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**Objective:**

To facilitate the creation of a collaborative effort across multiple organizations that can successfully develop and commercialize electrostatic fluid accelerator (EFA) technology for thermal management and microfluidic applications.

**Education:**

**University of Washington**, Seattle, WA *September 2003 - present*  
*Ph.D.* in Electrical Engineering, expected graduation date August 2007  
**GPA: 3.80**

**University of Washington**, Seattle, WA *September 1999 - Dec 2004*  
*Master of Science* in Electrical Engineering, awarded December 2004  
*Bachelor of Science* in Electrical Engineering, awarded June 2003

**Publications:**

C. P. Hsu, N. E. Jewell-Larsen, A. C. Rollins, I. A. Krichtafovitch, S. W. Montgomery, J. T. Dibene II, and A. V. Mamishev, "Miniaturization of Electrostatic Fluid Accelerators," *ASME International Mechanical Engineering Congress and Exposition, Chicago USA, November 2006 (Accepted)*.

N. E. Jewell-Larsen, P. Q. Zhang, C. P. Hsu, I. A. Krichtafovitch, and A. V. Mamishev, "Coupled-physics modeling of electrostatic fluid accelerators for forced convection cooling," *9th AIAA/ASME Joint Thermophysics and Heat Transfer Conference June 2006*.

N. A. Bernotski, X. Xiong, K. Wang, N. E. Jewell-Larsen, and K. F. Böhringer, "Formation of Two-Dimensional Colloidal Sphere Arrays on Micro-Patterns," *FNANO (2005)*.

N. E. Jewell-Larsen, E. Tran, I. A. Krichtafovitch, A. V. Mamishev, "Design and Optimization of Electrostatic Air Pumps," *IEEE Transactions on Dielectrics and Electrical Insulation (TDEI) Journal, Volume: 13 Issue: 1, February 2006 Page(s): 191-203*.

N. E. Jewell-Larsen, "Design Optimization and Miniaturization of Electrostatic Air Pumps for Thermal Management," *Masters Thesis*, University of Washington, December 2004.

N. E. Jewell-Larsen, D. A. Parker, I. A. Krichtafovitch, and A. V. Mamishev, "Numerical simulation and optimization of electrostatic air pumps," *CEIDP (2004)*, Boulder CO, pg 106-109.

F. Yang, N. E. Jewell-Larsen, D. L. Brown, K. Pendergrass, D. A. Parker, I. A. Krichtafovitch, A. V. Mamishev. "Corona driven air propulsion for cooling of electronics." *International Symposium on High Voltage Engineering* (2003):155.

Nels Jewell-Larsen, Vickie Pan, Buddy Ratner, and Denice Denton, "Controlled substance release through the degradation of biodegradable plasma deposited PLA (poly lactic acid) coatings." *UWEB Journal of Undergraduate Research* (2001): 110-121.

S. Seraji, Y. Wu, N. E. Jewell-Larsen, M. J. Forbess, S. J. Limmer, T. P. Chou, G. Cao. "Patterned Microstructure of Sol-Gel Derived Complex Oxides Using Soft Lithography." *Journal of Advanced Materials* (2000): 1421-1424.

## Patents:

Nels E. Jewell-Larsen, Stephen W. Montgomery, Joseph T. Dibene, "CARBON NANOTUBE MECHANICALLY ACTUATED TRANSISTOR." US Patent (Filed by Intel Corp, 08/29/2005)

Rajiv K. Mongia, Stephen W. Montgomery, Willem M. Beltman, Mark A. Trautman, Nels E Jewell-Larsen, "COOLING APPARATUS AND METHOD." US Patent (Filed by Intel Corp. 06/29/2005)

S. W. Montgomery, T. V. Aldridge, N. E. Jewell-Larsen, "FORMING A NANOTUBE SWITCH AND STRUCTURES FORMED THEREBY." US Patent (Filed by Intel Corp. 12/29/2004)

## Work/Research:

### **Lead Researcher:**

*January 2001 – present*

University of Washington Department of Electrical Engineering, Sensors, Energy, and Automation Laboratory (SEAL), Seattle WA. Lab director: Prof. Alexander V. Mamishev  
*Currently managing and leading a team of five student researchers*  
Optimization and miniaturization of electrostatic air pump technology for cooling the next generation of high-density electronics.

### **Intel Engineering Co-op:**

*June 2004 – March 2005 and June 2005 – March 2006*

Intel Digital Enterprise Group, Power and Thermal Pathfinding Technologies Laboratory in DuPont WA.  
Managers: Tom Aldridge and Steve Montgomery  
Drove and developed collaborative effort between Intel PTPT and the University of Washington to pursue the development of silicon level integrated micro electrostatic air pumps for cooling of electronics.  
Developed nanotechnology based solutions for high efficiency power delivery for electronics.  
Analog & Digital circuit modeling and design for the development of next generation embedded voltage regulator technology for high efficiency/performance power delivery.

### **Researcher:**

*September 2003 – July 2004*

University of Washington Department of Electrical Engineering, Micro Electrical Mechanical Systems (MEMS) Laboratory, Seattle WA. Lab director: Prof. Karl F. Bohringer  
*Graduate Lab Rotation*  
Developed a method of micro patterning nano structures through colloidal aggregation. This self assembly patterning technique is capable of sub micron feature sizes and may initially be used for low cost fabrication of CMOS lithography masks. Continuation of this project is now being done in conjunction with Intel.

### **Lead Researcher:**

*June 2000 - August 2000*

University of Washington Engineered Biomaterials (UWEB), Seattle WA. Lab director: Prof. Buddy Ratner  
Developed a method for controlled substance release through the degradation of biodegradable plasma deposited PLA (poly lactic acid) coatings. Used ESCA, AFM, SEM and UV-vis for sample analysis.

### **Researcher:**

*September 1999 - June 2000*

University of Washington Material Science & Engineering department Sol-Gel lab, Seattle WA  
Lab director: Prof. Guozhong Cao  
Worked to develop a method for micro patterning Piezoelectric sol-gels with soft lithography. Worked on soft / photo lithography and in-depth analysis using Atomic force microscopy (AFM). Experience in manufacturing process of Sol-Gel and ceramic based piezoelectrics.

### **HP Engineering Co-op:**

*April 1999 - July 1999*

Hewlett Packard Ink Jet Business unit, Corvallis OR. Project director: Dan Beamer  
Worked intimately with an engineering research group on material development for new ink jet cartridge technology. Designed and ran experiments, presented on experimentation results, and performed extensive data analysis.

## Management:

- Lead and managed a technical group of 3-5 undergraduate and graduate researchers at the University of Washington SEAL laboratory from 2002 to 2006.
  - *Acted as project manager and directed project vision as well as experimental design and development.*
  - *Human resource management, including the recruitment, development, and termination of group members.*
  - *Strategic partnership development. Developed relationship with both large and small corps. Including Intel Corp., Kronos Air Technologies, and Burle Glass, as well as with other relevant research labs within the University of Washington.*
  - *Funding: Played major role in the acquisition of research and stipend grants from the Washington Technology Center (WTC), Kronos Air Technologies, and Intel Corp. totaling over 280 thousand for 2004 and 2005.*
- Acting lab manager for the University of Washington SEAL laboratory from 2002 to 2005.

## Skills:

- *Programming languages: C/C++ ,Verilog, Matlab, Labview*
- *Modeling software :Cougar, Alliance, Cadence suite, P-spice, H-spice, FEMLAB, Ansoft Maxwell EM, Flomerics Flotherm*
- *Fabrication: General working knowledge of common micro-fabrication equipment and processes as well as machine shop experience.*
- *Measurement: Atomic force Microscopy (AFM), Electron Spectroscopy for Chemical Analysis (ESCA), Scanning Electron Microscope (SEM).*

## Membership:

- Past Vice President and current member of the University of Washington IEEE student chapter
- Member of Mechanical Engineering Honor Society Pi Tau Sigma
- NSCS member

## Honors:

- LINK graduate fellowship honorable mention for 2006
- Dept. of Electrical Engineering Outstanding Graduate Research Assistant 2005 nominee
- EEIC graduate poster competition 1<sup>st</sup> place recipient for 2006, 2005, and 2004
- NSF Graduate Fellowship Honorable Mention for 2003 and 2004
- Grainger graduate Fellowship for 2003
- Project lead for a 2003 Intel student research competition funded project
- IEEE Power Engineering society 2003 international poster comp 1<sup>st</sup> place recipient
- Dept. of Electrical Engineering Outstanding undergraduate Research Assistant for 2003
- IEEE regional student chapter paper contest 3<sup>rd</sup> place winner for 2003
- American Public Power Association DEED scholarship recipient for 2003
- 1<sup>st</sup> place winner for the 2003 UW EE departmental research proposal contest
- Grainger Undergraduate Fellow for 2003
- 2000, 2001, 2002 Mary Gates undergraduate research scholarship recipient
- 2002 Washington Space Grant recipient
- EEIC undergraduate poster competition 1<sup>st</sup> place winner for 2002 and 2003
- Departmental Scholar (Mill's Scholar 2001)

## Select presentations:

- AIAA conference on electronics packaging and heat transfer 2006
- Foundations of Nanoscience (FNANO) 2005
- 2004 IEEE Conference on Electrical Insulation and Dielectric Phenomena (CEIDP)
- 2003 International symposium on High Voltage Engineering
- 2002-03 IEEE Power Engineering Society Summer Conference
- Spring 2001 Professional Council of Federal Scientists and Engineers
- Fall 2001 University of Washington's annual Benefactors Banquet
- Fall 2000 annual Biomedical Engineering Society
- Work presented at 2000 annual meeting of the American Ceramic Society
- 2000 International Education Symposium, in Sendi Japan