IPRO 308

Creating an Artificial Pancreas

Grant Application to NCIIA as Final Report

Instructor	Dr. Emmanuel Opara
Mentor	Raymond DeBoth
Sponsors	The IPRO office
Student Leader	Rohan Mathews
IPRO Team	Zak Estrada
	Richard Hanley
	Shezami Khalil
	Kyle Laster
	Walatta Mesquitta
	Joon S. Park
	Anju Saseendran
	Michael Tishler
	William Wakeman

Illinois Institute of Technology

May 02, 2008

Grant Application to NCIIA

Introduction:

Modern glucose detection and insulin injection methods for diabetic subjects are moderately invasive insofar patients must prick their fingers multiple times per day. This procedure is unpleasant, especially for young children and the elderly. The long-term objective of our project is to improve upon existing technologies and produce a novel device to perform these functions in a non-invasive manner.

History and Context

Our team is composed of three subcommittees in order to enhance efficiency. These are research, closed-loop, and glucose measurement subcommittees. The research subcommittee is responsible for conducting extensive patent searches, as well as supporting the experimental teams by providing information and sourcing for funding. In previous IPRO teams, this subgroup has also researched existing patents for glucose measurement through the use of NMR spectroscopy, which is an alternative, in case emission and impedance spectroscopy are not viable options for measuring glucose for the final working prototype, as determined by the measurement subgroup. The research committeehas also researched r the frequencies at which glucose resonates and performed research into materials that could be used for the experiments dealing with the extraction of interstitial fluid from skin, as human skin could not be used due to lack of certification for handling human materials. Although the contribution of each subcommittee is important, it has been determined that the success of the closed-loop subcommittee is integral to the future of the project. The closed loop subgroup is charged with the task of testing the viability of using a combination of sonophoresis, iontophoresis and vacuum system to extract interstitial fluid, which will be the sample analyzed for glucose content in the prototype device.

In numerous sessions in the laboratory, the closed-loop subcommittee has been able to analyze the working of the vacuum suction, as well as the use of sonophoresis. The present team has expounded upon the work of a previous group by utilizing a fluorescing dye to determine the success of vacuum suction. Although portions of the pig skin fluoresced when exposed to ultra-violet light, further investigation is needed to conclude if this is the result of applied vacuum pressure. Analysis of previous semester's work has determined that the addition of sonophoresis using the prototype designed by the previous subgroup does not significantly alter skin-pore size. This is due to the fact that sound cannot propagate through a vacuum. As a result, the present team is currently designing a new prototype in which the speaker/transducer is confined in a separate compartment thus alleviating this issue. Earlier, they had determined that sound produced by standard paper speakers used by the previous group is inadequate due to a variety of parameters not factored in by the previous subgroups. The current group is presently investigating alternative options, which include medical grade ultrasonic equipment or a combination of transducers and sonic mirrors. It will be the task of both the research and closed-loop groups to investigate various acoustical equations in order to determine the sound intensities these devices are capable of producing. These tasks form the objectives that we desire to accomplish using the NCIIA funding.

Team

We have a balanced, multidisciplinary team made up of students, faculty, and advisors from a variety of disciplines ranging from Computing Science, Electrical and Mechanical Engineering and Molecular Biochemistry and Biophysics. The members of the team have very diverse backgrounds and include groups traditionally underrepresented in invention, innovation, and entrepreneurship, including women and minorities. All of the students on this team include only juniors and seniors enrolled in the Inter-Professional Project (IPRO) 308 course at the Illinois Institute of Technology in Chicago, IL. The members of this IPRO are counseled by the same two people every semester, even though the students on this team can change from semester to semester. The students continuing their education at the university have the choice to continue working on the project, so there is some student continuity. The turnover rate from semester to semester is estimated to be 88%. Information is transmitted within semesters of the project through binders, research materials, lab notebooks containing detailed information of lab sessions, as well as a web site. In addition, previous members of the project are always open to giving suggestions and advice to the existing members. The team members also have the option of seeking advice from other faculty members.

All the students that get involved with this project are either interested in helping the people that suffer from diabetes or want to use their expertise to create an affordable device that could potentially benefit human health. The project also attracts students who themselves are suffering diabetes and to derive personal benefits for their own health. Based on their knowledge and experience, each member of the team chose be a part of one of the subcommittees that will concentrate on one aspect of developing the artificial pancreas. The major subcommittee tasks include glucose concentration measurement or interstitial fluid extraction. Having one main objective increases efficiency and focus of the team members. One subcommittee exists to function as support to the other subcommittees by providing the necessary research materials and information, convey updated information, handling paperwork and any other essential tasks. For resourceful operation of the subcommittees, an able member is chosen to be the leader. The subcommittee leader is responsible for organization of the team, guiding the team skillfully to the objective and keeps the team updated with the team's progress.

Dr. Opara, a research professor in the Pritzker Institute of Biomedical Science and Engineering Department of the Illinois Institute of Technology, is one of the two advisors of this group. He is an expert on diabetes research and is well-qualified to lead such a research and development team.

Mr. Ray DeBoth is a retired electrical engineer who works with the IPRO office at the Illinois Institute of Technology as an at-large-engineer. He is the second advisor of the group. Due to his experience and knowledge, he is well-qualified to help lead the team and to assist in building a prototype.

Starting this semester, the project has integrated two more distinguishable persons into the team as counselors. Dr. Louis H. Philipson, the Director of University of Chicago Kovler

Diabetes Center as well as Professor of Endocrinology, Diabetes, & Metabolism at the University, is willing to share his expertise and knowledge within the field. Mr. Nik Rokop, the Managing Director of Knapp Entrepreneurship Center at IIT has also enthusiastically agreed to use his entrepreneurship skills to direct the team in developing a future market research and a commercialization plan.

It is also planned to make the team more diverse and extend the team's objectives to design an appropriate marketing strategy for the final working prototype. However, the team's most prioritized goal remains to develop a non-invasive procedure to extract interstitial fluid, which would be part of the final prototype device (artificial pancreas) since the other objectives are dependent on the success of extracting interstitial fluid. Therefore, the main purpose of this proposal is to determine the ability of the redesigned extraction procedure to extract microliter volumes (5-10 μL) of interstitial fluid, which could be used to measure glucose levels by any of the procedures being examined by the measurement subcommittee. The team is able to recruit students from any field at IIT according to the need of the project to work towards the goal of building an affordable, non-invasive prototype device.

The critical step in designing a working artificial pancreas prototype of the type that we desire is the ability to extract interstitial fluid. As aforementioned, both the closed-loop and research subcommittees have been collaborating with one another to assess the tools and techniques needed to optimize the extraction of interstitial fluid from the dermis. If our application is favorably considered for funding to achieve this critical objective, it is the firm belief of the team that a functional prototype could be designed thus bringing the project closer to fruition.

Work Plan and Outcomes:

Ambitions:
The IPRO 308 team's present intention is to develop an efficient means to extract interstitial fluid and make progress in the attempt to develop an artificial pancreas. The ultimate aspiration is to design an instrument that not only functions efficiently in non-invasive measurement of glucose and administration of insulin, but also a convenient design in an affordable model for broad use.

Time Table (Grant Period):
The time-table set for completion of a working prototype to extract interstitial fluid through a non-invasive method and measure glucose levels has been set to be three semesters. The first and second semesters probably have to be devoted to building a working prototype. In these semesters, the Closed Loop team will focus on extracting interstitial fluid since it is still in the preliminary stages of extraction. In the third semester, the focus will be measuring glucose levels in the extracted interstitial fluid to be performed by the measurement group using the most reliable procedure determined by their group. The last two semesters should also be utilized in doing market research and developing a commercialization plan as well as a marketing strategy. The NCIIA grant will cover Phase 1 of the project, which involves development of an apparatus able to extract the interstitial fluid in a non-evasive manner.

After Grant Period:
Assuming the extraction and measurement processes has been successfully implemented into a single apparatus; the second phase of the project will begin to develop a procedure to administer the proper amount of insulin in the same instrument. The IPRO is designed to recruit students of different disciplines for the completion of a project headed by an experienced faculty member. As was done for previous semesters, the necessary expertise for the next steps of the project will be heavily recruited. With the ability to recruit students from the different departments at Illinois Institute of Technology, the IPRO 308 project to develop an artificial pancreas becomes a very real possibility.

Evaluation and sustainability plan

We will know if our project has succeeded overall when we have a device that can detect the level of glucose in a person's bloodstream without taking blood, calculate the concentration of insulin that should be administered, and administer that amount of insulin in a non-invasive fashion. We set very definite short-term goals to keep our project moving forward and the members motivated.

Our internal measures of success:

- extract interstitial fluid using Sonophoresis/Iontophoresis/Vacuum suction
- successful extraction of a micro-volume of fluid to measure glucose levels
- correct detection of glucose concentration level in prepared saline solution with
- known amount of glucose added

Budget:

Expense Category:	Amount	Percent of Total
Equipment (Describe **briefly** below in Justifications area.)	6,740	38.98%
Materials & Supplies (Describe **briefly** below in Justifications area.)	1,050	6.07%
Student Stipend(s) - *May not exceed $3,000 per student or $7,500 total*	7,500	43.38%
Faculty Stipend(s) - *May not exceed $5,000*	-	0.00%
Travel Expenses (Describe **specifically** below in Justifications area - re: # of trips and # of people traveling.)	200	1.16%
Prototyping	300	1.74%
Consulting	1,500	8.68%
Other Expenses (Describe **very specifically** below in Justifications area.)	-	0.00%
Total	17,290	**100.00%**

Budget Justification:

Equipments:

Dissecting kit: $35
Food dye: $20
Ultrasonic Transducers: $50
Pressure gauge and transducer: $200 ** Can use more than one semester**
Pressure pump: $75 **
Vacuums (2): $100 **
Iontophoresis Extraction Device: $400 **
Electrical components: $50
Compound microscope with camera software (200X magnification): $2500 **
Some lab charges to use electron microscope hourly: $160 - $200 per hour = 5 hours per semester ➔ $1000

Total = $ 6740

Lab Materials and Supplies:
Purchase and Store of Live rats: $ 30/rat x 10 rats/semester
Anesthesia and lab materials: $ 50

Total = $1050

Travel Expenses:

Estimated cost for city travel to get supplies: $ 200 for 3 semesters

Prototyping:

Prototype construction materials: $ 100

Total = $ 300

Consultation:

Dr Philson's Consultation fee: $1500 for 3 semesters

Stipend:

Student Stipend: $ 7500 for 3 semesters

The group requires 3 semesters to come up with a working prototype, so each item is multiplied by 3 unless it can be used for more than one semester.

Resumes:

Anju Saseendran

[redacted] [redacted]

[redacted] asaseend@iit.edu

Objective: Summer intern ship in programming or electronics with opportunities to use skills in C++, Java and electronics

Education:

Illinois Institute of Technology (IIT), Chicago, IL

B.S.Electrical Engineering expected December 2008

Cardiff University, Cardiff, UK Jun 2006–Jun 2007

Earned 36 credits in Computing (C++), Electronic engineering, Power engineering and Microelectronic circuits and DSP and software engineering (Java).

Oakton Community College, Des Plaines, IL Aug 2002–Jul 2004

Earned 62 credits in Humanities, Sociology, Math and Physics

G.P.A. 3.9/4.0

Presidents Scholar Award 2003, First Prize Oakton Mathematics Competition 2003

Skills:

Languages: C, C++, Java, Mat lab, Basic HTML

Platforms: Windows 98/XP/Vista

Projects:

- **C++** project for the calculation of different aspects of a farmers field by use of loops, arrays and various functions
- **JAVA** project done in BlueJ to design a game "World of Zuul" using object oriented programming

Experience:

Cashier, Wal-Mart Stores, Niles, IL Nov 2007- Present

- Processed cash and credit sales and assisted customers with selections

Customer Service Associate, Somerfield Stores, Mumbles, UK Oct2005-Aug 2007

- Processed cash and credit sales and assisted customers.
  - Checked quality and arranged and displayed fresh food items.

Data Entry Clerk, Cook County Hospital Diabetes Center, Chicago, IL Jun 2003-Jun 2005

- Entered patient details into hospital database.
  - Performed general office tasks including photocopying, faxing and handled phone calls.

Activities:

IEEE Student member (2007-2008), Women in Engineering Student member

Work Status: U.S. Permanent Resident

WILLIAM R. WAKEMAN
[redacted]
bill.wakeman@gmail.com

OBJECTIVE

An internship with a well established, innovative, and competitive company centered on hard work and proven results.

SUMMARY

Hard working and quick learning adult student with maturity and life experience advantages over younger applicants complimented by excellent academic standing, a positive attitude, and a passion for engineering. Great pride taken in a job well done without compromising ethics or allowing outside influence over better judgment.

EDUCATION

Illinois Institute of Technology: BSME (expected: 2009) Current GPA **3.55**
Wilbur Wright College: Associates of Engineering Science (2005 - 2006) GPA **3.47**

HONORS AND AWARDS

Deans List: 7 semesters
National Dean's List: (Publication) fall 2007

PROFESSIONAL EXPERIENCE

Inter-Professional Project (IPRO) Sub-Group Leader: Illinois Institute of Technology; This semester I have taken on the task of sub-group leader in a project centered on the development and testing of an artificial pancreas. The group's focus is on the non-invasive extraction of interstitial fluid for use in measuring glucose levels. Duties include time management, keeping a detail lab book and reporting findings and results to the project leader through regular meetings.
Graphic Artist: JRL Enterprises; Artistic organization and presentation skills in the field of educational software production. Daily use of Macromedia Flash MX, Adobe Illustrator, and a web based Question Designer Tool. Have also taken personal initiative to learn Adobe Photoshop and Action Script Programming in Flash MX as they apply to software production. *2004 – current*
Plumbing Apprentice: Precision Plumbing; Expanded previous plumbing knowledge to include diagnostic and repair work. This requires the honing of an ability to mentally picture the workings and layout of a never before seen plumbing system hidden behind finished walls. *02/2004 - 06/2004*

Plumbing Apprentice: Eaton Plumbing Inc.; Began as a Plumber's Helper cutting pipe and quickly advanced to a level of managing and performing plumbing system rough-ins with a helper of my own. Advanced skills in mathematics, geometry, and efficiency and comfort with power tools. *2001 – 2003*

JOON S. PARK

[redacted] parkjs1@msn.com

OBJECTIVE: Entry Level Mechanical Engineering position with opportunity to use skills and experience in performing engineering duties and developing problem solutions

EDUCATION
ILLINOIS INSTITUTE OF TECHNOLOGY (IIT), Chicago, IL
B.S. Mechanical Engineering expected, May 2008 GPA 3.94/4.00
Major: Mechanical Engineering, Minor: Structural Engineering
Dean's List each semester
Tau Beta Pi
TRITON COMMUNITY COLLEGE, River Grove, IL
A.A.S. Engineering Technology (CAD), May 2005 GPA 3.98/4.00
President's Honor List each semester
Phi Theta Kappa

EXPERIENCE
Assistant Pipe Support Design Engineer/Project Engineer
EMICO Engineering Co, Inc., Des Plaines, IL August 2005 – Present
(Full-time summers, Part-time school year)
• Designed pipe support systems by performing 2D/3D modeling using AutoCAD
• Produced final engineering drawings and shop drawings
• Calculated final bid prices for RFP's/RFQ's and generated proposals for bids
• Ordered necessary hardware for projects by generating Purchase Orders
• Inspected quantity/quality of fabricated materials to meet customers' specifications
• Trained a new employee in various aspects
CAD Operator & Project Assistant
EMICO Pipe Support Co., Franklin Park, IL June 2003 – July 2005
• Produced final engineering drawings and shop drawings using AutoCAD
• Performed summarization of Bill of Materials
• Ordered steel and hardware for fabrication based on BOM summary
• Reduced material cost by developing Steel Cut Schedules to maximize the use of materials
• Generated Packing Lists and Bill of Ladings upon completion of fabrication
• Scheduled trucks for material pickup/delivery
• Performed general office tasks – received calls, generated documents/forms, etc.
INTERPROFESSIONAL PROJECT (IPRO)
The Art of Wind Power – Spring 2007
• Actively participated in class discussions for developing a MasterPlan

• Collected wind data for three regions – O'Hare, Waukegan Harbor, and Calumet
• Analyzed wind data by generating Wind Rose Diagrams and Wind Class Frequency Distribution
Graphs using WRPLOT program
• Collected data sheets and specifications for various wind turbines
• Conducted wind tunnel tests using wind tunnel facilities at IIT and collected wind speed data
• Analyzed wind speed data and calculated estimated total energy generation from various wind turbines using MS Excel
• Participated in project presentation in IPRO Day

SKILLS / PROFICIENCIES
• AutoCAD 2002/2006, Pro-Engineer, SolidWorks • MathCAD 13
• MS Word, Excel, and PowerPoint • QuickBooks Pro
• Strong written/oral communication skills • WRPLOT

Michael T Tishler
[redacted]
mtishler@iit.edu

OBJECTIVE

An internship with a well established, innovative, and competitive company centered on hard work and proven results.

SUMMARY

Hard worker and a quick learner. Takes pride in work and has a huge passion for engineering.

EDUCATION

Illinois Institute of Technology: BSME (expected: 2010)
Glenbrook South High School: (2002 - 2006)

PROFESSIONAL EXPERIENCE

Illinois Tool Works: Worked with Illinois Tool Works in the Product Development Center since the Fall of 2004. There I learned skills in SolidWorks, and Machining Strategist. There I also acquired skills in using a high speed camera, and also analyzing high speed movies. I learned how to use Daisylab for data acquisition. I also learned how to operate manual mills and lathes and how to operate C.N.C.'s and E.D.M.'s there. I have worked on many projects and designed and built many prototypes. A few were on

vibration dampening on drills, a grill lid damper, a push-push that could withstand 30 g's, car door handles that would not open in case of a crash, just to list a few.

COMPUTER SKILLS

SolidWorks (4 years)
Microsoft Office
AutoCAD (6 years)
Machining Strategist (4 years)
DaisyLab

OTHER SKILLS

Lathe and manual mills ect.
CNC, EDM and3D printer

Richard Hanley email: rhanley@iit.edu
[redacted]
[redacted]

Goal

Internship involved in one of the many computer engineering related topics including, but not limited to: embedded real time software development, analog hardware design, digital/VLSI design, or software engineering

Summary of Qualifications

- Student with good standing at the Illinois Institute of Technology
- Good knowledge of multiple computer languages
- A strong desire to acquire above stated internships, and an ability to work hard while paying attention to detail

Education at the Illinois Institute of Technology

- Majoring in Computer Engineering
- Began as freshman in Fall of 2006. Expected graduation date in Spring of 2009, after only three years
- Current GPA 3.11
- Currently have completed 91 of 130 hours of coursework required for obtaining a Bachelors of Science in Computer Engineering

Computer Languages and topics studied

- Object oriented programming with JAVA.
- Assembly for Motorola processors, specifically the MC68000 series. Focus on CISC instruction set with an introduction to the RISC instruction set.
- Object oriented and procedural programming in C++

- Web design with PHP and HTML. For more information see St. James below under previous employment
- Analysis of Discrete Structures applying to algorithms. Including the complexity of an algorithm, minimizing said complexity, recursive functions, graph theory

Past Engineering Topics studied

Past topics of study include: Architecture of the Motorola MC68000 family of micro-processors; Digital design with hardware description languages such as ABEL and VERILOG; Digital synthesis with ABEL and PSPICE; Analog design with OrCAD PSPICE; Impedance matching techniques; Analysis of analog circuits using PHASOR techniques; Analysis of transfer functions using Laplace and Fourier transforms; Analysis of low-pass, high pass, and band pass filters using Butterworth and Chebyshev circuit topologies; Development of Finite State machines

Current Topics of Study

Current topics of study this semester include: Semi-conductor devices (e.g. MOSFETS, JEFETS, bipolar junctions, diodes, ect.); Further study of embedded software design with Motorola processors; Data Structures and databasing in Linux and Windows environments (i.e. array lists, linked lists, binary search patterns, searching and sorting algorithms); research in developing an artificial pancreas

Previous Employment

- *Website Maintenance* at **Saint James Parish** (November 2007-Present)

As website maintainer duties are to update information on the website, and make any changes that are required. The website is designed using mostly PHP, and changes are written in either PHP or HTML. The website is www.stjamesonwabash.com

-Reference

Business manager Christine Pao
Saint James Catholic Church
2942 S. Wabash Avenue
Chicago, IL 60616
Phone: (312) 842-3612

- *Manager of Reception and Sacristan* at **Holy Name Cathedral** (May 2006-Present)

As head of reception duties included scheduling, hiring and training of new receptionists and sacristans, data entry, manning the phones, dealing with walk-ins, miscellaneous clerical duties. As sacristan duties included preparing for liturgical events, security of the sacristy, ensuring the sacristy is clean and in good order.

Working at Holy Name gave a good experience in working with people and paying attention to detail within my work

-Reference

Deacon Stanley Strom Head of Facilities at Holy Name Cathedral
Holy Name Cathedral
730 North Wabash
Chicago, IL 60611

Phone: (312) 787-4404

Personal Achievements

Training at the Southwest Academy of Kyukoshinkai Karate

I have spent the last six years training at the above dojo. Currently I am training for Shodan (i.e. first degree black belt). More than any other thing this training has given me confidence in all the work I do, both physical and mental. In many ways the training I have received is one of the most influential aspects of my life.

-Personal Reference

Hanshi Gregory T. Johnson director of National Martial Arts Association, Head of Southwest Academy of Kyukoshinkai Karate

7834 West 95th Street
Hickory Hills, Il 60457
(708) 598-7734

Walatta Tseyon W. Mesquitta

[redacted]

E-mail: tseyonmesquitta@yahoo.com

Undergraduate Education:

- **Manchester Community College**, Physics major (2004-2006)

  GPA: 3.495/ 4.0

  - Earned 60 credits toward undergraduate degree
- **Capitol Community College**, Physics major (2005)

  GPA: 4.0/4.0
- **Illinois Institute of Technology**: (Fall 2006-present)
  - Bachelor of science in **Molecular Biochemistry and Biophysics**,

    expected May 2009
  - Major: **Molecular Biochemistry & Biophysics**

Work Experience:

- Counselor for West End Community Center Summer Day Camp, Hartford, CT
  - Organized, coordinated, and supervised group activities
  - Accompanied youth on recreational and educational excursions
  - Worked to ensure a disciplined but fun camp environment for youth and staff
- Tax Preparer for Liberty Tax Services, Bloomfield, CT

- Conducting thorough client interviews
- Thoroughly explaining appropriate procedure, benefits, and flow of client's chosen service
- Completing applicable paperwork and inputting client information in office computers
- Answering and researching all tax questions

- Admissions Student Assistant, Manchester Community College, Manchester, CT
  - Acting as admissions receptionist
  - Creating, filing, and locating student folders
  - Locating and researching student information in department database
  - Sorting incoming and preparing outgoing mail
- University of Chicago summer research intern
  - Examining physiology of Na^+/ Cl^- transport within the mammalian nephron in the lab of *Dr. Robert H. Hoover*
- Administrative Assistant, receptionist, Partners in Community Building (PICB) Chicago, IL
  - Processing housing information for city residents
  - Taking and receiving calls
  - Servicing clients in Low Income Heating and Energy Assistance Program, (LIHEAP)

Volunteer Service/ Experience:

- St. Francis Hospital/Home Health and Hospice, Hartford, CT
  - Filing and alphabetizing patient records
  - Preparing folders and/or charts for department nurses (Hospice and Home Health)
  - Replenishing data stocks as they decreased
  - Entering data into Excel spreadsheets
  - Photocopying and preparing envelopes for manager and employees
- St. Francis Pediatric Clinic, Hartford, CT
  - Filing, sorting, retrieving, and delivering medical records
  - Sorting department mail and depositing in staff and doctor mailboxes
  - Alphabetizing medical records

- West End Community Center, Hartford, CT
    - Tutoring and Supervising kids in After School Program

Honors and/or Distinctions:

- Dean's list / Spring 2004, Fall 2005 / Spring 2006 Manchester Community College, Manchester, CT

Zachary J. Estrada
[redacted]
zestrada@iit.edu [redacted]

Objective
To obtain a position which will provide an opportunity to contribute and acquire new skills, as well as continue to build on existing ones.

Education
Illinois Institute of Technology: Chicago, IL
Major: Computer Engineering

□ □ Junior Status as of 2007

□ □ Cumulative GPA: 3.42 on a 4.0 scale

□ □ Camras Heald Scholarship

□ □ Resident Advisor

Northside College Preparatory High School: Chicago, IL
Attended: 2001-2005

□ □ Prairie State Achievement Award

□ □ AP Scholar Award

□ □Class of 2005 Excellence in Computer Science Award

Work Experience
Chicago Mercantile Exchange Group: Chicago, IL
Unix Group Research and Development Lab Intern

□ □ Build and maintain Red Hat Linux servers in a large (~4000 servers) scale enterprise environment

□ □ Deploy, customize, and script software for large scale environment

□ □ Test and benchmark different hardware and software platforms

Illinois Institute of Technology: Chicago, IL
Conference Housing Assistant
(May 2007 – August 2007)

□ □ Respond to guest's needs

□ □ Work with team to accomplish goals

Teacher's Assistant for CS105: Intro to Computer Programming
(January 2007 – May 2007) Zak Estrada Page 2

CS350 (Computer Organization and Assembly Programming) Course redesign (December 2006 – May 2007)

□ □ Designed labs written in C to be run on the Nintendo GameBoy Advance

□ □ Grade labs and homework

□ □ Provide individual guidance to students

□ □ Collaborated on the redesign of the course

Teacher's Assistant for CS115: Object-Oriented Programming I (September 2006 – December 2006) **United States Marine Corps Officer Candidates School:** Quantico, VA
Officer Candidate (May 28th –July 7th 2006)

□ □ Completed Platoon Leaders Class, Juniors Course

□ □ Held various leadership positions

□ □ Learned to work in a stressful environment and think under pressure

□ □ Acquired valuable teamwork skills

Northside College Prep: Chicago, IL **Student Tech Intern** (Fall 2003 - Summer 2005)

□ □ Supervised up to 4 other student techs

□ □ Set up workstations, handled systems configuration, ensured network connectivity, installed and tested hardware / software

□ □ Responsible for maintenance and backups of workstations, servers, printers, and network

□ □ Troubleshot hardware and network problems

□ □ Created web-based file system interface for Netware Server

□ □ Provided technical and hands-on desktop support to teachers and staff, approximately 100 end-users

Northside College Prep: Chicago, IL **Clean and Green Hand** (Summers: 2002, 2003)

□ □ General maintenance of school and grounds including:

painting, cleaning, laying sod, and excavating. **Bryn Mawr Country Club:** Lincolnwood, IL **Golf Caddy** (Summer 2001)

□ □ Ensured that club members and guests enjoyed the course and provided players with assistance as needed.

Volunteer Experience St James on Wabash: Chicago, IL **Food Pantry Volunteer** (April 2007 – August 2007) **Student Volunteer Organizer** (September 2007 – December 2007) Zak

Computer Skills:

□ □ Microsoft Office (Word, Excel, PowerPoint)

□ □ SQL (MySQL)

□ □ C/C++ (2-3 years)

□ □ JAVA (3-4 years)

□ □ Linux (5 years)

□ □ Windows (7 years)

□ □ Novell Netware (1 year)

□ □ Norton Ghost (2 years)

□ □ PHP (2 years)

□ □ Various experiences and proficiencies with hardware and networking

lastkyl@iit.edu

Campus Address **Permanent Address**

[redacted]

Education: Illinois Institute of Technology
Bachelor of Science in Biology
Major: Molecular Biochemistry and Biophysics
Expected Graduation Date: May 2008 C.G.P.A.: 3.18/4.0

Course Work: General & Human Biology, Genetics, General Chemistry I & II, Organic Chemistry I and Lab, Calculus I & II, Verbal and Visual Communications.

Experience:

Northwestern University
08/2005 – Present Undergraduate Researcher

- Working with auditory hair cells in order to assess the ototoxicity of certain drugs, also gaining knowledge and experience in the subjects of anatomy, biochemistry, Electrophysiology (specifically those of K+ Channels), and protein chemistry.

Chicago Urban League
10/2004 – 05/2005 Tutor/Mentor

- Assisted students in Reading and Mathematics, as well as provided life skills training.

Developing Minds Home School and Tutoring Service
07/2002 – 08/2004 Tutor/Summer Program Counselor

- Tutored high school and college students in the academic study areas of Algebra I & II, Geometry, Trigonometry, College Algebra, and Statistics.
- Mentored and taught students who attended the summer program in the study areas of Reading, Mathematics, and entry level Spanish.

Skills: Knowledge of scientific method, standard laboratory and safety procedures, four years of Spanish. Familiar with C++ programming language.

Honors & Awards:

- Outstanding Achievement in Mathematics- Thornton Township High School 2004
- National Spanish Honors Society- Thornton Township High School 2004
- Citizenship Award- Thornton Township High School 2004
- Center for Drug Discovery and Chemical Biology Summer Student- Northwestern University 2006
- Summer Research Opportunity Program Research Student- Northwestern

University 2006

ROHAN MATHEWS

College Address:

rmathew4@iit.edu , rohan.mathews@gmail.com

Permanent Address:

OBJECTIVE Fourth Year Undergraduate seeking entry-level job opportunity in a competitive electrical and power engineering environment.

EDUCATION

College :
Illinois Institute of Technology,
Fourth year Undergraduate,
Electrical Engineering
Graduating Date : May 2008

High School :
West African College of the Atlantic
(Senegal, West Africa)
International Baccalaureate program
(2000 to 2005)

EXPERIENCE

Intern, Sigenics Inc.
October 2007-Present
- Design, building and testing of IC chips
- Worked with extensive circuit analysis for prosthetics.

Laboratory Assistant, Pritzker Institute of Medicine, IIT
June 2007-October 2007
- Organized layout of the laboratory
- Built and tested various electrical devices and IC designs

Brushless DC Motor Research, ECE Department, Illinois Institute of Technology
September 2007 - Present
- Aid with the research and production of efficient Brushless DC motors.
- Design, build and test different components of the motor

Team Leader, InterProfessional Project (IPRO) : Developing an artificial pancreas, Illinois Institute of Technology January 2008 - Present
- Design a working prototype for the non-invasive closed-loop process of glucose monitoring and insulin delivery for diabetic patients.
- Coordinate team tasks and duties.

SKILLS

MATLAB, ORCAD, Express PCB, PowerWorld, PSpice, AutoCAD Electrical, JAVA, Interactive C, MS Office, circuitry and electronics.

LANGUAGES

Fluent in written and spoken English and French. Working knowledge of Hindi and Spanish

HONORS & ACTIVITIES

DANCE 101 President (2006 – present) Illinois Institute of Technology
- In charge of Public Relations and organizing events.

Motor Sports Fan Club (2006 – present) Illinois Institute of Technology
- In charge of Public Relations and advertising.

Shezami Khalil
[redacted]

skhalil@iit.edu

EXPERIENCE:

Research Assistance December ’07 – present
Illinois Institute of Technology,
Chicago, Illinois

- Involved in a research to study the mechanism involving the stretch activation of muscles using x-ray diffraction patterns.
- Responsible for data analysis and comparison.

IPRO 308 January ’07 – present

- An IIT inter-professional project involved in designing a non evasive method of measuring the blood sugar level and injecting the required amount of insulin in a diabetic patient.

Intern June ‘07 – August ‘07
International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B)
Dhaka, Bangladesh

- Worked on a project called “The Effect of Migration on the Health of Bangladeshi Labors”.
- Went to the field with my supervisor for data collection, surveys and interviews.
- Responsible for the data entry, writing articles and progress reports, interaction with the parent organizations like UNICEF and ILO.
- Substituted for another intern for a week in a project called “Preventing HIV/AIDS among Young People in Bangladesh”.

Teacher January ’05 – March ‘05
Sir John Wilson School, Dhaka, Bangladesh

- Substitute third grade teacher for Bengali and Health & Morality.
- Prepared the schedule, examinations and homeworks for regular assessment.
- Wrote the progress report at the end of the term and had a parent-teacher meeting.

Intern July ’04 - October ‘04
Standard Chartered Bank
Dhaka, Bangladesh

- Opened accounts, issued fixed deposits and certificates, wrote customer portfolios, answered customer queries involving bank statements, account credit, debit and transfers and phone and internet banking.
- Received insight on auditing and credit analysis.

Volunteer June ’02 – August ‘02
Kalyani Protibondhi Foundation (School for disabled children)
Dhaka, Bangladesh

- Assisted the class teacher in helping the children to be independent.
- Guided them to speak, eat and maintain themselves acceptably.

- Had to help control the children, when required, with songs, games and puzzles.

EDUCATION:

Bachelors of Science (Biochemistry Major)
August 2007 - Present
Junior (Transfer Student)
CGPA: 3.60
Illinois Institute of Technology
Chicago, Illinois 60616

Bachelors of Science
May 2005 – April 2007
CGPA: 3.67
Nilai International College
Nilai, Malaysia 71800

GCE Advanced Level, 2004
Two B's and a C in Chemistry, Mathematics and Biology respectively.
Scholastica
Dhaka, Bangladesh

GCE Ordinary Level, 2002
All A's in English, Bengali, Mathematics, Pure Mathematics, Chemistry, Biology, Physics and Economics.
Sunbeams
Dhaka, Bangladesh

OTHER SKILLS:

- Computing Skills in Microsoft Office, AutoCAD, Ruby Programming and also using Linux operating system
- Fluent in Bengali, English and Hindi.

NAME	POSITION TITLE
Philipson, Louis H.	Professor

eRA COMMONS USER NAME Lphilipson	

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Harvard College	B.A.	1976	Biochemistry
University of Chicago	Ph.D.	1982	Biochemistry
University of Chicago	M.D.	1986	Medicine

Positions and Employment

1986-1988	Dept of Medicine Residency, PGY1-2, University of Chicago
1988-1991	Fellow in Endocrinology, (with Dr. D. Steiner, MI, University of Chicago)
1991-	Attending Physician, University of Chicago, Dept. of Medicine
1991-1998	Assistant Professor, University of Chicago, Dept. of Medicine
1998-2003	Associate Professor, University of Chicago, Dept of Medicine
1999-2000	Acting Section Chief, Section of Endocrinology
2000-	Committee on Molecular Metabolism and Nutrition
2003-	Professor, University of Chicago, Dept. of Medicine
2006-	Director, University of Chicago Kovler Diabetes Center

Other Experiences and Professional Memberships

2006-08 National Scientific Meeting Planning Committee, American Diabetes Association

1997-present NIH Peer Review: Special study section on Centers of Excellence in Diabetes Research, 12/99; SBRI review panel 7/2000 and 3/2001; 2001 NIDDK Cell biology of the Beta Cell Study Section; Several Special Emphasis Panels; Metabolism Study Section ad hoc, 2003; Endocrinology study section ad hoc, 2003; Cellular Aspects of Diabetes and Obesity (CADO) 2003-2004 ad hoc; CADO member 2005-7;

Editorial Boards: *Diabetes (*1996-99*); American Journal of Physiology, Endocrinology and Metabolism (*2001-2007*); Journal of Biological Chemistry* (2006-present)

*Honors**: Alpha Omega Alpha and John Van Prohaska Award, University of Chicago (1986); Young Investigator Award, American Diabetes Association Illinois Section (1989); Mary Jane Kugel Award, Juvenile Diabetes Foundation International (1999); Scientist of the Year, NDRI (2007)***

B. Selected peer-reviewed publications

1. Roe, M.W., Worley, III, J.F., Qian, F., Tamarina, N., Mittal, A.A., Dralyuk, F., Blair, N., Mertz, R.J., **Philipson, L.H.**, and Dukes, I.D. Characterization of a Ca^{2+} release activated non selective cation current (ICRAN) regulating membrane potential and [Ca^{2+}] oscillations in transgenically-derived ß-cells. J Biol Chem. 273: 10402-10410 1998.
2. Zhou, Y-P, Pena, J.C., Roe, M.W., Mittal, A., Levisetti, M., Baldwin, A.C., Pugh, W., Ostrega, D., Ahmed, N., Bindokas, V.P., **Philipson**, **L.H**., Hanahan, D., Thompson, C.B., Polonsky, K.S. Overexpression of bcl-xl in pancreatic beta-cells prevents cell

death but inhibits insulin secretion by impairing mitochondrial function. Am. J. Physiol. Endocrinol Metab 278:E340-51, 2000.
3. Tamarina N., Wang, Y., Mariotto, Y., Bond, C., Adelman J., **Philipson, LH**. Small conductance calcium-activated K+ channels (SK) are expressed in pancreatic islets and regulate glucose responses. Diabetes 52:2000-6, 2003.
4. Bindokas, V.P., Kuznetsov, A., Sreenan, S., Polonsky, K.S., **Philipson, L.H**. Visualizing superoxide production in normal and diabetic rat islets of langerhans. J Biol Chem. 278:9796-9801, 2003.
5. Fridyland, L.E., Tamarina, T., **Philipson, L.H**. Modeling of Ca2+ flux in pancreatic beta-cells: role of plasma membrane and intracellular stores. Am J. Physiol 285:E138-54, 2003.
6. Yaekura, K., Julyan, R., Wicksteed, B.L., Hays, L.B., Alarcon, C., Sommers, S., Poitout, V., Baskin, D.G., Wang, Y., **Philipson, L.H**. Rhodes, C.J. Insulin secretory deficiency and glucose intolerance in rab3a null mice. J Biol Chem. 278:9715-21, 2003.
7. Fridlyand, L.E., and **Philipson, L.H**. Does the Glucose-dependent Insulin Secretion Mechanism Itself Cause Oxidative Stress in Pancreatic b-cells? Diabetes, 53:1942-1948, 2004.
8. Ma, L., Bindokas, V., Kuznetsov, A., Rhodes, C., Hays, L., Edwardson, J.M., Ueda, K., Steiner, D.F. and **Philipson, L.H**. Direct Imaging Shows Insulin Granule Exocytosis Occurs by Complete Vesicle Fusion. Proc Natl Acad Sci USA 101:9266-71, 2004.
9. Kuznetsov A, Bindokas V.P., Marks J.D., **Philipson L.H**. FRET-Based Voltage Probes For Confocal Imaging:Membrane Potential Oscillations Throughout Pancreatic Islets. Am J Physiol Cell Physiol. 289:C224-9, 2005.
10. Hays, L.B., Wicksteed, B., Wang, Y., McCuaig, J.F., **Philipson, L.H**. Edwardson, J.M., and Rhodes, C.J. Intragranular targeting of syncollin, but not a syncollin-GFP chimera, inhibits regulated insulin exocytosis in pancreatic beta cells. J. Endocrinol. 185:57-67, 2005.
11. Fridlyand L.E., Ma L, **Philipson L.H**. Adenine Nucleotide Regulation In Pancreatic Beta Cells: Modeling of ATP/ADP - Ca^{2+} Interactions. Am J Physiol Endocrinol Metab. 289:E839-48, 2005.
12. Tamarina, N.A., Kuznetsov, A., Fridlyand, L.E. and **Philipson. L.H**. Delayed Rectifier (Kv2.1) Regulation of Pancreatic Beta Cell Calcium Responses to Glucose: Inhibitor Specificity and Modeling. Am. J. Physiol 289:E578-85, 2005.
13. Tamarina, N.A., Kuznetsov, A., Rhodes, C.J., Bindokas, V.P., and **Philipson, L.H**. Inositol 1,4,5-Trisphosphate Dynamics and Intracellular Calcium Oscillations in Pancreatic beta Cells. Diabetes, 54:3073-81, 2005.
14. Chong, A.S., Shen, J., Tao, J., Yin, D., Kuznetsov, A., Hara, M., and **Philipson, L.H**. Reversal of diabetes in NOD mice without spleen-cell derived beta-cell regeneration. Science, 311:1774-5, 2006.
15. Jacobson D.A., Cho J., Landa L.R., Tamarina N.A., Roe M.W., Buxbaum J.D., **Philipson L.H.** The Downstream Regulatory Element Antagonistic Modulator Regulates Islet Prodynorphin Expression. Am J Physiol Endocrinol Metab. 291:E587-95, 2006.

16. Jacobson DA, Weber CR, Bao S, Turk J, **Philipson L.H.** Modulation of the Pancreatic Islet beta-Cell-delayed Rectifier Potassium Channel Kv2.1 by the Polyunsaturated Fatty Acid Arachidonate. J Biol Chem. 282:7442-9, 2007.
17. Jacobson DA, Kuznetsov A, Lopez JP, Kash S, Ämmälä CE, **Philipson L.H.** Kv2.1 Ablation Alters Glucose Induced Islet Electrical Activity, Enhancing Insulin Secretion. Cell Metab., 6:229-35, 2007.
18. Støy, J., Edghill, E.L., Flanagan S.E., Ye, H., Paz V.P., Pluzhnikov, A., Below, J.E. Hayes, M.G. Cox, N.J. Lipkind, G.M., Lipton, R.B., Greeley, S.A., Patch, A.-M. Ellard, S. Steiner, D.F., Hattersley, A.T., **Philipson, L.H.** and Bell, G.I., & Neonatal Diabetes International Collaborative Group. Insulin Gene Mutations as a Cause of Permanent Neonatal Diabetes. Proc Nat Acad USA 104:15040-4, 2007.
19. Jacobson DA, **Philipson LH.** Action potentials and insulin secretion: new insights into the role of Kv channels. Diabetes Obes Metab. Suppl 2:89-98, 2007.
20. Fridlyand LE, Harbeck MC, Roe MW, **Philipson LH.** Regulation of cAMP dynamics by Ca2+ and G protein-coupled receptors in the pancreatic beta-cell: a computational approach. Am J Physiol Cell Physiol. 293(6):C1924-33, 2007.
21. Bao, S., Jacobson, D.A., Wohltmann, M., Bohrer, A., Jin, W., **Philipson, L.H**. and Turk., J. Glucose Homeostasis, Insulin Secretion, and Islet Phospholipids in Mice that Overexpress iPLA2β in Pancreatic β-Cells and in iPLA2β-Null Mice, Am J Physiol Endocrinol Metab., 294(2):E217-29, 2008
22. Edghill EL, Flanagan SE, Patch AM, Boustred C, Parrish A, Shields B, Shepherd MH, Hussain K, Kapoor RR, Malecki M, Macdonald MJ, Støy J, Steiner DF, **Philipson LH**, Bell GI; the Neonatal Diabetes International Collaborative Group, Hattersley AT, Ellard S. Insulin Mutation Screening in 1044 Patients with Diabetes: Mutations in the INS gene are a Common Cause of Neonatal Diabetes but a Rare Cause of Diabetes Diagnosed in Childhood or Adulthood. Diabetes, 57(4):1034-42, 2008

Research Support (Selected)

Ongoing Research Support

R01 DK48494 Philipson (PI) 12/01/02 – 11/30/07
NIH/NIDDK (no cost extension)
"Modulation of K+ Channel Expression in Beta-Cells"
The objective to study how specific ion channels regulate intracellular calcium concentration and thereby insulin secretion in pancreatic ß-cells in normal and diabetic states.
Role: P.I.

P60 DK20595 Bell (PI) 11/30/07 – 11/30/12 (renewed)
NIH/NIDDK
Diabetes Research and Training Center
The aims of the center are to foster diabetes and endocrinology research.
Role: Core Director

Takeda Pharmaceuticals Chong (PI) 01/03/06 – 01/2/08

"The Effect of Pioglitazone on Pancreatic Beta Cell Regeneration"
The objective of the project was to understand signal transduction mechanisms underlying the effects of pioglitazone on Zucker diabetic rat islets.
Role: Co-Investigator

Takeda Pharmaceuticals Philipson (PI) 9/01/2006 - 9/01/2008
Takeda-University of Chicago Fellowship in Beta Cell Research
The overall goal of this project is to sponsor a post-doctoral fellow for 2 years to learn the advanced techniques in beta cell research.
Role: PI

Juvenile Diabetes Research Foundation Philipson (PI) 3/01/2007 – 2/28/2008
Beta-Cell Regeneration in the NOD Mouse
The overall goal of this project is to gain a better understanding of the origin of new beta-cell during betee-cell regeneration in NOD mice.
Role: PI

Juvenile Diabetes Research Foundation Philipson (PI) 11/01/2007 – 10/30/2009
Permanent Neonatal Diabetes registry
The overall goal of this project is to develop national registry of patients with neonatal diabetes.
Role: PI

R01 DK063493 Philipson (PI) 9/30/02 – 07/31/06
NIH/NIDDK (no cost extension)
"Imaging Beta Cell Function with Biosensors"
The goal of this project is to understand the calcium (Ca^{2+}) dependent stimulus-secretion coupling mechanisms that regulate β-cell function *in vivo* from the perspectives of biophysics, physiology and molecular biology.
Role: PI

NovoNordisk Philipson (PI) 11/01/07 – 10/30/08
Effect of Liraglutide on Insulin Exocytosis
Pole: PI

F31 DK076171 NRSA Lopez (PI) 12/01/06 – 11/30/09
ERM Proteins roles in glucose stimulated insulin secretion
The overall goal of this project is to test the hypothesis that activation of the related proteins ezin, moesin and radixin ("ERMs") play critical roles in glucose stimulated secretion that might be dysfunctional in Type 2 diabetes mellitus.
Role: PI/Mentor

American Diabetes Association Philipson (PI) 1/01/07 – 12/31/09
"Beta cell damage due to reactive oxidative stress: mitochondria and endoplasmic reticulum"

This study aims to correlate ER and mitochondrial ROS with changes in the structure and function associated with insulin secretion and diabetes.
Role: PI

Completed Research Support (SELECTED)

American Diabetes Association Philipson (PI) 07/01/02 – 6/30/05
"Mentor Based Minority Post-Doctoral Fellowship Award"
Objective: Support post-doctoral minority fellowship training in beta cell / islet biology and biophysics.
Role: PI/Mentor

Protocol No: 003-03R Philipson (PI) 06/01/03 – 05/31/05
Takeda Pharmaceuticals
The Effect of Pioglitazone on Islet Function
The objective of the project was to understand signal transduction mechanisms underlying the effects of pioglitazone on Zucker diabetic rat islets.
Role: PI

R01 DK063493 Philipson (PI) 9/30/02 – 07/31/06
NIH/NIDDK
"Imaging Beta Cell Function with Biosensors"
The goal of this project is to understand the calcium (Ca^{2+}) dependent stimulus-secretion coupling mechanisms that regulate β-cell function *in vivo* from the perspectives of biophysics, physiology and molecular biology.
Role: PI

American Diabetes Association Philipson (PI) 07/01/02 – 6/30/06
"Mentor Based Post-Doctoral Fellowship Award"
Mentor: L. Philipson
Objective: Support post-doctoral fellowship training in beta cell / islet biology and biophysics.
Role: PI

R01 NS25946 MacDonald (PI) 07/01/02 - 05/31/06
NIH/NINDS
"Pathophysiology of Cerebral Vasospasm"
The objective of this proposal is to determine the mechanism of vasospasm after subarachnoid hemorrhage and thereby to develop treatments that will prevent and/or reverse it.

Role: Collaborator

NIK ROKOP, PE
[redacted] nrokop@nlake.com

[redacted]

PROFESSIONAL SUMMARY

An Entrepreneur and Business Development Leader with 25 years of experience in industrial products and technology
for small and midsized companies. Responsibilities encompass sales, business development, strategic planning,
turnaround operations and negotiations with customers, strategic partners and investors. Grows companies and delivers
bottom line performance.

PROFESSIONAL EXPERIENCE

July 2007 to Present
Knapp Entrepreneurship Center at IIT, Chicago, IL
Center established to help start and grow entrepreneurial ventures
Managing Director
□ □ Leading and building an effective resource for entrepreneurs to create successful companies
□ □ Developing business model, sustainability plan and infrastructure of support services
□ □ Integrating entrepreneurship throughout the university and developing partnerships with the community

May 2002 to Present
nLAKE TECHNOLOGY PARTNERS, LLC, Chicago, IL
Management, business development and technology commercialization group
President & CEO
□ □ Founded a technology commercialization partnership by assembling an experienced multi-disciplined team
committed to the growth of emerging technology companies in the Chicago area.
□ □ Creating business opportunities through management involvement with a focus on customer applications in
electronics, materials and manufacturing technology.

August 2006 to July 2007
BIAS POWER, LLC, Chicago, IL (under contract to nLake Technology Partners)
Supplier of AC/DC power supplies
Vice President, Business Development
□ □ Providing strategic partnership, funding, & sales services as part of the senior management of
startup electrical component supplier by tapping global personal network.
□ □ Developing international partnerships, strategic client relationships and helping drive product development.
□ □ Writing business plan and participating in investor presentations.

May 1998 to December 2001
IRON DYNAMICS PROCESS INTL, Chicago, IL
Sales company for new iron-making process
President

□ □ Led global sales of a new iron-making process by generating strong interest at customer and trade show
presentations.
□ □ Managed corporate venture-funded startup and represented shareholders on Board of Directors.
□ □ Negotiated licenses, contracts for feasibility studies and created strategic alliances for technology
development.

January 1987 to April 1998
NRE INC., Pittsburgh, PA
Engineering services, technical training and business development company
Owner and President
□ □ Founded an engineering and consulting company combining engineering and computer skills to compete
profitably with larger firms to achieve annual revenues up to $650,000.
□ □ Designed technologically advanced equipment, managed $23 million plant installation from concept to
successful startup, and trained engineers using automated design tools.

August 1996 to December 1997
LA PRIMA CYBAIRCAFFÉ, Pittsburgh, PA (under NRE Inc, dba)
First airport Internet café
Founder
□ □ Installed the first Internet Café in a major airport, the Pittsburgh International Airport, by recognizing needs of travelers to be connected
□□ Developed concept and web site and successfully negotiated with airport authority and key partners.
□ □ Conceived strategy for expansion and future business development and promoted to companies
with large groups of travelers, generating national publicity and interest.

November 1993 to April 1995
UNIFAB INC. Enon Valley, PA (under NRE Inc, dba)
Custom job shop manufacturer
President
□ □ Negotiated and purchased distressed custom job shop with revenues of $1 million.
□ □ Turned around the company through renegotiation with vendors, automating engineering, accounting and production control systems while adding employees and reorganizing.
□ □ Worked with customers to increase sales 100% and vendors and employees to achieve positive cash
flow in the first year.

January 1988 to August 1989
ALLIANCE MACHINE COMPANY, Alliance, Ohio (under NRE Inc)
Major heavy industrial equipment manufacturer
VP Sales
Part of senior management team in turnaround, responsible for sales & estimating to win profitable,
competitive contracts, resulting in a successful sale of the company.

June 1974 to December 1986 and June 1990 to August 1992
ROKOP CORPORATION, Pittsburgh, PA
Global continuous casting equipment supplier
Vice President
□ □ Directed engineering, construction, sales and marketing support, customer service and project management
activities of $25 million continuous casting technology company.
□ □ Achieved major market share in the US and enabled the growth of the US mini-mill industry.
□ □ Led product and market development, generating new designs, patents.
□ □ Created a manufacturing base in China by evaluating manufacturers capable of maintaining US quality
standards, negotiating contracts and directing conversion of critical designs to Chinese, resulting in several
profitable multi-million dollar contracts and long-term relationships achieving 40% lower costs.
November 1981 to May 1984
ROKOP DAVY LTD., Stockton, England
Joint venture for supply of process plants in Europe, Asia, Middle East
Managing Director
□ □ Directed and grew an engineering, capital equipment supply and construction joint venture in the
UK from inception to $15 million annual sales.
□ □ Profitably developed business in Europe, Asia, China and Middle East through direct sales and by
building and managing an excellent sales and implementation team.

EDUCATION

Bachelor of Science, Mathematics, 1974
Carnegie Mellon University
Bachelor of Science, Mechanical Engineering, 1978
University of Pittsburgh

PROFESSIONAL CERTIFICATION and ASSOCIATIONS

Professional Engineer (PA)
NSPE, PSPE, AISE, ISS
Chicago Microtechnology & Nanotechnology Community - President
BIG Idea Forum - Founding board member
MITEF Chicago – Vice Chair
Top 100 In Technology in Chicago Award – 2002
Guest lecturer at IIT, DePaul, Northwestern, UIC

E-mail: raydeboth@cs.com
[redacted]

Experience

Admiral/Rockwell/Boeing 1973-1997

- New Product facilitator for the (Advanced Technology Think Tank)
- Tactical systems division material & process engineer
- Component vendor and field failure analyzer
- Color TV production engineer and Microwave oven R&D

Zenith Production Group Leader for: 1952-1973

- Color & B&W TV deflection circuitry
- Power supplies, picture tubes
- Production prototypes

Zenith Color R&D engineer

.

Giddings & Lewis Machine Tool Company 1941

- Machinist

WW2 LORAN Ground Station Engineer & In Flight LORAN Navigation Instructor

W9HBY- Radio amateur License 1939

Affiliations

Associations currently active in:

- FVEAA (Fox Valley Electric Auto Association)
- IMAPS (International Microelectronic and Packaging Society)
- SMTA (Surface Mount Technology Association)
- MEF (Midwest Entrepreneurs' Forum)

Education

BSEE- Marquette University 1952

NAME Emmanuel C. Opara	POSITION TITLE Research Professor
eRA COMMONS USER NAME oparae	

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE(s)	YEAR(s)	FIELD OF STUDY
University of Nigeria, Nsukka, Nigeria	B.S (Hon)	1976	Biochemistry
University of Surrey, Guildford, Surrey, UK	M.S	1980	Clinical Biochemistry
University of London, London, UK	*Ph.D.*	1984	Medical Biochemistry
Mayo Clinic/Foundation, Rochester, MN	Post-doc	1984-86	Endocrinol/Metabolism

A. Positions and Honors.

Positions and Employment

1976-1977 Laboratory Scientist on National Youth Service, State Hospital, Ado Ekiti, Nigeria
1977-1978 Food and Drug Inspecting Officer, Federal Ministry of Health, Port Harcourt, Nigeria
1978-1980 Clinical Biochemist, Epsom Hospital Laboratories, Epsom Surrey, England
1980-1983 Demonstrator (Instructor) in Biochemistry, Chelsea College, University of London, England
1984-1986 W.H.O. Fellow in Endocrinology and Gastroenterology Res, Mayo Clinic, Rochester, MN
1986-1988 Visiting Fellow, National Institute of Diabetes, Digestive and Kidney Diseases, NIH,
Bethesda, MD
1988-1993 Research Associate, Department of Surgery, Duke Univ Med Center, Durham, NC
1991-2003 Member, Sara W. Stedman Center for Nutritional Studies, Duke Univ Med Center, Durham, NC
1994-1999 Assistant Research Professor, Department of Surgery, Duke Univ Med Center, Durham, NC
1996-2003 Assistant Research Professor, Dept. of Cell Biology, Duke Univ Med Center, Durham, NC
2000-2003 Associate Research Professor, Department of Surgery, Duke Univ Med Center, Durham, NC
2003-present Research Professor, Pritzker Institute of Biomed Sci & Engr, IIT, Chicago, IL
2003-present Senior Investigator, Human Islet Transplant Program, University of Chicago, IL
2004–present Co-Director, IIT Engineering Center for Diabetes Research & Education

Other Experience and Professional Memberships

1984- present Member, American Diabetes Association of Health, Bethesda, MD
1990-present American Federation for Medical Research
1995-present Member, American Gastroenterological Association
1998-present Member, Editorial Board of Pancreas
2000-present Member, Transplantation Society
2001 Chair, Clinical Research 2001 AFMR/VA Symposium on Islet Cell Transplantation**,** Marriott
Gateway, Crystal City, VA
2002 Organizer & Chair, 2002 Experimental Biology Mini-symposium on"Type 2 Diabetes in Older
Adults",New Orleans, Louisiana

Honors

1984-1986 World Health Organization Fellow, Mayo Clinic/Foundation, Rochester, MN
1986-1988 John E. Fogarty Fellow, NIDDK, National Institutes of Health, Bethesda

B. Selected peer-reviewed publications (in chronological order).

(Publications selected from >60 peer-reviewed publications)

Opara EC, Kutlu M, van Haeften T, Kennedy FP, Gerich JE. Effect of internalization and degradation on rat insulin receptor binding kinetics. Clin Physiol Biochem 6: 1-11, 1988.
Opara E.C., Atwater I., Go V.L.W. Characterization and control of pulsatile secretion of insulin and glucagon. Pan-creas 3:484-489, 1988.
Opara EC, Burch W, Akwari OE. Characterization of glutamine-regulated pancreatic hormone release.
Surg Forum 41:16-19, 1990.
De Vries C.P, van Haeften T.W, **Opara E.C**, Van der Veen E.A. Influence of inhibition of insulin degradation on Scatchard analysis in H35 rat hepatoma cells. Biomed. Biochim. Acta 50: 1027-1032, 1991.
Opara EC, Go VLW. Influence of gastric inhibitory polypeptide and glucose on the alpha cell secretion of glucagon. Regul Peptides 32:65-73, 1991.
Opara EC, Burch W, Taylor I, Akwari OE. Pancreatic hormone response to neuropeptide Y (NPY) perifusion in vi-tro. Regul Peptides 34:225-233, 1991.
Opara EC, Garfinkel M, Burch WM, Akwari OE. Glutamine blocks essential fatty acid-induced desensitization of both pancreatic alpha and beta cells response to glucose. Surg Forum 42:18-21, 1991.
Garfinkel M, **Opara EC**, Akwari OE. Insulinotropic potency of lauric acid: a metabolic rationale for medium chain fatty acids in TPN solutions. J Surg Res 52:238-333,1992.
Opara EC, Go VLW. Dual effects of gastric inhibitory polypeptide (GIP) on insulin secretion. Pancreas 8:39- 43, 1993.
Opara EC, Hubbard VS, Burch W, Akwari OE. Characterization of the insulinotropic potency of polyunsaturated fatty acids. Endocrinology 130:657-662,1992.
Opara EC, Lee SK, Akwari OE. Glutathione-mediated blockade of essential fatty acid-induced desensitization of pan-creatic beta cells to glucose. Surg Forum 43:3-6,1992.
Opara EC, Hubbard VS, Burch WM, Akwari OE. Addition of L-glutamine to a linoleic acid perifusate prevents the fatty acid-induced desensitization of pancreatic islet response to glucose. J. Nutr Biochem. 4: 357-361,1993.
Geoghegan JG, Lawson DC, Cheng CA, **Opara E**,Taylor IL, Pappas TN. Intracerebroventricular neuropeptide Y in-creases gastric and pancreatic secretion in the dog. Gastroenterology 105 : 1069-1077, 1993.
Opara EC, Garfinkel M, Hubbard VS, Akwari OE. Effect of fatty acids on insulin release: role of chain length and degree of unsaturation. Am J Physiol. 266 (Endocrinol Metab 29): E635-639, 1994.
Seldin M.F, Mott D, Bhat D, Petro A, Kuhn CM, Kingsmore SF, Bogardus C, **Opara EC**, Feinglos MN, Surwit RS. Glycogen synthase: a putative locus for diet-induced hyperglycemia. J Clin Invest. 94:269-276,1994.
Lee SK, **Opara EC,** Surwit RS, Feinglos MN, Akwari OE. Defective glucose-stimulated insulin release from perifused islets of C57BL/6J mice. Pancreas 11:206-211,1995.
Littman E, **Opara EC**, Akwari OE: Glutathione-mediated preservation and enhancement of isolated perifused islet function. J Surg Res 59: 694-698, 1995.
Wencel HE, Smothers C, **Opara EC**, Kuhn CM, Feinglos MN, Surwit RS. Impaired second phase insulin response of diabetes-prone C57BL/6J mouse islets. Physiol Behav 57: 1215-1220,1995.

Surwit RS, Feinglos MN, Rodin J, Sutherland A, Petro AE, **Opara EC**, Rebuffe-Scrive M. Differential effects of fat and sucrose on the development of obesity and diabetes in C57BL/6J and A/J mice.
Metabolism 44: 645- 651, 1995.
Opara EC, Petro A, Tevrizian A, Feinglos MN, Surwit RS. L-glutamine supplementation of a high fat diet reduces body weight and attenuates hyperglycemia and hyperinsulinemia in C57BL/6J mice.
J Nutr 126: 273-279,1996.
Ballard TC, Farag A, Branum GD, Akwari OE, **Opara EC**. Effect of L-glutamine on impaired glucose regulation during intravenous lipid administration. Nutrition 12: 349-354,1996.
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Diabetes Technology & Therapeutics 7: 968-985, 2005.

C. Research Support. List selected ongoing or completed (during the last three years) research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and your role (e.g. PI, Co-Investigator, Consultant) in the research project. Do not list award amounts or percent effort in projects.

Completed in the last 3 years:
RNA-binding proteins and Beta cell function
Principal Investigator: Bentley Cheatham, Ph.D.
Role: Co-Principal Investigator
Type: NIH SBIR/STTR
Period: 05/01/04 – 04/30/06
The experiments proposed in this project are designed as 'proof of concept' studies in which Ribonomics technology is applied to the □-cell, focusing on glucose-regulated insulin secretion and proinsulin biosynthesis and □-cell development. These studies are relevant to both Type 1 and Type 2 diabetes, as they will generate a list of candidate therapeutic targets for treatment of these diseases.

On-going:
Title: Development of an experimentally validated fluid dynamics model for future non-invasive glucose monitors
Principal Investigator: Ganesh Raman, Ph.D.
Role: Co-Principal Investigator
Funding Agency: Pritzker Institute, IIT, Chicago, IL
Period: 01/01/07 – 12/31/2008

Title: REU Site: Summer Engineering Research Experiences in Diabetes for Undergraduates
Principal Investigator: Vincent Turitto, D.Eng.Sci
Role: Co-Principal Investigator
Funding Agency: National Science Foundation
Period: 2/1/06-1/31/09

Letters of Support:

April 11, 2008

In re: IPRO diabetes technology course

Dr. Emmanuel Opara
Research Professor
Illinois Institute of Technology
Engineering 1 Building, Room 116
10 West 32nd Street
Chicago, IL 60616-3793

Dear Manny,
I am writing to enthusiastically support your application for support for the project stemming from your Interprofessional Projects course "Creating a non-invasive glucose monitor and insulin pump." As you know, I am Professor of Medicine at the University of Chicago in the section of Endocrinology, Diabetes and Metabolism. I have an active NIH-funded research lab, with major research areas including pancreatic beta cell ion channels and the genetics of diabetes, with a core lab in the Diabetes Research and

Training Center. I will be delighted to act as a consultant for this project. Since we are only a few blocks away, I will be able to be an active resource in this exciting effort.
As Director of Kovler Diabetes Center, I see patients and train students, residents and fellows in the advanced treatment of all forms of diabetes. Our center has a particular focus on Type 1 diabetes, and we advocate intensive insulin therapy when appropriate using state of the art insulin pumps and FDA approved continuous glucose monitors. While there is a growing literature on the successful use of this technology, none of the existing devices are ideal, and the communication between these devices resulting in a closed loop external artificial pancreas is an area of intense research. Some of my patients have given up using the current devices for a variety of reasons, despite their utility. Your course broght together experts in diverse fields to address this problem in a unique inter- and multidisciplinary approach. I was greatly impressed by the way your students tackled the issues. They asked terrific questions while developing great insight into the formidable problems of next-generation diabetes technology. There is plenty of room in this field for additional technological developments. Current monitors can be life saving, help reduce glucose swings, and can prevent hypoglycemic seizure at night, but often are not accurate, may not correlate closely with actual blood sugars, and require the patient to carry a cumbersome receiver in some cases. New developments in this area are essential to drive the field forward. I wish you all the best with this exciting project and look forward to our continued interactions.

Sincerely,
Louis H. Philipson, M.D., Ph.D.
Director, Kovler Diabetes Center
Professor, Section of Endocrinology, Diabetes, & Metabolism

April 21, 2008

Dr. Emmanuel Opara
Research Professor
Illinois Institute of Technology
Engineering 1 Building, Room 116
10 West 32nd Street
Chicago, IL 60616-3793

Dear Dr. Opara,
I am writing to extend my support for IPRO 308: Developing an Artificial Pancreas.
As you may know, I am an entrepreneur and business development leader with 25 years of experience in industrial products and technology for small and midsized companies. I have worked with numerous entities in building effective resources for the creation of successful companies. I will be happy to lend a hand as consultant for this project, offering my expertise in business matters in person and via email.
It is apparent that diabetes is becoming an increasingly larger problem. As scientists begin to obtain a better understanding in regards to how genetic predispositions and lifestyle choices influence the disease, their findings only seem to

indicate that the phenomenon will continue to grow. As a result, many agencies are involved in developing and marketing technologies to treat the illness. I will help this team develop a technology roadmap and business plan to move forward effectively on this project toward commercialization.
I wish the team the best of luck in its endeavors.

Sincerely,
Nik Rokop
Managing Director

Prototype Model: