

Institutional Profile Report *2014*

Prepared by the Office of Institutional Research and Planning
New Jersey Institute of Technology

September 2014

Statement of Accuracy and Completeness

The information contained in this report is, to the best of my knowledge, complete and accurate.

A handwritten signature in black ink, appearing to read "Joel Bloom". The signature is written in a cursive style with a large initial "J" and "B".

Joel S. Bloom

President

I. Table of Contents

I. TABLE OF CONTENTS	III
A. INTRODUCTION	1
B. NJIT MISSION STATEMENT.....	3
C. NJIT STRATEGIC PLAN 2010-2015.....	4
D. UNDERGRADUATE RECRUITMENT AND ADMISSIONS POLICIES	8
II. DATA BY CATEGORY	10
II.A. ACCREDITATION STATUS	10
II.A.1. Institutional Accreditation.....	10
II.A.2. Professional Accreditation	10
II.B. NUMBER OF STUDENTS SERVED.....	11
II.B.1. Number of Undergraduate Students by Attendance Status	11
II.B.2. Number of Graduate Students by Attendance Status.....	11
II.B.3. Number of Non-Credit Students Served	11
II.B.4. Unduplicated Number of Students for Entire Academic Year.....	12
II.C. CHARACTERISTICS OF UNDERGRADUATE STUDENTS	13
II.C.1. Mean Math, reading and writing SAT Scores	13
II.C.2. Enrollment in Remediation Courses by Subject Area	14
II.C.3. Race/ Ethnicity, Gender, and Age	15
II.C.4. Numbers of Students Receiving Financial Assistance under Each Federal-, State-, & Institution-Funded Aid Program.....	16
II.C.5. Percentage of Students who are New Jersey Residents	16
II.D. STUDENT OUTCOMES.....	17
II.D.1. Graduation Rates	17
II.D.1.a. Four-, Five- and Six-Year Graduation Rate by Race/Ethnicity.....	17
II.D.2. Third-Semester Retention Rates.....	17
II.D.2.a. By Attendance Status.....	17
II.E. FACULTY CHARACTERISTICS.....	18
II.E.1 Full-Time Faculty by Race/Ethnicity, Sex, and Tenure Status.....	18
II.E.2. Percentage of Course Sections Taught by Full-Time Faculty.....	19
II.E.3. Ratio of full- to part-time faculty.....	19
II.F. CHARACTERISTICS OF THE TRUSTEES OR GOVERNORS	20
II.F.1. Race/ Ethnicity and Sex.....	20
II.F.2. List of Trustees/ Governors with Titles and Affiliations.....	20
II.F.3. URLs of WebPages with Information on Trustees/ Governors	21
II.G. PROFILE OF THE INSTITUTION	22
II.G.1. Degree and Certificate Programs.....	22
II.H. MAJOR RESEARCH AND PUBLIC SERVICE ACTIVITIES.....	28
II.H.1. Sustainable Systems	30
II.H.2. Convergent Life Science & Engineering.....	36
II.H.3. Information Everywhere	39
II.H.4. Research Centers and Specialized Labs	44
II.H.5. NJIT Intellectual Property	47
II.H.6. Business Incubation	53

<i>II.H.7. Businesses & Governmental Assistance Services</i>	53
<i>II.H.8 New Jersey Immunization Information System and the New Jersey Local Information Network & Communications System</i>	55
<i>II.H.9 Developing Digital Learning</i>	56
II.I. MAJOR CAPITAL PROJECTS UNDERWAY IN FISCAL YEAR 2015	57
<i>II.I.1 Updating Facilities</i>	57
III. OTHER INSTITUTIONAL INFORMATION	58
III.A. DEGREES	58
<i>III.A.1. Bachelor’s Degrees Awarded in Fiscal Year 2013</i>	58
<i>III.A.2. Master’s Degrees Awarded in Fiscal Year 2013</i>	59
<i>III.A.3. Doctoral Degrees Awarded in Fiscal Year 2013</i>	60

A. Introduction

NJIT enrolled 10,130 students in Fall 2013. NJIT also awarded 2,176 degrees including baccalaureate through doctorate in the 2012-2013 fiscal year in an array of engineering and technology disciplines, computer and information science, architecture, management, applied sciences, mathematics and biotechnology. The university offers Ph.D. programs in 19 professional areas, master's programs in 59 specialties, and 49 baccalaureate degree programs; conducts research with important commercial and public policy applications; and performs a broad spectrum of economic development and public service activities. NJIT has one of the most computing-intensive campuses in America. NJIT also contributes significantly to New Jersey's economy and economic development. NJIT's students have provided 150,000 hours of community service over the past five years, and the university serves more than 5,000 elementary and secondary school students and teachers annually through an array of pre-college programs.

NJIT was founded in 1881 as the Newark Technical School. Today, the university has six schools and colleges: Newark College of Engineering (1919), the College of Architecture and Design (1973), the College of Science and Liberal Arts (1982), the School of Management (1988), the Albert Dorman Honors College (1993), and the College of Computing Sciences (2001). From the beginning, NJIT has provided government, industry, and the larger community with a technologically educated workforce. Today's emphasis on graduate studies and research builds upon the fine undergraduate programs that have distinguished the institution since its earliest days. Currently, about one-third of NJIT's students are enrolled in master's and doctoral programs.

NJIT's evolution as a significant research university has been achieved through an aggressive faculty recruitment plan matched by an extensive building effort that doubled the size of the main campus over the past decade and added major research facilities for environmental engineering and science, advanced manufacturing, and microelectronics. Annual research expenditures are now more than \$107.3 million. The strong applications orientation of the university's research program has allowed NJIT to respond to state, federal, and industrial initiatives, to help address pressing public policy issues, and stimulate economic growth. Research activities, often carried out by interdisciplinary teams of investigators, are focused especially on manufacturing systems, infrastructure, information technologies, environmental engineering and science, architecture and building science, and management. Major funding for instructional and research programs is obtained from leading corporations, foundations and government agencies including the National Science Foundation, the United States Department of Defense, the U.S. Environmental Protection Agency, the U.S. Department of Transportation and many others.

NJIT's 45 acre, computing-intensive, residential campus is located in the University Heights section of Newark, less than 10 miles from New York City and Newark International Airport. It is easily reached by interstate highways and public transportation. Graduate, undergraduate, and continuing education classes are offered at the main campus, at extension

sites at colleges and other locations throughout New Jersey and increasingly through a variety of electronically mediated distance learning formats.

B. NJIT Mission Statement

Mission

NJIT is New Jersey's science and technology university,

committed to the *pursuit of excellence* ----

- in undergraduate, graduate, and continuing professional *education*, preparing students for productive careers and amplifying their potential for lifelong personal and professional growth;
- in the conduct of *research* with emphasis on applied, interdisciplinary efforts encompassing architecture, design, the sciences, including the physical and life sciences, engineering, mathematics, and infrastructure systems, computing information and communications technologies and management;
- in *service* to both its urban environment and the broader society of the city, state, nation and global community by conducting public policy studies, making educational opportunities widely available, and initiating community-building projects;
- in contributing to *economic development* through the state's largest business incubator system, workforce development, joint ventures with government and the business community, and through the development of intellectual property;

NJIT *prepares its graduates* for positions of leadership as professionals and as citizens; *provides educational opportunities* for a broadly diverse student body; *responds to needs* of large and small businesses, state and local governmental agencies, and civic organizations; *partners with educational institutions* at all levels to accomplish its mission; and *advances the uses of sciences, technology, engineering and mathematics (STEM)* as a means of improving the quality of life.

C. NJIT Strategic Plan 2010-2015

Vision

A preeminent engineering, design, science and technology university known for research and education fostering innovation, entrepreneurship, and engagement.

Core Values

Our core values reflect our beliefs, guide our behavior, shape our culture, and in so doing establish a sense of community, common purpose and student focus.

Excellence

We innovate in the pursuit of excellence in all that we do and continue to improve in order to meet and sustain the highest standards of performance.

Integrity

We are honest and ethical in all we do, keep our promises, and acknowledge our mistakes.

Civility

We treat each other with respect and with dignity.

Social Responsibility

We pride ourselves in being an engaged partner in enhancing in the communities in which we live.

Diversity

We celebrate the diversity of our university community and are sensitive to cultural and personal differences. We do not tolerate discrimination of any form.

Communication

We strive to share information and understand each other's perspective.

Value Proposition

NJIT provides accessible, affordable education for the engineering, science and technology professions yielding an excellent return on investment to a diverse student body, delivers practical research results to its sponsors, and is an active participant in the life of the community in which it lives.

Goals

1. NJIT's goals are to: 1) grow the university's academic stature as measured by selectivity of the students, faculty and staff that we recruit and retain, 2) maintain and enhance the financial sustainability of the university's operations, 3) support increased research efforts that emphasize practical value and societal impact, 4) continue to improve the quality of campus life for all members of the NJIT community, 5) institutionalize a culture of innovation, entrepreneurship and engagement, 6) provide NJ residents with access to a first-rate, affordable education across all academic disciplines.

Strategic Priorities and Objectives

- *Enhance the quality of academic and campus life for the university community.*
 - Foster adherence to Core Values
 - Integrate the college/schools academic plans into a comprehensive university academic plan
 - Review, revise, and further implement elements of the facilities master plan
 - Strengthen shared governance
 - Upgrade the interior conditions of laboratories, studios, student work space, classrooms, and upgrade technology infrastructure
 - Reengineer administrative processes to improve customer and student satisfaction
 - Strengthen assessment of student learning and developmental outcomes and institutional effectiveness
 - Develop and implement major community-building initiatives, including fall and spring signature events, learning communities within all colleges and increased opportunities to participate in the performing arts
 - Complete the subsequent phases of the NJIT Gateway Plan
- *Sustain a base of private support.*
 - Continue to implement the strategic plan for the Alumni Association of NJIT
 - Reinforce and implement the branding communications plan focusing on selected key messages and university milestones
 - Increase alumni participation in the Annual Fund to the benchmark for public peer institutions over the next five years

- Successfully meet the proposed timeline to launch the planned Comprehensive Campaign
- Increase unrestricted annual gift revenue 5% per year over the next five years

➤ ***Be nationally recognized for thematic core areas of integrated research and learning in: (1) Sustainable Systems; (2) Life Science and Engineering; (3) Digital “Everyware”. For each core area:***

- Increase in scholarly activities in thematic areas as measured by: (a) increased sponsored research (b) increased publication and conference presentation count (c) increased active Ph.D. dissertation projects
- Expand relations with relevant professions and organizations, particularly in the each thematic education and research areas
- Implement campus-wide integrated research and demonstration projects in the thematic areas with an emphasis on interdisciplinary work and alignment with regional industry clusters
- Develop inventory of market-driven diversity in on-line degree programs, certificate programs, and graduate professional degree programs

➤ ***Be nationally recognized for attracting high-achieving students, faculty and staff from diverse populations.***

- Achieve an overall enrollment of 11,000 with an increasing percentage of graduate enrollment
- Increase the percentage of female students
- Benchmark current GRE and GMAT levels and establish admission tactics
- Maintain robust enrollment levels of Honors College and EOP students
- Improve retention and graduation rates of students at all levels
- Actively recruit women and minority faculty and university lecturers
- Be known for the achievements and reputation of our faculty
- Provide opportunities for personal and professional development.

D. Undergraduate Recruitment and Admissions Policies

As a public institution, NJIT strives to achieve three complementary and mutually reinforcing goals through its undergraduate recruitment and admissions policies:

- To attract highly talented students who are fully prepared for the university's rigorous curricular demands and can satisfy the highest academic standards;
- To enroll students from population groups that are under-represented in the professions, while providing the extra academic support they may need; and
- To recruit and admit students who will successfully complete one of NJIT's curricula in numbers large enough to make a substantial contribution toward meeting state and national demands for technological and managerial professionals.

These three goals are complementary and mutually reinforcing. They clearly reflect the responsibilities of a public institution with a public mission. And they are consistent with NJIT's long-range vision of joining the ranks of the nation's leading technological research universities.

There are four avenues to undergraduate admission:

- Admission to the Albert Dorman Honors College
- Regular admission
- Admission to the Educational Opportunity Program (EOP)
- Admission as a transfer student from another college or university

NJIT uses multiple methods to determine an applicant's admissibility. No single measure is sufficient to predict success. Therefore, all of the following are considered: high school transcripts and rank-in-class data; college or university transcripts where applicable; recommendations; SAT scores; interviews of candidates seeking admission to the Honors College or admission through the Educational Opportunity Program; and portfolios for candidates seeking admission to the College of Architecture and Design.

The *Albert Dorman Honors College* program is designed to attract exceedingly able and highly motivated students to NJIT, to provide a rich and challenging educational experience, and to prepare them for positions of leadership. Some NJIT courses are open only to honors students, but most include both honors and non-honors students; by participating in classes and laboratories with others, the honors students raise the level of discourse in all of NJIT's curricula. The SAT profile of the honors students (required minimum composite score of 1250) falls within the range that many people believe is not served by New Jersey's institutions. Enrollment in the *Albert Dorman Honors College* increased from 209 scholars in Fall 1993 to 687 in Fall 2013. The university's plans call for further significant expansion of the Honors College.

NJIT also has an outstanding *Educational Opportunity Program* (EOP) with an enrollment of 650 undergraduates in Fall 2013. It is a program of extraordinary importance to the state and nation because the people it typically serves are under-represented in the fields which NJIT prepares students to enter, and successful completion of an NJIT degree program generally leads to a productive career. The success of EOP graduates over a quarter century is further proof that multiple criteria should be used in determining who can benefit from the higher education experience. It should also be noted that the state, through its Educational Opportunity Fund, has by regulation required institutions to admit educationally and economically disadvantaged students in numbers equal to at least ten percent of the New Jersey high school graduates in each entering class. Because of NJIT's specialized mission and sense of commitment, NJIT has historically exceeded this percentage. NJIT firmly believes holding open this door to opportunity is one of the strengths of our state system of higher education.

NJIT is proud of the results achieved with its undergraduate recruitment and admissions policies. *Diversity* is a hallmark of the campus community. As the state's public technological research university, NJIT admits individuals who want to study in the fields it offers, regardless of personal background or family finances. Of all senior public institutions in NJ, NJIT serves the highest percentage of economically challenged students. It also offers 65% of undergraduate students financial aid. NJIT selects those who indicate a strong desire to succeed. For those who do succeed, the experience is life transforming. We believe this is what a public university should be about in a democratic society.

II. Data by Category

II.A. Accreditation Status

II.A.1. Institutional Accreditation

- The Middle States Association of Colleges and Schools (2002)
 - Additional Middle States accredited site in Beijing, China

In its session of June 28, 2012, the Middle States Commission on Higher Education acted to reaffirm accreditation for NJIT until the time of its next Periodic Review Report in 2017.

The report of the Middle States Commission evaluation team, led by Dr. Robert Palazzo, says:

“The New Jersey Institute of Technology meets or exceeds all fourteen standards outlined in the Characteristics of Excellence in Higher Education.”

“The New Jersey Institute of Technology is making a disproportionate impact in higher education given its means. In particular, NJIT is providing an admirable service to first-in-family students attending college. The students are excellent, well trained, and graduates are highly successful after leaving the university. NJIT’s success in providing a first-class education and college experience to a diverse student body is enviable.”

The full report of the evaluation team may be found on the NJIT Middle States Accreditation home page at <http://www.njit.edu/middlestates/evaluation.php>

II.A.2. Professional Accreditation

- American Assembly of the Collegiate Schools of Business (AACSB)
- Computer Accreditation Commission of the Accreditation Board for Engineering and Technology (CAC/ABET)
- Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET)
- National Architecture Accrediting Board (NAAB)

II.B. Number of Students Served

II.B.1. Number of Undergraduate Students by Attendance Status

**Table II.B.1:
Undergraduate Enrollment by Attendance Status, Fall 2013**

<u>Full-time</u>		<u>Part-time</u>		<u>Total</u>
<u>Num</u>	<u>Pct</u>	<u>Num</u>	<u>Pct</u>	
5,709	78.0%	1,608	22.0%	7,317

Source: IPEDS Fall Enrollment Survey

II.B.2. Number of Graduate Students by Attendance Status

**Table II.B.2:
Graduate Enrollment by Attendance Status, Fall 2013**

<u>Full-time</u>		<u>Part-time</u>		<u>Total</u>
<u>Num</u>	<u>Pct</u>	<u>Num</u>	<u>Pct</u>	
1,596	56.7%	1,217	43.3%	2,813

Source: IPEDS Fall Enrollment Survey

II.B.3. Number of Non-Credit Students Served

NJIT served 1033 non-credit students in fiscal year 2013.

II.B.4. Unduplicated Number of Students for Entire Academic Year

	<u>Headcount Enrollment</u>	<u>Credit Hours</u>	<u>FTE</u>
Undergraduate	8,127	192,908	8,038
Graduate	3,482	42,765	2,376
TOTAL	11,609	235,673	10,414

Source: IPEDS 12-Month Enrollment Survey

II.C. Characteristics of Undergraduate Students

II.C.1. Mean Math, reading and writing SAT Scores

**Table II.C.1:
Mean Math, Reading and Writing SAT Scores for First-Time Freshmen,
by Admission Status and Overall, Fall 2013**

	Full-Time Students						Part-Time Students					
	Math	N	Reading	N	Writing	N	Math	N	Reading	N	Writing	N
Regular Admits	621.7	810	556.0	810	550.1	807	515.4	72	427.6	72	433.2	72
EOF Admits	542.2	99	482.0	99	474.0	100	0.0	0	0.0	0	0.0	0
Special Admits	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
All Admits	613.1	909	547.9	909	541.6	907	515.4	72	427.6	72	433.2	72
Missing Scores		36		36		38		0		0		0

Source: SURE Fall Enrollment file

II.C.2. Enrollment in Remediation Courses by Subject Area

II.C.2 ENROLLMENT IN REMEDIATION COURSES

Total Number of Undergraduate Students Enrolled in Fall 2013

<u>Total Undergraduate Enrollment</u>	<u>Number of Students Enrolled in One or More Remedial Courses</u>	<u>% of Total</u>
7,317	138	1.9%

Total number of First-time, Full-time (FTFT) students enrolled in remediation in Fall 2013

<u>Total Number of FTFT Students</u>	<u>Number of FTFT Students Enrolled in One or More Remedial Courses</u>	<u>Percent of FTFT Enrolled in One or More Remedial Course</u>
957	93	9.7%

First-time, Full-time students (FTFT) enrolled in remediation in Fall 2013 by subject area

<u>Subject Area</u>	<u>Number of FTFT Enrolled In:</u>	<u>Percent of all FTFT Enrolled In:</u>
Computation	0	0.0%
Algebra	0	0.0%
Reading	0	0.0%
Writing	0	0.0%
English	93	9.7%

Source: SURE Fall Enrollment file

II.C.3 Race/ Ethnicity, Gender, and Age

Table II.C.3.a
Undergraduate Enrollment by Race/Ethnicity, Fall 2013

	White		Black		Hispanic		Asian*		American Ind.		Alien		Race Unknown*		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Full-time	1863	32.6%	498	8.7%	1110	19.4%	1148	20.1%	2	0.0%	275	4.8%	813	14.2%	5,709	100.0%
Part-time	391	24.3%	119	7.4%	246	15.3%	230	14.3%	2	0.1%	50	3.1%	570	35.4%	1,608	100.0%
Total	2,254	30.8%	617	8.4%	1,356	18.5%	1,378	18.8%	4	0.1%	325	4.4%	1,383	18.9%	7,317	100.0%

* Note: Asian includes Pacific Islanders and Unknown includes 2 or More Races.

Table II.C.3.b
Undergraduate Enrollment by Sex, Fall 2013

	Full-time					Part-time					Total				
	Male	Pct	Female	Pct	Total	Male	Pct	Female	Pct	Total	Male	Pct	Female	Pct	Total
	4,495	78.7%	1,214	21.3%	5,709	1,088	67.7%	520	32.3%	1,608	5,583	76.3%	1,734	23.7%	7,317

Table II.C.3.c
Undergraduate Enrollment by Age, Fall 2013

		LT 18	18-19	20-21	22-24	25-29	30-34	35-39	40-49	50-64	65+	Unknown	Total
Full-time	Num	17	1,650	1,748	1,506	528	159	54	36	11	0	0	5,709
	Pct	0.3%	28.9%	30.6%	26.4%	9.2%	2.8%	0.9%	0.6%	0.2%	0.0%	0.0%	100%
Part-time	Num	126	311	233	375	243	154	87	44	28	2	5	1,608
	Pct	7.8%	19.3%	14.5%	23.3%	15.1%	9.6%	5.4%	2.7%	1.7%	0.1%	0.3%	100%
Total	Num	143	1,961	1,981	1,881	771	313	141	80	39	2	5	7,317
	Pct	2.0%	26.8%	27.1%	25.7%	10.5%	4.3%	1.9%	1.1%	0.5%	0.0%	0.1%	100%

Source: IPEDS Fall Enrollment Survey

II.C.4. Numbers of Students Receiving Financial Assistance under Each Federal-, State-, & Institution-Funded Aid Program

**Table II.C.4:
Financial Aid from Federal, State & Institution-Funded Programs, AY 2012-13**

	<u>Recipients</u>	<u>Dollars(\$)</u>	<u>\$/Recipient</u>
<u>FEDERAL PROGRAMS</u>			
Pell Grants	2,703	11,058,000	4,091.01
College Work Study	289	398,000	1,377.16
Perkins Loans	315	253,000	803.17
SEOG	670	288,000	429.85
PLUS Loans	174	2,370,000	13,620.69
Stafford Loans (Subsidized)	3,121	13,144,000	4,211.47
Stafford Loans (Unsubsidized)	2,790	10,583,000	3,793.19
SMART & ACG or other	0	0	--
<u>STATE PROGRAMS</u>			
Tuition Aid Grants (TAG)	2,129	15,256,000	7,165.81
Educational Opportunity Fund (EOF)	423	471,000	1,113.48
Outstanding Scholars (OSRP)	0	0	--
Distinguished Scholars	36	30,000	833.33
Urban Scholars	25	22,000	880.00
NJ STARS	32	71,000	2,218.75
NJCLASS Loans	184	2,324,000	12,630.43
<u>INSTITUTIONAL PROGRAMS</u>			
Grants/Scholarships	1,953	18,645,000	9,546.85
Loans	0	0	--

Source: NJIPEDS Form #41 Student Financial Aid Report

II.C.5. Percentage of Students who are New Jersey Residents

**Table II.C.5
Fall 2013 Full-time First-time Undergraduate Enrollment
by State Residence**

<u>State Residents</u>	<u>Non-State Residents</u>	<u>Total</u>	<u>% State Residents</u>
966	63	1,029	93.9%

Source: IPEDS Fall Enrollment Survey

II.D. Student Outcomes

II.D.1. Graduation Rates

II.D.1.a. Four-, Five- and Six-Year Graduation Rate by Race/Ethnicity

Table II.D.1.a
Four-, Five- and Six-Year Graduation Rates of Fall 2007 Full-time First-time Degree-Seeking Undergraduates by Race/Ethnicity

	White		Black		Hispanic		Asian		Alien		Other *		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Fall 2007 Cohort	301		69		129		156		37		40		732	
Graduates after 4 years	59	19.6%	5	7.2%	24	18.6%	60	38.5%	14	37.8%	9	22.5%	171	23.4%
Graduates after 5 years	127	42.2%	18	26.1%	58	45.0%	90	57.7%	23	62.2%	20	50.0%	336	45.9%
Graduates after 6 years	173	57.5%	23	33.3%	72	55.8%	102	65.4%	26	70.3%	25	62.5%	421	57.5%

* Other includes American Indians, Native Hawaiian & Pacific Islanders, 2 or More Races and Unknown.

Source: IPEDS Graduation Rate Survey

II.D.2. Third-Semester Retention Rates

II.D.2.a. By Attendance Status

Table II.D.2
Third Semester Retention of First-time Undergraduates, Fall 2012 to Fall 2013

<u>Full-Time</u>			<u>Part-Time</u>		
<u>Fall 2012</u> <u>First-Time</u> <u>Undergraduates</u>	<u>Retained</u> <u>in</u> <u>Fall 2013</u>	<u>Retention</u> <u>Rate</u>	<u>Fall 2012</u> <u>First-Time</u> <u>Undergraduates</u>	<u>Retained</u> <u>in</u> <u>Fall 2013</u>	<u>Retention</u> <u>Rate</u>
938	807	86.0%	80	63	78.8%

SOURCE: IPEDS Fall Enrollment Survey, Part E

II.E. Faculty Characteristics

II.E.1 Full-Time Faculty by Race/Ethnicity, Sex, and Tenure Status

**Table II.E.1:
Full-Time Faculty by Race/Ethnicity, Sex, Tenure Status and Academic Rank, Fall 2013**

White		Black		Hispanic		Asian*		American Ind.		Alien		Race Unknown*		Total	
Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom	Men	Wom

Tenured

Professors	83	12	4	1	1	0	37	1	0	0	0	0	0	0	0	125	14
Associate Prof.	55	8	3	2	3	1	17	7	0	0	1	1	0	0	0	79	19
Assistant Prof.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
All Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	138	20	7	3	4	1	54	8	0	0	1	1	0	0	0	204	33

Without Tenure

Professors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Associate Prof.	3	0	0	0	0	0	1	0	0	0	0	1	0	0	0	4	1
Assistant Prof.	15	3	0	0	1	1	7	3	0	0	7	1	1	0	0	31	8
All Others	72	31	4	1	4	0	10	5	0	0	5	0	0	0	0	95	37
TOTAL	90	34	4	1	5	1	18	8	0	0	12	2	1	0	0	130	46

Total

Professors	83	12	4	1	1	0	37	1	0	0	0	0	0	0	0	125	14
Associate Prof.	58	8	3	2	3	1	18	7	0	0	1	2	0	0	0	83	20
Assistant Prof.	15	3	0	0	1	1	7	3	0	0	7	1	1	0	0	31	8
All Others	72	31	4	1	4	0	10	5	0	0	5	0	0	0	0	95	37
TOTAL	228	54	11	4	9	2	72	16	0	0	13	3	1	0	0	334	79

Source: IPEDS Human Resources Survey

* Note: Asian includes Pacific Islanders and Unknown includes 2 or More Races.

II.E.2. Percentage of Course Sections Taught by Full-Time Faculty

Fall 2013

Total Number of Course Sections	Taught by Full-time Faculty		Taught by Part-time Faculty		Taught by Others*	
	Number	Percent	Number	Percent	Number	Percent
	982	66%	304	21%	193	13%

Note: Others includes Full-time Administrators and Teaching Assistants

II.E.3. Ratio of full- to part-time faculty

Fall 2013

Full-time		Part-time		Total	
Num	Pct	Num	Pct	Num	Pct
413	63.2%	240	36.8%	653	100.0%

Source: IPEDS Human Resources Survey

II.F. Characteristics of the Trustees or Governors

II.F.1. Race/ Ethnicity and Sex

Board of Trustees by Gender and Ethnicity

	B	AI/AN	A/PI	H	W	Total
Male	0	0	1	0	11	12
Female	0	0	0	1	0	1
Total	0	0	1	1	11	13

B : Black/African American, Non-Hispanic

AI/AN : American Indian/Alaskan Native

A/PI : Asian/Pacific Islander

NRA : Non-Resident Alien

H : Hispanic

W : White, Non-Hispanic

U : Unknown

II.F.2. List of Trustees/ Governors with Titles and Affiliations

- Hon. Christopher J. "Chris" Christie, ex-officio,
Governor of the State of New Jersey
- Hon. Ras J. Baraka, ex-officio,
Mayor of the City of Newark
- Stephen P. DePalma, PE, PP, CME '72, (Chair)
Chairman and CEO (Ret.),
Schoor DePalma, Inc.,
- Dr. Vincent L. DeCaprio '72 (Co-Vice Chair)
President (Ret.),
Vyteris, Inc.
- Philip K. Beachem,
President,
New Jersey Alliance for Action
- Dennis M. Bone ,
President (Ret.),
Verizon New Jersey, Inc.
- Peter A. Cistaro '68,
Vice President, Gas Delivery (Ret.)
Public Service Electric and Gas Company
- C. Stephen Cordes '72 (Co-Vice Chair)
Managing Director (Ret.)
Clarion Partners
- Gary C. Dahms, PE, PP, CME,
President & CEO
T&M Associates
- Elizabeth ("Liz") Garcia, PE '73, (Co-Vice Chair)
Manager, Public Affairs (Ret.)
Infineum USA, LP

- Anthony J. Knapp Jr.,
Proprietor (formerly),
Black Horse Restaurant Group
- Lawrence A. Raia, P.E. '65,
Partner,
Raia Properties
- Anthony R. Slimowicz, Esq.
Sr. VP/ Chief Claims Officer
Crum & Forster
- Dr. Binay Sugla,
Chairman
Vesta LLC
- Joseph M. Taylor
Chairman & CEO
Panasonic Corporation of North America

II.F.3. URLs of WebPages with Information on Trustees/ Governors

- <http://www.njit.edu/about/boards/trustees/members.php>

II.G. Profile of the Institution

II.G.1. Degree and Certificate Programs

NJIT offered 127 degree programs (49 Bachelor's degree programs, 59 Master's programs, and 19 Doctoral programs) during fiscal year 2013:

Bachelors Degrees (49 programs, CIP Code listed after program name)

Applied Mathematics (W/ Rutgers-Nwk) (B.A.) 270301	Electrical Engineering (B.S.) 141001
Applied Physics (W/ Rutgers-Newark) (B.S.) 400801	Engineering Science (B.S.) 141301
Architecture (B.Arch.) 040201	Engineering Technology (B.S.) 150000
Architecture (B.S.) 040201	Enterprise Development (B.S.) 529999
Bachelor of General Studies (B.G.S.) 240102	Environmental Engineering (B.S.) 141401
Biochemistry (B.S.) 260202	Environmental Sciences (W/ Rutgers-Nwk) (B.S.) 030104
Bioinformatics (B.S.) 261103	Fine Arts (B.F.A.) 500701
Biology (W/ Rutgers) (B.A.) 260101	Geoscience Engineering (W/ Rutgers-Nwk) (B.S.) 143901
Biology (W/ Rutgers) (B.S.) 260101	History (W/ Rutgers-Nwk) (B.A.) 540101
Biomedical Engineering (B.S.) 140501	Human Computer Interaction (W/ Rutgers-Nwk) (B.S.) 110401
Biophysics (B.S.) 260203	Industrial Design (B.S.) 049999
Business (B.S.) 520201	Industrial Engineering (B.S.) 143501
Business & Information Systems (B.S.) 110401	Industrial Engineering [Dual W/ Rutgers-Nwk B.A. In Physics] (B.S.) 143501
Chemical Engineering (B.S.) 140701	Information Systems (W/ Rutgers) (B.A.) 110401
Chemistry (B.S.) 400501	Information Technology (B.S.) 110103
Civil Engineering (B.S.) 140801	Interior Design (B.A.) 500408
Clinical Laboratory Sciences (w/Rutgers) (B.S.) 511099	International Business (B.S.) 521101
Communication and Media (B.A.) 231303	Law/Technology and Culture (B.A.) 229999
Communication and Media (B.S.) 231303	Manufacturing Engineering (B.S.) 143601
Computational Sciences (B.S.) 261103	Mathematical Sciences (B.S.) 270101
Computer Engineering (B.S.) 140901	Mechanical Engineering (B.S.) 141901
Computer Science (B.S.) 110101	Science/Technology & Society (B.S.) 301501
Computer Science (W/ Rutgers) (B.A.) 110101	Science/Technology & Society (W/ Rutgers) (B.A.) 301501
Computing and Business (B.S.) 110701	Theater Arts & Technology (B.A.) 500502
Digital Design (B.A.) 100304	

NJIT's accelerated programs

NJIT offers or participates in 9 accelerated programs:

- B.S./M.S.
- B.Arch./M.S.
- B.S./M.S. with Kean University
- B.S./D.M.D. with Rutgers Biomedical and Health Sciences
- B.S./M.D. with Rutgers Biomedical and Health Sciences
- B.S./D.P.T. with Rutgers Biomedical and Health Sciences
- B.S./M.D. with St. George's University School of Medicine
- B.S./O.D. with the State University of New York-New York School of Optometry
- B.S./J.D. with Seton Hall University School of Law-Newark

Masters Degrees (59 programs, CIP Code listed after program name)

Applied Mathematics (M.S.) 270301	History (W/ Rutgers) (M.A.) 540101
Applied Physics (W/ Rutgers-Newark) (M.S.) 400801	History (W/ Rutgers) (M.A.T.) 540101
Applied Science (M.S.) 409999	Industrial Engineering (M.S.) 143501
Applied Statistics (M.S.) 270501	Information Systems (M.S.) 110401
Architecture (M.Arch.) 040201	Infrastructure Planning (M.I.P.) 040301
Architecture (M.S.) 040201	Interdisciplinary Studies (M.S.) 309999
Bioelectronics (M.S.) 140501	International Business (M.S.) 521101
Bioinformatics (M.S.) 261103	Internet Engineering (M.S.) 110901
Biology (W/ Rutgers) (M.S.) 260101	IT Administration and Security (M.S.) 110103
Biomedical Engineering (M.S.) 140501	Management (M.S.) 520201
Biostatistics (M.S.) 261102	Management of Technology (M.B.A.) 520299
Business and Information Systems (M.S.) 110401	Manufacturing Systems Engineering (M.S.) 143601
Chemical Engineering (M.S.) 140701	Materials Science & Engineering (M.S.) 141801
Chemistry (M.S.) 400501	Mathematical and Computational Finance (M.S.) 270301
Civil Engineering (M.S.) 140801	Mechanical Engineering (M.S.) 141901
Computational Biology (W/ Rutgers-Nwk) (M.S.) 261103	Occupational Safety & Health Engineering (M.S.) 142701
Computer Engineering (M.S.) 140901	Occupational Safety & Industrial Hygiene (M.S.) 150701
Computer Science (M.S.) 110101	Pharmaceutical Bioprocessing (M.S.) 144301
Computing and Business (M.S.) 110701	Pharmaceutical Chemistry (M.S.) 512004
Critical Infrastructure Systems (M.S.) 142701	Pharmaceutical Engineering (M.S.) 140701
Cyber Security & Privacy (M.S.) 111003	Pharmaceutical Materials Processing (M.S.) 141801
Electrical Engineering (M.S.) 141001	Pharmaceutical Systems Management (M.S.) 142701
Emergency Management & Business Continuity (M.S.) 110199	Power & Energy Systems (M.S.) 141001

Engineering Management (M.S.) 151501	Professional & Technical Communication (M.S.) 231303
Engineering Science (M.S.) 141301	Public Health (W/ UMDNJ & Rutgers) (M.P.H.) 512201
Enterprise Development (M.S.) 529999	Software Engineering (M.S.) 140903
Environmental and Sustainability Policy (M.S.) 440501	Telecommunications (M.S.) 141001
Environmental Engineering (M.S.) 141401	Transportation (M.S.) 140804
Environmental Science (W/ Rutgers-Nwk) (M.S.) 030104	Web Systems (M.S.) 111004
Healthcare Systems Management (M.S.) 510702	

Doctoral Degrees (19 programs, CIP Code listed after program name)

Applied Physics (W/ Rutgers-Newark) (Ph.D.) 400801
Biology (W/ Rutgers) (Ph.D.) 260101
Biomedical Engineering (W/ UMDNJ) (Ph.D.) 140501
Chemical Engineering (Ph.D.) 140701
Chemistry (Ph.D.) 400501
Civil Engineering (Ph.D.) 140801
Computer & Information Science (Ph.D.) 110101
Computer Engineering (Ph.D.) 140901
Computer Science (Ph.D.) 110701
Electrical Engineering (Ph.D.) 141001
Environmental Engineering (Ph.D.) 141401
Environmental Science (W/ Rutgers-Nwk) (Ph.D.) 030104
Industrial Engineering (Ph.D.) 143501
Information Systems (Ph.D.) 110401
Materials Science & Engineering (Ph.D.) 141801
Mathematical Sciences (W/ Rutgers) (Ph.D.) 270101
Mechanical Engineering (Ph.D.) 141901
Transportation (Ph.D.) 140804
Urban Systems (W/ Rutgers & UMDNJ) (Ph.D.) 459999

NJIT teaches, advises, and mentors doctoral students in one degree program where Rutgers University is the degree-granting institution:

- Management (*Ph.D.*) 520201

Graduate Certificates (16 programs, CIP Code listed after program name)

Applied Mathematics (Grad.Cert.) 270301
Architecture (Grad.Cert.) 040201
Business Administration (Grad.Cert.) 520201
Chemical Engineering (Grad.Cert.) 140701
Chemistry (Grad.Cert.) 400501
Civil Engineering (Grad.Cert.) 140801
Computer & Information Sciences (Grad.Cert.) 110101
Computer Engineering (Grad.Cert.) 140901
Electrical/Electronics & Communications Engineering (Grad.Cert.) 141001
English/Technical & Business Writing (Grad.Cert.) 231303
Industrial Engineering (Grad.Cert.) 143501
Information Sciences & Systems (Grad.Cert.) 110401
Mechanical Engineering (Grad.Cert.) 141901
Miscellaneous Biological Specialties (Grad.Cert.) 269999
Pharmaceutical Technology/Management (Grad.Cert.) 149999
Public Policy Studies (Grad.Cert.) 440501

NJIT's 2+2 and 3+2 programs

NJIT offers 2+2 programs through a joint admissions agreement with 10 county colleges:

- Bergen Community College
- Brookdale Community College
- Burlington County College
- County College of Morris
- Essex County College
- Hudson County Community College
- Mercer County College
- Middlesex County College
- Ocean County College
- Raritan Valley Community College
- Union County College

NJIT offers 3+2 programs through a joint admissions agreement with 3 colleges:

- Kean University
- Seton Hall University
- Stockton State College
- William Paterson University

NJIT's articulation arrangements

NJIT currently has articulation arrangements with the following 19 institutions:

- Bergen Community College
- Brookdale Community College
- Burlington County College
- Camden County College
- County College of Morris
- Cumberland County College
- Essex County College
- Hudson County Community College
- Kean University
- Mercer County College
- Middlesex County College
- Ocean County College
- Paul Smith's College
- Passaic County Community College
- Raritan Valley County College
- Union County College
- Seton Hall University
- Stockton State College
- William Peterson University

NJIT currently offers an accelerated B.S. in Information Technology at Camden County College and partners with Camden County College to offer courses leading to masters degrees in Engineering Management, Computer Science, and Information Systems

Collaborative Academic Degree Programs

Joint Degree Programs

- Rutgers - The State University, Newark Campus
- Rutgers Biomedical and Health Sciences

Joint programs with Rutgers - The State University, Newark Campus include:

- Applied Mathematics (B.A.) 270301
- Applied Physics (B.S.) 400899
- Biology (B.A.) 260101
- Biology (B.S.) 260101
- Computer Science (B.A.) 110101

- Environmental Science (*B.S.*) 030102
- Geoscience Engineering (*B.S.*) 141601
- History (*B.A.*) 450801
- Human Computer Interaction (*B.S.*) 110401
- Information Systems (*B.A.*) 110401
- Industrial Engineering (*B.S.*) 143501
- Applied Physics (*M.S.*) 400899
- Biology (*M.S.*) 260101
- Computational Biology (*M.S.*)
- Environmental Science (*M.S.*) 030102
- History (*M.A.T.*) 131328
- History (*M.A.*) 450801
- Applied Physics (*Ph.D.*) 400899
- Biology (*Ph.D.*) 260101
- Environmental Science (*Ph.D.*) 030102
- Mathematical Sciences (*Ph.D.*) 270101
- Urban Systems (*Ph.D.*) 459999

Joint programs with the Rutgers Biomedical and Health Sciences include:

- Public Health (*M.P.H.*) 512201
- Biomedical Engineering (*Ph.D.*) 104501
- Urban Systems (*Ph.D.*) 459999

II.H. Major Research and Public Service Activities

**R&D EXPENDITURES: Fiscal Year 2013
Institution: New Jersey Institute of Technology**

	Amount (Dollars in thousands)
Federally Financed Academic R&D Expenditures	57,466
Institutionally Financed Academic R&D Expenditures	40,592
State, Industry & Other Financed R&D Expenditures	9,252
Total Academic R&D Expenditures	\$107,310

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 FY2013, with research expenditures of over \$107M, including Federal funding of \$57.5M. Based on FY2011 data, the most recently available public rankings, NJIT placed sixth in the United States for research expenditures among all polytechnical universities. The top performers of the full list are shown in the table below. NJIT’s growth in research since then makes it likely that this position will remain unchanged through the next available ranking.

R&D expenditures at all polytechnical universities and colleges without a medical school, ranked by all R&D expenditures, by source of funds: FY 2011

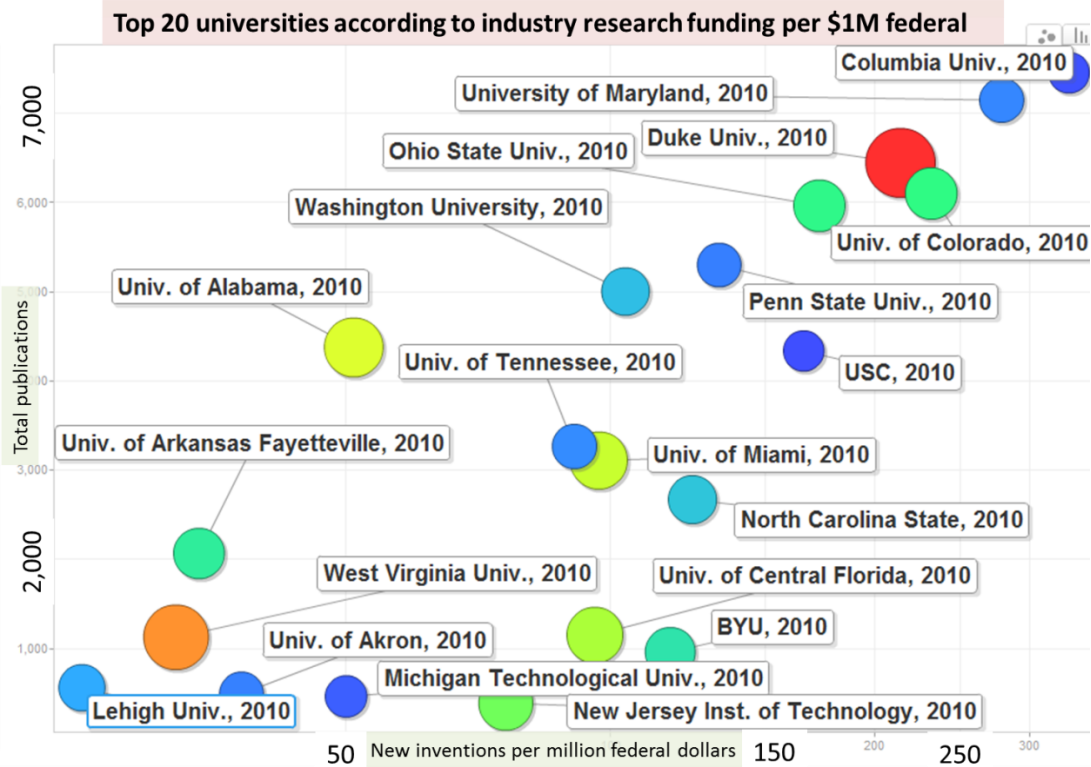
Natl Rank	Institution	All R&D expenditures	Federal government	State and local government	Industry	Institution funds	Found	All other sources
20	MA Institute of Technology	723,610	489,080	216	16,840	110,006	73,453	34,015
26	GA Institute of Tech	655,375	427,867	10,916	157,968	42,190	12,728	3,706

New Jersey Institute of Technology

41	VA Polytechnic Institute and State U.	450,058	189,198	108,768	107,683	22,777	19,019	2,613
58	CA Institute of Technology	377,514	342,945	1,780	4,927	8,202	16,807	2,853
122	TX Tech U.	149,399	35,191	19,559	73,712	10,914	10,023	0
148	NJ Institute of Technology	100,491	54,250	5,118	32,260	7,734	594	535
151	U. TX, Dallas	93,230	33,216	18,689	24,504	2,001	14,820	0
157	Northeastern U.	86,783	67,938	1,423	10,509	4,248	2,665	0
158	Rensselaer Polytechnic Institute	84,834	59,284	6,003	13,192	3,975	2,380	0
173	MI Technological U.	70,089	32,724	595	31,182	5,042	221	325
201	Colorado School of Mines	48,704	33,789	1,281	321	10290	3023	0
208	NM Institute of Mining and Technology	43,857	37,316	582	4,470	1,403	0	86

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Research and Development Expenditures at Universities and Colleges, FY 2011.

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 Rutgers Biomedical and Health Sciences 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, Rutgers Biomedical and Health Sciences, 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 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 multiple molecular 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 Rutgers Biomedical and Health Sciences, 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 RMI 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. Information Everywhere

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 its 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

- 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 Center for Brain Imaging conducts forefront research mapping the brain and brain functions
- 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, vergence eye movements.

ARCHITECTURE AND BUILDING SCIENCES

- Center for Building Knowledge: 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

- The Center for Natural Resource Preservation & Development pioneers technologies for sustainable development without ecological damage.
- 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-site environmental measurement.

MATERIALS SCIENCE AND MANUFACTURING

- CNBM Laboratory for New Energy Materials Research is developing tools and technologies for next generation thin film solar panel fabrication
- 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

SOLAR PHYSICS

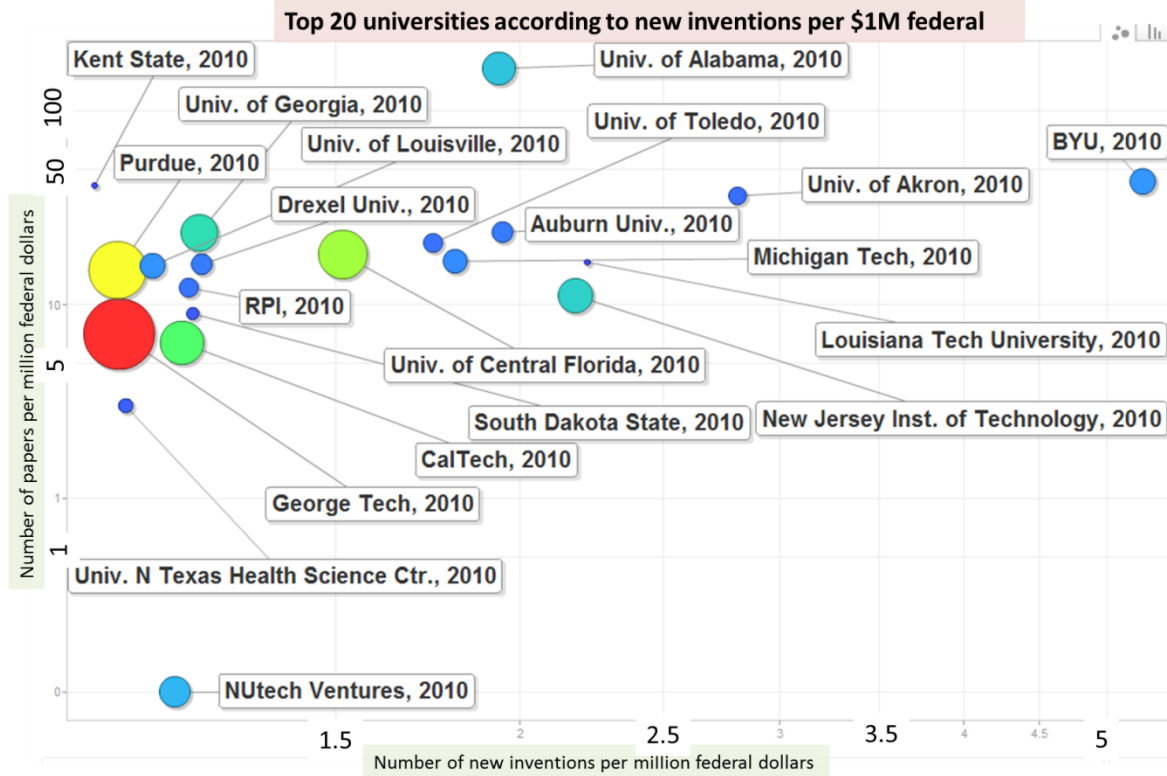
- Center for Solar-Terrestrial Research: Solar optical astronomy, solar radiophysics, terrestrial science.
- Big Bear Solar Observatory: Solar observation, helioseismology.
- Owens Valley Solar Array: Transient energetic phenomena, coronal magnetic fields.
- The Frequency-Agile Solar Radiotelescope (FASR) 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 Laboratory: 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.
- CSRZIC Laboratory for Rail System Network and Information Technologies is developing wireless technologies for high speed rail control systems and passenger services

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 Property 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, Abraham 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, Lakshmi / 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. / Zivras, 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, Trenea 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, Trenea 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. / Gelinias, 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 / Halfoster, 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 / Arinze, 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, Cieliana / 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 like 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 (NJIS) and the New Jersey Local Information Network and Communications System (NJLINCS) for the New Jersey Department of Health and Senior Services (NJDHSS).

NJIS 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 NJIS.

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 Developing Digital Learning

Over the past year and a half NJIT and Pearson Embanet have successfully partnered to enroll new students in the online MS in Civil Engineering along with its two online Graduate Certificates in Construction Management and Project Management. The services that Pearson Embanet provides include marketing, recruitment and retention.

In December, 2012 NJIT and Pearson Embanet expanded this relationship by agreeing to add three new degrees effective in fall 2013, along with companion graduate certificates, to the University's totally online graduate offerings. The three new degrees to be offered wholly online are the MBA, the MS in Electrical Engineering and the MS in Computer Science. Additionally, Pearson Embanet will manage the conversion of NJIT's course content to an online format, and will provide 24x7 Help Desk assistance for both faculty and students. By 2016, the plan also calls for the launch of six new fully online NJIT MS degrees, based on market-driven business analytic research on existing or new NJIT degrees which are industryready in that they provide advanced learning which is consistent with what specific industries are likely to need in the future. Extensive analysis has been completed by both Pearson Embanet and NJIT including an in-depth market analysis for each of the three new degrees. These students are predominantly part-time and take on average 1.5 classes each semester. Pearson Embanet will also share with NJIT what they have learned regarding Best Practices. This includes the use of a scheduling practice, referred to as a scalable course carousel which ensures that each cohort of students has the courses they need to graduate in a timely matter each and every semester.

This initiative holds the potential to bring to NJIT more than 1000 new graduate students, each studying entirely online in the next few years. Thus none of these students will need to use NJIT physical space in Newark, but plans have already been made to ensure that NJIT is equipped with appropriate expanded IT-related infrastructure and faculty and staff personnel who are required both to teach and provide services for such an increase of online-only learners in the overall NJIT student body. Discussions with Pearson Embanet with university administrators indicate that the company expects as much as three times the projected 1000 new graduate students once the program is fully functioning and fully marketed.

II.I. Major Capital Projects Underway in Fiscal Year 2015

NJIT is in the second phase of a multi-phase multi-year project to rehabilitate the former Newark Central High School. The original structure was built in 1919 with an addition to accommodate a gymnasium and swimming pool in 1970. The building is about 220,000 gross square feet and occupies a prominent position on Martin Luther King Jr. Blvd. With the award of \$86.3 million from the state of NJ, the project is now advancing rapidly and we anticipate completion by 2017.

The current phase is focused on preparing the 3rd and 4th floors for academic and research use. The 3rd floor will add approximately 500 seats to NJIT's campus classroom count. The 4th floor labs for Biology are scheduled for completion and occupancy in January 2015. The NJIT research staff, currently housed at Rutgers Newark, will be relocated to the new 4th floor labs upon completion. The next phase of the project will work to complete the exterior façade and interior fit up work.

A second state grant of \$13.5 million has been awarded to build an 'Integrative Life Science and Engineering Laboratory' as an extension to the existing York Center for Environmental Engineering and Science. This project will substantially expand laboratory space on campus. Work will begin shortly on this project and completion is expected by 2016.

II.I.I Updating Facilities

NJIT continues its program of major maintenance projects including roof repairs/replacements, HVAC system and control upgrades, building refurbishments and sustainability improvements.

As part of the overall planning efforts, NJIT is updating its space utilization plan to support the new strategic initiatives which includes hiring new faculty in targeted areas.

III. Other Institutional Information

III.A. Degrees

III.A.1. Bachelor's Degrees Awarded in Fiscal Year 2013

CIP Code	Institutional Program Title	Total
400801	Applied Physics	7
040201	Architecture	99
260202	Biochemistry	1
260101	Biology	60
140501	Biomedical Engineering	55
520201	Business	96
110401	Business & Information Systems	14
140701	Chemical Engineering	57
400501	Chemistry	5
140801	Civil Engineering	100
231303	Communication	9
140901	Computer Engineering	30
110101	Computer Science	42
150000	Computer Technology	21
110701	Computing & Business	2
150000	Concrete Industry Management	7
150000	Construction Engineering Tech	27
150000	Construction Management Tech	6
100304	Digital Design	15
150000	Electrical & Computer Eng Tech	38
141001	Electrical Engineering	59
141301	Engineering Science	3
030104	Environmental Science	7
540101	History	10
049999	Industrial Design	17
143501	Industrial Engineering	15
110401	Information Systems	11
110103	Information Technology	99
500408	Interior Design	16
521101	International Business	12
229999	Law, Technology and Culture	6
270101	Mathematical Sciences	24
141901	Mechanical Engineering	92
150000	Mechanical Engineering Tech	47
150000	Medical Informatics Tech	4

301501	Science, Technology & Society	9
150000	Surveying Engineering Tech	11
150000	Telecommunications Mgmt Tech	4
500502	Theater Arts and Technology	2
110401	Web & Information Systems	3
Total		1142

III.A.2. Master's Degrees Awarded in Fiscal Year 2013

CIP Code	Institutional Program Title	Total
270301	Applied Mathematics	5
400801	Applied Physics	3
270501	Applied Statistics	19
040201	Architecture	30
140501	Bioelectronics	1
261103	Bioinformatics	9
260101	Biology	4
140501	Biomedical Engineering	57
261102	Biostatistics	1
110401	Business & Information Systems	26
520299	Business Administration	44
140701	Chemical Engineering	28
400501	Chemistry	10
140801	Civil Engineering	51
261103	Computational Biology	1
140901	Computer Engineering	7
110101	Computer Science	98
110701	Computing & Business	2
142701	Critical Infrastructure	2
111003	Cyber Security & Privacy	2
141001	Electrical Engineering	81
110199	Emergency Management Bus Cont	3
151501	Engineering Management	80
141401	Environmental Engineering	12
440501	Environmental Policy Studies	4
030104	Environmental Science	11
520201	Healthcare Systems Management	2
143501	Industrial Engineering	24
110401	Information Systems	59
040301	Infrastructure Planning	8
521101	International Business	8
110103	IT Administration & Security	35
520201	Management	33

New Jersey Institute of Technology

143601	Manufacturing Systems Engr	1
141801	Materials Science &Engr.	7
270301	Mathematical & Comp Finance	2
520299	MBA Management of Technology	3
141901	Mechanical Engineering	28
142701	Occup. Safety & Health Engr.	7
144301	Pharmaceutical Bioprocessing	2
512004	Pharmaceutical Chemistry	31
140701	Pharmaceutical Engineering	37
142701	Pharmaceutical Sys Management	15
141001	Power and Energy Systems	21
231303	Professional & Tech Comm	6
140903	Software Engineering	5
141001	Telecommunications	13
140804	Transportation	2
Total		940

III.A.3. Doctoral Degrees Awarded in Fiscal Year 2013

CIP Code	Institutional Program Title	Total
400801	Applied Physics	7
260101	Biology	1
140501	Biomedical Engineering	5
140701	Chemical Engineering	7
400501	Chemistry	7
140801	Civil Engineering	4
140901	Computer Engineering	1
110101	Computer Science	3
141001	Electrical Engineering	9
141401	Environmental Engineering	1
030104	Environmental Science	1
143501	Industrial Engineering	1
110401	Information Systems	1
141801	Materials Science &Engr.	6
270101	Mathematical Sciences	7
141901	Mechanical Engineering	1
140804	Transportation	3
459999	Urban Systems	2
Total		67