
BIOMETRICS ANALYTICS



Developing Novel Analytics for Movement Disorders and Related Neurological Diseases

Team Profiles		
Name	Degree Sought	Expected Graduation Date
Adam Li	Bioengineering & Mathematics-Applied Sciences	2015
Neil Gandhi	Bioengineering	2014
Joshua Chu	Biotechnology	2015
Lu Li	Electrical Engineering	2014

Technology and Value Proposition:

Today, there are over 1 million people in the United States who are afflicted with Parkinson's disease (PD). The current and accepted method for diagnosing PD is the Unified Parkinson's Disease Rating Scale (UPDRS), a method used by clinicians to observe and rate the patient's symptoms. However, this scale relies on the physician's qualitative analysis of a patient as well as patient's memory, which may not be reliable. The qualitative assessment is then translated to a rating scale (integer values from 0-4 based on a severity scale), which varies among physicians. The UPDRS is incapable of performing objective analysis on a patient's gait and is subject to ~30% variability across different doctors. Since there is no other systematic approach to diagnosing PD, there exists a significant need to quantify the characteristics of PD in order to reduce the subjectivity of UPDRS, which can lead to misdiagnoses and inter-physician variability.

BioMetrics Analytics aims to address this largely unmet need in patient diagnostics for PD with a methodology/platform that gives clinicians a tool to apply objective standards to the UPDRS method and track the progression of PD. By providing an objective analysis of severity, our solution can streamline the process for finding the optimum dosage of levodopa, a pharmaceutical treatment for PD. BioMetrics provides an excellent platform that allows tracking of PD over time, as the patient's movements can be analyzed by our software for every visit to the clinic. Using this objective information, physicians can provide insurance companies with an objective metric system for reporting on the status of their PD patients. We have proved diagnostic accuracy through the development of our prototype, and we are now in the process of obtaining intellectual property protection. Currently we are working with Erik Viera, an IP lawyer to file a patent.

Our product is a functional prototype that is an extremely cost-efficient software solution, which uses the Microsoft Kinect sensor to record a person's full body motion (Figure 1) and translates this data into clinically relevant metrics for the physician to use and interpret (Figure 2, Table 1). See the supplemental video for a visualization of this process (see appendix). Acquired data is then analyzed in MATLAB with our custom algorithms in order to determine kinematic gait parameters of a patient. We have received Institutional Review Board (IRB) approval to work with a neurologist at UCSD to show the value added in using this software solution in conjunction with UPDRS vs. the standalone UPDRS method. Our initial proof of concept tests simulate PD and controls and have shown that our motion-tracking system can detect statistical differences in the parameters of interest. In addition, we have gathered initial data on PD patients vs. control subjects, showing the capabilities of our system to detect and analyze differences in the two groups. We have written a successful Health & Life Sciences Grant for \$10,000 to run a pilot clinical study. Moving forward, we plan on fully validating our technology by running a clinical study (n=20) with 10 controls and 10 PD patients. In doing so, we will compare the effectiveness of analyzing the patients with the standalone UPDRS method against the use of our software solution as a tool for physicians.

We believe that our main customers are physicians, but we are looking into attaining a customer base in research of Parkinson's disease and gait analysis. Since bringing a product to researchers does not require FDA approval, they compromise our short-term target. With acceptance into the NCI E-Team program, we will be able to continue our market validation process and development of our product. Our proposed

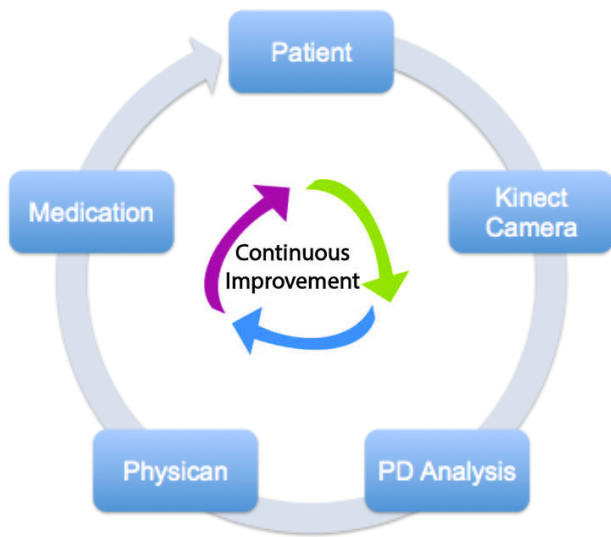


Figure 1: Outline of value chain with our analytics

solution is better than existing solutions that analyze gait and PD because it is PD specific, physician friendly, cost effective, and analyzes the entire body. It provides a quantitative tool for physicians to use that can provide higher resolution to the UPDRS, which will eventually lead to better quality of care and more accurate dosages of levodopa. With the adoption of our technology, physicians can better track the progression of PD, and by doing so, add value for the patient. As a result, our value proposition is to save physician's time, money, and provide user-friendly analytics that improve

their patient care. Large-scale adoption can lead to decreased costs related to Parkinson's because of improved tracking and analysis of the disease.

In addition to our technology and value proposition, we are interested in examining the possibility of reimbursement through insurance companies. Currently we are conversing with insurance companies to see how our value proposition fits in with their reimbursement models.

Business Model and Market:

The estimated size of the PD treatment market is ~\$20 billion/year. This was calculated using a bottom-up approach, where we started with ~1-2 million patients in the USA. The costs that a patient undertakes in the form of research costs, medication, physician visits, nursing expenses and more total ~\$12,500/year. This totals about \$20 billion/year in healthcare costs total. The customers to whom we are seeking to market are researchers in the short term, followed by clinics, and hospitals in the long term. Our value proposition lies in our software and proposed IT system for physicians and researchers who analyze PD. By using our system, we hypothesize that physicians will have a better tool to analyze PD patients, and a streamlined process within the clinic. By providing users with metrics that translate to quantitative measures physicians are used to, we can help save time, as well as provide a higher resolution of analysis that may lead to higher quality of living for PD patients. Some potential business models that we are currently exploring are sales through reimbursement, or setting up a data acquisition system within the clinic, and providing analytical reports to physicians.

The existing solutions for motion tracking include accelerometers and miniature gyroscopes. They have been used to assess typical PD symptoms, but are limited to taking measurements only on certain limbs such as legs and wrists. They are also costly and cumbersome. There are currently no existing design solutions which analyze Parkinson's disease and translate data into clinically relevant metrics. Other technologies that are used by our competitors are shown in Figure 3. It compares our system to potential competitors who are also aiming to quantify movement disorders. As seen in the appendix, we believe our unique approach of analyzing parameters in a way that will be specific to Parkinson's disease and easily understood by physicians. In terms of

commercialization, we intend to look into possible partnerships with Microsoft and other existing hardware companies that have sensory systems.

We intend on conducting more focused customer interviews with researchers and physicians to understand their underlying needs. In addition, we are speaking with insurance companies and administrators to understand how reimbursements currently work for Parkinson's treatment. We can either pursue reimbursement through the existing ICD code for PD, or work with insurance companies to establish a new code specific to our device and analytics. Exploring these two options will give our product different price ranges that are ultimately paid for by the insurance companies every time a patient goes into the clinic. We are also looking at the potential for FDA approval depending on how it affects the business model. The key questions to consider are whether FDA approval will make physicians want to use our product and whether FDA approval will matter in the reimbursement process. The feedback that we have received has been very positive and focused on the values we think are important: easy to use, objective, and PD specific.

In order to distribute our product, we will eventually hire a sales team and establish a distribution channel network using our existing connections with the scientific and medical community. We are exploring whether we want to either license our system at a set annual rate that is based on the value-added to an average PD patient per year, or use our pilot clinical data to establish the value of our analytics in comparison to UPDRS. There are many revenue models we are exploring (see Appendix Figure 4). Through the NCIIA Phase I, we intend to isolate our business model and revenue strategy through customer interviews. In addition, we intend to explore other markets based off of our value proposition. We plan to conduct interviews with researchers, other gait-related movement disorders, concussion and physical therapy.

Our design represents a very economical approach in using relatively inexpensive hardware to perform motion capture when interfaced with our software. The majority of the maintenance efforts will go toward improving the software. The cost associated with software improvement and development is generally low since the libraries were free of charge. Thus, using our current design, we do not expect maintenance and setup costs to exceed \$100, which is the estimated maximum price of a software package in the situation that the libraries are no longer free of charge. We envision a for-profit venture that has partnerships with hardware companies that become our key suppliers of sensory systems. We will delve deeper into the various business models we outlined, and based on customer feedback utilize the one that is sustainable.

Parts	Cost
Microsoft Kinect for Windows (Academic) Mfg. Part: 7CT-00001 CDW Part: 2849923 UNSPSC: 43211705	\$169.57
Microsoft Windows SDK Version: 1.8	\$0
Visual C++ 2010 for Windows	\$0
*Microsoft Kinect 2	\$500-600
Maintenance & Set Up Costs	~\$100
Total Cost	\$769.57-869.57

*Projected price, and not used yet because commercial product has not been released yet.

Who We Are:

Our current members are Adam Li, Neil Gandhi, Joshua Chu and Lu Li. Adam Li is a current student double majoring in Bioengineering and Mathematics, and he will lead the business model development and product development of the software algorithms. He is working closely with advisors such as Dr. Rosibel Ochoa, Dr. Michael Krupp, and Dr. Coleman. Neil Gandhi is a current student majoring in Bioengineering, who will lead the technical development of the software algorithms. In addition, he is working closely with Dr. Litvan, our physician partner. Joshua Chu is a current student majoring in Biotechnology, who will be a lead engineer in the product development. He is developing the software algorithms for high quality analysis. Lu Li is an Electrical Engineering student, who is a lead engineer for data acquisition for our project. She is continuing to develop and improve data acquisition algorithms, which will allow for easier subsequent analysis.

Professor Todd Coleman (Ph.D. of Bioengineering) is advising us on developing robust and efficient algorithms. Dr. Irene Litvan (M.D.) is the Director of the Movement Disorders Center and is advising us on clinical implementation. In addition, we have business mentors and advisors through the Von Liebig NSF I Corps program. Michael Krupp (Ph.D.), who has experience in the commercialization of healthcare products, advises us on regulatory pathways as well as the commercialization strategies we can pursue. Rosibel Ochoa (Ph.D.), the director of the Von Liebig Entrepreneurism Center is also advising us on customer interviews, and business model validation.

WORK PLAN AND OUTCOMES

Milestones	Description	Timeline
1. Optimize Prototype	Develop prototype further, and refine analytics. Iterate 5-10 times between a physician for feedback. Refine using clinical trial user-experience feedback.	Present – December 2014 (bulk will be done in the next few months)
2. Clinical Trials	We have an IRB approval to run a pilot study with 20 patients and a \$10,000 Health and Life Sciences Grant for supporting the clinical study. We must carry out the trials.	May 2014 – July 2014
3. Finish IP application	Finish talking to IP lawyer and file for patent.	May 2014 – July 2014
4. Analyze Clinical Trials	Using data collected from clinical trials, and the results. Establish evidence that our software system combined with physicians can provide a higher resolution of care.	July 2014 – September 2014
5. Researcher Interviews	Interview more researchers (early stage customers), who would be willing to try out our product during their PD studies.	May 2014 – September 2014
6. Insurance	Interview reimbursement stakeholders. Cold call insurance	June 2014 –

Company Interviews	companies and ask about the potential value of our product. Inform them of clinical trial results, and see if this is something that they would want to reimburse because it provides them with a way of tracking the PD patient's status in a more quantitative way.	September 2014
7. Network To Establish Partnerships	Attend networking events, and cold call Microsoft and other hardware sensor companies to try to establish partnerships and a potential supply chain. Also talk to insurance companies about reimbursing our product.	September 2014 – January 2015
8. Explore Additional Markets	Conduct interviews with researchers in gait related movement disorders, concussion stakeholders, and physical therapists.	August 2014 – January 2015
9. Isolate and Validate Core Business Model	Based off customer interview findings and additional market research, we will isolate a business model and pursue that customer base. We will pivot as required.	September 2014 – April 2015
10. Hire Team	Hire engineers to continue building product. Hire Business development team to establish networks with customers and our key suppliers/partners. Sales team will start reaching out to customer network.	June 2015 – September 2015
11. Present Product	Present product at annual healthcare conferences, including: EBD Biotech Showcase, JP Morgan Healthcare Conference and more.	January 2015 – December 2015
12. Work with Small Customer Groups	Work with small customer group, including our initial physician and research contacts to have them trial our product and provide feedback.	June 2015 – August 2015
13. FDA Approval	Establish FDA approval if required. Based on research, we predict it will take on average 5 months for a FDA to clear a 510(k) application of a hypothesized class I device.	January 2015 – June 2015
14. First Sales	After working with our partners, key focus groups and customer interviews, we will attempt to garner our first sales by using results and feedback we got from clinical trials, and customer trials.	August 2015 – December 2015

Success will be measured by our ability to refine our product based on customer feedback, the success of establishing key relationships, positive clinical trial results, FDA approval and reimbursement from insurance company approval. We should be receiving improving customer feedback, as we change our analytics, and user experience. These metrics of success will allow us to see what areas we are lacking in, and how to address challenges.

Michael N. Krupp, Ph.D.
8601 Via Mallorca, Unit C
La Jolla, CA 92037

Dear NCIIA E-Team Acceptance Committee,

I am writing this letter in support the BioMetrics Analytics team for the NCIIA E-team competition. I work closely with the team as a business advisor. From what I have observed, the team possesses the knowledge and drive required for successful completion of this program.

As advisor to the team, I have seen them transform a senior design capstone project into a venture with significant impact on patient care. Behind Adam and Neil's leadership and Josh and Lu's technical support, they have expanded the scope of our research and development to address a potential \$20B Parkinson's Disease market. The development of their business venture would be greatly accelerated with the training provided by the E-team program. They wish to use their entrepreneurship training to cater their technical development toward the target market and obtain feedback from their potential customer base.

Since the team's inception, they have collaborated closely with physicians to develop user-friendly technology valuable for tracking the progression of Parkinson's Disease over time. Currently, they have an IRB approval for running pilot clinical studies with the Director of the Movement Disorders Center at San Diego, Dr. Irene Litvan.

During the technical development process the team has been developing insights into the healthcare industry that has enabled them to explore potential business models and consider the movement from a fee-for-service model to a value-based purchasing model for insurance reimbursement. In addition, they continuously gauge customers to ensure that the correct needs are being met.

I believe that the BioMetrics team will be an excellent fit for the E-team program because they will use this additional training to work with customers and create value in their technology. The team is very passionate

and knowledgeable about the intersection of healthcare, engineering, and business, and I recommend them without reservation for the program

Thank you for creating this wonderful opportunity for young students.

Sincerely yours,

A handwritten signature in black ink, reading "Michael N. Krupp". The signature is written in a cursive style with a large, stylized "M" and "K".

Michael N. Krupp, Ph.D.



UC San Diego

SCHOOL OF MEDICINE

Irene Litvan, MD | David Barba, MD | J. Vincent Filoteo, PhD | Jennifer Friedman, MD
Stephanie Lessig, MD | Fatta Nahab, MD | David Song, MD, PhD

May 1, 2014

Dear NCIIA E-Team Committee,

It is my great pleasure to write this letter in support of the UCSD Bioengineering and the Electrical Engineering student's application to the BioMetrics Analytics team for the E-team competition. I am a practicing neurologist specializing in movement disorders and epidemiology and the director of the UCSD Movement Disorder Center. As their physician advisor and potential customer, I see that the group has a strong vision and passion for making a clinical impact for Parkinson's disease.

The team is comprised of four undergraduate students, Neil Gandhi, Adam Li, Joshua Chu, and Lu Li, who represent the Bioengineering and the Electrical Engineering departments at UCSD. The team has a strong interest in translating engineering into medical practice and has shown great determination for commercial viability during the course of this project.

I helped provide the needs assessment for the team's product since it was desirable to have a method or device that would allow neurologists like myself to quantify the severity of and track the progression of patients with Parkinson's disease. In particular, analyzing the gait of patients with Parkinson's disease will greatly improve the quality of life of these patients. This device will also serve as a good outcome measure for our clinical therapeutic trials. The team has worked with me closely ever since they learned of this need, and I have been thrilled with their progress. One of their greatest strengths has been their acute awareness of their physician customer base, as they have conducted several interviews with these physicians.

Current gait analysis labs are very costly, impractical, and require a technician to operate the equipment. The team's proposal would more seamlessly fit into the clinic with the lower cost point and ease of use. Their idea and prototype can accurately detect changes in a patient's movements over time, allowing medications to be tailored individually to the patient's condition.

The team has made great progress in developing a prototype, obtaining IRB Approval, and receiving a Health Sciences Grant to fund the pilot clinical validation study. We have already started testing patients as of April 17, 2014, and the data I recently received from them looks very promising.

The key to success with this group is their willingness to work closely with physicians to understand what parameters are needed to promote a better care, eventual diagnosis and how



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the data should be presented to facilitate the smoothest assimilation into the clinic with a minimum learning curve for physicians.

I am pleased to support the BioMetrics Analytics team, and I give them my highest recommendation for your E-team competition.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Irene Litvan", with a long, sweeping underline.

Irene Litvan, M.D.
Tasch Endowed Chair in Parkinson Disease Research
Director, Movement Disorder Center
Professor, Department of Neurosciences
University of California, San Diego



Dear NCIIA E-Team Acceptance Committee,

My name is Rosibel Ochoa, and I am the von Liebig Entrepreneurism Center's Executive Director. The von Liebig Entrepreneurism Center is part of UCSD's highly-ranked Jacobs School of Engineering, and it was established to foster commercialization of Jacobs School research and to prepare engineering students for the entrepreneurial workplace. Prior to joining the von Liebig Entrepreneurism Center, I was the founder of TekDome, LLC., a technology commercialization consultancy in San Diego, California. Its clients included Research Triangle Institute, the Georgia Institute of Technology, and several startup companies.

I would like to support the BioMetrics Analytics team for the NCIIA E-Team program. The team exhibits the passion and enthusiasm that should be present in a successful startup venture. They were selected to participate in the NSF I Corps program that I run here at UCSD, where they are learning the basics of technology commercialization and customer development.

Adam Li and his team are very good engineering and math students and because of their leadership skills, initiative and participation in organizations such as Engineering World Health, International Society for Pharmaceutical Engineering they were awarded a Gordon Center for Engineering Leadership Fellowship in April 2014.

Their technology aims at producing a better tool for analyzing and diagnosing Parkinson disease using software that they have developed combined with off the shelf hardware and are in the process of testing this prototype in the clinic. On their own initiative, they recruited as part of their team Dr. Irene Litvan a specialist in movement disorders to advise them on how to better implement their solution in the clinical setting. If successful, their technology, promises to provide better tools in the hands of the physician that could result in an improved quality of life for the patients and reduced cost of healthcare delivery.

Their commitment to commercialization of their technology has led them to secure \$10,000 in funding from the Health and Life Science grant fund to run a clinical trial with their physician partners, and have already received IRB approval.

I fully support this team's application for the NCIIA E-Team challenge. If you have any questions, or require additional background, please contact me.

Best Regards,

Rosibel Ochoa, PhD
Executive Director

Adam Jin Li

Permanent Address:

5309 Via Capote, Thousand Oaks, CA, 91320

(805) 807-5898

Adam2392@gmail.com

Campus Address:

University of California San Diego, Bioengineering Department

9500 Gilman Drive, La Jolla, CA, 92093

adl013@ucsd.edu

Web Address: www.linkedin.com/in/adamli2392/

EDUCATION:

UNIVERSITY OF CALIFORNIA, SAN DIEGO

Bachelor of Science: Bioengineering

Bachelor of Science: Mathematics-Applied Science

GPA:3.60/4.0 GPA

Expected March 2015

COURSEWORK:

- | | | | |
|--|--|--|----------------------------|
| • Mammalian Physiology | • Continuum Mechanics | • Matlab & SolidWorks Design | • Mass Transfer |
| • Bioinstrumentation | • Biomechanics | • Fluid Mechanics | • Thermodynamics |
| • Linear Circuits | • Applied Linear Algebra | • Biomedical Imaging | • Statics & Dynamics |
| • Computational Methods in Engineering | • Independent Research in Tissue Engineering | • Mathematical Statistics & Probability | • Advanced Data Structures |
| • Engineering Graphics & Design | • Biomaterials Engineering | • Experimental Techniques in Circuitry and Heat Transfer | • Biosystems and Control |

RESEARCH EXPERIENCE:

BIOMETRICS ANALYTICS

Sept 2013 – Present

Senior Engineer/Researcher

La Jolla, CA

- Researching and developing novel ways to evaluate Parkinson's Disease in collaboration with UCSD Jacobs School of Engineering and School of Medicine.
- Co-founded a project to develop a Parkinson's disease tracking software product using C++, Matlab that analyzes gait and 3D spatiotemporal data to produce physician friendly metrics
- Wrote a successful Health and Life Sciences grant for \$10,000 for carrying out pilot clinical study, as well as received the Gordon Fellowship Award for outstanding engineering leadership
- Leading a startup team of five to analyze potential business models and create presentations that outline customer interviews, potential IP strategy and projected finances of our value proposition in order to raise funding up to ~\$50,000
- Startup with a potential market size of ~\$20B; was later accepted into the Von Liebig National Science Foundation I-Corps Program

QUALCOMM INSTITUTE

06/2012 – 09/2012

Summer Research Scholar under Calit2

La Jolla, CA

- Conduct experiments using a LabView programmed mechanical actuator to compress agarose hydrogels with embedded radiopaque particles, while imaging with 3D microCT
- Developed an Excel analysis method with 90% accuracy to measure tissue biomechanics and statistical variance using quantitative statistical analysis, which resulted in streamlined data analysis

CARTILAGE TISSUE ENGINEERING LABORATORY

09/2011 – 06/2013

Undergraduate Researcher under Dr. Robert L Sah

La Jolla, CA

- Conducted pilot studies in tissue engineering with micro computed tomography to test hypotheses in orthopedic healthcare, using research and image data analysis to drive conclusions
- Created standard operating procedures for inventory processing, laboratory operations, sample preparation, data mining methods and data analysis of CT images that reduced training time
- Document experimental results through scientific reports, and translate literature findings to research proposals

INDUSTRY EXPERIENCE:

CSE 12 AND 100

Sept 2013 – Mar 2014

Programmer at UCSD Computer Science Department

La Jolla, CA

- Implement basic and advanced data structures, such as linked lists, stacks, queues, binary trees and hash tables in C
- Use object-oriented design features such as interfaces, polymorphism, encapsulation, abstract data types, pre/post conditions, and recursion
- Analyze high-performance data structures and algorithms (randomized trees, Huffman algorithm, graphs and red-black trees), using memory management, pointers, C++ and STL

GENENTECH INC.

July 2013 – Sept 2013

Process Development Engineering Intern under Domenic Schmizzi

San Francisco, CA

- Implement a new batch control process using PLCs to replace data server management, which results in reducing the purification plant's down-time and poor system performance
- Develop program design iterations to incorporate SMART goals, object-oriented programming, modular control architecture, and UX friendly HMI system for running purification processes

ADDITIONAL EXPERIENCE:

RGB Capital LLC.

Feb 2013 – Present

Investment Management Intern

La Jolla, CA

- Assist the CEO in building excel models for a \$50M fund, focused on managing and minimizing day-to-day volatility for clients
- Create and optimize ETF and Mutual fund screeners using Visual Basic to program macros that automate screening process

UCSD STUDENT FOUNDATION INVESTMENT COMMITTEE

Sept 2013 – Present

Associate and CFA Support Researcher

La Jolla, CA

- Generating buy-side equity research reports for \$450,000 student endowment fund, producing yearly return rates of ~6%
- Effectively analyzed companies with a bottom-up approach, using discounted cash flow, company comparable, and precedent transaction analysis

ENGINEERING WORLD HEALTH

09/2012 – Present

Project Team Leader for PCR under Dr. David M Smith

La Jolla, CA

- Collaborate with UCSD School of Medicine and a clinic in Mozambique to develop a rapid, cost-effective diagnostic device for detecting drug resistance in HIV patient, which culminated in 2nd place for the EWH National Design Competition
- Led a team of 5 for the product development of a PCR, from an Arduino microcontroller with PWM current delivery using a PID algorithm for temperature control
- Advising a team of 10 in product development, while managing a budget of over \$10,000. Responsible for setting the product strategy that resulted in a successful prototype that has a 95% cost-savings

ALPHA KAPPA PSI

04/2012 – Present

President and Director of Consulting under Professor Delbert Foit Jr.

La Jolla, CA

- Led the strategic vision and daily operations for a team of 15 over 6 weeks to raise \$5,000; also completed a market research project on Facebook Inc. and 100K business plan proposal for a social media startup
- Spearheaded a team of four to compete in the PBLI Case Competition of 2013, where the company strategy, financials of mobile advertising, and operational risks of Facebook Inc. were analyzed

INTERNATIONAL SOCIETY FOR PHARMACEUTICAL ENGINEERING

09/2011 – Present

Vice President External under Professor Melissa Micou

San Diego, CA

- Set the strategy and operational goals with a team of 25, while maintaining an ~\$5,000 budget; won Chapter of the Year against all national chapters for two consecutive years
- Led a series of 12 workshops for leadership development and implemented a mentorship program for students to connect with over 30 industry professionals, which was emulated by the national chapter of ISPE's program

HONORS/AWARDS:

Tau Beta Pi (UCSD) Engineering honor society	2014
Gordon Fellow (UCSD) Engineering leadership excellence award	2014
Von Liebig NSF I-Corps Fellow (UCSD) Competitive entrepreneurship program with seed funding	2013
Gordon Leadership Scholar (UCSD) Competitive leadership program	2013
California Institute of Technology Summer Research Grant (UCSD) Competitive research scholarship	2012
Provosts Honors (UCSD) Obtaining a term GPA greater than 3.5	2011-2014

ADDITIONAL SKILLS:

LABORATORY:

- Knowledgeable about HPLC, Microfluidics, Ethanol Precipitation, Buffer/Reagent Preparation, AFM, Optical Microscopy, Hydrogel Polymerization

SOFTWARE/OTHER:

- Knowledgeable about Object-Oriented Programming, Entrepreneurship, Project Management in Agile and Iterative, IP Strategy, Market Research, Financial Modeling, Equity Research
- Proficient with MS Word, PowerPoint and Excel; Web Design and Data Analysis
- Skilled in C, C++, Python, Java, JavaScript, SQL, HTML, R, MATLAB, LabView, Finite Element Analysis/Modeling, SolidWorks, MS Visual Studio, Structured Text, SFC
- Fluent in English and Chinese

Neil Gandhi

9229 Regents Rd. L327 La Jolla, CA 92093 | (949) 391-5790 | nrgandhi@ucsd.edu

Education

Bachelor of Science, Bioengineering (Medical Device Conc.)

Expected June 2014

University of California, San Diego (UCSD), Jacobs School of Engineering, CA

Current GPA: **3.99** (Out of 4.0)

Experience

BioMetrics Analytics Technical Lead

September 2013 – Present

Parkinson's Disease Diagnostic Aid via Motion Tracking

Advisors: Prof. Todd Coleman; Prof. Irene Litvan

- Collaborated with Computer Vision Lab to utilize Microsoft Kinect for signal processing and data acquisition
- Analyzed gait and statistical kinematics of Parkinson's patients in MATLAB
- Wrote \$10k Health Sciences Grant to run a pilot patient study in collaboration with UCSD Neurology Department
- Awarded \$3k for business model planning, patenting, and commercialization from von Liebig Entrepreneurism Center

Amgen Scholar/Undergraduate Researcher, California Institute of Technology

June 2012 – Present

Autism Diagnosis and Differentiation via Eye-tracking

Advisors: Prof. Ralph Adolphs, Caltech; Prof. Dan Kennedy, Indiana University

- Analyzed autism subjects eye-tracking data with controls in order to determine a correlation for social cognition
- Developed data processing pipeline in MATLAB to categorize eye movements and compare gaze data between subjects
- Awarded \$3500 Julia Brown Scholarship to fund software and computational hardware
- Co-authored abstracts in Society for Neuroscience 2013 and International Meeting for Autism Research 2014

Undergraduate Researcher, Integrated Systems Neuroengineering, UCSD

September 2010 – June 2012

Wireless EKG/EEG Diagnostics

Advisor: Prof. Gert Cauwenberghs

- Optimized signal clarity and minimized external interference and electrochemical drift by testing materials of capacitive and insulative properties on both a live subject and simulative conductors
- Developed and tested noise spectra of non-contact electrode sensors capable of detecting biopotentials in MATLAB
- Optimized mechanical aspects of non-contact wireless EEG for increased comfort and wearability
- Published first-author in *IEEE Proceedings for Body Sensor Networks* and presented at UT Dallas, May 2011

Retinal Prosthesis

- Characterized *in vitro* neuron and glial cell firing via controlled bursts from an ultrasound transducer
- Processed fluorescent calcium-wave images in Image J and analyzed the neuron-firing threshold in MATLAB
- Gained a clinical perspective by observing diagnosis and treatment of patients with neuro-optical disorders

Engineering Consultant Intern, Boston Scientific, CA

June 2011 – September 2011

- Investigated mechanical effects of angioplasty balloons and RF ablation electrodes to optimize occlusion in arteries
- Performed statistical analysis for safety and efficacy on clinical & pre-clinical trials renal denervation
- Gained insight into the catheter product development process and FDA regulation
- Wrote reports showcasing Design of Experiments (DOE)

Publications

Paper:

Gandhi, N., Khe C., Chung D., Chi Y.M., Cauwenberghs, G. (2011). Properties of Dry and Non-contact Electrodes for Wearable Physiological Sensors. *IEEE Proceedings for Body Sensor Networks*.

Abstracts:

Kennedy, D., **Gandhi N.,** Adolphs R. (2014). Adults with Autism Display Increased Gaze to Low-Level Visual Features When Viewing Dynamic Social Videos. *International Meeting for Autism Research*.

Kennedy, D., **Gandhi N.,** Adolphs R. (2013). Adults with Autism Show Atypical, but Consistent, Patterns of Gaze to Dynamic Social Stimuli. *Society for Neuroscience Hot Topics*.

Gandhi, N., Adolphs R., Kennedy, D. (2013). Differences in Gaze Patterns to Dynamic Social Scenes between Autistic and Neurotypical Adults. *Undergraduate Research Conference*.

Gandhi, N., Adolphs R., Kennedy, D. (2013). Differences In Gaze Patterns To Dynamic Social Scenes Between Autistic And Neurotypical Individuals. *UC San Diego Bioengineering Day*.

Gandhi, N., Adolphs R., Kennedy, D. (2012). Gaze Patters of Individuals with Autism on Dynamic Visual Scenes. *California Institute of Technology SFP*.

Gandhi, N., Khe C., Chung D., Chi Y.M., Cauwenberghs, G. (2011). Properties of Dry and Non-contact Electrodes for Wearable Physiological Sensors. *UC San Diego Bioengineering Day*.

Community Involvement

Demonstrated leadership, teamwork, communication ability, public speaking, and data management through involvement in student and charity organizations:

- | | |
|--|-------------|
| • Co-President of UCSD International Society for Pharmaceutical Engineering (ISPE) | 2013 - 2014 |
| • Vice President External of Tau Beta Pi Engineering Honor Society | 2012 - 2013 |
| • Vice President of UCSD ISPE | 2012 - 2013 |
| • Shiley Eye Center Neuro-Ophthalmology Volunteer | 2012 - 2013 |
| • Bioengineering Day Chair of UCSD ISPE | 2011 - 2012 |
| • Volunteer science instructor for Florence Elementary School Outreach Program | 2011 - 2014 |
| • Public Relations Committee Officer of UCSD ISPE | 2010 - 2011 |

Honors and Awards

- Gordon Fellow 2014
- ASAO Design Competition Finalist 2014
- Von Liebig Entrepreneurism Center NSF I-Corps Award 2014
- Barry Goldwater Scholarship Nominee 2013
- Julia Brown Scholarship 2013
- Genentech PR&D Outstanding Junior Award 2012
- Gordon Scholar 2012
- Amgen Scholar 2012
- Bioengineering Day – 1st Prize for Undergraduate Poster Presentation 2011
- Best in Warren Writing Award 2011
- UCSD Regents Scholarship 2010
- Warren College Provost Honors 2010-2014

Lu Li

Beijing University of Posts and Telecommunications(BUPT), Beijing 100876

Mobile phone: China: (+86)13681203386, USA: (+1)6195082718 Email: liluxiaolizi@gmail.com

EDUCATION**09/2010-06/2014 Beijing University of Posts and Telecommunications (BUPT), China**

Bachelor of Engineering degree (expected in 06/2014) in School of Information and Communications Engineering

Major GPA: 90.93/100 Rank: 5/567(freshman), 91.75/100 Rank: 6/600(sophomore), 91.5/100 Rank: 5/600(junior)

03/2013-02/2014 University of California, San Diego, La Jolla, CA, USA

Exchange student in Dept. of Electrical and Computer Engineering

Major GPA: 4.0/4.0

09/2014-07/2015 California Institute of Technology, Pasadena, CA, USA

Master of Science degree (expected in 07/2014) in Dept. of Electrical Engineering

RESEARCH EXPERIENCES IN USA**08/2013-02/2014 Developer in Video Processing Lab, Dept. of ECE; Movement Disorder Center UCSD, USA**

Adviser: Vice Chair/Prof. Truong Nguyen, Dr. Irene Litvan, Associate Prof. Todd Coleman

Project: Detecting Parkinson's Disease Using KINECT

- Created a reliable platform combining KINECT and C++ to realize accurate skeleton and hand detection
- Quantified the clinical measures and compiled the program on MATLAB
- Researched into depth noise filtering and color texture fusion
- Presented a form talk in group meeting
- Written the formal technical proposal

06/2013-08/2013 Research assistant, Dept. of ECE UCSD, USA

Adviser: Prof. George Papen

Project: Smart Nic (A hybrid top-of-rack data center)

- Researched into the circuit-switched and packet-switched fabric model
- Examined and debugged the codes of the controller using Verilog

RESEARCH EXPERIENCES IN CHINA**10/2012-01/2013 Developer in Lab of Digital Circuit and Logic Design BUPT, China**

Adviser: Prof. Dongming Yuan

Project: Multifunctional digital piano

- Realized the manual and automatic play with pause and resume, and record in virtue of VHDL on FPGA
- Visualized the melody using an 8*8 dynamic dot matrix and displayed the real-time music notes

ACTIVITIES

01-04/2014 Attended Phase 1 of Von Liebig Start-up competition program and won \$3000

06/2012 Presented a formal talk in IBM Research China on behalf of IEEE China Student Congress

06/2012 Assisted to organize the 2012 Science and Technology Forum of Scientists from China and Pakistan

HONORS AND AWARDS2013 Excellent College Student with all-round development on CHINA CAMPUS, **only 5** students in China

2012 Enterprise "Tangjun" Scholarship Top 1%

2012 School Outstanding Student, Top 2% for all-round development

2011 University First Prize Scholarship, Top 2%

2011 School Outstanding Student, Top 2% for all-round development

STANDARDIZED TESTS**TOEFL:** Reading 29 + Listening 28 + Speaking 26 + Writing 27 = 110

SKILLS AND INTERESTS**Software:** C++, VHDL, Verilog, MATLAB, Mathematica, LabVIEW,**Hardware:** PCB design, FPGA based system design**Singing:** Soprano in the Chorus, won 3rd prize in the national game, A+ in Music Class, UCSD

Joshua Chu

9450 Gilman Drive #45050, La Jolla, CA 92092 • j.chu004@gmail.com • 714-653-4426

Education

B.S. Bioengineering: Biotechnology
Concentration: Electrical Engineering
University of California, San Diego
GPA: **3.97/4.00**

Expected graduation: June 2015

Relevant Coursework

- Biomedical Instrumentation
- Circuits, Transducers, and MEMS Laboratory
- Linear Circuit Analysis
- C/C++ Programming
- Introduction to Digital Logic and Design (in progress)
- Circuits and Systems (in progress)
- Fluid Mechanics and Mass Transfer
- Biochemistry: Protein Structure and Metabolism

Skills and Qualifications

- **Computer:** MATLAB, MS Office, Graph Pad Prism statistical analysis, C/C++ programming, LabVIEW, ImageJ, Bioinformatics gene sequencing analysis, Ingenuity Pathway Analysis
- **Electrical:** Altium schematics, Multimeter, Oscilloscope, Analog Filters, Op Amps, Build of Materials
- **Biological:** Cell culture, DNA/RNA extraction, PCR, Gel electrophoresis, Protein purification, Histology
- **Other:** Strong organizational skills and attentiveness to detail

Relevant Experience

Research Assistant, Integrated Systems Neuroengineering Lab, San Diego, CA

January 2012--January 2014

- Designed and tested neural recording device to achieve optimized noise filtering
- Improved apparatus design to measure biocompatibility properties of nanomaterials for use in retinal implant
- Developed MATLAB program to detect spikes from neuron signaling
- Cultured cells and synthesized media to generate raw materials for experiments

Junior Research Specialist, Gavin Herbert Eye Institute, Irvine, CA

July 2012—September 2012

- Investigated response of retinal pigment epithelial and human Muller cells to toxicants and protecting agents to discover mechanism of protection
- Determined mitochondrial haplotypes of various cell lines to understand their genetic background

Projects

Gait Analysis of Parkinson's Disease, University of California, San Diego

September 2013—present

- Developed MATLAB tools to analyze gait parameters
- Selected as a team to receive \$3000 in funding from the von Liebig Entrepreneurism Center
- Wrote and received \$10000 research grant as a team for a pilot clinical study

Phosphoglycerate Mutase Deficiency, University of California, San Diego

January 2012—March 2012

- Key contributor in a Mathematica computer simulation of phosphoglycerate mutase deficiency
- Researched enzyme parameters in scientific literature to ensure accuracy of the enzyme computer model

Leadership Experience

Mentorship Committee, ISPE, University of California, San Diego

June 2013—present

Treasurer, Scholars Society Overnight Stay Program, University of California, San Diego

December 2012—May 2013

Honors

Tau Beta Pi Honors Society
Phi Beta Kappa Honors Society
Provost's Honors
UC San Diego Regents Scholar

April 2013—present
June 2012—present
January 2011—present
September 2010—present