobility and accessibility, the study will analyze the interruption in freight movement caused by the September 11, 2001 terrorist attack on the World Trade Center. This effort is supported by a grant through the North Jersey Transportation Planning Authority's Unified Planning Work Program.

Traffic Congestion

NJIT assisted the New Jersey Department of Transportation in developing the "Congestion Relief Plan for the Garden State Parkway." The study highlights traffic congestion impacts as part of the development of the ten-year plan to remove toll barriers on the Garden State Parkway.

Researchers at NJIT completed the second iteration of its study "Mobility and the Costs of Congestion in New Jersey" that was funded by the U.S. Department of Transportation (USDOT) and a grant from the Foundation of the New Jersey Alliance for Action. NJIT's analysis builds on a 1996 study by the Texas Transportation Institute which made state-to-state comparisons using national highway data. By using more detailed data on traffic volume and roadway characteristics in New Jersey and an enhanced methodology, we were able to determine the cost of congestion on the roadway network throughout the state.

The NCTIP research team analyzed data from the N.J. Department of Transportation (NJDOT) to measure and compare congestion in terms of traffic volumes, travel speeds, trip lengths, fuel consumption and truck flows. The study assesses a dollar value for delays experienced by drivers under current conditions, on a statewide and county level, as well as corridor and project level.

Detecting Concealed Explosives

A team of researchers at NJIT is working to develop a technology capable of monitoring and detecting concealed explosives and biological agents that may pose a threat to people, buildings, mass transportation or other environments. With funding from the National Science Foundation and the Army Research Office, the investigators are exploring the use of terahertz (THz) electromagnetic radiation to detect and identify explosives and biological agents by means of a spectroscope. Picometrix, Inc., Ann Arbor, Michigan, a manufacturer of high-speed optical receivers and ultrafast instrumentation, is collaborating on the project.

II.H.2 Convergent Life Science & Engineering

If any field of study is to experience a fundamental change in the coming decades, it is those topics related to the life sciences and healthcare. Our ability to understand the origins of life and the onset of disease from the scientific understanding of bio-chemical origins at the sub-cellular level will transform the life sciences from an "outlier" relative to the physical sciences to a discipline amenable to all of the tools and techniques used in those other areas. Consequently, every traditional discipline has a contribution to make in addition to the core work done by our researchers in Biology and Biomedical Engineering.

Harnessing Stem Cells

Two NJIT biomedical researchers are doing pioneering work on the application of human stem cells to regenerative medicine that may someday extend peoples' lives. Both biomedical engineering department researchers have recently received the prestigious Coulter Foundation Translational Awards for their promising patent applications.

NJIT Associate Professor Treena Arinzeh's research focuses on tissue engineering, the application of principles and methods of engineering and life sciences toward a fundamental understanding and development of biological substitutes to restore maintain and improve human tissue functions. Bone regeneration may be achieved by the use of osteogenic cells and/or factors to induce bone growth in combination with an appropriate scaffold to guide and support the laying down of new bone tissue. Professor Arinzeh has developed composite material can be combined with stem cells to enhance the rate of bone repair.

NJIT Assistant Professor Cheul Cho Cho's research focuses on designing a clinically-scaled bio-artificial liver. Embryonic stem cells are considered a potential source of cells for hepatic therapies due to their limitless capacity for self-renewal and proliferation, and their ability to differentiate into all major cell lineages. Cho's novel method differentiates embryonic stem cells into hepatocytes with high purity. Incorporating these cell-derived hepatocytes into a device to treat fulminant hepatic failure has improved animal survival, thereby underscoring the cells' therapeutic potential.

Bio-power

Research Professor Zafar Iqbal has developed patented technology to create a functioning nano-dimensioned fuel cell. The fuel cell small enough to be used to power implanted bio-electromechanical devices or sensors. Furthermore, the fuel cell draws its power from sugars metabolized in the bloodstream. In essence, it draws its chemical energy the same way as the rest of the body. As a consequence, bio-implants never need to be removed to replace battery packs. The research has already produced a fuel cell that can power a conventional pacemaker.

Improving Treatment for Hydrocephalus

NJIT Professor Gordon Thomas and NJIT Research Professor Reginald Farrow, both in the department of physics, and NJIT alumnus Sheng Liu, formerly a doctoral student of both researchers were awarded a patent for the NJIT SmartShunt™, a unique device to help patients with brain injuries. The patent, entitled "No Clog Shunt Using a Compact Fluid Drag Path" (US Patent Number 8,088,091), discloses a device that enables the non-invasive wireless monitoring of both the extremely slow flow of cerebrospinal fluid as well as tiny changes in pressure in a shunt that drains fluid out of the brain. Ordinary shunts are commonly used by patients suffering from severe excess pressure in the brain due to hydrocephalus or brain injury. The technology will enable patients and physicians to determine whether cerebrospinal fluid flow is in fact, impaired and the device will also allow those involved to determine better what medical procedures should be performed. It is designed to have a lifetime of more than a decade because it needs no internal power. The Team recently received a multi-year, multi-million dollar grant to partner with Boston Children's Hospital/Harvard Medical school physicians and a commercial firm to take the device to animal testing as the next step in the FDA approval process.

Understanding Collagen

Collagen research is a new emphasis of the Medical Device Concept Laboratory (MDCL). MDCL projects focus on reconstituted collagen fiber formation, collagen characterization—both as a "material" and as tissue engineering substrate, collagen mechanical properties and transport of small molecules through skin. One project of special interest is collaboration with the University of Medicine and Dentistry of New Jersey aimed at understanding the collagenous failure that leads to uterine prolapse, a major problem in women's health.

The Medical Device Concept Laboratory is the technology transfer arm of the New Jersey Center for Biomaterials (NJCB), for which it plays a key role as the fabrication and biorelevant characterization resource. NJCB is a joint center of Rutgers University, NJIT, the University of Medicine and Dentistry of New Jersey, and Princeton University, supported by the New Jersey Commission on Science and Technology. The lab recently entered collaboration with the Polymer Processing Institute at NJIT to help industry solve problems in biopolymers, medical devices and pharmaceutical packaging.

Understanding Neuron Growth

Research. Biomedical Engineering Prof. Bryan Pfister, an NSF Career Award winner, uses his cellular stretching technique to find clues to repairing traumatic injuries to the spinal cord and other nerve tissue. Pfister studies how nerves grow in response to the stimuli of stretching. His research is so significant and so advanced that it could soon help tissue engineering experts learn how to repair damaged nerves. A breakthrough of that magnitude would of course be of immense solace to the millions of patients who have nerve or spinal cord damage. His team includes investigators from UMDNJ, Rutgers-Newark Biology, and the VA Hospital.

Neural Prostheses for Spinal Injuries

Prof. Mesut Sahin's research conducts pioneering work in the field of Neural Prostheses where he conceived the idea of using the neural activity of the descending tracts in the spinal

cord as a form of brain-computer interface. His current project, funded by a grant from the National Institute of Neurological Disorders and Stroke, is to develop and test a technology known as FLAMES -- floating light activated micro-electrical stimulators --for wireless activation of the central nervous system. Energized by an infrared light beam through an optical fiber located just outside the durameter, the tough, fibrous membrane forming the outermost of the three coverings of the brain and spinal cord, these micro-stimulators allow victims of spinal cord injuries to regain self-mobility, environmental control and computer access. FLAMES is a small device that is remotely controlled by an external unit via a near-infrared laser. The FLAMES device is implanted into the spinal cord, and is then allowed to float in the tissue with no wires attached. A patient would send the command to the external unit to activate the laser,the laser would excite the FLAMES device, which would in turn stimulate the neuron via an electrical current.

Improving Microscopy

Mathematical and experimental modeling of immunocolloid labeling techniques for electron microscopy is the focus of research to develop a new labeling technology that will allow investigators to rapidly and reliably identify and localize multiplemolecular species in a single specimen.

Immunocolloid labeling is a technique for high resolution studies of biological structure and ultrastructure. Nanoscale metal particles joined to antibodies or other biomolecules scatter electrons efficiently allowing the biomolecules to be discerned under an electron microscope. Immunocolloid labeling has been used for a wide variety of purposes, including the detection of certain viruses and bacteria and direct observation of the development of blood clots. In research funded by the National Institute of Health the objective is to gain a better understanding of the labeling process to optimize the choice of experimental conditions and maximize the efficiency and accuracy of labeling.

Combating Eye Disease

NJIT biomedical researchers are collaborating with physicians as well as private companies to develop new medical devices to combat eye diseases through the New Jersey Vision Technology Center. The Center was established with a one-year seed grant from the New Jersey Commission on Science and Technology. In addition to improving the diagnosis and management of diseases such as glaucoma and diabetes, the center aims to spur economic development in the state's biotechnology industry, by developing useful medical devices with promising commercial prospects. Current projects include a device to allow simplified eye pressure testing for glaucoma patients, and another to measure blood sugar. In each of the center's research projects, scientists and clinicians work closely with a New Jersey firm whose R&D staff helps to turn prototypes into products.

The Vision Center is also funded by grants from the National Medical Technology Testbed (Department of the Army) the Gustavus and Louise Pfeiffer Research Foundation, of Denville, N.J., as well as by funds from Becton Dickinson, Inc. and Lucent Technologies.

Understanding Neural Networks

A better understanding of the cellular mechanisms that allows a neural network to produce stable behavior while retaining the flexibility to respond to the disruptions produced by growth, learning, sensory input and injury is the focus of research at NJIT. In a five-year

project funded by the National Institutes of Mental Health, research centers around the mechanism known as activity-dependent regulation of voltage-sensitive ionic currents which may underlie the expression of these two seemingly paradoxical aspects of neuronal activity, namely flexibility and stability. Ionic currents produce the electrical changes that characterize neuronal activity, and individual neurons and neural networks carry signals throughout the nervous system that are responsible for the generation of behavior. This mechanism is potentially of great importance as it may underlie a new form of learning and memory via its stabilizing effect on neural network activity.

Designing Computer Therapies

Research involving human-computer interaction has developed an audio browser that allows information access for blind users. Users provide input to the browser by stroking their fingers on a touch pad. The browser responds with spoken output based on the particular cell touched by the user. The device allows users to search an address book, a collection of music or read a downloaded copy of the current news.

Another project, in collaboration with the University of Medicine and Dentistry of New Jersey, Rutgers University, developed a Virtual Reality system for rehabilitating hand function in stroke patients. The PC-based desktop system uses two hand input devices, a CyberGlove and a RMII force feedback glove, to allow the user to interact with one of four rehabilitation exercises. Specific exercises work on each of the specific parameters of hand movement—range of motion, speed of motion, fractionation (the ability to move individual fingers separately) or strength. The patient receives performance-based target levels that adapt between sessions in order to induce the user to improve.

Identifying Harmful Biological Agents

The development of a portable MEMS (microelectromechanical systems) device as part of a biological detection system is the focus of a joint research project between NJIT and Sandia National Laboratories in Albuquerque, N.M., the government facility charged with developing technologies to support national security. The device - known as a trigger - is the key component in a system for the rapid and accurate identification of harmful biological agents in field and urban environments. The new approach in this research involves the use of electro-hydrodynamic phenomena in a suspension subject to electric fields to control and manipulate microscopic particles in flowing fluids for the segregation and concentration of biological material in microfluidics. Other potential applications of electro-micro-technologies include tiny separation devices for a wide variety of systems for environment monitoring, health care, and medical diagnostics. The electro-microfluidics are currently being tested at NJIT and Sandia.

II.H.3 Digital Transformation

Digital convergence has been a popular buzz word for over twenty years. It conveyed the promise of fundamentally new concepts in communication that would arise from the transformation of telephony, broadcast and data transmission from analog to digital. We have certainly seen the transition of voice, video, print and music to digital formats, but the emergence of exciting new applications and industries has been overstated – until now. The advent of wireless, broadband connectivity and the emergence of highly functional, portable

devices – mainly smartphones or PDAs – have taken computing out of the office and opened the door to innovation that touches every aspect of life.

Healthcare Informatics

NJIT received more than $23 million of the $2 billion allocated by the American Recovery and Reinvestment Act of 2009 to achieve widespread meaningful use of health IT and facilitate use of an electronic health record (EHR) by every person by the year 2014. The New Jersey Health Information Technology Extension Center (NJ-HITEC) initiative proposed by NJIT Senior Vice President for Research and Development Donald H. Sebastian, PhD, principal investigator, will assist New Jersey's 20,000 health care providers achieve "meaningful use" use of health information technology through outreach, consultation and user support for the state's primary care providers serving at-risk population centers. The center has already enrolled over 6000 physicians, exceeding its funded target of 5000, and moved more than half of them through the second programmatic milestone of meaningful use. It has become a practice leader across the national program and its director, William O'Byrne now chairs the team charting the course of the national program beyond it four year launch under the ARRA stimulus funding. It is collocated and will interoperate with Health-e-cITi-NJ one of 3 major health information exchanges in the state, and the Healthcare Innovation Center an NJIT program to foster new products and services that bring advanced information technology together with process innovation to achieve improved healthcare delivery.

Location-Aware, Personalized Computing

Think about the most popular Web sites of the past two years: MySpace, Facebook, Friendster, Flickr, YouTube.... They're all forms of virtual social networks. People create profiles and share opinions, pictures, and movies—all in an effort to meet new people, even if they never really meet in person. A research team led by Professor Quentin Jones wants to "put the place back in social networks." The SmartCampus project aims to turn the NJIT campus into one of the world's first locations to have a suite of "People to People to Geographical Places" systems (P3 for short) that covers the entire area.

Students and faculty create user profiles, listing personal information, hobbies, tastes, opinions, pictures, movies, etc. Users select the information they want to share and the types of people with whom they want to share it. Using wireless-enabled devices like laptops, PDAs, cell phones, BlackBerries, etc., users can tap into a campuswide virtual social network that adapts to their physical location.

The SmartCampus project has received $1.8 million in direct funding from the National Science Foundation, a Hewlett-Packard Technology for Teaching Grant, and support from NJIT's NSF Industry/University Collaborative Research Center for Information Protection (I/UCRC).

Securing the Cloud

At the early stage in the development of cloud computing, we have a chance to break the typical pattern where security is added only as an afterthought, usually after attacks happen. Since cloud platforms are still in their infancy, security can be part of the initial design. College of Computing Sciences Assistant Professor Reza Curtmola works on this problem with the support of a Faculty Early Career Development grant of more than $500,000 from

the National Science Foundation. Curtmola is seeking to make the relationship between data owners and what they've entrusted to the clouds more secure. In large measure, when data is outsourced to a cloud storage provider, the owner of the data loses control over its integrity. He intends to build a practical remote-data-checking (RDC) framework to assure long-term integrity and reliability of remotely stored data. Overcoming the limitations of current RDC protocols and existing cloud-storage architectures will mean that you won't have to rely just on the word of your provider that all is well with your data.

Securing Wireless Communications

With the proliferation of laptops, tablets, smart phones and other devices, computing power is everywhere and very much on the go. The combination of computing, mobility and wireless connectivity offers a wealth of new capabilities – and new security challenges. Meeting these challenges is basic to the work of Associate Professors Cristian Borcea and Guiling Wang.

Borcea is exploring ways to enhance the intelligence of smart phones with sensors designed to monitor pollution, traffic conditions and other aspects of our environment. He is also researching systems that enable social interaction with superior performance, trust and privacy. In addition to exploring the capabilities of peer-to-peer networks, Borcea is teaming with NJIT colleagues, researchers at other universities and industry experts to address security issues unique to wireless interconnection. These include authenticating a mobile user's location and maximizing trust in ad hoc, or decentralized, networks, since familiar safeguards such as firewalls do not work for wireless communication.

Most recently, Assoc. Prof. Grace Wang's research has focused on the potential and security of wireless sensor networks. The sensors that interest Wang are typically designed to collect data about the environment in which they are deployed, store that information, and transmit it to a central database. Capable of forming self-organizing networks, these devices can collect data in remote or inhospitable areas about weather or pollutants, warn drivers of traffic congestion when embedded in roads, or signal that a bridge or other structure has deteriorated to an unacceptable degree. As with ad hoc and peer-to-peer computing networks, the wireless foundation of remote sensing presents special security issues. Wang and her colleagues are working to develop encryption techniques that are both more effective and economical, methods to detect whether data collected by sensors has been tampered with, transmission technology that makes unauthorized access as difficult as possible, and network architecture that minimizes damage after an attack.

Keeping the Internet Secure

Data watermarking, intrusion alarm systems and distortionless data hiding are some of the techniques under study at the Center for Wireless Networking and Internet Security. A partnership between NJIT's Department of Electrical and Computer Engineering and Princeton University, the new center is supported by a $2.6 million R&D Excellence Grant from the New Jersey Commission on Science and Technology. Among the projects are:

- A project to develop a dynamic watermarking and encryption method,
- A new distortionless marking technique based on the integer wavelet transforms,

- Methods to predict and intercept on-line intruders and trigger a defensive shield.

Improving Face Recognition

A new technology that can verify a person's identity using facial images is the goal of research involving a face recognition system developed by an NJIT researcher that improves on previous technology by taking into account such factors as lighting and facial expressions. The system has tested 100 percent effective in matching videotaped images to those stored in government databases by comparing 62 features or facial landmarks. Such a technology can be used as a security system with facial identification replacing a physical key or a password. An effective face recognition system could also assist law enforcement officials in locating fugitives by means of video cameras strategically placed in public places such as airports. NJIT recently received funding from the Department of Defense to support this research as part of the government's effort for combating terrorism using face recognition technologies.

Leading the Way in CAD Design

For an unprecedented seventh consecutive year, students from New Jersey School of Architecture took top prizes in the annual CADDIES Competition for Excellence in Design Visualization. Sponsored in part by Cadalyst magazine, the annual international competition celebrates excellence in digital imaging and presents awards in student and professional categories for both still images and animation.

Moving Market Research On Line

Researchers at NJIT are building a Web-based software system that conducts a new kind of market research—it scours areas of the Web and extracts "interest information'" from personal homepages. The research team aims to make use of the abundance of personal homepages on the World-Wide Web where people freely express many of their likes and dislikes. Such information can be very valuable to marketers looking to narrowly identify individuals as potential customers for particular products. It can also be used to draw conclusions about certain relationships between interests and demographic categories.

The ultimate goal is to help marketers to construct collections of individuals (with e-mail addresses) with a potential interest in certain categories of products. A prototype is on line. The system sorts people both by demographics which defines people of interest to market researchers, and by more than 31,000 interests. Marketers will be able to link various classes of individuals to categories of interests and corresponding products. The study is partially supported by the New Jersey Commission on Science and Technology.

Developing Community Informatics Systems

The development of community informatics systems as a broad economic, social and political force is the focus of a research project supported by a grant from the Ford Foundation; the project aims to expand research, policy, programming, commercial and teaching activities supporting the development of the community informatics sector.

Community informatics is the application of information technologies to enable the achievement of community objectives. Initially used in geographical communities, the concept is now being applied to virtual communities based on common interests, industries or marketplaces. The project will bring together the best current thinking of practitioners,

academics and industry experts. Results will be presented in book form, potentially supplemented by a web site and CD-ROM. This comprehensive "living document" can provide an initial electronic architecture and resources for creating and maintaining a vertical community informatics sector as well as horizontal "thematic" sub-sectors. It is anticipated that the project will also help to refocus policy attention on how the Internet is used and how it could be used to enable the betterment of communities—community wealth creation; community social, economic and cultural development; and community empowerment.

Integrating Library Services

A project to develop a Digital Library Service Integration (DLSI) infrastructure to provide a systematic approach for integrating digital library collections and services is being supported by the National Science Foundation under its National Science, Technology, Engineering, and Mathematics Education Digital Library (NSDL) program.

Digital library repositories contain on-line collections of multimedia documents—text files, photos, videos and animations, teaching materials, and computer programs. Digital library services are emerging, such as classification, searching, and peer review, as well as hypermedia functionality such as annotation and guided tours. Currently specific digital library services work for specific digital library collections only. The NSDL program, which aims to establish a national digital library for science, technology, engineering, and mathematics, is focusing on gathering educationally related collections and services and integrating these so that services can be shared among collections.

Using the Dynamic Hypermedia Engine (DHE) developed at NJIT's Collaborative Hypermedia Research Laboratory, the DLSI program will integrate relatively simple services that may be used without modification. The project will also explore giving access to services that require customization, such as peer review. Services and collections generally will require minimal or no changes to plug into the DLSI infrastructure. The research team believes that DLSI can form the core of vibrant virtual educational communities by supporting a broad range of community support services.

Measuring Software Quality Attributes

Developing a system of metrics measurements of software quality which indicate the complexity, understandability, testability, description and intricacy of code—for software architectures is the focus of a study supported by a grant from the National Science Foundation, to facilitate product line engineering, a specialized form of software reuse. One way to reduce the cost of developing software is to create a product line, a group of similar products structured to take advantage of each other's assets. The research is investigating metrics for domain architecture, the organizational structure or design of software systems. The project has a three-tiered approach, involving a distinction among qualitative attributes, quantitative factors and computable metrics. The project will lead to a better understanding of quality attributes of product line architectures and better means of quantifying these attributes.

Next-Generation Wireless Communications

Technologies to enable the next generation of wireless digital communications are the focus of research at the Center for Communications and Signal Processing. The group addresses

issues such as privacy and security, interference and jamming, ever heavier user traffic, and rapid transmission of data through wireless networks.

Developing Technologies for Defense and Homeland Security
Recognizing that technology is the best way to defend against bioterrorism, secure our borders and protect critical infrastructure such as power systems, bridges and airports, NJIT has established a new Homeland Security Technology Center, led by Dr. Donald H. Sebastian, Vice President for Research and Development. The center coordinates defense-related projects in the university and forges partnerships with agencies like Picatinny Arsenal, the Center for Disease Control, the New Jersey Department of Health and Senior Services, the National Guard, and the New Jersey State Police for homeland security initiatives. The software systems use Global Information Systems (GIS)-based information to support simulations used to coordinate a response to a disaster. People who would benefit from these simulations include members of emergency response teams, hospital workers, public and private transportation administrators and others. The software gives New Jersey a system to prepare for anything from a natural disaster to a chemical, biological or radiological attack.

II.H.4. Research Centers and Specialized Labs

NJIT's research program focuses on applied research in the most promising of emerging technologies, with emphasis on technology transfer and commercialization. Research at NJIT is organized around multi-disciplinary centers of excellence that encourage partnerships among various disciplines, as well as with other educational institutions, private enterprise and government agencies.

APPLIED LIFE SCIENCES

- Newark Institute for Regenerative Healthcare develops process technology to bring stem cell – based therapies to practical, reproducible, commercial scale.
- Biomedical Engineering: Stem cell applications in tissue regeneration, vision and neural engineering, bioMEMS, motion analysis and rehabilitation engineering, biomaterials and biopolymers.
- Center for Applied Genomics: Development and application of DNA microarray technology.
- The Medical Device Concept Laboratory : Synthetic materials in biomedicine.
- Membrane and Separation Technologies: Micro- and nanoporous filters for medicine and pharmaceutical manufacture.
- The Vision and Neural Engineering Lab: Oculomotor dynamics, vergeance eye movements.

ARCHITECTURE AND BUILDING SCIENCES

- Center for Architecture and Building Science Research: Educational facilities, health care and aging environments, developmental disabilities planning, historic preservation, housing and community development.
- Concrete Testing Laboratory: Reinforced and high-strength concretes.

COMPUTING, MATHEMATICS AND TELECOMMUNICATIONS

- Center for Applied Mathematics and Statistics: Mathematical biology, fluid dynamics, wave propagation.
- Center for Wireless Communications and Signal Processing Research: Multi-carrier systems, Turbo Coding techniques, ultra-wideband communications, MIMO systems.
- Cryptography & Telecommunication Laboratory: Cryptography, computer security and telecommunications networks.
- electronic Arts Habitat (eArtH): Multimedia, social computing, human-computer interaction.
- New Jersey Center for Wireless Networking and Internet Security: Intrusion detection, watermarking, mobile networks.

ENVIRONMENTAL SCIENCE AND ENGINEERING

- York Center for Environmental Engineering and Science: Hazardous substance management, pollution remediation and prevention, sustainable manufacturing.
- Geoenvironmental Engineering Laboratory: Solid waste management and disposal, environmental systems, waste water treatment, site remediation.
- Laboratory for Process and Field Analytical Chemistry: On-line process analysis, environmental monitoring, portable instruments for on-sire environmental measurement.

MATERIALS SCIENCE AND MANUFACTURING

- Bearings and Bearing Lubrications Laboratory: Hydrodynamic, hydrostatic, rolling element bearings and novel designs of unique bearings.
- Computational Fluid Dynamics: Particulate flows, mixing enhancement, suppression/enhancement of turbulence, drag minimization, thermal management.
- Electro-hydrodynamics Laboratory: Sensors and separation devices for a wide variety of systems for environment monitoring, health care, and medical diagnostics
- Electronic Imaging Center: Infrared filters, sensors and detectors utilizing terahertz radiation, carbon nanotubes.
- W.M. Keck Laboratory: Manipulation of liquid flows and the small particles/microorganisms they transport in biological and biomedical technologies.
- Materials Characterization Laboratory: Elemental. organic and structural analysis
- Metal Combustion Laboratory: Propellants, explosives, pyrotechnics, and incendiaries.
- Microelectronics Fabrication Center: Application-specific integrated circuits, optical switches, pressure sensors, and MEMS for biomedical, biometrics, and microfluidics application.

- New Jersey Center for Engineered Particulates: Tailored particle coatings for pharmaceuticals, food, cosmetics, ceramics, defense, electronics and specialty chemicals.
- New Jersey Center for Microflow Control: Fluidic devices, with a focus on miniaturized flows, and miniaturized sensors and actuators.
- Polymer Processing Institute: Modification of polymers processing into special property products for the medical, health care, automotive, electronics, construction, and packaging industries
- Waterjet Technology Lab: Waterjet machining and cleaning applications.

SOLAR PHYSICS

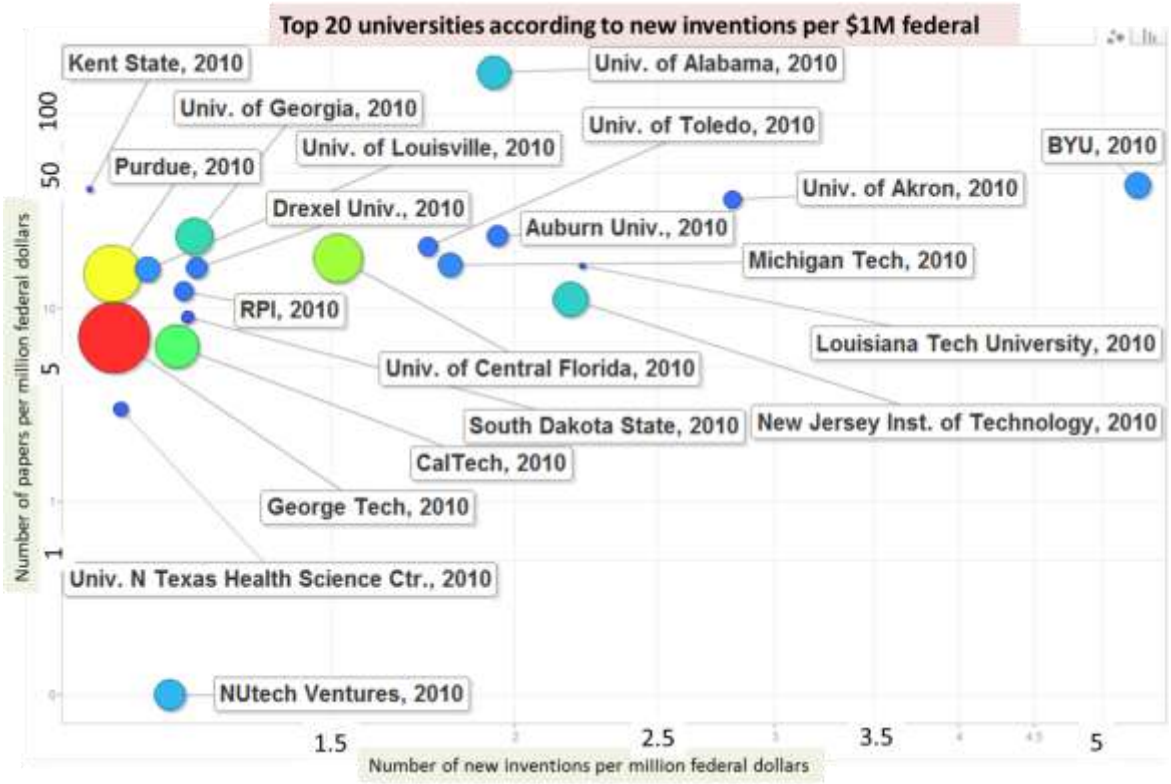
- Center for Solar-Terrestrial Research: Solar optical astronomy, solar radiophysics, terrestrial science.
- Big Bear Solar Observatory: Solar observation, helioseismology.
- Owens Valley Solar Array: Transient energetic phenomena, coronal magnetic fields.
- The Frequency-Agile Solar Radiotelescope (FASR) Project: Nature and evolution of coronal magnetic fields, physics of solar flares, drivers of space weather, the quiet Sun.
- Global High-Resolution H-Alpha Network: Round-the-clock solar observation.
- Space Weather Project: Monitoring and forecasting solar activity that may affect Earth's climate and technologies.

TRANSPORTATION

- Liberty Corridor Planning Institute: Port Newark, Elizabeth, Bayonne redevelopment; Freight transportation, brownfields and passenger transportation
- North Jersey Transportation Planning Authority: Maintaining and improving transportation systems.
- Transportation, Economic and Land Use System (TELUS): Computerized transportation planning and programming.

II.H.5. NJIT Intellectual Property

NJIT has grown its patent activity significantly over the last decade and is now ranked 4th in the US among all universities for its productivity in turning federal research dollars into invention disclosures. Inventions stem primarily from grant funded research, but also from classroom activities that feature open-ended design challenges. The inventiveness is distributed across all of the academic units, and includes student inventors. Resources do not permit filing for patent coverage on every internal disclosure. A standing committee of senior university official meets every month to evaluate the list of new disclosures and recommend those most suitable for university investment based on likelihood of commercial adoption.



Source:http://triplehelixinnovation.com/who-does-it-best-comparing-universities-by-number-of-papers-inventions-and-industry-research-funding/2883

NJIT Intellectual Propoerty Disclosures in FY2012

12-001 Broadband Circularly Polarized Moxon Based Antennas for UHF SATCOM; Niver, Edip / Manzhura, Oksana Y.; NCE Electrical & Computer Engineering

12-002 Composite Matrix for Bone Repair; Arinzeh, Treena L. ; NCE Biomedical Engineering

12-003 Method for Cooperative Interference Management in Spectrum Leasing; Elkourdi, Tariq / Simeone, Osvaldo ; NCE Electrical & Computer Engineering

12-004 Method for Spectrum Leasing with Multiple Primary Users; Elkourdi, Tariq / Simeone, Osvaldo ; NCE Electrical & Computer Engineering

12-005 Device created to assist players and coaching staff to optimize practice outcome; Martins, Jose R. ; ATH Athletics

12-006 A new type of bonds that is valued at issuance and maturity based on value of issuing entity's revenue units; Abdul-Halim, Abrahim A.; SOM School of Management

12-007 Individually Addressable Optical Micro-Stimulators for Neural Stimulation; Sahin, Mesut / Unlu, Selim / Freedman, David S. / Abdo, Ammar R; NCE Biomedical Engineering / BU Boston University

12-008 Vanadium-Boron Coating on Stainless Steel 316L for Implanted Biomaterial Devices ; Petrova, Roumiana S. / Suwattananont, Naruemon ; CSLA Chemistry & Environmental Science

12-009 Library for Public Key Cryptography that utilize Lucas Sequence Exponentiation of Gaussian Integers; Koval, Aleksey Y. ; CCS Computer Science

12-010 Method for stabilizing type II acetaminophen (APAP) particles; Iqbal, Zafar / Dave, Rajesh N. / Zarow, Anna / Jallo, Laila; NCE Chemical, Biological & Pharmaceutical Engineering / CSLA Chemistry & Environmental Science

12-011 The mold test: a proposed test method for rapid measurement of approximate fines content in non-organic soils; Mahgoub, Mohamed / Bayoumi, Ahmed; NCE Engineering Technology

12-012 Piezoelectric Materials for Bone Repair; Arinzeh, Treena L. ; NCE Biomedical Engineering

12-013 AC field driven nozzle design for drop on demand applications; Shen, Yueyang / Elele, Ezinwa / Khusid, Boris ; NCE Chemical, Biological & Pharmaceutical Engineering

12-014 Periodic stabilizer addition in wet media milling for enhanced dissolution and bioavailability of micro and nanosuspensions of poorly water soluble pharmaceutical compounds; Bilgili, Ecevit A. / Bhakay, Anagha A. / Afolabi, Afolawemi ; NCE Chemical, Biological & Pharmaceutical Engineering

12-015 Transformation of nanosuspensions into films containing nanoparticles; Sievens-Figueroa, Lucas / Dave, Rajesh N. / Bilgili, Ecevit A. / Khusid, Boris / Susarla, Ramana ; NCE Chemical, Biological & Pharmaceutical Engineering

12-016 Nano-coating via resonance acoustic mixing; Scicolone, james v. / Dave, Rajesh N. / Gurumurthy, Lakxmi / Jallo, Laila; NCE Chemical, Biological & Pharmaceutical Engineering

12-017 Intelligent Cell Breathing to Maximize Renewal Energy Utilization for Cellular Networks ; Ansari, Nirwan / Han, Tao ; NCE Electrical & Computer Engineering

12-018 Methods for cell, ecm, and biomolecule patterning and neural differentiation of pluripotent stem cells; Cho, Cheul Hyung / Gittens, Jamila S. ; NCE Biomedical

Engineering

12-019 Method for biomimetic 3-d liver model; Cho, Cheul Hyung / Rajendran, Divya ; NCE Biomedical Engineering

12-020 Hydrophobic Epoxides from Isosorbide and Isoidide 2; Hammond, Willis B. / East, Anthony J. / Jaffe, Michael / Feng, Xianhong ; NCE Biomedical Engineering

12-021 Nano-coating via Comil; scicolone, james v. / Dave, Rajesh N. / Ghoroi, Chinmay / Gurumurthy, Lakxmi / Beach, Lauren E. / To, Daniel ; NCE Chemical, Biological & Pharmaceutical Engineering

12-022 Multi-Wavelength Imaging of Skin-Tissue for 3-D Reconstruction and Assessment of Selected Chromophores; Dhawan, Atam P. / D'Alessandro, Brian ; NCE Electrical & Computer Engineering

12-023 Fun Jungle Play Equipment; Tartaro, Samantha M. / Gulliford, Kyle V. / Lerner, Ran ; ARCH Art & Design

12-024 Easy Plugs ; Goldman, Samantha - Ran Lerner Gro / Sosa, Daniel / Lerner, Ran ; ARCH Art & Design

12-025 Social Lid; Caleja, philip / Kim, Hyungshin S. / Lerner, Ran ; ARCH Art & Design

12-026 Alleviating Solar Energy Congestion in the Distribution Grid via Smart Metering Communications ; Ansari, Nirwan / Lo, Chun-Hao ; NCE Electrical & Computer Engineering

12-027 Disclosure for "Tilt Turf"- developmental toy for children; Tarkowska, Dominika A. / Kolesnikov, Alexandr A. / Ferrer, Jonathan P. / Lerner, Ran ; ARCH Art & Design

12-028 Method to measure clock skew between two remote hosts connected through a computer network.; Rojas-Cessa, Roberto / Salehin, Khondaker M. ; NCE Electrical & Computer Engineering

12-029 Materials with temperature-controlled thermal conductivity; Dreyzin, Edward L. / Schoenitz, Mirko ; NCE Chemical, Biological & Pharmaceutical Engineering

12-030 System and method for implementing and monitoring a cyberspace security econometrics system and other complex systems; Mili, Ali / Abercrombie, Robert K. / Sheldon,, Frederick T. ; CCS Computer Science / Oak Ridge National Labs

12-031 Vector Coprocessor Sharing for Multicore Processors Towards Sophisticated Performance, Resource and Energy Gains; Beldianu, Spiridon F. / Ziavras, Sotirios G. ; NCE Electrical & Computer Engineering

12-032 Foamed Celluloid Mortar Propellant Increment Containers; Gogos, Costas G.,Zhu, LinJie / Bonnett, Peter / Young, Ming-Wan ; NCE Chemical, Biological & Pharmaceutical Engineering / PPI

12-033 Bioactivity and Osteogenic Activity of Composite Scaffolds; Arinzeh, Treena L. ; NCE Biomedical Engineering

12-034 Noninvasive Blood Glucose Meter; Dhawan, Atam P. / Ly, Kevin / Das, Anjali / Gowda, Mohanika / Shah, Shivani ; ADHC Honors

12-035 A Family of Highly Efficient Approximate String Matching Methods; Rudniy, Alex / Geller, James / Song, Min ; CCS Computer Science

12-036 A Highly Efficient Approximate String Matching Method based on Longest Approximately Common Prefix; Rudniy, Alex / Geller, James / Song, Min ; CCS Computer Science

12-037 A method for measuring impurity levels in semiconductors with spatial resolution; Cheng, Zimeng (Ben) / Chin, Ken K. ; CSLA Physics

12-038 Method and Apparatus to Measure Throughput of Data of Access Wireless Links through a remote host connected to the Internet ; Rojas-Cessa, Roberto / Salehin, Khondaker M. ; NCE Electrical & Computer Engineering

12-039 Design and manufacturing of a polymer humidity sensor for harsh environments;

Kazerani, Hamed / Federici, John F. / Sirkar, Kamalesh K. ; CSLA Physics / NCE Chemical, Biological & Pharmaceutical Engineering

12-040 OTECCS – Organics to electricity coupled cell system ; Rajan, Nevedha / Zaman, Asim / Christian, Margaret R. / Oh, Lindsey ; ADHC Honors

12-041 Soy protein and poly (L - lactic acid) blend nanofibers for drug delivery of Nardostachys jatamansi ; Tiwari, Swetha / Jaffe, Michael ; NCE Biomedical Engineering

12-042 The digital grid with packeted energy: a new way to deliver electrical power ; Grebel, Haim / Rojas-Cessa, Roberto ; NCE Electrical & Computer Engineering

12-043 Method for compacting dust in vacuum cleaner; Dreyzin, Edward L. / Schoenitz, Mirko ; NCE Chemical, Biological & Pharmaceutical Engineering

12-044 System for manufacture of thin pharmaceutical films by drying polymer-based solutions in controlled air/vapor mixture flow ; Khusid, Boris / Shen, Yueyang ; NCE Chemical, Biological & Pharmaceutical Engineering

12-045 Superdisintegrant-Based Nanocomposite Microparticles for Fast Redispersion and Dissolution of Active Pharmaceutical Agents ; Bilgili, Ecevit A. / Dave, Rajesh N. / Bhakay, Anagha A. / Azad, Mohammad A. ; NCE Chemical, Biological & Pharmaceutical Engineering

12-046 Method to remotely measure the processing time of a packet by a host connected through a computer network; Rojas-Cessa, Roberto / Salehin, Khondaker M.; NCE Electrical & Computer Engineering

12-047 A Novel Composite Matrix for Bone Repair Applications; Arinzeh, Treena L.; NCE Biomedical Engineering

12-048 Optimizing Cell Size for Energy Saving in Cellular Networks with Hybrid Energy Supplies; Ansari, Nirwan / Han, Tao; NCE Electrical & Computer Engineering

12-049 A Solvent-less Acoustic Mixing Based Process for Polymer Coating Active Pharmaceutical Ingredients; Dave, Rajesh N. / Capece, Maxx W. / To, Daniel ; NCE Chemical, Biological & Pharmaceutical Engineering

12-050 Particle engineering process for preparing a fast dissolving composite particle; Dave, Rajesh N. / Knieke, Catharina / Azad, Mohammad A. / Bilgili, Ecevit A. / To, Daniel ; NCE Chemical, Biological & Pharmaceutical Engineering

12-051 A process of preparing engineered composite particles and applying a bi-layer coating by a fluidized bed process; Dave, Rajesh N. / To, Daniel ; NCE Chemical, Biological & Pharmaceutical Engineering

12-052 Formation of thin films with self-assembled monolayers embedded on their surfaces; Singh, Pushpendra ; NCE Industrial & Manufacturing Eng.

12-053 A Simple Sleep Control Scheme Based on Traffic Monitoring and Inference for IEEE 802.16e/m Systems; Ansari, Nirwan / Zhang, JingJing ; NCE Electrical & Computer Engineering

12-054 Standards-compliant EPON Sleep Control for Energy Efficiency: Design and Analysis; Ansari, Nirwan / Zhang, JingJing ; NCE Electrical & Computer Engineering

12-055 Method for passive high resolution direction finding through spatial compressive sensing and efficient global search algorithm ; Rossi, Marco / Haimovich, Alexander M. ; NCE Electrical & Computer Engineering

12-056 Method for active high resolution direction finding through spatial compressive

sensing and efficient global search algorithm ; Rossi, Marco / Haimovich, Alexander M. ; NCE Electrical & Computer Engineering

12-057 AutisMind: Textured Original Invention (T.O.I); Esseghir, Amira / Selevany, Mariam / Asif, Kamran / Kuruvila, Livia; ADHC Honors

12-058 Cascading impacts of plant restoration on pollinator communities on a capped landfill in the New Jersey Meadowlands; DeVan, Caroline / Bunker, Daniel E. ; CSLA Biological Sciences

12-059 An Electrohydrodynamic Method and Device for Two-Phase Heat Transfer; Elele, Ezinwa / Khusid, Boris / Shen, Yueyang ; NCE Chemical, Biological & Pharmaceutical Engineering

12-060 A method and apparatus to predict ahead highly probable future misses in instruction caches and to initiate fetch signature based very early prefetch of the cache blocks; Ziavras, Sotirios G. / John, Johnsy K. / Gelinas, Robert / Kalamatianos, John ; NCE Electrical & Computer Engineering / AMD

12-061 Using Mean Failure Cost To Assess Security Measures; Mili, Ali / Sheldon, Frederick T. ; CCS Computer Science / Oak Ridge National Labs

12-062 Method for blind modulation classification of MIMO-OFDM signals ; Haimovich, Alexander M. / Liu, Yu / Agirman-Tosun, Handan ; NCE Electrical & Computer Engineering

12-063 Tracheostomy Airflow Monitor; Conneran, Maria E. / Antonicello, Nicole / Halbfoster, Brodie / Geraldo, Gabriel ; NCE Biomedical Engineering

12-064 Fiber reinforced hydrogel composites from gelatin/sulfated polysaccharides: An approach to mimic articular cartilage.; Muthalagu, Tamilvizhi / Collins, George / Arinzeh, Treena L. ; NCE Biomedical Engineering

12-065 Nano-sensor artificial pancreas; Thomas, Gordon A. / Kanwal, Alokik / Farrow, Reginald C. ; CSLA Physics

12-066 Decentralized Controls and Communications for Autonomous Distribution Networks in Smart Grid ; Ansari, Nirwan / Lo, Chun-Hao ; NCE Electrical & Computer Engineering

12-067 Painless Needle; Daudelin, Isaac B. / Taylor, Brian M. / Heberling, William W. / Jen, Jeremy ; ADHC Honors

12-068 Instabilities on Newtonian Films and Nematic Liquid Crystal Droplets; Kondic, Lou / Lin, Te-Sheng ; CSLA Mathematical Sciences

12-069 An Ontology-Supported Web-Search Process with Dynamic Augmentation ; Geller, James / Ochs, Christopher ; CCS Computer Science

12-070 Mathematical Models of Combustion at High Pressure ; Fong, Daniel ; CSLA Mathematical Sciences

12-071 A Novel Membrane and Process for Purification of Air Used to Produce N2-enriched air by Membrane Permeation; Sirkar, Kamalesh K.; NCE Chemical, Biological & Pharmaceutical Engineering

12-072 Waterproof Cast; Taherisefat, Mona / Pasiciel, Cielianna / Patel, Krish / Misistia, Anthony C. / Jaffe, Michael ; NCE Biomedical Engineering

12-073 Electrospinning Soy Protein and Crosslinking of Soy Protein Nanofibers; Friend, Colin / Collins, George / Jaffe, Michael ; NCE Biomedical Engineering

12-074 Methods for Robust Uplink Transmission for Remote Radio Heads with Centralized Processor via Distributed Compression; Park, Seok-Hwan / Simeone, Osvaldo / Sahin, Onur / Zeira, Ariela ; NCE Electrical & Computer Engineering

12-075 Methods for Joint Base Station Scheduling and Distributed Compression for Remote

Radio Heads with Centralized Processor; Park, Seok-Hwan / Simeone, Osvaldo / Sahin, Onur / Zeira, Ariela ; NCE Electrical & Computer Engineering / InterDigital

Licenses & Options

In FY 2012 NJIT licensed the following IP assets to a subsidiary of Intellectual Ventures:

- Fair Quantized Congestion Notification (FQCN) to Mitigate TCP Throughput Collapse in Data Center Networks. (*Nirwan Ansari and Yan Zhang) NJIT Reference Number 11-003.*
- An Enhanced EM (EEM) Algorithm and Its Application to Image Retrieval and Authentication (Yun-Qing Shi and GuoRong Xuan) *NJIT Reference Number 10-038*
- HERO: The Hierarchical Energy Optimization Algorithm for Data Center Networks (*Nirwan Ansari and Yan Zhang) NJIT Reference Number 11-036*
- Alleviating Solar Energy Congestion in the Distribution Grid via Smart Metering Communications Networks (*Nirwan Ansari and Chun-Hao Lo) NJIT Reference Number 12-026*
- Optimizing Cell Size for Energy Saving in Cellular Networks with Hybrid Energy Supplies (*Nirwan Ansari and Tao Han) NJIT Reference Number 12-048.*

NJIT also licensed these assets to EmCon Scientific LLC, a start-up involving Professor Som Mitra

- U.S. Patent No. 5,435,169, Issued 7/25/1995, entitled Continuous Monitoring of Organic Pollutants (Som Mitra) NJIT Reference Number 92-013; and
- U.S. Patent Application No. 61/323,864, Filed 4/13/2010, entitled System and Method for Novel Microtrap Preconcentrator for Green House Gas Monitoring (Som Mitra and Chutarat Saridara) NJIT Reference Number 10-004.

It also signed two option agreements, One in July 2011 with TMS Associates for the following IP:

- Hydrogel Composition for Use in Absorbent Materials (George Collins, Treena Arinzeh and Bhavita Joshi) NJIT Reference Number 11-044, and
- Provisional Patent Application Number 61/508,998 filed with the United States Patent and Trademark Office on July 18, 2011, entitled, System and Method for Absorbent Hydrogel.

And then one in June 2012 with Gunter Media Group for

- U.S. Provisional Patent Number 61/499,818, entitled An Ontology-Supported Web Search Process (James Geller) NJIT Reference Number 11-053; and
- An Ontology-Supported Web-Search Process with Dynamic Augmentation (James Geller and Christopher Ochs) NJIT Reference Number 12-069.

II.H.6. Business Incubation

NJIT's Enterprise Development Center is New Jersey's oldest and largest small business incubation program. It has become one of the largest university run, technology business incubators in the nation. It hosts more than 90 portfolio companies with combined revenues

of over $82M that have attracted over $67M in third-party investment. Collectively they have created almost 800 jobs in Newark and provided work experiences for over 300 students. EDC has been granted the status of "Soft Landings International Incubator" by the National Business Incubation Association, making it a preferred location for international companies seeking to establish a US base of operations. In related efforts, EDC leader, and NJIT Assoc. VP Judith Sheft has been instrumental in assisting government and university officials in Lima, Peru as well as in Spain and Portugal to establish incubator programs with the prospect of flowing those companies back through EDC when their needs grow.

EDC, founded in 1988 by NJIT, with assistance along the way from Prudential, the New Jersey Commission on Science and Technology, the New Jersey Economic Development Authority, and the U.S. Economic Development Administration, is the oldest and largest incubator facility in New Jersey, which is currently serving more than 80 client businesses. EDC provides a broad base of support and acts as a "proving ground" for new and developing high-tech products. Many client companies are developing commercial enterprises that reflect the university's major thrusts in information technology, health sciences, environmental science and engineering, and materials science and engineering. The university provides the latest technical information, including access to the university's specialized equipment, faculty experts and students. The success rate for EDC businesses is higher than 85 percent; more than 50 businesses have graduated from the incubator facility.

Based on its experience in high-tech business incubation, NJIT has placed a focus on increasing the depth and breadth of services that these incubators can offer to resident firms. In particular, the objective should be to promote business acceleration – growing companies more rapidly from business concept to fledgling business. On the technological front, underwriting the expense of access to university based personnel and equipment assets and facilitating the ability to compete for federal and foundation grant funding will more rapidly move companies to critical "proof of concept" and reduce the inherent risk to investors. In addition, adding new professional services liked shared support for marketing, information technology infrastructure, management team building and other critical growth items will increase the flow of successful businesses from existing incubators. NJIT has won several grants from the NJCS&T and has application spending with the National Science Foundation to further enhance its concepts for new business acceleration – and these are viewed as critical competitive advantages for the NJ-EDA led Innovation Zone program in Newark.

II.H.7. Businesses & Governmental Assistance Services

NJIT is dedicated to making practical connections between the resources of the university and the needs of New Jersey's business and industry. Academic research and contract development is one mode, but various forms of technology extension, workforce training and other assistance are essential elements necessary to reach companies of all sizes. The benefits are not limited to the private sector, as NJIT also assists state and local governments to achieve the benefits of technology insertion for business process improvement.

Advanced Manufacturing Talent Network

New Jersey's Department of Labor and Workforce Development awarded grants to six organizations to create "Talent Networks" in the priority industry clusters of the state strategic plan for economic development. The goal of the "Talent Networks" is to connect businesses in six key industries with educational institutions, workforce development

agencies, government and community groups to identify the skills and training Garden State employers require in prospective employees to remain competitive in the global market. By being trained in those skills, students and job-seekers will be able to find long-term jobs in New Jersey and help to boost the state's economy. The NJIT-led Advanced Manufacturing Talent Network, (ManufactureNJ) is an industry demand-side driven strategy to respond to current and future employment and education needs within this rapidly changing industry. The network will be an important change agent to empower an ever growing number of NJ companies and their workforces to effectively integrate advanced manufacturing technologies into daily operations and to do so across a large number of NJ companies not normally thought of as "manufacturers" such as in biomedical devices, pharmaceuticals, engineering technologies, computer and electronics, chemical, transportation equipment, machinery, electrical equipment, and petroleum, to name a few. Activities & objectives include

- Put workforce needs of advanced manufacturing sector FIRST among existing entities;
- Link with all M-NJ-related partners: industry, education, non-profit organizations, workforce-related entities, job seekers and across existing Talent Networks; and
- Build capacity of M-NJ Talent Network and each of its non-exclusive members through information and assistance

Lean Manufacturing Assistance

More than 100 New Jersey manufacturing firms benefited this year from the technical assistance programs of the Center for Manufacturing Systems (CMS). The center, directed by Wayne Chaneski, offers services that range from identifying short-term productivity improvement opportunities to long-term engagements geared toward streamlining entire operations. CMS also assisted companies with product design and prototyping, process development, plant layout, machining of complex parts, and training in modern manufacturing concepts.

Training in lean manufacturing is one of the center's most popular services. Lean techniques -- inventory reduction, reduced lead time, continuous flow, increased flexibility -- are critical to the small and mid-sized manufacturing businesses that are the center's clients. One project for Purepac Pharmaceutical, an Elizabeth-based manufacturer of generic drugs, focused on reducing setup time -- the time a machine is out of service for changeover between the end of one run and the beginning of another. The CMS team videotaped an actual machine setup, then helped employees to review the process and identify solutions to problems. One department also got 5S training (Sort, Set-in-Order, Shine, Standardize, and Sustain) for improving efficiency by reorganizing workspace.

II.H.8 New Jersey Immunization Information System and the New Jersey Local Information Network & Communications System

NJIT has put into production for statewide use the New Jersey Immunization Information System (NJIIS) and the New Jersey Local Information Network and Communications

System (NJLINCS) for the New Jersey Department of Health and Senior Services (NJDHSS).

NJIIS is an on-line immunization registry capable of enrolling all New Jersey children at birth and recording and evaluating their immunization histories for completeness under the Center for Disease Control and Prevention's current guidelines. Over 150,000 children are currently in the registry and more than 150 health departments, clinics and private physician's offices are currently participating via dial in modems or the Internet. NJIT installs client software at user sites, operates the servers and provides administrative and technical support for the NJIIS.

NJLINCS is an Internet based communications system that will link all local health departments with the NJDHSS in Trenton. NJLINCS provides rapid, two-way communication between state health officials and local health officers for dissemination and collection of health related information and data. NJIT operates the servers and provides administrative and technical support for the NJLINCS.

Other Assistance to Business

NJIT offers direct assistance to business through several services to small- and medium-sized businesses to encourage their growth and success. These services are delivered primarily through NJIT's six-business assistance centers:

- Technology Extension Program in Manufacturing Engineering (a component of the New Jersey Manufacturing Extension Partnership – NJMEP): a statewide manufacturing extension program to help small- and medium-sized manufacturing businesses to modernize and become more competitive
- Center for Information Age Technology (CIAT): integrates computer technology into the operations of New Jersey business, government, non-profit and educational organizations
- Center for Manufacturing Systems: assists manufacturers with prototype product development, process improvement and modernization with high speed machining center, advanced CAD/CAM and rapid prototyping facilities.
- Defense Procurement Technical Assistance Center: helps New Jersey small businesses obtain defense and other federal contracts
- Enterprise Development Center: small business incubators that help new and developing enterprises survive the typically difficult start-up stages;
- New Jersey Technical Assistance Program (NJTAP): helps New Jersey small- and medium-sized businesses comply with state and federal pollution prevention regulations;
- Micro-fabrication Center: serves to assist businesses with design and fabrication services related to silicon processing technologies in the university's clean room for MEMS and CMOS processing;
- Polymer Processing Institute: provides assistance to small businesses in processing of polymers and plastics.

NJIT also provides assistance to business through workforce development activities, research activities, economic development activities, and public service activities.

II.H.9. Sports/Sport Events

In 2011-12 NJIT completed our third year as a NCAA Division I member.

We had 247 student-athletes, 165 males and 82 females. Full and partial athletic scholarships were given to 139 student-athletes whose sum totaled just over $2.8. million. There were 131 scholar-athletes (53%) who earned a cumulative GPA of at least 3.0. The departments cumulative GPA remained over a 3.0 for an 8th consecutive semester. In addition 77 (31%) student athletes are members of the Albert Dorman Honors College.

In 2011-12 the university sponsored 18 intercollegiate varsity sports: baseball, M/W basketball, M/W cross country, M/W fencing, M/W soccer, M swimming, M/W tennis, M/W indoor and outdoor track, and M/W volleyball.

We continue to increase our national visibility. Our sports results-specifically men's basketball, and some women's basketball, are reported nightly on local tv news and radio outlets, the local sports networks MSG/SNY, and the ESPN family of networks. Stories of our teams have been discussed nationally on ESPN and the Today Show, and locally on many radio and TV stations, plus written articles in the Star Ledger, Wall Street Journal, and New York Times. We continue to play a national schedule with our teams facing teams in North Carolina, Utah, Texas, Florida, and many other states. Some of our men's and women's games were broadcast live- fox sports net in North Dakota and Utah. Men's basketball also had a game televised on ESPN 360, and streamed live on ESPN 3. Additionally we broadcast 42 basketball games (25 men/ 17 women) over the internet.

2011-12

Athletic Highlights include our women's tennis teams 2nd consecutive Great West Conference Championship, and a season won- loss record of 21-3. Our men's fencing won't the MACFA saber squad conference championship. Two of our more successful individual achievements include men's basketball player Isaiah Wilkerson, being named Great West Conference Player of the Year, and also an Associated Press (AP) honorable mention All-American. Men's volleyball player Brady Smith was an NCAA statistical champion, leading the nation in "digs per set.

Academic highlights include 50 student-athletes being named to their respective conference's all academic teams. In addition, our swimming, and men's and women's cross-country teams were recognized by their respective national coaching organizations as All- Academic teams.

Our marketing and promotions department won the NCAA women's basketball "Pack the House" for our conference. Over 20,000 people, mostly students, attended on campus athletic events.

The department continues to upgrade our facilities. This was the first full year the Naimoli center was available for use by the university community. We hosted many of our more

visible and important university wide events such as fall and winter open house, fall and spring career fairs and our freshmen convocation. We completed phase I of the press box renovation, and converted the lower level hall of fame room to an academic support area for the athletes. Our baseball team continues to play their home games at Bears & Eagles Riverfront Stadium.

Although we continue to search for a regional all sports conference, NJIT is still an active member of the Great West Conference. Other conference members include: Chicago State, Houston Baptist University, University of North Dakota, University of Texas at Pan American, and Utah Valley University.