



NSF Award EEC-1160504

IAB Retention & Recruitment 2016

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Understand the Wants & Needs of Your IAB

- RANK the importance of the factors influencing your decision to join and remain an IAB member with TANMS (very important to most important only below out of 15 factors):
 - 1- **Follow developments in Nanoscale Multiferroic Systems (91%)**
 - 2- **Gain access to specific expertise resident at TANMS (86%)**
 - 3- **Support advances in a technology area important to my company (85%)**
 - 4- **Return on Investment for TANMS Membership Fee (71%)**
 - 5- **Participate in Joint Research Proposals (67%)**
 - 5- **Establish relationships with TANMS Faculty (67%)**
 - 6- **Receive a steady stream of relevant communications from TANMS (58%)**
 - 6- **Access TANMS developed intellectual property (58%)**

 - 7- **Gain access to TANMS facilities/ equipment (57%)**
 - 8- **Potential to provide guidance on TANMS research direction (53%)**
 - 9- **Leverage TANMS funding (52%)**
 - 10- **Evaluate TANMS students as potential employees (48%)**



Ask IAB how to improve and add more value.

‘Written in’ responses by IAB:

- Continue to host workshops that include industry participants.
- **Offer a TANMS Newsletter with frequent updates about everything happening.**
- Alert us about TANMS published papers.
- **More collaborative joint proposals (go after more funding together).**
- Provide on-site workshops and presentations for our colleagues.
- **WebEx seminars (some offered later in the day).**
- Make all presentations available to members.
- **More networking opportunities with TANMS faculty. Especially remote activity.**
- Provided more ways to demonstrate an increased ROI.

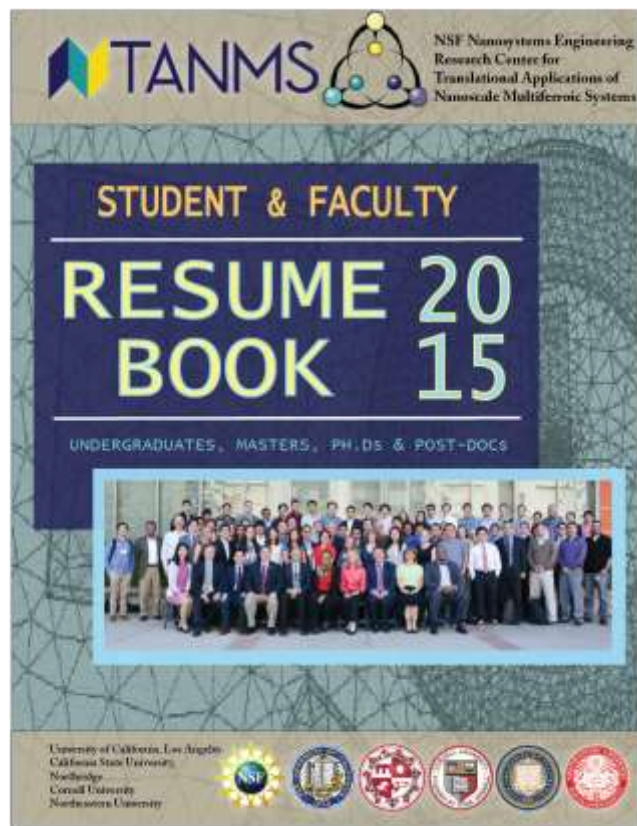


Consider A Newsletter such as: *Multiferroic Focus*

- Keeping everyone informed



Student and Faculty Resume/BIO Book



- **A chance for IAB to reach out to faculty and students across all institutions!**



Offer A succinct Industry FACTSHEET for promotion and recruitment



**NSF Nanosystems Engineering Research Center for
Translational Applications of
Nanoscale Multiferroic Systems**

Engineering a revolution in miniature electronics and systems

Who we are

Founded in 2012, TANMS is a NSF funded Engineering Research Center (ERC) comprised of 17 world-class faculty, and 150+ students, and businesses spread across 5 prestigious institutions - UCLA, UC Berkeley, Cal State Northridge, Cornell University, and Northeastern University. Headquartered in the UCLA Henry Samueli School of Engineering and Applied Science (HSEAS), TANMS is strategically located near global enterprises, startups, research/industrial design centers, as well as Los Angeles' own Silicon Beach.

What we do

TANMS focuses on innovative research, striving to create a new class of miniature electromagnetic materials that outpace current industry benchmarks in size, power, and efficiency. We join with industry partners to connect emerging technologies with marketplace innovation opportunities.

TANMS provides cutting edge R&D, expertise, and intellectual property to Fortune 500 and Global 1000 companies, startups, and government agencies. In addition, TANMS embraces a cradle-to-career model in developing the next generation talents in engineering, equipped with the skill-sets prized by both industry and academia.

How we do it

TANMS holds bi-annual meetings for industry to guide TANMS' research direction with quarterly updates on inventions disclosed along with year-round access to diverse, talented student pools from pre-college through post-doctorate levels.

Membership includes industry education on multiferroic materials and research, as well as access to specialized expertise, intellectual property and capital intensive infrastructure (e.g. prototyping and processing lines, new materials development, access to clean rooms and top-notch research facilities, etc.).

TANMS adds value to a company's R&D effort by creating new business options, accelerating time to commercialization, and providing first-hand access to research findings. Members provide guidance on TANMS research direction, share intellectual property rights, and gain connections to a skilled and diverse student population.

Why join?

Join Us. Call (310) 825-7855

Or visit our website at: <http://www.tanms-erc.org>

OUR PARTNERS

A partial public list - many client relationships and work are highly confidential

<p>National Science Foundation</p> <p>The Boeing Company</p> <p>General Motors</p> <p>HGST</p> <p>Radiant Technologies</p> <p>DARPA</p> <p>US Army</p> <p>AFOSR</p> <p>Lockheed Martin</p>	<p>Northrop Grumman</p> <p>Raytheon</p> <p>NextGen Aeronautics</p> <p>Cummins</p> <p>Maritime Applied Physics</p> <p>PaneraTech</p> <p>Inston</p> <p>GroupH</p> <p>ATMI Entegris</p>
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INDUSTRY CONTRIBUTION MILESTONES

<p>Spin-out</p> <p>1kb Memory Testbed</p> <p>Multiferroic Receive Antenna</p> <p>Nanoscale Motor</p> <p>Multiferroic Software Development and Optimization Platform</p>	<p>INSTON Inc.</p> <p>Integrated High Efficiency Memory Electrically small $\lambda < 100$</p> <p>Size of a red blood cell</p> <p>Currently in Beta with Industry</p>
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ACCOLADES

Professional affiliations of TANMS researchers include:

- National Academy of Engineering (NAE)
- American Society of Mechanical Engineers (ASME)
- American Institute of Aeronautics and Astronautics (AIAA)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Association for the Advancement of Science (AAAS)
- Materials Research Society

Awards & honors received by TANMS researchers include:

- Semiconductor Industry Research Award
- Guggenheim Fellow Award
- SPR Lifetime Achievement Award
- Qualcomm Innovation Fellowship
- Beckman Young Investigator Award
- DNR Young Investigator Award
- Motorola Legacy Builders of the Year Award
- NSF Cooperative & Foundation Alliance Recognition Award
- Rumrill Fellowship, MIT
- Woodruff Science Foundation Faculty Career Award AVS
- Coburn & Winsten Award
- AVS Peter Mark Award
- Alfred P. Sloan Fellowship
- National Science Foundation Early Career Award
- Army Research Office Young Investigator Award

Testbed Systems
(Memory, Antenna, Motor)



Multiferroic Devices



Materials



Modeling



Nanoscale Multiferroic Transitions

Memory

- Logic
- Signal Processing
- Communications

Antennas

- Electrically Small
- Phase Shifters
- Frequency of Selective Surfaces

Motors

- Propulsion
- Printing
- Tweezers

Multiferroic Research Areas

Modeling

- 4d Printing
- Material's
- Biosynthesis
- MO Gas/monolayer

Materials

- Single Phase
- Exchange Coupled
- Strain Mediated
- Charge Mediated

Career Development

- K-12 Outreach & Teacher
- Professionals' Development
- High School Research
- Undergraduate Research
- Undergraduate/Graduate Mentor Development
- Entrepreneurship Training
- Career Training

Visit our website for more information.

CONTACT US

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Consider a Tradeshow Booth for conferences, etc...



Ask IAB and PIs Where You Should Exhibit

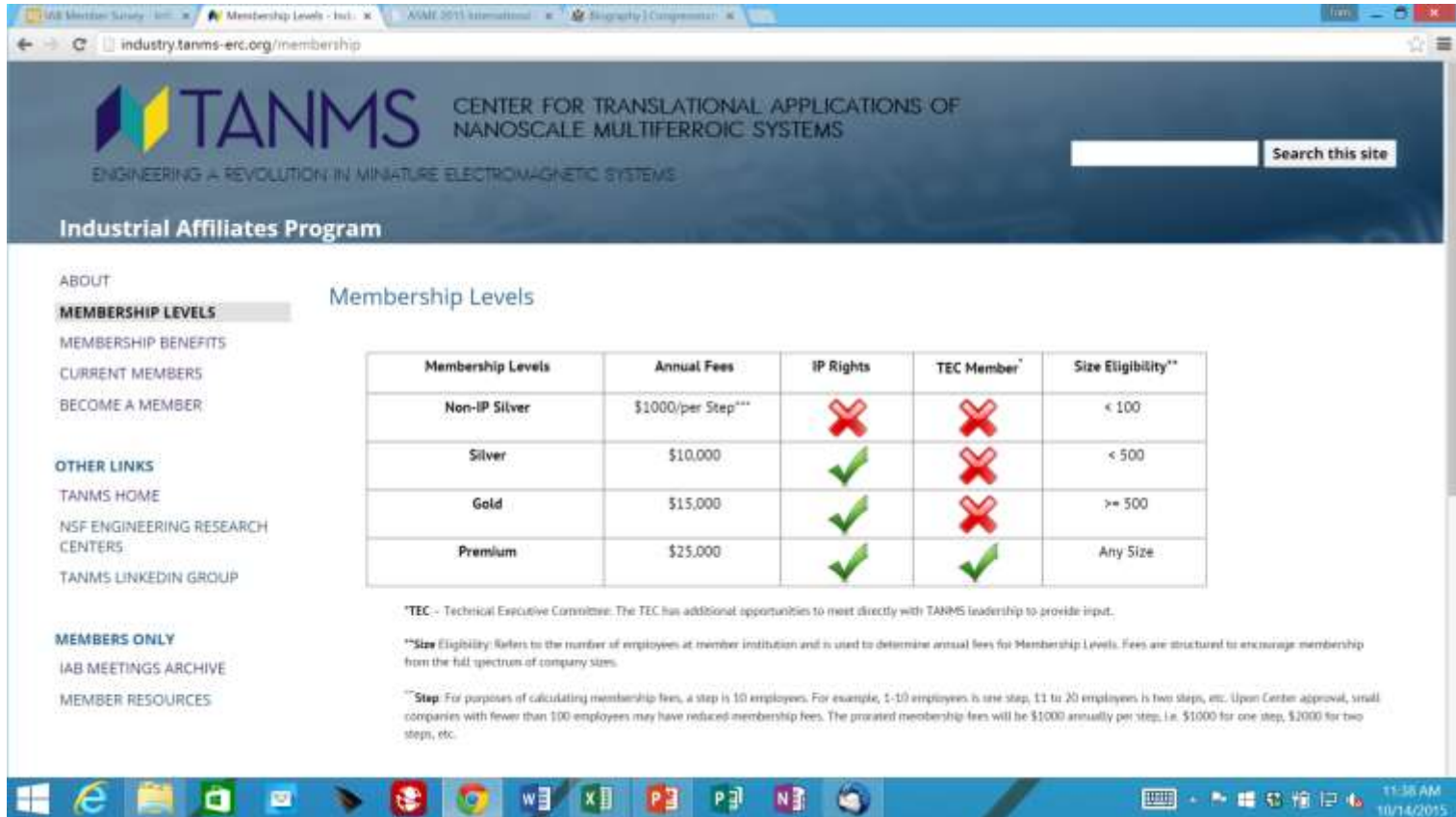
IAB Recommends:

- ASME – Smart Materials Conference
- COMSOL's annual conference in Boston
- Any DoD, DoE commercial trade-shows with focus on memory, RF, nano
- **ARPA E Energy Innovation Summit**
- **IEEE APS, ACES (Advanced Computational Electromagnetics Society)**
- **IEEE Antennas and Propagation Conference/ URSI**
- *IEEE IMS, APS, IEDM (Int'l Electronics Devices Meeting), VLSI*
- *Intermag, MMM, SEMICON, MRS*
- *International piezoMEMs Workshop*
- **SPIE, and ASME's IMECE**
- **Nano for Defense- NT4D**



Evaluate your Membership Levels

- Revisiting the order of IP Rights by membership level (1st Choice Premium, 2nd Gold, 3rd Silver) + possible new Ruby Level at \$80K/year:



The screenshot shows the TANMS website's 'Membership Levels' page. The page features a navigation menu on the left with categories like 'ABOUT', 'MEMBERSHIP LEVELS', 'MEMBERSHIP BENEFITS', 'CURRENT MEMBERS', and 'BECOME A MEMBER'. The main content area displays a table with the following data:

Membership Levels	Annual Fees	IP Rights	TEC Member [*]	Size Eligibility ^{**}
Non-IP Silver	\$1000/per Step ^{***}	✗	✗	< 100
Silver	\$10,000	✓	✗	< 500
Gold	\$15,000	✓	✗	≥ 500
Premium	\$25,000	✓	✓	Any Size

Footnotes on the page:

- ^{*}TEC – Technical Executive Committee. The TEC has additional opportunities to meet directly with TANMS leadership to provide input.
- ^{**}Size Eligibility: Refers to the number of employees at member institution and is used to determine annual fees for Membership Levels. Fees are structured to encourage membership from the full spectrum of company sizes.
- ^{***}Step: For purposes of calculating membership fees, a step is 10 employees. For example, 1-10 employees is one step, 11 to 20 employees is two steps, etc. Upon Center approval, small companies with fewer than 100 employees may have reduced membership fees. The prorated membership fees will be \$1000 annually per step. i.e. \$1000 for one step, \$2000 for two steps, etc.

- Customized on-site seminars for Platinum Level IAB Members!



Ask your IAB and PIs for Recruitment Referrals

- EATON, Honeywell, Microsoft
- Intel, SONY
- **BAE Systems**
- APPLE, Texas Instruments, AMAT
- Micron Tech, Samsung, SK Hynix
- Qualcomm, Broadcom/Avago, Ethertronics
- Seagate, Global Foundries, IBM
- TSMC and Intellectual Ventures
- Quadrant Solutions, Metamagnetics
- General Dynamics
- Lam Research, Teledyne



Consider a Proactive SBIR/STTR Process

To add value to your small business IAB members by ultimately generating more joint proposals/ wins for improved ROI:

- **Search the SBIR/STTR solicitations each 'cycle' and look for potential matches** (by research areas and technical project managers)
- Results funneled to PIs for interest
- **PI Interests are then matched to IAB members**
- Matched IAB members contacted for interest
- **Proposal generated and ERC follows up**



Additional ideas....



Industry recruitment & engagement...



- **Host tech. specific Workshops with Industry**
- Give PI's and students a recruitment slide to present at relevant conferences and seminars
- **Consider Career Panels and mock interviewing at IAB Meetings**
- Student poster interactions at IAB meetings, PerfectPitch judging
- **Overall - Enhance two-way communications**

Strong membership base, and work to keep it!





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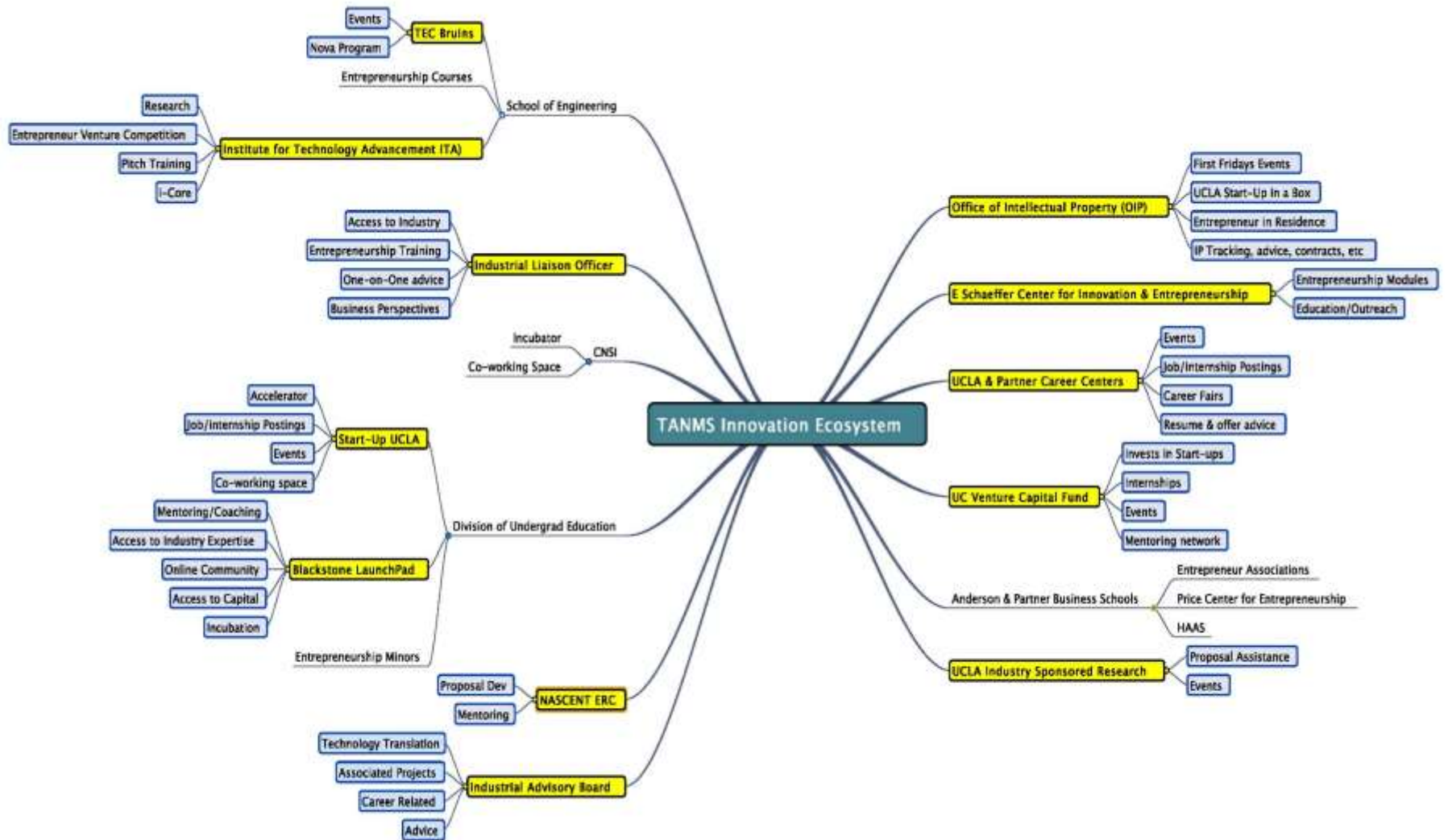
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TANMS Innovation Ecosystem



Industry Engagement

- **Industry Engagement**

- Build Affiliate Member Program
- “...deeper and richer...”
- Maintain relationships with current members

- **Strategy and Goals**

- Develop Value Chain, Partner Benefits
- Identify Gaps and Members
- Engage New Members
- Deepen Existing Relationships – Project Work, Engagement



New Member - Strategies

Engineering bi-directional brain computer interfaces (BBCI)



BBCI

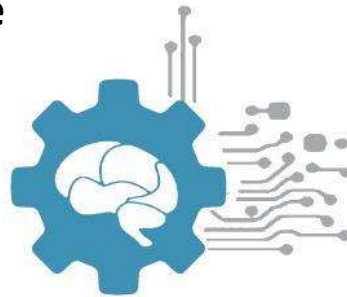


Cyberonics®



Medical Devices

Communication & Interface



Consumer Electronics

Neuroethics



Computational Neuroscience



Patient Therapy



New Member - Strategies

- **Identifying New Potential Members**

- Neural Engineering Space
- Interest in
 - IP Generated by CSNE Research
 - Medical devices, Other Disease States **SWOT**
 - Commercial Applications **SWOT**
- Philanthropic Groups – Brain, Stroke / SCI Rehab
- Especially focused on Thrust and Test-Bed Areas

Electrodes

Single Chip

Computational Neuroscience

Security

Neuroethics

SoC

Wireless Power

Stroke / SCI Rehab



New Member - Strategies

Where:

- Conferences – IAB, Field
- Who is Faculty working with?
- Initial Proposal Support
- Who are companies working with?
- Who used to be a member?
- Who WANTS to work with our companies?
- Who knows us and switched companies?
- What companies could benefit from SBIRs in this space?
SECOs?



New Member - Strategies

Membership Benefits:

- Faculty expertise
- Student talent
- Collaboration opportunities
- IP and pre-publication research results
- Network of CSNE partners

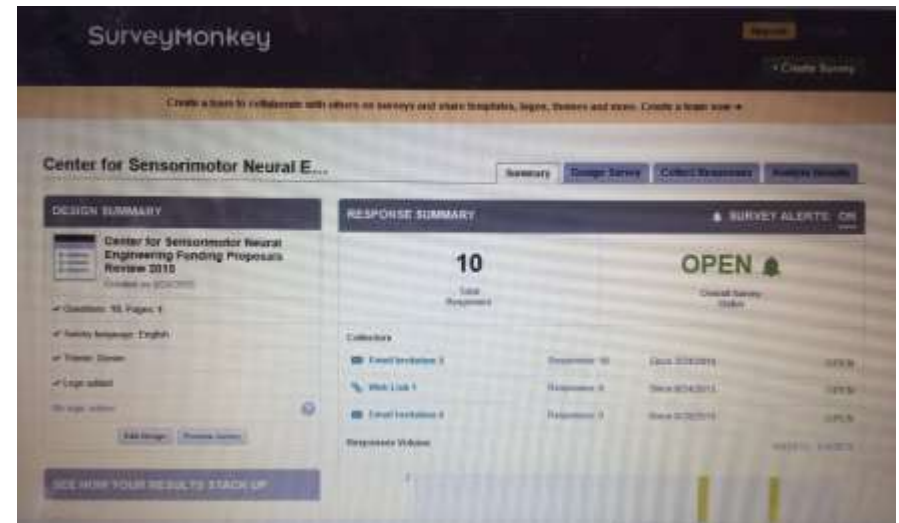
Companies contribute:

- Member fees and project support
- Career opportunities for students
- Feedback on CSNE research
- Subject Matter Expertise



Richer, Deeper...

- EQuIP Calls
- Funding Proposal Reviews
- Tool Kit
- Site Visits / Meetings / Calls
 - Project Ideas
 - Student Lunches
 - Speaking Events
- Individual Membership Program



Industry Projects

Benefits:

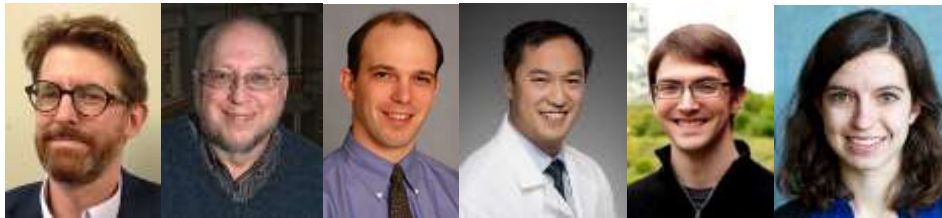
- Deeper Collaboration
- Increased funding for students
- Publications
- Pre-competitive collaboration
- Increased presence within Center
- Hiring opportunities for Students
- Easier renewals
- More obvious Value-Add
- Pull in other members



Highlight: Industry Engagement



- Closed loop DBS and implanted BCI
- \$275K in cash
- \$1 Million in hardware
- Activa PC+S chronic ECoG human trials: First ET patient implanted
- Tech Transfer to Stanford, UCSF



<http://www.medtronic.com/us-en/about/news/dbs-research-university-of-washington.html>



- Large-scale ECoG analysis using cloud-based machine learning
- \$80K in cash
- Collab featured in VP's talk
- ECoG decoding competition: <http://aka.ms/decodesignals>



<https://www.oreilly.com/ideas/connected-brains>



Industry Projects

ABM

GSK

Medtronic

Microsoft

Cyberonics

OpenBCI

Reach Bionics

Ekso Bionics

WRF

White Matter (nano-Z)

NeuroRecovery

Technologies

MultiModal Health

