

**NEW JERSEY INSTITUTE OF TECHNOLOGY**  
**BOARD OF TRUSTEES**  
**PUBLIC SESSION**  
**November 8, 2012 - 1:00 PM**

**Call to Order**

1. **Notice of Meeting to Public** (statement to be read by the Chair, a requirement of the NJ Open Public Meeting Act) **{pg. 4}**
2. **Presentations**
  - A. Board of Trustees Scholar Presentations (C. Fey) **{pg. 6}**
  - B. Recognition of Recent Faculty Achievements **{pg. 8}**
    - R. Farrow – Thomas A. Edison Patent Award
    - G. Thomas – Thomas A. Edison Patent Award
    - L. Lanzerotti – NJ Inventors Hall of Fame
    - N. Ansari – NJ Inventors Hall of Fame
  - C. Presentation on Alumni Association Updates (J. Stanley)
3. **Minutes** (Approve minutes of the September 13, 2012 meeting of the Board of Trustees) **{pg. 14}**
4. **Public Comments**
5. **Action Items**
  - A. Approve Resolution to Revise Bylaws of Gateway Corporation/ Foundation **{pg. 19}**
  - B. Approve Resolution to Authorize Line of Credit
  - C. Approve Resolution to Authorize Exclusive License of University Intellectual Property **{pg. 32}**
  - D. Approve Resolution to Authorize Exclusion of Certain Trustees and Officers from Required Filing **{pg. 35}**
  - E. Approve Resolution to Recognize the Passing of Victor A. Pelson
6. **Reports**
  - A. President's Report (J. Bloom)
  - B. Report on Research Growth Strategies, FY12 Submissions and Outcomes, Intangible Assets and EDC (D. Sebastian) **{pg. 39}**
  - C. Report of Gifts and Fund Raising Activities (C. Dees) **{pg. 59}**
  - D. Operating Statement Year to Date (H. Mauermeyer) **{pg. 62}**
  - E. Schedule of Short Term Investments (H. Mauermeyer) **{pg. 65}**

**7. Announcement of Next Meeting**

Chair to read resolution regarding Closed Session to discuss Personnel, Real Estate and Contract Matters to be held on Thursday, February 7, 2013, Eberhardt Hall NJIT Alumni Center.

Announce next public meeting: Thursday, February 7, 2013, Eberhardt Hall NJIT Alumni Center.

**Adjourn Public Meeting**

**New Jersey Institute of Technology**  
**--innovative, entrepreneurial, engaged**

**Mission**

NJIT is the *state's technological research 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, the sciences, including the health sciences, engineering, mathematics, transportation and infrastructure systems, information and communications technologies;
- 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;
- in *service* to both its urban environment and the broader society of the state and nation by conducting public policy studies, making educational opportunities widely available, and initiating community-building projects.

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 science, technology, engineering and mathematics (STEM)* as a means of improving the quality of life.

**Vision**

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

# **1. Notice of Meeting to Public**

**BOARD OF TRUSTEES**

**STATEMENT TO BE READ AT THE OPENING OF EACH  
MEETING OF THE BOARD OF TRUSTEES**

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**“NOTICE OF THIS MEETING WAS PROVIDED TO THE PUBLIC  
AS REQUIRED BY THE NEW JERSEY PUBLIC MEETING ACT, IN  
THE SCHEDULE OF MEETING DATES OF THE BOARD OF  
TRUSTEES OF THE NEW JERSEY INSTITUTE OF TECHNOLOGY  
WHICH WAS MAILED TO THE STAR LEDGER, THE HERALD NEWS,  
AND THE VECTOR ON JULY 19, 2012. THIS SCHEDULE WAS  
ALSO MAILED TO THE COUNTY CLERK ON JULY 19, 2012  
FOR FILING WITH THAT OFFICE AND POSTING IN SUCH PUBLIC  
PLACE AS DESIGNATED BY SAID CLERK.”**

## **2A. Board of Trustees Scholar Presentations**

## **Prospective Board of Trustees (BOT) Scholars for 2012-13**

### **Jaelynn King, Freshman, Chemical Engineering**

My Name is Jaelynn King and I am from West Deptford, New Jersey. Currently I am a freshman studying Chemical Engineering in the Newark College of Engineering as a member of the Albert Dorman Honors College. Although I have made the decision to add a minor, I am undecided as to whether I will minor in business or in chemistry. I am an active member of the NJIT chapter of the American Institute of Chemical Engineers as a member of the fuel technology team on this year's ChemE Car project. The decision to join the fuel division of the project was made in an effort to familiarize myself with creating new fuel technology, the area of Chemical engineering I would like to be my concentration. I am also looking forward to joining the NJIT chapters of Engineers Without Borders and Society of Women Engineers. Through these organizations, I look forward to being a member of projects that could potentially have an impact. Not only have I actively pursued my interests by joining organizations, I also began serving my new community by attending the Inauguration of President Joel Bloom as a flag bearer. Through this involvement, I felt a sense of pride while representing NJIT and thus I was able to foresee a strong connection between NJIT and myself in the future.

### **Anna Jezewska, Freshman, Mathematical Sciences**

My name is Anna Jezewska and I am currently a freshman from Wallington, New Jersey, majoring in Mathematical Sciences at NJIT. I have chosen the unique track of Mathematics of Finance and Actuarial Science in order to explore and broaden my understanding of the mathematical applications that are currently being implemented in a variety of diverse disciplines. My involvement on campus includes being a member of the Albert Dorman Honors College, Cross Country and Track and Field teams, and Engineers Without Borders. Off campus, I volunteer as an assistant coach for the girls' youth soccer league in my hometown and also at my local parish. Thus far, my on campus involvement and experience has been very rewarding and my plan for the near future is to continue to increase my participation in the different organizations and clubs available at NJIT. I am very interested in becoming more active in programs affiliated with the Honors College because of the multitude of opportunities it has provided me with since the day I set foot on campus. The Albert Dorman Honors College has allowed me to pursue higher education by easing my financial burdens and, in only one semester's worth of time, has given me one opportunity after the next to grow, prosper, and improve myself. My ultimate goals for my undergraduate career are to excel academically, to continue to gain insightful experiences, and to give back to the NJIT community.

## **2B. Recognition of Recent Faculty Achievements**

- **R. Farrow – Thomas A. Edison Patent Award**
- **G. Thomas – Thomas A. Edison Patent Award**
- **L. Lanzerotti – NJ Inventors Hall of Fame**
- **N. Ansari – NJ Inventors Hall of Fame**

**RESOLUTION COMMENDING  
PROFESSORS REGINALD FARROW**

**WHEREAS**, Research and Development Council of New Jersey has promoted the importance of R&D in the state for 50 years and;

**WHEREAS**, the Council has recognized significant inventions created in the state of New Jersey at its Edison Patent Award Ceremony, and;

**WHEREAS**, the Council convened a selection committee of experts that chose thirteen patents from diverse fields of endeavor for recognition at the Council's 33<sup>rd</sup> Edison Patent Award Ceremony at the Liberty Science Center on November 8, 2012, and;

**WHEREAS**, the patented device, "No Clog Shunt Using a Compact Fluid Drag Path" (U.S. Patent 8,088,091), invented by Professors Reginald Farrow and Gordon Thomas and former graduate student Sheng Liu, will receive the patent award in the medical device category, and;

**WHEREAS**, Dr. Reginald Farrow is a Research Professor in The Department of Physics at NJIT, and;

**WHEREAS**, the Board wishes to commend and express its appreciation for his accomplishments and the manner in which his work communicates NJIT's unique strengths and attributes;

**NOW THEREFORE, BE IT RESOLVED**, that the Board of Trustees of the New Jersey Institute of Technology does hereby thank and commend Professor Reginald Farrow and his research team for their work and dedication resulting in the award of a 2102 Edison Patent Award.

November 8, 2012

**RESOLUTION COMMENDING  
PROFESSORS GORDON THOMAS**

**WHEREAS**, Research and Development Council of New Jersey has promoted the importance of R&D in the state for 50 years and;

**WHEREAS**, the Council has recognized significant inventions created in the state of New Jersey at its Edison Patent Award Ceremony, and;

**WHEREAS**, the Council convened a selection committee of experts that chose thirteen patents from diverse fields of endeavor for recognition at the Council's 33<sup>rd</sup> Edison Patent Award Ceremony at the Liberty Science Center on November 8<sup>th</sup> 2012 , and;

**WHEREAS**, the patented device, "No Clog Shunt Using a Compact Fluid Drag Path" (U.S. Patent 8,088,091), invented by Professors Reginald Farrow and Gordon Thomas and former graduate student Sheng Liu, will receive the patent award in the medical device category, and;

**WHEREAS**, Dr. Gordon Thomas is a Professor in The Department of Physics at NJIT, and;

**WHEREAS**, the Board wishes to commend and express its appreciation for his accomplishments and the manner in which his work communicates NJIT's unique strengths and attributes;

**NOW THEREFORE, BE IT RESOLVED**, that the Board of Trustees of the New Jersey Institute of Technology does hereby thank and commend Professor Gordon Thomas and his research team for their work and dedication resulting in the award of a 2102 Edison Patent Award.

November 8, 2012

**RESOLUTION COMMENDING  
PROFESSOR LOU LANZEROTTI**

**WHEREAS**, the New Jersey Inventors Hall of Fame honors inventors, organizations, and others who have contributed to innovation in the Invention State. and;

**WHEREAS**, the New Jersey Inventors Hall of Fame selects individuals who have made a significant technological/scientific achievement such as a conceptual idea, theory, mathematical formula or the like, to be honored with the Innovators Awards, and;

**WHEREAS**, Professor Lou Lanzerotti, Research Professor in Physics is a scientist associated with NJIT's Center for Solar Terrestrial Research, and the principal investigator for the RBSPICE instrumentation recently put into orbit on two NASA satellites to develop an understanding of space weather and the behavior of the Van Allen Radiation Belts and;

**WHEREAS**, Professor Lanzerotti's lifetime of achievement in understanding the Impact of Solar-Terrestrial Processes on Technologies has resulted in his selection as an Innovator Award winner recognized at the New Jersey Inventors Hall of Fame Reception on October 18, 2012;

**NOW THEREFORE, BE IT RESOLVED**, that the Board of Trustees of the New Jersey Institute of Technology does hereby thank and commend Professor Lou Lanzerotti and his research team for their work and dedication resulting in the award of a 2102 New Jersey Inventor's Hall of Fame Innovators Award.

November 8, 2012

**RESOLUTION COMMENDING  
PROFESSOR NORWAN ANSARI**

**WHEREAS**, the New Jersey Inventors Hall of Fame honors inventors, organizations, and others who have contributed to innovation in the Invention State. and;

**WHEREAS**, the New Jersey Inventors Hall of Fame selects individuals who have made a significant technological/scientific achievement such as a conceptual idea, theory, mathematical formula or the like, to be honored with the Innovators Awards, and;

**WHEREAS**, Professor Nirwan Ansari, Professor of Electrical and Computer Engineering is an accomplished scholar and inventor who is an alumnus of the undergraduate class of 1982, and;

**WHEREAS**, Professor Ansari's many patents and publications in the area of Broadband Networks, Multimedia and Communications Technologies has resulted in his selection as an Innovator Award winner recognized at the New Jersey Inventors Hall of Fame Reception on October 18, 2012;

**NOW THEREFORE, BE IT RESOLVED**, that the Board of Trustees of the New Jersey Institute of Technology does hereby thank and commend Professor Nirwan Ansari and his research team for their work and dedication resulting in the award of a 2102 New Jersey Inventor's Hall of Fame Innovators Award.

November 8, 2012

## **2C. Presentation on Alumni Association Updates**

**Approve Minutes of the  
September 13, 2012 Meeting of  
the Board of Trustees**

**NEW JERSEY INSTITUTE OF TECHNOLOGY  
BOARD OF TRUSTEES  
MINUTES OF PUBLIC MEETING (DRAFT)  
(September 13, 2012)**

1. The meeting was called to order by Chairperson Wielkopolski at 1:00 p.m., in Eberhardt Hall, NJIT Alumni Center Boardroom, NJIT Campus, Newark, N.J. Also in attendance were Chair-Elect DePalma, Vice Chairs DeCaprio and Slimowicz, and Board Members Beachem, Bone, Cistaro, Dahms, Garcia, Knapp, and Raia. Absent: Board Member Babineua. Administrative members in attendance included President Bloom, Treasurer Mauermeyer, Secretary Stern, Provost Gatley, Vice Presidents Dees, Fey, Johnson and Sebastian.
2. In accordance with the New Jersey Open Public Meeting Act, Acting Chairperson DePalma read the following statement:

“Notice of this meeting was provided to the public as required by the New Jersey Meeting Act, in the schedule of meeting dates of the Board of Trustees of the New Jersey Institute of Technology which was mailed to the Star Ledger, The Herald News and Vector on July 19, 2012. The Schedule was also mailed to the City Clerk of Newark on July 19, 2012, for filing with that office and posting in such public place as designated by said Clerk.”

3. BY A MOTION DULY MADE BY MR. CISTARO, SECONDED BY DR. DeCAPRIO AND UNANIMOUSLY APPROVED, with the exception of Mr. Bone who noted that he was not present for that meeting, the Board voted to approve the minutes of the July 12, 2012 meeting of the Board of Trustees.
4. BY A MOTION DULY MADE BY MR. CISTARO, SECONDED BY MR. BEACHEM AND UNANIMOUSLY APPROVED, the Board voted to APPROVE RESOLUTION TO APPROVE GOURMET DINING SERVICES CONTRACT, with certain amendments to the contract as noted.
5. BY A MOTION MADE BY MR. DAHMS, SECONDED BY MR. BEACHEM AND UNANIMOUSLY APPROVED, the Board voted to APPROVE RESOLUTION COMMENDING THE NJIT MIDDLE STATES SELF-STUDY TEAM AND CHAIRPERSON PROFESSOR NORBERT ELLIOT.
6. BY A MOTION DULY MADE BY DR. DeCAPRIO, SECONDED BY MR. BONE AND UNANIMOUSLY APPROVED, the Board voted to APPROVE RESOLUTION TO APPROVE EXCLUSIVE PATENT LICENSE AGREEMENT WITH CATALENT.
7. BY A MOTION DULY MADE BY DR. DeCAPRIO, SECONDED BY MR. KNAPP AND UNANIMOUSLY APPROVED, the Board voted to APPROVE RESOLUTION TO APPROVE EXCLUSIVE PATENT LICENSE WITH INTELLECTUAL VENTURES.

8. BY A MOTION DULY MADE BY MR. SUGLA, SECONDED BY MR. DAHMS AND UNANIMOUSLY APPROVED, the Board voted to APPROVE RESOLUTION TO ACCEPT FY 12 AUDITED FINANCIAL STATEMENTS.
9. President Bloom gave a report on Strategic Planning Implementation Tactics. The Board had previously adopted a revised Strategic Plan for the period of 2010 – 2015. The Plan specifies, in matrix form, the strategy and objectives; who is responsible for the execution of the objectives; metrics, outcomes, and completion dates. He highlighted certain additions, including the objective relating to shared governance, and our plan to seek AGB assistance. Dr. Bloom reviewed updates to the last Strategic Plan, and stated that he intends to have twice yearly discussions with the Senior Staff. Additional discussion included facilities issues (Gateway Redevelopment), updated facilities Master Plan, Learning Communities, the Warren Street Village Project, noting the February meeting would focus on the Capacity Study. He also noted progress on our Communication Plan (particularly with respect to branding); the public phase of the Next Campaign; national recognition for thematic core programs; and the E-NJIT initiative including the launching 10 Masters degree programs for fall 2013. With respect to enrollment and retention, we are seeking to achieve a 61% graduation rate, and we will focus on advising, which will be an initiative of Dr. Charles Fey. Also, we will focus on diversity in hiring, particularly focusing on racial and gender diversity in the faculty.
10. Vice President Dees gave a report of gifts and fundraising activities. The year to date figures are similar to where we were at this time in previous years. The number of alumni participating is good. It is too early in the year to assess our progress, but we should have a better assessment at the next meeting. Chairperson Wielkopolski commended Dr. Dees on the quality of the alumni newsletter, and the letter of alumni activity.
11. Dr. Gentul gave a report on Fall enrollment. We are close to 10,000 students; including both undergraduate and graduate, which is an all time high. We have been more proactive about payment of tuition, and feel that the enrollment number is a solid number. We continue to have concern about MS enrollment, where there continues to be decline in enrollment, although the applicant pool was increased by 4%. We are looking at on-line MS programs to reverse the trend. The PhD enrollment has remained flat. Also, the average SAT score is at 1161, which is the highest ever, and 20 points higher than last year. In response to a question, Treasurer Mauermeyer noted that there is traditionally a 4 to 7% decline from the Fall to the Spring Semesters and we are monitoring the tuition and fee actual income.
12. Dr. Gatley gave a presentation on Faculty Hires for FY 2013. We have a total of 16 new tenured/tenure track faculty members, and 8 replacement ones as well as 9 university lecturers; the chart in the Board book describes the hires in relation to the thematic education and research areas, and the approved academic plan. There was a strong applicant pool, and we are excited about the addition of the new faculty.
13. Treasurer Mauermeyer discussed the Operating Statement Year to Date and the Schedule of Short Term Investments. He noted that the summer figures are included; the 53% noted in

the Board book includes both the Summer and Fall tuition and fees. He also pointed out that the \$22,174,000 noted as financial aid to students includes the university discount for tuition and fees. On the Supplemental Schedule, we have provided detailed accounts of academic and support activities. While it is early in the year, we do project the cost of payroll to make sure we are not overcommitted. With regard to the Schedule of Short Term Investments, our position of cash has improved over last year. We have good working capital, and we are watching opportunities carefully.

14. The Chairperson read a resolution regarding Closed Sessions to discuss Personnel, Real Estate, Contract and Legal Matters to be held immediately following this Public Session and on Thursday November 8, 2012 at 10:00 a.m. at Eberhardt Hall Alumni Center Board Room, to discuss personnel, real estate and contract matters. The following resolution was read and approved by all Trustees present.

WHEREAS, there are matters that require consideration by the Board of Trustees that qualify under the Open Public Meetings Act for discussion at closed sessions;

WHEREAS, it is not known precisely at this time when or if the contents of the discussions may be disclosed; however, no less frequently than annually, NJIT will cause the minutes of the closed sessions to be reviewed and disclose the discussion provided that the basis for conducting the closed session no longer exists and disclosure of the discussion will not adversely impact NJIT;

NOW, THEREFORE, BE IT RESOLVED, that the Board of Trustees shall have a Closed Session to discuss matters involving personnel, real estate and contracts to take place immediately following this meeting and on Thursday November 8, 2012 at 10:00 a.m., Eberhardt Hall, NJIT Alumni Center Board Room. The subjects of these meeting to include review of personnel and legal matters.

The next Public Session of the Board will take place on Thursday, November 8, 2012 at 1:00 p.m., Eberhardt Hall Board Room, following the Closed Session of the Board.

15. The public session adjourned at 1:35 p.m.

## **4. Public Comments**

**5A. Approve Resolution to Revise  
Bylaws of Gateway Corporation/  
Foundation**

## Resolution to Approve Amendments to Development Corporations By-Laws

Whereas, NJIT has established two corporations to facilitate the implementation of the Gateway Project, consisting of a for-profit corporation and a not-for-profit corporation, and

Whereas, After review it is deemed advisable to amend the By-Laws of the each corporation with respect to Board membership in the best interests of the University and the advancement of the Gateway Project, and

Whereas, It is recommended that each board consist of 10 members – Two (2) University officers – the President and the Senior VP for Administration and Treasurer; Two (2) members designated by the NJIT Board of Trustees; five (5) members designated by the NJIT President; and, the President of the Corporation, Ex-Officio, non-voting, and

Whereas, Necessary amendments to language related to the terms and election of the Board members and other minor clarifications are proposed and shown on the attached draft document, and

Now Therefore Be It Resolved that the Board of Trustees approves the amended By-Laws as shown on the attached document.

8 November 2012

BYLAWS OF  
CAMPUS GATEWAY FOUNDATION, INC.

ARTICLE I  
NAME AND ACTIVITIES

I.1 Name: The name of the organization, incorporated under the laws of the State of New Jersey, shall be "Campus Gateway Foundation, Inc." which shall be referred to hereinafter as the "Corporation". It was incorporated pursuant to the provisions of the New Jersey Nonprofit Corporation Act, N.J.S.A.15A:1-1, *et seq.* (the "Act").

I.2 Purposes: The Corporation is organized exclusively for charitable purposes within the meaning of section 501 (c) (3) of the Internal Revenue Code, or the corresponding section of any future federal tax code (the "Code"), including without limitation, the purpose (the "Purpose") of promoting and effectuating economic development, aesthetic improvement, quality of life and the redevelopment and rehabilitation of the University Heights neighborhood of Newark, New Jersey.

I.3 Uses of Resources: The Corporation shall be committed to using all of its resources for the accomplishment of the Purpose set forth in section 1.2 hereof, and the Corporation shall not accumulate income for any other purposes.

ARTICLE II  
OFFICES AND REGISTERED AGENT

II.1 Registered Office: The address of the registered office of the Corporation in New Jersey shall be as registered with the State of New Jersey, Department of Treasury, and shall be at such location as the Board of Trustees may from time to time determine.

II.2 Other Offices: The Corporation may also have offices at such other places within or outside the State of New Jersey as the Board of Trustees may from time to time appoint and the Purpose of the Corporation may require.

II.3 Registered Agent: The agent of the Corporation registered with the State of New Jersey shall have a business address identical with the registered office of the Corporation. The Registered Agent shall ensure that the Corporation files an Annual Report with the State of New Jersey and remains in good standing.

ARTICLE III  
MEMBERS

III.1 Members: The Corporation shall have no members entitled to vote on any matter. Any  
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provision of the Act, or any other provision of law requiring notice to, the presence of, or the vote, consent or other action by members of the Corporation, shall be satisfied by notice to, the presence of, or the vote, consent or other action by the Board of Trustees.

#### ARTICLE IV BOARD OF TRUSTEES

**IV.1 Terminology:** The Board of Trustees shall consist of all of the Trustees of the Corporation and is referred to herein as the Board of Trustees or the Board, such terms being interchangeable.

**IV.2 Management:** The business and the affairs of the Corporation shall be directed, controlled and managed by the Board which shall be the governing body of the Corporation.

**IV.3 Duties of Board of Trustees:** The Board shall manage all of the affairs, the property and funds of the Corporation, and shall have the duty and authority to do and perform all acts consistent with these Bylaws, the Certificate of Incorporation of the Corporation and any amendments thereto, and the laws of the State of New Jersey including, without limitation, the authority to:

- (a) Set the objectives and goals of the Corporation and define the role it should play in accomplishing its Purpose;
- (b) Establish policies and programs for the Corporation in accordance with approved objectives and goals;
- (c) Adopt a long-range master plan for the orderly development of the policies and programs;
- (d) Establish controls to ensure that approved policies and programs are implemented;
- (e) Consider and approve annual operating and capital budgets for implementing plans and programs;
- (f) Provide for the adequate financing of operations by ensuring sufficient revenue, establishing sound financial policies and enforcing controls over expenditure policies;
- (g) Establish investment policies for all investable capital of the Corporation and review the implementation of such policies; and
- (h) Elect ~~Designate~~ the individuals who shall serve as officers of the Corporation.

**IV.4 Numbers, Designation and Terms of Office:**

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(a) The Board shall consist of ~~not less than three (3) and not more than eleven (11) ten~~  
~~(10) individuals voting members and one (1) non-voting member, with the actual number of Trustees to~~  
~~be set from time to time by resolution of the Board of Trustees.~~

(b) The Board shall include the individuals serving in the following capacities for New  
Jersey Institute of Technology: ~~President and the Senior Vice President for Administration and Treasurer,~~

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~~President;~~  
~~Senior Vice President for Administration and Treasurer;~~  
~~Vice President for Academic and Student Services;~~  
~~Associate Vice President for Finance and Controller;~~  
~~Associate Treasurer.~~

(c) ~~One Two~~ members of the Board shall be designated by the Board of Trustees of New  
Jersey Institute of Technology.

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~~(e)(d) Five members shall be designated by the President of New Jersey Institute of~~  
~~Technology.~~

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~~(e) President of the Corporation, as Ex-officio, non-voting.~~

~~(d)(f) The Trustees shall be elected designated at the Annual Meeting of the Board of~~  
~~Trustees, by the vote of a majority of the Board then in office.~~

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~~(e)(g) All Trustees shall retain their respective offices as Trustees until their successors shall~~  
~~be duly elected designated and qualified, except Trustees who are removed or who resign from office~~  
~~whose tenures as Trustees shall terminate upon their resignation or removal.~~

**IV.5 Governance of the Board:** The Board shall be governed by the Chairperson of the Board  
~~elected designated~~ annually by the Board at its Annual Meeting from those Trustees ~~elected designated~~  
said meeting.

(a) It shall be the duty of the Chairperson of the Board to:

1. Exercise overall supervision of Board affairs, be a voting member, and preside  
at all meetings of the Board;

2. Provide leadership to the Board and any committees in the formulation,  
development, and evaluation of the Corporation's policies and goals; and

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3. Serve as liaison between the President and the Board and work with the President on a continuing basis.

**IV.6 Compensation:** No Trustee shall receive any compensation for his or her services as a Trustee. The foregoing shall not prevent the Board from providing reasonable compensation to a Trustee for the providing of goods or services to the Corporation if such contract is in the best interest of the Corporation and is on fair and reasonable terms, as determined by a vote of Trustees not having a material financial interest in the matter. The Board may reimburse any Trustee for expenses actually and necessarily incurred in the performance of his or her duties as a Trustee.

**IV.7 Conflicts of Interest:**

(a) Any conflict of interest on the part of any Trustee shall be disclosed to the Board of Trustees.

(b) Any Trustee having a conflict of interest shall not vote on the matter subject to such conflict, but shall be counted in determining the quorum for action by the Board on such matter, and shall be absent from the meeting during deliberation and voting on such matter after stating his or her position and responding to any questions on the matter. The minutes of the meeting shall reflect that a disclosure was made, and the abstention from voting on such matter. Any new Trustee will be advised of this policy upon undertaking the duties of his/her office.

(c) The Board shall adopt a Conflict of Interests Policy consistent with this section IV.7 of these Bylaws.

**IV.8 Removal or Suspension of Trustees:**

(a) Any Trustee may be removed or suspended from office, for cause, by the vote of at least two-thirds of the Trustees.

(b) Prior to such removal or suspension of a Trustee; he or she shall be entitled to make an appearance at a meeting of the Board of Trustees and be heard on the subjects under consideration. Such appearance shall not constitute a formal hearing and the Trustee shall not be entitled to be represented by counsel at such meeting. The removal of any Trustee shall take effect immediately upon the conclusion of the action by the Board. Trustees removed from office shall not retain their respective offices as Trustees until their successors shall be duly appointed or elected ~~designated~~ and qualified.

(c) The Chairperson of the Board of Trustees shall have the authority, whenever action must be taken immediately in the best interest of the Corporation, to summarily suspend any member of the Board of Trustees, pending the appearance provided for in subsection (b) of this section IV.8, which shall not be unduly delayed.

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**IV.9 Resignation of Trustees:** Any Trustee may resign from office, with or without cause, by delivering a written statement of resignation to the President of the Corporation or Chairperson of the Board. Any such resignation shall take effect, at the option of the Board, immediately upon its receipt or at a later date, if a later effective date for the resignation is specified in the notice of resignation.

**IV.10 Vacancies on the Board of Trustees:** The Board of Trustees may at any meeting fill any vacancy, including a vacancy resulting from the enlargement of the Board, for a term ending at the date of the next Annual Meeting at which time a Trustee shall be ~~elected~~ designated to fill the vacancy in the manner prescribed by section IV.4 hereof.

**IV.11 Meetings of the Board of Trustees:** The Board shall meet no fewer than five times a year. At the Annual Meeting, which may run concurrently with a regular meeting, the Board shall be ~~elected~~ designated, the officers of the Corporation shall be elected, the Chairperson of the Board shall be elected, and the Chairperson shall appoint members of any committees for approval by a majority of the Board. The term of office for Trustees, the Chairperson and the officers elected and appointed as provided herein shall begin immediately. The date, time, and place of the Annual Meeting and regular meetings shall be fixed by resolution of the Board.

**IV.12 Special Meetings:** Special meetings of the Board may be called by the Chairperson of the Board, the President, or any three Trustees.

**IV.13 Notice:** Notice of the Annual Meeting, regular meetings and any special meetings of the Board shall be mailed or sent by fax or electronic mail to the Trustees at least ten (10) days but not more than sixty (60) days before the meeting except for regular meetings for which no notice is required. Notice of any meeting shall not be necessary for any person who attends the meeting or who signs a written waiver of notice before or after the meeting is held. Any person who does not protest proper notice prior to the conclusion of a meeting shall be deemed to have waived notice of such meeting.

**IV.14 Voting and Quorum of Trustees for Transacting Business:** A majority of the Board shall constitute a quorum at a meeting of the Board. A majority of the voting members of any committee of the Board shall constitute a quorum for the transaction of business of such committee. Whenever less than a quorum is present at any duly noticed meeting of the Board, or of any committee of the Board, a majority of those present may adjourn the meeting without notice of such adjournment other than by announcement at the meeting. No such meeting shall be reconvened following adjournment until proper notice under these Bylaws has been given to each of the Trustees of the time and place of such reconvened meeting. Each Trustee shall have one (1) vote on each matter submitted to the Board of Trustees for his/her vote, consent, waiver, release or other action. The affirmative vote of a majority of the Trustees or committee members present at any meeting of the Board or committee, respectively, at which there is a quorum shall be the act of the Board or of the committee, respectively, except when a larger vote may be required by the laws of the State of New Jersey, these Bylaws, or the Certificate of Incorporation of the

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Corporation. A Trustee of the Corporation who is present at a meeting of the Board of Trustees, at which action on any matter is before the Board for a vote, shall be presumed to have assented to the action taken unless he votes against such action or abstains from voting because of an asserted conflict of interest.

**IV.15 Actions by Unanimous Written Consent:** Any action required or permitted at any meeting of the Board or any committee thereof may be taken without a meeting, without prior notice and without a vote if all of the Trustees or members of the committee, respectively, entitled to vote thereon consent in writing. Said written consents shall be filed with the minutes of the proceedings and shall have the same effect as a vote for all purposes.

**IV.16 Conference Telephone:** A member of the Board or of any committee may participate in a meeting by means of conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear one another. Participation in a meeting in this manner constitutes presence in person at the meeting.

## ARTICLE V OFFICERS OF THE CORPORATION

**V.1 Officers:** The officers of the Corporation shall consist of a President, a Secretary, a Treasurer and such other officers as the Board may from time to time determine. Any person may hold more than one office, but no officer shall execute, acknowledge or verify any instrument in more than one capacity if the instrument is required by law or by the Bylaws to be executed, acknowledged or verified by two or more officers.

**V.2 Election and Term of Office:** Officers of the Corporation shall be elected at the Annual Meeting of the Board of Trustees, by the vote of a majority of the Board elected at such meeting. Each officer shall be elected for a term of one (1) year. The duties of the President, the Secretary and the Treasurer are set forth in sections V.5 through V.7 hereof.

**V.3 Removal:** Any officer may be removed by the affirmative vote of a majority of the Trustees at any regular or special meeting of the Board.

**V.4 Vacancies:** In the event of the death, resignation, removal or other inability to serve of any officer, the Board shall appoint a successor who shall serve until the expiration of the normal term of such officer or until his or her successor shall be elected or appointed.

**V.5 President:** The President shall be the chief executive officer of the Corporation. He or she shall be responsible to the Board for the planning, direction and development of the Corporation within the framework of programs approved by the Board. The President may enter into and execute in the name of the Corporation contracts or other instruments in the regular course of business or contracts or other instruments not in the regular course of business which are authorized, either generally or specifically, by

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the Board. He or she shall direct and coordinate the administration and management of the Corporation. The President shall have the power to hire employees of the Corporation and to terminate the employment of employees of the Corporation, except officers of the Corporation. The President shall supervise the maintenance of the Corporation's books of account and its annual financial statements.

**V.6 Secretary:** The Secretary shall have the authority to enter into and execute in the name of the Corporation contracts or other instruments in the regular course of business or contracts or other instruments not in the regular course of business which are authorized, either generally or specifically, by the Board. The Secretary shall keep accurate corporate records, including minutes of all proceedings of the Board and its committees.

**V.7 Treasurer:** The Treasurer shall maintain the financial books and records of the Corporation and shall provide financial information to the Board, review reports of the Corporation's financial position and transactions with the Board, and provide sufficient information to enable the Board to evaluate the financial affairs of the Corporation. The Treasurer shall have the authority to enter into and execute in the name of the Corporation contracts or other instruments in the regular course of business or contracts or other instruments not in the regular course of business which are authorized, either generally or specifically, by the Board.

## **ARTICLE VI COMMITTEES**

**VI.1 Creation of Committees:** The Board of Trustees may, by resolution passed by a majority of the whole Board, designate an Executive Committee and one or more other committees.

**VI.2 Executive Committee:** The Executive Committee (if there is one) shall consult with and advise the officers of the Corporation in the management of its affairs and shall have and may exercise, to the extent provided in the resolution of the Board of Trustees creating such Executive Committee, such powers of the Board of Trustees as can be lawfully delegated by the Board.

**VI.3 Other Committees:** The Board of Trustees may designate other committees that shall have such functions and may exercise such power of the Board of Trustees as can be lawfully delegated and to the extent provided in the resolution or resolutions creating such committee or committees.

**VI.4 Meetings:** Regular meetings of the Executive Committee and other committees may be held without notice at such time and at such place as shall be determined by resolution of the Executive Committee or such other committees, and special meetings of the Executive Committee or such other committees may be called by any member thereof upon two (2) days' notice to the other members of such committee, or on such shorter notice as may be agreed to in writing by each of the other members of such committee, given either personally or in the manner provided in these Bylaws pertaining to notice for Board meetings.

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**VI.5 Vacancies:** Vacancies on the Executive Committee or on other committees shall be filled by the Board of Trustees then in office at any regular or special meeting of the Board of Trustees.

**VI.6 Quorum:** At all meetings of the Executive Committee or other committees, a majority of the committee's members in good standing shall constitute a quorum for the transaction of business.

**VI.7 Manner of Acting:** The acts of a majority of the members in good standing of the Executive Committee or other committees present at any meeting at which there is a quorum shall be the act of such committee.

**VI.8 Minutes:** The Executive Committee and the other committees shall keep regular minutes of their proceedings and report the same to the Board of Trustees when required.

## **ARTICLE VII EXCULPATION AND INDEMNIFICATION**

**VII.1 Exculpation:** No Trustee or officer shall be personally liable to the Corporation for damages for breach of any duty owed to the Corporation, except that this provision shall not relieve a Trustee or officer from liability for any breach of duty based upon an act or omission (1) in breach of such person's duty of loyalty to the Corporation, (2) not in good faith or involving a knowing violation of law, or (3) resulting in receipt by such person or an improper personal benefit.

**VII.2 Indemnification:** The Corporation shall indemnify, in the manner and to the full extent permitted by the Act, any "corporate agent" of the Corporation (as such term is defined in Section 15A:3-4 of the Act) who was or is a party to, or is threatened to be made a party to, any "proceeding" (as such term is defined in said Section 15A:3-4), whether or not by or in the right of the Corporation, by reason of the fact that such person is or was a corporate agent of the Corporation. Where required by law, the indemnification provided for herein shall be made only as authorized in the specific case upon a determination that indemnification of the corporate agent is proper in the circumstances. To the full extent permitted by law, the indemnification provided herein shall include "expenses" (as such term is defined in said Section 15A:3-4) and in the manner provided by law, including the receipt of any undertaking that may be required by law, any such expenses may be paid by the Corporation in advance of the final disposition of such proceeding. The indemnification provided herein shall not be deemed to limit the right of the Corporation to indemnify any other person for any such expenses, nor shall it be deemed exclusive of any other rights to which any person seeking indemnification from the Corporation may be entitled under any agreement, corporate resolution, or otherwise, both as to action in such person's official capacity, and as to action in another capacity while holding such office.

**VII.3 Insurance:** The Corporation, with the approval of the Board, may purchase and maintain insurance on behalf of any person who is or was a Trustee, officer, employee or agent of the Corporation

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and on behalf of the Corporation against any liability asserted against him, her, or the Corporation and incurred by him, her, or the Corporation in any such capacity, or arising out of his or her status as such, whether or not the Corporation would have the power to indemnify him or her against such liability under the provisions of this Article.

**VII.4 Advice of Counsel:** Neither the Corporation nor its Trustees, officers, employees or agents, nor any person acting on its behalf shall be liable to anyone for any determination as to the existence or absence of conduct which would provide a basis for making or refusing to make any payment under this Article or for taking or omitting to take any other action under this Article, if such determination, action or omission is made in reliance upon the advice of counsel.

**VII.5 References Included:** Each reference herein to Trustees, officers, employees or agents shall be deemed to include references to former Trustees, officers, employees or agents and their respective heirs, executors and administrators. The indemnification hereby provided shall not be exclusive of any other rights to which any person may be entitled, including any right under policies of insurance that may be purchased and maintained by the Corporation or others, with respect to claims, issues, or matters in relation to which the Corporation would not have the power to indemnify such person under the provisions of this Article.

## **ARTICLE VIII AMENDMENTS**

**VIII.1 Amendments:** These Bylaws may be amended by the Board at any regular or special meeting called for that purpose, provided said changes have been circulated to the Trustees ten (10) days before the called meeting. A vote of at least two-thirds of the Trustees present and voting shall be sufficient to enact such amendments.

## **ARTICLE IX DISSOLUTION**

**IX.1 Dissolution:** In the event that the Corporation is dissolved, its net assets shall be distributed in the discretion of the Board to NJIT. If NJIT does not enjoy exempt status under the provisions of Section 501(c)(3) of the Code then the assets shall be distributed to the Foundation at NJIT. If the Foundation at NJIT does not enjoy exempt status under the provisions of Section 501(c)(3) of the Code then the assets shall be distributed to any corporation or other organization formed under any law to carry out purposes similar to those of this Corporation; provided that at the time of distribution the organization or organizations to which such distribution is made shall enjoy exempt status under the provisions of Section 501(c)(3) of the Code. If for any reason distribution as provided above cannot be carried out, such net assets shall be distributed to such other organization or organizations enjoying exempt status under the provisions of Section 501(c)(3) of the Code as may be selected by the United States District Court for the District of New Jersey.

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**ARTICLE X  
GENERAL PROVISIONS**

**X.1    Construction:** Unless these Bylaws expressly or by clear construction or implication so provide, nothing contained in these Bylaws is intended to or shall limit, qualify, or restrict any power or authority granted or permitted to nonprofit Corporations by the Act. References in these Bylaws to the Certificate of Incorporation shall include all amendments thereto unless specifically excepted. Should any of the provisions of these Bylaws be held unenforceable or invalid for any reason, the remaining provisions shall be unaffected by such holding.

**X.2    Books and Records:** The Corporation shall keep correct and complete books and records of account, and shall keep minutes of the proceedings of its Board and Committees; and shall keep at its registered office or principal place of business, a record of its Trustees, names and addresses of all Trustees, a copy of the application for tax-exemption, with all correspondence to and from the IRS in connection with the application, and a copy of the annual reports of the corporation filed with the IRS for the previous three years. Such records must be disclosed to the public upon request in accordance with IRS public disclosure requirements.

**X.3    Checks, Bank Accounts and Investments:** The monies and other assets of the Corporation shall be deposited in the name of the Corporation in such bank or banks or financial institution(s) or trust companies as the Board shall designate, and shall be drawn from such accounts only by check or money transfer with proper signatory authority, as shall be determined by resolution of the Board. The funds of the Corporation may be retained in whole or in part in cash or be invested and reinvested from time to time in such property, real, personal or otherwise, including stocks, bonds or other sureties, as the Board may from time to time authorize.

**X.4    Fiscal Year:** The fiscal year of the Corporation shall be the period beginning on January 1 of each calendar year and ending on December 31 of the same calendar year.

These bylaws were adopted by resolution of the Board of Trustees of the Corporation on [date]

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**5B. Approve Resolution to  
Authorize Line of Credit**

**5C. Approve Resolution to  
Authorize Exclusive License  
of University Intellectual  
Property**

**STATEMENT OF INFORMATION FOR  
EXCLUSIVE LICENSE OF NJIT INVENTION DISCLOSURES  
November 8, 2012**

**Introduction**

As part of its Intellectual Property ("IP") Program, NJIT assesses the commercial value of its Intellectual Property to determine the most appropriate avenue to achieve a return on its investment. Options include the exclusive licensing of Intellectual Property.

A subsidiary of Intellectual Ventures ("IV"), has expressed interest in acquiring an exclusive license to the NJIT Invention Disclosure listed below for the life of each patent issued by the USPTO and/or foreign jurisdiction.

As the exclusive license of the Invention Disclosures and patent applications derived therefrom for the life of the patent essentially represents a disposition of NJIT property, the Board of Trustees is being asked to approve the same. A Resolution has been prepared for consideration.

**Background of Intellectual Ventures**

IV is a private company founded in 2000 by Nathan Myhrvold and Edward Jung, both former executives of Microsoft. The purpose of the company is to invest in innovations and technologies across a broad spectrum of industries (i.e., technology, biotechnology, consumer electronics, nanotechnology and others). IV has also acquired inventions and related IP from a combination of individual inventors, government agencies, and universities. IV's business plan is to group all acquired patents into clusters of like technology and then license the patents to potential users and/or infringers of each technology cluster. The goal is to derive more value than is likely to be attained from the licensing of any individual patent.

**Current Licensing Offer**

At its April 10, 2008 meeting the Board of Trustees authorized the execution of a one year Master Patent License Agreement, which was executed on August 15, 2008, and which has since been renewed to August 15, 2013 (automatic one year renewals after August 15, 2010).

This request is for the exclusive license of an additional Invention Disclosure with right to sublicense. IV will pay for all on-going patent prosecution costs levied by the USPTO and/or foreign jurisdictions, including issuance fees on allowed patents as well as maintenance fees that become due on any and all issued patents. If any of the patents are sublicensed to third parties, NJIT will also receive an annual royalty payment. The individual Invention Disclosure included in this ninth request under the new Master License Agreement is found below.

**Trading Spectrum for Energy Savings in Green Cognitive Cellular Networks (Inventors:  
Nirwan Ansari and Tao Han) NJIT Reference Number 13-003**

After NJIT's reimbursement of associated out-of-pocket expenses, if any, the remaining net amount derived from the transaction shall be shared with the inventors pursuant to NJIT's current Patent Policy.

**RESOLUTION TO AUTHORIZE EXCLUSIVE LICENSE OF  
UNIVERSITY INTELLECTUAL PROPERTY**

WHEREAS, the Board of Trustees of New Jersey Institute of Technology is empowered to direct and control the disposition of NJIT intellectual property if deemed necessary or advisable to carry out the goals of NJIT; and

WHEREAS, the Board of Trustees at its April 10, 2008 approved the execution of a one year Master Patent License Agreement with a subsidiary of Intellectual Ventures, which was executed on August 15, 2008 and which has since been renewed to August 15, 2013 (automatic one year renewals after August 15, 2010); and

WHEREAS, a subsequent transaction under such Master Patent License Agreement is for the exclusive licensing of certain identified NJIT Intellectual Property.

NOW THEREFORE BE IT RESOLVED by the Board of Trustees of New Jersey Institute of Technology that the proposed exclusive licensing of the Intellectual Property (Reference Number 13-003) by NJIT is hereby approved; and

THEREFORE BE IT FURTHER RESOLVED by the Board of Trustees of New Jersey Institute of Technology, that the Senior Vice President for Research & Development is hereby authorized to execute any and all agreements or documents on behalf of NJIT to consummate such licensing transactions.

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Holly C. Stern, Esq.  
General Counsel and  
Secretary to the Board of Trustees  
New Jersey Institute of Technology

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Date

**5D. Approve Resolution to Authorize  
Exclusion of Certain Trustees  
and Officers from Required Filing**

**RESOLUTION TO AUTHORIZE EXCLUSIONS OF CERTAIN NJIT  
PERSONNEL FROM REQUIRED FILING**

**WHEREAS**, current Department of Defense Regulations contain a provision making it mandatory that certain NJIT personnel meet the personnel clearance requirements established for a contractor's facility clearance; and

**WHEREAS**, said Department of Defense Regulations permit the exclusion from the personnel clearance requirements of certain NJIT personnel provided that this action is recorded in the corporate minutes.

**NOW THEREFORE BE IT RESOLVED** that the Board hereby ratifies the resolution entered into in closed session for security purposes, authorizing exclusions of certain NJIT personnel from required filing, which resolution designates the specific positions duly authorized.

**BE IT RESOLVED FURTHER** that the NJIT personnel referenced in the closed session resolution shall not be required, shall not have, and can be effectively excluded from access to classified information in the possession of the corporation.

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Holly C. Stern, Esq.  
General Counsel and  
Secretary to the Board of Trustees  
New Jersey Institute of Technology

November 8, 2012  
Board Resolution

**5E. Approve Resolution to Authorize  
Recognize the Passing of Victor A.  
Pelson**

## **6A. President's Report**

**6B. Report on Research Growth  
Strategies, FY12 Submissions  
and Outcomes, Intangible  
Assets and EDC**

**Board of Trustees Update – Research Strategy**  
**Donald H. Sebastian, Sr. Vice President Research & Development**  
**November 2012**

NJIT continues to grow its research enterprise. It completed a record year in FY2012, with research expenditures of \$102M, including a 12% increase in Federal funding to an all-time high of \$55M. Based on FY2009 data, the most recently available public rankings, NJIT placed fifth in the United States for research expenditures among all polytechnical universities. The top 10 of the full list are shown in the table below. The growth in research of \$10M since then makes it likely that this position will remain unchanged through the 2012 rankings.

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

Rank	Institution	All R&D expenditures	Federal government	State and local government	Industry	Institution funds	All other sources
	All Institutions	2,906,768	1,787,933	191,988	274,495	474,384	177,968
1	MA Institute of Technology	736,102	532,618	655	102,894	7,875	92,060
2	GA Institute of Technology all campuses	561,631	322,452	10,727	43,885	167,766	16,801
3	VA Polytechnic Institute and State U.	396,681	148,411	100,217	20,444	105,525	22,084
4	CA Institute of Technology	342,455	305,682	1,630	8,766	5,398	20,989
5	NJ Institute of Technology	92,891	42,656	5,006	4,659	31,394	9,176
6	NM Institute of Mining and Technology	81,742	61,178	5,798	10,094	4,607	65
7	TX Tech U.	80,011	24,184	22,093	6,353	24,056	3,325
8	Rensselaer Polytechnic Institute	77,890	48,216	8,986	5,119	13,094	2,495
9	Northeastern U.	61,309	38,178	761	12,169	10,201	0
10	U. TX Dallas	61,214	25,651	14,183	11,474	9,906	0

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

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

The new NJIT strategic plan defines three thematic based on our current strengths forming clusters that are easily understood by internal and external stakeholders. They were chosen to be compelling topics of societal relevance, and were also chosen to embrace multi- and inter-disciplinarity providing on-ramps for virtually every college, and thus every faculty member to contribute. The three thematic areas are: Sustainable Systems, Convergent Life Science & Engineering, and Digital Everywhere. Progress has already been made in establishing "signature" activities in each of these areas that will elevate the university's profile in both professional and general public settings. A summary of the research expenditure trends through FY12 is contained in the table below.

Expenses	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12
Direct Expenses	\$36	\$37	\$39	\$46	\$44	\$46	\$46	\$52	\$59
F&A Recovery	5.4	6.0	6.5	7.1	7.4	7.8	7.3	8.2	8.6
Subtotal - External	\$41	\$43	\$46	\$53	\$51	\$54	\$53	\$61	\$68
Internal Funds	28	29	26	29	31	31	31	32	29
Total	\$69	\$72	\$72	\$82	\$82	\$85	\$84	\$93	\$97
Related Organizations	6.1	4.8	5.9	6.4	7.3	7.5	7.9	7.0	6.0
Grand Total	\$75	\$77	\$78	\$88	\$90	\$92	\$92	\$100	\$102

## 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. 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

Nuggehalli 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. 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. Mitra and his research team took 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 multi-frequency (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' team and Building Media Inc. (BMI), a DuPont subsidiary, lead one of 15 research and deployment partnerships to help dramatically improve the energy efficiency of American homes — the Building America Retrofit Alliance (BARA).

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. This new invention is an epoxy resin that can be obtained from corn sugar. Both components of the epoxy—the resin and the hardener—are from water-soluble, plant-derived chemistries.

### **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.

### **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.

### **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. The key element in the device is a "microtrap" that gathers organics from the air stream in a sorbent. 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 nano-machines 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."

### **Traffic Congestion**

Researchers at NJIT completed another 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.

### **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 spectroscopy.

## **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'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. This device 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. 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. The Team recently received a multi-year, multi-million dollar grant to partner with Boston Children's Hospital/Harvard Medical school physicians and a commercial firm to take the device to animal testing as the next step in the FDA approval process.

### **Understanding Collagen**

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

### **Understanding Neuron Growth**

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

### **Neural Prostheses for Spinal Injuries**

Prof. Mesut Sahin's 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. 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. 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. Current projects include a device to allow simplified eye pressure testing for glaucoma patients, and another to measure blood sugar. 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. This mechanism is potentially of great importance as it may underlie a new form of learning and memory via its stabilizing effect on neural network activity.

### **Designing Computer Therapies**

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

Another project, in collaboration with the University of Medicine and Dentistry of New Jersey, Rutgers University, developed a Virtual Reality system for rehabilitating hand function in stroke patients. The PC-based desktop system uses two hand input devices, a CyberGlove and a 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 (micro-electromechanical 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 electrohydrodynamic 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.

## **Digital 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 through 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**

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 campus-wide 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**

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 wireless security issues that 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.

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. 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..

### **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.

### **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.

### **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. 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. 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. 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, Sr. 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. The software gives New Jersey a system to prepare for anything from a natural disaster to a chemical, biological or radiological attack.

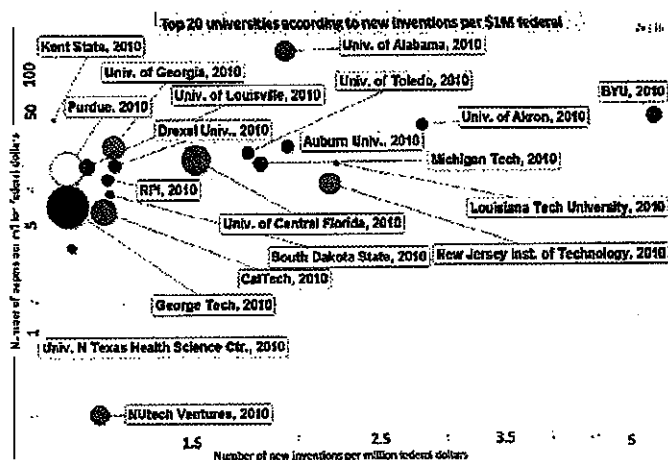
**NJIT Board of Trustees**  
**2012 Intangible Asset Review**  
 Dr. Donald H. Sebastian, Senior Vice President for Research & Development  
 Judith A. Sheft, Associate Vice President for Technology Development  
 November 8, 2012

NJIT's activities in patents and licensing continue the trend established since the restructuring of the Office of Technology Development (OTD) and the implementation of the new Patent Policy in 2003. Invention Disclosures have more than doubled from less than 30 in 2003 to an average of approximately 70 in the past three fiscal years. In 2011 we implemented a new tracking database, which includes several attractive features: an on-line capability for submitting new invention disclosures to OTD; the ability of individual inventors to review the status of their submissions, including any pending patents, and an easier method for OTD to publicize available technologies to third parties.

**Table 1. Patent Statistics**

	FY 10	FY 11	FY 12
Invention Disclosures	76	63	75
US Patent Applications Filed	66	57	40
US Issued Patents	17	32	31

One of the metrics a number of universities use to compare their performance to other US universities is the number of Invention Disclosures per million dollars of Sponsored Research. In FY2011 NJIT's ratio was 63% (the average was 36) giving NJIT a ranking of 25th out of 143 US universities and research institutions responding to the annual AUTM survey. 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 (See Figure below). No other New Jersey located university was in the top 20 in either of these metrics.



Another significant change that came out of the restructuring of the OTD is the growth in licensing revenues, which has increased from only \$16K in 2003 to an average of \$375k over the last eight fiscal years. Although we continue to receive milestone payments upon issuance of the patents our primary licensee is prosecuting on behalf of NJIT, we are not enjoying the same level of success we did previously with that licensee due to a change in their licensing strategy. To offset this loss of income, we are focusing more on other opportunities and continue to negotiate several deals we hope will bear substantial fruit in the future as well as exploring other opportunities for our expanding portfolio of licensable IP. In addition we frequently find that our marketing efforts result in new sponsored research projects for faculty, which if successful, may lead to a future licensing relationship.

**Table 2. License Statistics.**

	FY 10	FY 11	FY 12
IP Assets Licensed or Optioned	234	205	179
License Income	\$508K	\$268K	\$221K

NJIT's performance in management of its IP assets relative to those similar sized NSF Polytechnical schools reporting results to AUTM: Colorado School of Mines, Louisiana Tech, Michigan Technological Institute, and RPI is above average. Based on AUTM data NJIT ranks above average in 7 of 11 metrics: Sponsored Research \$\$, Invention Disclosures, New US Patents Filed, Licenses/Options Executed, Number of Licenses/Options Yielding Income, US Patent Issued and New Start-ups. Although both RPI and NJIT reported 63 new Invention Disclosures NJIT's patent prosecution expenses were less than one-third of RPI's suggesting that we are doing a good job of leveraging other people's money to finance our patent expenses. NJIT currently has over 150 US pending and issued patents financed by third parties.

**Table 3. 2012 AUTM Statistics (FY2011 Data) for Top Polytechnics**

Name of Institution	Total SR \$K	Discl Revd	Discl per SM RD	New Pat Filed	Lic/ Opt	Gross Lic Inc Re'd \$K	Lic/ Opt w/ Inc	Legal Exp \$K	US Pat Issd
California Inst. of Technology	498,6889	336	1.48	524	55	29,044	82	4,092	132
Colorado School of Mines	46,700	24	1.95	16	7	120	9	N.A.	4
Georgia Inst. of Technology	714,760	384	1.86	246	78	3,894	66	3,483	79
Louisiana Tech Univ.	27,583	18	1.53	16	2	32	8	161	7
Massachusetts Inst. of Technology	1,490,429	603	2.47	652	119	76,120	394	17,630	174
Michigan Technological Univ.	70,088	41	1.71	5	12	296	22	267	4
New Jersey Inst. of Technology	100,491	63	1.60	32	24	268	78	281	31
Rensselaer Polytechnic Inst.	71,700	63	1.14	54	8	1,161	32	970	13
Virginia Tech Intellectual Properties	247,777	149	1.66	75	24	1,816	62	1,018	26

As a consequence of a reduced budget allowance for patent prosecution, OTD's filing of new patents is down significantly from the high of 100 filings reached in FY09. As a result, the pipeline of NJIT patent applications pending with the USPTO is also down (currently 136). Having an in-house patent attorney

enables us to cost effectively handle both the filing of new provisional patents (28 in the past year) and the management of the patent prosecution process for pending non-provisionals. Nevertheless, this budget constraint severely limits our ability to convert to full patents any asset not directly tied to a prospective commercialization partner. Similar limits have also been applied to the maintenance of pending and issued patents – if there is no identifiable commercialization path, then those assets are offered to inventors for them to pursue under appropriate terms.

To identify licensing targets and sponsored research collaboration partners OTD continues to participate in several external venues to showcase various NJIT technologies available for licensing: BioTech Innovation Corridor, NJEN Poster Exhibit, NJTC Venture Conference, NJTC Regional Commercialization Conference, and the Venture Forum/Faculty Pitch Fair at Rutgers as well as the NJIT NSF Advance Grant which showcases women's research to industry and academic partners. These venues have resulted in our attracting several new parties with whom we are now in early licensing and/or sponsored research discussions.

OTD continues its tradition of preparing the NJIT nominations from Research & Development to both the New Jersey Inventors Hall of Fame (Professor Gordon Thomas received the Innovator's Award in 2011 and Professors Louis Lanzerotti and Nirwan Ansari received it in 2012; and the Research & Development Council of New Jersey's Thomas Alva Edison Patent of the Year Award — US Patent 7,619,056 "Thermoset Epoxy Polymers from Renewable Resources" in 2011 (inventors are Anthony East, Michael Jaffe, and Yi Zhang from NJIT and Luiz Catalani from the U. of Sao Paulo) and US Patent 8,088,091 "No Clog Shunt Using a Compact Fluid Drag Path" in 2012 (inventors are Gordon A. Thomas, Reginald C. Farrow and Sheng Liu).

OTD has been working closely with both the Honor's College Interdisciplinary Design Studio program and the new design courses in the School of Art & Design — coaching students and faculty on the IP and commercialization aspects of their projects, some of which build on NJIT faculty research.

The Capital One Innovation Acceleration Challenge has also provided students with the opportunity to explore entrepreneurship and commercial of their ideas. This year NJIT students received funding to continue work during the summer for a glaucoma monitoring system and a microbial electrolysis hydrogen fuel cell.

OTD also continues to work with faculty members who have expressed interest in forming ventures based on the technology developed at NJIT: biofuel cells (EnzoNano and Carbomet), SmartCampus (Coo-e), energetic materials (RMI), NanoSepex membranes. This year two NJIT teams are participating in the NSF's new i-Corps program aimed at commercializing NSF sponsored research. We also encourage both students and faculty interested in starting a venture to participate in the periodic Venture Acceleration Boot Camps run by the NJIT Center for Innovation Acceleration and the EDC Incubator.

The following seventy-five disclosures were received in FY12:

- 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 Isodide 2; Hammond, Willis B. / East, Anthony J. / Jaffe, Michael / Feng, Xianhong ; NCE Biomedical Engineering
- 12-021 Nano-coating via Cornil; scicolone, James v. / Dave, Rajesh N. / Ghoroi, Chinmay / Gurumurthy, Lakshmi / 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. / Ziafras, Sotirios G. ; NCE Electrical & Computer Engineering
- 12-032 Foamed Celluloid Mortar Propellant Increment Containers; Gogos, Costas G., Zhu, LinJie / Bonnett, Peter / Young, Ming-Wan ; NCE Chemical, Biological & Pharmaceutical Engineering / PPI
- 12-033 Bioactivity and Osteogenic Activity of Composite Scaffolds; Arinzeh, Treena L. ; NCE Biomedical Engineering
- 12-034 Noninvasive Blood Glucose Meter; Dhawan, Atam P. / Ly, Kevin / Das, Anjali / Gowda, Mohanika / Shah, Shivani ; ADHC Honors
- 12-035 A Family of Highly Efficient Approximate String Matching Methods; Rudniy, Alex / Geller, James / Song, Min ; CCS Computer Science
- 12-036 A Highly Efficient Approximate String Matching Method based on Longest Approximately Common Prefix; Rudniy, Alex / Geller, James / Song, Min ; CCS Computer Science
- 12-037 A method for measuring impurity levels in semiconductors with spatial resolution; Cheng, Zimeng (Ben) / Chin, Ken K. ; CSLA Physics
- 12-038 Method and Apparatus to Measure Throughput of Data of Access Wireless Links through a remote host connected to the Internet ; Rojas-Cessa, Roberto / Salehin, Khondaker M. ; NCE Electrical & Computer Engineering
- 12-039 Design and manufacturing of a polymer humidity sensor for harsh environments; Kazerani, Hamed / Federici, John F. / Sirkar, Kamalesh K. ; CSLA Physics / NCE Chemical, Biological & Pharmaceutical Engineering
- 12-040 OTECCS – Organics to electricity coupled cell system; Rajan, Nevedha / Zaman, Asim / Christian, Margaret R. / Oh, Lindsey ; ADHC Honors
- 12-041 Soy protein and poly (L - lactic acid) blend nanofibers for drug delivery of Nardostachys jatamansi; Tiwari, Swetha / Jaffe, Michael ; NCE Biomedical Engineering
- 12-042 The digital grid with packeted energy: a new way to deliver electrical power ; Grebel, Haim / Rojas-Cessa, Roberto ; NCE Electrical & Computer Engineering
- 12-043 Method for compacting dust in vacuum cleaner; Dreyzin, Edward L. / Schoenitz, Mirko ; NCE Chemical, Biological & Pharmaceutical Engineering
- 12-044 System for manufacture of thin pharmaceutical films by drying polymer-based solutions in controlled air/vapor mixture flow; Khusid, Boris / Shen, Yueyang ; NCE Chemical, Biological & Pharmaceutical Engineering
- 12-045 Superdisintegrant-Based Nanocomposite Microparticles for Fast Redispersion and Dissolution of Active Pharmaceutical Agents; Bilgili, Ecevit A. / Dave, Rajesh N. / Bhakay, Anagha A. / Azad, Mohammad A. ; NCE Chemical, Bio. & Pharm. Engineering
- 12-046 Method to remotely measure the processing time of a packet by a host connected through a computer network; Rojas-Cessa, Roberto / Salehin, Khondaker M.; NCE Electrical & Computer Engineering

- 12-047 A Novel Composite Matrix for Bone Repair Applications; Arinzeh, Treena L.; NCE Biomedical Engineering
- 12-048 Optimizing Cell Size for Energy Saving in Cellular Networks with Hybrid Energy Supplies; Ansari, Nirwan / Han, Tao; NCE Electrical & Computer Engineering
- 12-049 A Solvent-less Acoustic Mixing Based Process for Polymer Coating Active Pharmaceutical Ingredients; Dave, Rajesh N. / Capece, Maxx W. / To, Daniel; NCE Chemical, Biological & Pharmaceutical Engineering
- 12-050 Particle engineering process for preparing a fast dissolving composite particle; Dave, Rajesh N. / Knieke, Catharina / Azad, Mohammad A. / Bilgili, Ecevit A. / To, Daniel; NCE Chemical, Biological & Pharmaceutical Engineering
- 12-051 A process of preparing engineered composite particles and applying a bi-layer coating by a fluidized bed process; Dave, Rajesh N. / To, Daniel; NCE Chemical, Biological & Pharmaceutical Engineering
- 12-052 Formation of thin films with self-assembled monolayers embedded on their surfaces; Singh, Pushpendra; NCE Industrial & Manufacturing Eng.
- 12-053 A Simple Sleep Control Scheme Based on Traffic Monitoring and Inference for IEEE 802.16e/m Systems; Ansari, Nirwan / Zhang, JingJing; NCE Electrical & Computer Engineering
- 12-054 Standards-compliant EPON Sleep Control for Energy Efficiency: Design and Analysis; Ansari, Nirwan / Zhang, JingJing; NCE Electrical & Computer Engineering
- 12-055 Method for passive high resolution direction finding through spatial compressive sensing and efficient global search algorithm; Rossi, Marco / Haimovich, Alexander M.; NCE Electrical & Computer Engineering
- 12-056 Method for active high resolution direction finding through spatial compressive sensing and efficient global search algorithm; Rossi, Marco / Haimovich, Alexander M.; NCE Electrical & Computer Engineering
- 12-057 AutisMind: Textured Original Invention (T.O.I); Esseghir, Amira / Selevany, Mariam / Asif, Kamran / Kuruwila, 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. / Gelinis, Robert / Kalamatianos, John; NCE Electrical & Computer Engineering / AMD
- 12-061 Using Mean Failure Cost To Assess Security Measures; Mili, Ali / Sheldon, Frederick T.; CCS Computer Science / Oak Ridge National Labs
- 12-062 Method for blind modulation classification of MIMO-OFDM signals; Haimovich, Alexander M. / Liu, Yu / Agirman-Tosun, Handan; NCE Electrical & Computer Engineering
- 12-063 Tracheostomy Airflow Monitor; Conneran, Maria E. / Antonicello, Nicole / Halbfoster, Brodie / Geraldo, Gabriel; NCE Biomedical Engineering
- 12-064 Fiber reinforced hydrogel composites from gelatin/sulfated polysaccharides: An approach to mimic articular cartilage.; Muthalagu, Tamilvizhi / Collins, George / Arinzeh, Treena L.; NCE Biomedical Engineering
- 12-065 Nano-sensor artificial pancreas; Thomas, Gordon A. / Karwal, 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, Kamallesh K.; NCE Chemical, Biological & Pharmaceutical Engineering
- 12-072 Waterproof Cast; Taherisefat, Mona / Pasiciet, Ciellanna / 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

Since our last review in 2011, 32 new US Patents have been granted, as follows:

- 07-025 MULTI-CRITERIA OPTIMIZATION FOR RELAYING IN MULTI-HOP WIRELESS AD HOC AND SENSOR NETWORKS (De, Swades K. / Egoh, Komlan) US Patent Number 7,872,977 Issued on 1/18/2011.
- 03-022 DETERMINISTIC PACKET MARKING (Ansari, Nirwan / Belenky, Andrey) US Patent Number 7,873,997 Issued on 1/18/2011.
- 05-025 METHOD AND/OR SYSTEM FOR SPACE-TIME ENCODING AND/OR DECODING (Haimovich, Alexander M. / Chen, Hangjun) US Patent Number 7,882,413 Issued on 2/1/2011.
- 06-063 A METHOD AND APPARATUS FOR STEGANALYSIS FOR TEXTURE IMAGES (Shi, Yun-Qing / Chen, ChunHua) US Patent Number 7,885,470 Issued on 2/8/2011.
- 00-003 METHOD AND SYSTEM FOR A HIERARCHICAL TRAFFIC SHAPER (Uzun, Necdet) US Patent Reissue Number RE42,121 Issued on 2/8/2011 (reissue of 6,735,214).
- 07-030 SYSTEMS AND METHODS FOR REDUCING ELECTROSTATIC CHARGE IN A FLUIDIZED BED (Pfeffer, Robert / Quevedo, Jose A.) US Patent Number 7,905,433 Issued on 3/15/2011.
- 06-021 METHODS AND APPARATUS FOR THE NON-DESTRUCTIVE DETECTION OF VARIATIONS IN A SAMPLE (Federici, John F. / Federici, Rose M.) US Patent Number 7,906,975 Issued on 3/15/2011.
- 03-027 ACCOMODATING FRAGMENTATION IN DETERMINISTIC PACKET MARKING (DPM) (Ansari, Nirwan / Belenky, Andrey) US Patent Number 7,908,654 Issued on 3/15/2011.
- 08-066 METHODS OF RAPID PHASE MODULATION OF THZ RADIATION FOR HIGH SPEED THZ IMAGING, SPECTROSCOPY, AND COMMUNICATIONS DEVICES AND SYSTEMS (Federici, John F.) US Patent Number 7,915,587 Issued on 3/29/2011.
- 06-007 METHOD FOR IDENTIFYING MARKED IMAGES USING BASED AT LEAST IN PART ON FREQUENCY DOMAIN COEFFICIENT DIFFERENCES (Shi, Yun-Qing / Chen, ChunHua) US Patent Number 7,925,080 Issued on 4/12/2011.
- 05-022 MIMO CHANNEL ESTIMATION USING COMPLEMENTARY SETS OF SEQUENCE IN MULTIUSER ENVIRONMENTS (Abdi, Ali / Wang, Shuangquan) US Patent Number 7,929,563 Issued on 4/19/2011.
- 06-050 AN APPARATUS AND METHOD FOR A GENERALIZED BENFORD'S LAW FOR ANALYSIS OF DCT AND JPEG COEFFICIENTS (Shi, Yun-Qing / Fu, DongDong) US Patent Number 7,940,989 Issued on 5/10/2011.
- 08-042 POLYOXAZOLIDONES DERIVED FROM BISANHYDROHEXITOLS (East, Anthony J. / Jaffe, Michael / Hammond, Willis B. / Collins, George / DeMartino, Ronald N. / Ophir, Zohar) US Patent Number 7,947,785 Issued on 5/24/2011.
- 05-034 DISTRIBUTED BANDWIDTH ALLOCATION FOR RESILIENT PACKET RING NETWORKS (Ansari, Nirwan / Alharbi, Fahd) US Patent Number 7,948,881 Issued on 5/24/2011.

- 07-059 NANOTUBE DEVICE AND METHOD OF FABRICATION (Farrow, Reginald C. / Liu, Sheng / Goyal, Amit / Iqbal, Zafar) US Patent Number 7,964,143 Issued on 6/21/2011.
- 03-021 A SUB-SEGMENT BASED TRANSPORT LAYER PROTOCOL FOR WIRELESS MEDIUM (Ansari, Nirwan / Sengupta, Somenath) US Patent Number 7,965,674 Issued on 6/21/2011.
- 05-047 PROVIDING PROPORTIONALLY FAIR BANDWIDTH ALLOCATION IN COMMUNICATION SYSTEMS (Ansari, Nirwan / Xu, Kai / Cheng, Gang) US Patent Number 7,969,881 Issued on 6/28/2011.
- 07-039 APPARATUS AND METHOD FOR REVERSIBLE DATA HIDING FOR JPEG IMAGES (Shi, Yun-Qing / Xuan, GuoRong) US Patent Number 7,974,477 Issued on 7/5/2011.
- 02-020 CLIPPING DISTORTION CANCELLER FOR OFDM SIGNALS (Haimovich, Alexander M. / Chen, Hangjun) US Patent Number 7,983,144 Issued on 7/19/2011.
- 02-003 APPARATUS FOR PHASE NOISE SUPPRESSION FOR OFDM BASED WLANS (Bar-Ness, Yeheskel / Wu, Song P.) US Patent Number 7,983,233 Issued on 7/19/2011.
- 08-022 METHODS AND APPARATUS FOR RAPID SCANNING CONTINUOUS WAVE TERAHERTZ SPECTROSCOPY AND IMAGING (Federici, John F.) US Patent Number 7,986,413 Issued on 7/26/2011.
- 06-037 A METHOD AND APPARATUS FOR IMAGE/TAMPERING DETECTION USING MOMENTS OF WAVELET CHARACTERIC FUNCTIONS AND STATISTICS OF 2-D PHASE CONGRUENCY ARRAYS (Shi, Yun-Qing / Chen, Wen) US Patent Number 7,991,185 Issued on 8/2/2011.
- 07-034 METHOD AND SYSTEM FOR DECENTRALIZED POWER CONTROL OF A MULTI-ANTENNA ACCESS POINT USING GAME THEORY (Bar-Ness, Yeheskel / Simeone, Osvaldo / Stanojev, Igor) US Patent Number 8,014,809 Issued on 8/17/2011.
- 05-015 METHOD AND/OR SYSTEM FOR ESTIMATING PHASE NOISE ERROR (Bar-Ness, Yeheskel / Liu, Pan) US Patent Number 8,023,583 Issued on 9/20/2011.
- 07-017 METHOD AND APPARATUS FOR A NATURAL IMAGE MODEL BASED APPROACH TO IMAGE/SPLICING/TAMPERING DETECTION (Shi, Yun-Qing / Chen, ChunHua) US Patent Number 8,023,747 Issued on 9/20/2011.
- 04-007 IONTOPHORETIC TRANSDERMAL DRUG DELIVERY SYSTEM BASED ON CONDUCTIVE POLYANILINE MEMBRANE (Sirkar, Kamalesh K. / Fan, Qiuxi) US Patent Number 8,036,738 Issued on 10/11/2011.
- 05-014 METHOD AND/OR SYSTEM FOR REDUCTION OF PAPR (Bar-Ness, Yeheskel / Latinovic, Zoran) US Patent Number 8,040,787 Issued on 10/18/2011.
- 06-053 IDENTIFYING COMPUTER GRAPHICS FROM DIGITAL PHOTOGRAPHS (Shi, Yun-Qing / Chen, Wen) US Patent Number 8,041,124 Issued on 10/18/2011.
- 08-024 APPARATUSES AND METHODS FOR CONTROL AND SELF-ASSEMBLY OF PARTICLES INTO ADAPTABLE MONOLAYERS (Singh, Pushpendra / Aubry, Nadine N. / Nudurupati, Sai / Janjua, Muhammad M.) US Patent Number 8,049,183 Issued on 11/1/2011.
- 06-002 NO CLOG SHUNT USING A COMPACT FLUID DRAG PATH (Thomas, Gordon A. / Liu, Sheng / Farrow, Reginald C.) US Patent Number 8,088,091 Issued on 1/3/2012.
- 06-016 BEHAVIOR-BASED TRAFFIC DIFFERENTIATION (BTD) TO DEFEND AGAINST DISTRIBUTED DENIAL OF SERVICE ATTACKS (Ansari, Nirwan / Gao, Zhi Qiang) US Patent Number 8,091,132 Issued on 1/3/2012.
- 06-008 METHOD FOR IDENTIFYING MARKED IMAGES USING STATISTICAL MOMENTS BASED AT LEAST IN PART ON A JPEG ARRAY (Shi, Yun-Qing / Chen, ChunHua) US Patent Number 8,103,054 Issued on 1/24/2012.

In FY 2012 NJIT licensed the following 5 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.

We also licensed 2 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.

We 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.

## **6C. Report of Gifts and Fund Raising Activities**

**Summary – 2011 (7/1/2010 to 9/30/2010) vs 2012 (7/1/2011 to 9/30/2011) vs 2013 (7/1/2012 to 9/30/2012)**

**Comparison of Total Giving Year to Date:**

	2011			2012			2013		
	\$ Giving	%	#	\$ Giving	%	#	\$ Giving	%	#
All Sources:				\$2,290,799			\$1,699,272		
All Sources without Gifts in Kind:				\$1,871,315			\$1,668,099		
Matching Gifts:				\$7,838			\$34,060		
Category	\$ Giving	%	#	\$ Giving	%	#	\$ Giving	%	#
Alum	\$834,454 <sup>1</sup>	36.43	262	\$273,678	5.44	240	\$712,491 <sup>2</sup>	41.93	487
Corp	\$792,559 <sup>3</sup>	34.60	93	\$774,328 <sup>4</sup>	15.39	74	\$589,674 <sup>5</sup>	34.70	86
Foundations	\$568,500 <sup>6</sup>	24.82	5	\$182,964 <sup>7</sup>	3.64	4	\$101,301	5.96	7
Friends	\$89,771	3.92	114	\$3,788,570 <sup>8</sup>	75.28	87	\$225,344	13.26	207
Other	\$5,515	0.24	3	\$13,337	0.26	5	\$70,462 <sup>9</sup>	4.15	7
Totals:	\$2,290,799	100.00	477	\$5,032,877	100.00	410	\$1,699,272	100.00	794

**Year End Total Comparison to 2007 Base Year**

	Total Dollars	% of FY 07 Funds Raised	% of Year Elapsed
2007	\$8,205,293	100%	100%
2008	\$13,324,197	163%	100%

<sup>1</sup> Alumni – Reif BQ \$100K, Adams BQ \$614K

<sup>2</sup> Alumni – Kaiser BQ \$500K

<sup>3</sup> Corporation – Anonymous \$383K

<sup>4</sup> Corporation – NE Precast \$512K

<sup>5</sup> Corporation – ExxonMobil \$129K, ADP \$100K, Pepsi \$100K

<sup>6</sup> Foundation – Leir/Ridgefield \$375K, Coulter \$180K

<sup>7</sup> Foundation – Coulter \$112K

<sup>8</sup> Friend – Hartmann BQ \$3.6M

<sup>9</sup> Other – EPRI \$50K

2009	\$9,391,314	114%	100%
2010	\$7,882,525	96%	100%
2011	\$6,604,795	80%	100%
2012	\$8,532,797	104%	100%
2013	\$1,699,272	21%	25%

## **6D. Operating Statement Year to Date**

## Schedule A

New Jersey Institute Of Technology  
Statement of Current Fund Revenues and Expenditures  
For the Three Months Ended September 30, 2012  
(Dollars In Thousands)

Restricted Funds				Unrestricted Funds				
FY2013 Budget	FY2013 YTD	25% of Budget FY2013	25% of Budget FY2012		FY2013 Budget	FY2013 YTD	25% of Budget FY2013	25% of Budget FY2012
Revenues								
Education and General								
				Tuition and Fees	\$ 143,340	\$ 75,895	53%	55%
\$ 115,360	\$ 29,360	25%	26%	Appropriations, Contracts, Gifts	67,646	16,730	25%	23%
				Other sources	12,943	2,968	23%	27%
				Allocated Balances	3,615	904	25%	25%
<u>115,360</u>	<u>29,360</u>	<u>25%</u>	<u>26%</u>	Total	<u>227,544</u>	<u>96,497</u>	<u>42%</u>	<u>42%</u>
				Auxiliary Enterprises	16,147	7,392	46%	47%
<u>115,360</u>	<u>29,360</u>	<u>25%</u>	<u>26%</u>	Total Revenues	<u>243,691</u>	<u>103,889</u>	<u>43%</u>	<u>43%</u>
Expenditures								
Educational and General								
2,172	182			Instruction	84,664	21,143	25%	25%
74,915	14,125			Research	8,320	2,069	25%	19%
262	174			Public Service	3,049	551	18%	19%
537	26			Academic Support	22,179	5,153	23%	28%
2,147	656			Student Services	16,156	3,805	24%	26%
280	138			Institutional Support	36,269	8,252	23%	25%
				Operation and Maintenance of Physical Plant	13,319	2,908	22%	19%
35,047	14,059			Financial Aid to Students	22,174	10,976	49%	44%
<u>115,360</u>	<u>29,360</u>	<u>25%</u>	<u>26%</u>	Total Educational and General	<u>206,130</u>	<u>54,857</u>	<u>27%</u>	<u>27%</u>
				Transfers	21,414	5,148	24%	24%
<u>115,360</u>	<u>29,360</u>	<u>25%</u>	<u>26%</u>	Total	<u>227,544</u>	<u>60,005</u>	<u>26%</u>	<u>26%</u>
				Auxiliary Enterprises	10,487	2,298	22%	23%
				Auxiliary Transfers	5,660	1,415	25%	25%
				Total Auxiliary	<u>16,147</u>	<u>3,713</u>	<u>23%</u>	<u>24%</u>
<u>115,360</u>	<u>29,360</u>	<u>25%</u>	<u>26%</u>	Total Expenditures & Transfers	<u>243,691</u>	<u>63,718</u>	<u>26%</u>	<u>26%</u>
Excess Of Revenues Over Expenditures And Transfers					\$ <u>0</u>	\$ <u>40,171</u>		
\$ <u>0</u>	\$ <u>0</u>							

**New Jersey Institute Of Technology**  
**Expense Report**  
**For the Three Months Ended September 30, 2012**  
**(Dollars In Thousands)**

	Current Month	FY2013 YTD	FY2013 Budget	25% of Budget		
				Actual Year to Date	Includes Commitments Prior Year	Current Year
<b>Academic</b>						
Salaries & Fringe Benefits	\$ 9,521	\$ 29,141	\$ 115,344	25%	93%	92%
Equipment Purchases	96	346	4,132	8%	31%	31%
Financial Aid to Students	9,753	10,976	22,174	49%	44%	49%
<i>Other Operating Expenses:</i>						
Materials & Supplies	128	274	1,612			
Travel & Development	155	405	2,109			
Library Collections	4	132	1,332			
Other General Operating	548	2,423	9,839			
Total Other Operating	835	3,234	14,892	22%	47%	40%
<b>Total Academic</b>	<b>20,205</b>	<b>43,697</b>	<b>156,542</b>	<b>28%</b>	<b>81%</b>	<b>80%</b>
<b>Support</b>						
Salaries & Fringe Benefits	2,389	7,889	33,622	23%	99%	91%
Equipment Purchases	181	210	550	38%	26%	60%
Utilities	586	1,413	8,179	17%	85%	88%
<i>Other Operating Expenses:</i>						
Materials & Supplies	81	232	1,300			
Travel & Development	156	220	600			
Other General Operating	591	1,196	5,337			
Total Other Operating	828	1,648	7,237	23%	75%	79%
<b>Total Support</b>	<b>3,984</b>	<b>11,160</b>	<b>49,588</b>	<b>23%</b>	<b>92%</b>	<b>89%</b>
Transfers	1,716	5,148	21,414	24%	94%	96%
<b>Total Academic, Support &amp; Transfers</b>	<b>25,905</b>	<b>60,005</b>	<b>227,544</b>	<b>26%</b>	<b>85%</b>	<b>83%</b>
Auxiliary Enterprises	684	2,298	10,487	22%	93%	92%
Auxiliary Transfers	471	1,415	5,660	25%	100%	100%
<b>Total Auxiliary Expenses</b>	<b>1,155</b>	<b>3,713</b>	<b>16,147</b>			
<b>Total Unrestricted Expenses</b>	<b>27,060</b>	<b>63,718</b>	<b>243,691</b>	<b>26%</b>	<b>85%</b>	<b>84%</b>
Restricted Expenses	8,745	29,360	115,360	25%	74%	54%
<b>Total Expenses And Transfers</b>	<b>\$ 35,805</b>	<b>\$ 93,078</b>	<b>\$ 359,051</b>	<b>26%</b>	<b>82%</b>	<b>74%</b>

## **6E. Schedule of Short Term Investments**

# NEW JERSEY INSTITUTE OF TECHNOLOGY

## CASH AND CASH EQUIVALENTS AND INVESTMENTS

AS OF SEPTEMBER 30, 2012

(Dollars in thousands)

	WELLS FARGO	JP MORGAN CHASE	CITY NATIONAL BANK	PNC BANK	9/30/2012 TOTAL	9/30/2011 TOTAL
Cash and cash equivalents:						
Money market funds	\$ 45,993	\$ 2,290	\$ 270	\$ 393	\$ 48,946	\$ 44,410
	<u>45,993</u>	<u>2,290</u>	<u>270</u>	<u>393</u>	<u>48,946</u>	<u>44,410</u>
Investments:						
U.S. Treasury and government agency bonds	8,114	-	-	-	8,114	7,393
Mutual bond funds	5,236	-	-	-	5,236	130
Certificate of deposit	-	-	500	-	500	500
	<u>13,350</u>	<u>-</u>	<u>500</u>	<u>-</u>	<u>13,850</u>	<u>8,023</u>
Total	\$ 59,343	\$ 2,290	\$ 770	\$ 393	\$ 62,796	\$ 52,433

## **Chairperson's Closing Statement**

**BOARD OF TRUSTEES**

**RESOLUTION RE: CLOSED SESSION TO DISCUSS PERSONNEL MATTERS,  
REAL ESTATE AND CONTRACT MATTERS.**

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**WHEREAS, THERE ARE MATTERS THAT REQUIRE CONSIDERATION BY  
THE BOARD OF TRUSTEES THAT QUALIFY UNDER THE OPEN PUBLIC  
MEETINGS ACT FOR DISCUSSION AT A CLOSED SESSION.**

**NOW, THEREFORE, BE IT RESOLVED, THAT THE BOARD OF TRUSTEES  
SHALL HAVE A CLOSED SESSION TO DISCUSS MATTERS INVOLVING  
PERSONNEL, REAL ESTATE AND CONTRACTS TO TAKE PLACE ON  
FEBRUARY 7, 2013, AT 10:00 AM, EBERHARDT HALL NJIT ALUMNI  
CENTER BOARD ROOM.**