

# RAMANA KUMAR VINJAMURI

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## RESEARCH INTERESTS

Signal processing, and optimization  
Neural signals and systems  
Mathematical modeling of bio-systems  
Rehabilitation and bio-instrumentation  
Hardware design, digital logic, and logic design

## EDUCATION

**University of Pittsburgh**, Pittsburgh, PA

Ph.D. in Electrical Engineering, August 2008, GPA 3.78/4.0

Course work: Embedded Computer System Design, System-on-chip Design, Validation and Verification Methodologies, Optimization Methods, Stochastic Processes, Human Postural Control, etc.

**Villanova University**, Villanova, PA

M.S. in Electrical Engineering, August 2004, GPA 3.74/4.0

Course work: Computer Organization and Design, Hardware System Design and Modeling, VLSI Design, Advanced Computer Architecture, Optoelectronics, Fuzzy Logic Engineering Applications etc.

**Kakatiya University**, India

BS in Electrical and Electronics Engineering, May 2002, GPA 4.0/4.0

## EXPERIENCE

### Research experience

Postdoctoral Research Fellow, Department of Physical Medicine and Rehabilitation, School of Medicine, University of Pittsburgh, Aug. 2008- Present. Project: Virtual reality based rehabilitation and Brain Computer Interface for Neural Prosthesis

Research assistant, Department of Electrical and Computer Engineering, University of Pittsburgh. Aug. 2005—2008. Project: Dimensionality reduction in control and coordination of human hand: time-varying synergies in joint movements of hand (Optimization methods in MATLAB)

Research associate, Department of Neurological Surgery, University of Pittsburgh. Aug. 2005—Dec. 2007. Project: Extraction of neural sources from patients with movement disorders: tremor detection in essential tremor (Blind source separation of convoluted mixtures in MATLAB)

Research assistant, Department of Electrical and Computer Engineering, Villanova University. Aug. 2002—Aug. 2004. Project: Design and implementation of a state of charge meter for Li ion batteries to be used in portable defibrillators (Fuzzy Logic in MATLAB and Motorola HC12)

### Teaching experience

Mentored and trained graduate student researchers about ongoing research at Dr. Singh's research lab at Villanova University. Aug. 2002—Aug. 2004

Teaching assistant, Electrical and Computer Engineering Department, University of Pittsburgh. Aug. 2004— Aug. 2005, for Computer Organization and Digital Systems Laboratory

Mentored undergraduate students in Pitt Excel student research internship in computer visualization of Kinematic synergies

Mentored graduate students in novel research of hand movement analysis in Dr. Mao's Lab towards dissertation

### **Industry experience**

Research intern, ECIL Corporation of India Ltd., AP, India

Project: Hardware design of 32-bit ALU Dec. 2001—Aug. 2002

### **Other activities**

Lab manager for Dr. Mao's Laboratory in Department of Electrical and Computer Engineering, University of Pittsburgh. Hardware and software installation of CyberGlove, Fastrack, surface EMG, 5DT data gloves and Labview. Trained graduate and under graduate students for research experience.

Proposal writing for multiple NSF grants

Presented papers and posters at NSF and IEEE conferences

Vice-president (2007) for engineering graduate student organization at University of Pittsburgh

## **SCHOLARSHIPS**

Research Fellowship supported by NIH for design and implementation of state-of-charge meters for Li-ion batteries used in portable defibrillators. Aug. 2002—2004

Teaching Fellowship by Department of Electrical and Computer Engineering, University of Pittsburgh. Aug. 2004—2005

Research Fellowship supported by Department of Electrical and Computer Engineering, University of Pittsburgh and in part by NSF. Aug. 2005—Aug. 2008

## **PUBLICATIONS**

### **Journal papers**

1. P. Singh, R. Vinjamuri, X. Wang, and D. Reisner. Fuzzy logic modeling of EIS measurements on Lithium-ion batteries, *Electrochimica Acta*, Vol. 51, pp. 1673-1679, 2006.
2. P. Singh, R. Vinjamuri, X. Wang, and D. Reisner. Design and implementation of a fuzzy logic based state-of-charge meter for Li-ion batteries used in portable defibrillators, *Journal of Power Sources*, Vol. 152, pp. 829-836, 2006.
3. R. Vinjamuri, D. Crammond, D. Kondziolka, H.-N. Lee and Z.-H. Mao. Extraction of sources of tremor in hand movements of patients with movement disorders. *IEEE Transactions on Information Technology in Biomedicine*, Vol.13, pp. 49-56, 2009.
4. R. Vinjamuri, M. Sun, R. Sciabassi, and Z. -H. Mao. Temporal postural synergies of hand in rapid grasping tasks. Submitted to *IEEE Transactions on Information Technology in Biomedicine*.

5. R. Vinjamuri, M. Sun, R. Sclabassi, and Z.-H. Mao. Dimensionality reduction in control and coordination of human hand. Revised in *IEEE Transactions on Information Technology in Biomedicine*.
6. R. Vinjamuri, M. Sun, C.-C. Chang, H.-N. Lee, R. Sclabassi, and Z.-H. Mao. Time-varying kinematic synergies in joint velocities of hand during reach and grasp. Submitted to *IEEE Transactions in Biomedical Engineering*.
7. R. Vinjamuri, M. Sun, R. Sclabassi, and Z.-H. Mao. Inherent bimanual postural synergies in hands. Submitted to *IEEE Transactions on Information Technology in Biomedicine*.

#### **Peer-reviewed conference papers**

8. P. Singh, R. Vinjamuri, X. Wang, and D. Reisner. Fuzzy logic based state-of-health estimation of Li-ion Batteries, in *41<sup>st</sup> Power Sources Conference*, Philadelphia, PA, pp. 461-464, 2004.
9. P. Singh, R. Vinjamuri, X. Wang, and D. Reisner. Fuzzy logic modeling of EIS measurements on Lithium-ion batteries, in *International Symposium on Electro chemical Impedance Spectroscopy*, Cocoa Beach, FL, 2004.
10. R. Vinjamuri, Z.-H. Mao, R. Sclabassi, and M. Sun. A novel architecture for the design of prosthetic and robotic hands, in *32<sup>nd</sup> Northeast bio Engineering Conference*, Allentown, PA, pp. 163-164, 2006.
11. R. Vinjamuri, Z.-H. Mao, R. Sclabassi, and M. Sun. Limitations of surface EMG signals of extrinsic muscles in predicting postures of human hand, in *Proceedings of the 28th IEEE EMBS Annual International Conference*, NY, USA, pp. 5491-5494, 2006.
12. R. Vinjamuri, Z.-H. Mao, R. Sclabassi, and M. Sun. Time-varying synergies in velocity profiles of finger joints of the hand during reach and grasp, in *Proceedings of the 29th IEEE EMBS Annual International Conference*, France, pp. 4846-4849, 2007.
13. R. Vinjamuri, M. Sun, R. Sclabassi, and Z.-H. Mao. Inherent bimanual postural synergies in hands, in *Proceedings of the 30th IEEE EMBS Annual International Conference*, Canada, pp. 5093-5096, 2008.
14. R. Vinjamuri, D. Weber, A. Degenhart, J. Collinger, G. Sudre, P. D. Adelson, D. L. Holder, M. L. Boninger, A. B. Schwartz, D. J. Crammond, E. C. Tyler-Kabara and W. Wang. A Fuzzy logic model for hand posture control using human cortical activity recorded by micro-ECoG electrodes, in *Proceedings of the 31st IEEE EMBS Annual International Conference*, Minneapolis, MN, USA, 2009.
15. R. Vinjamuri, M. Sun, D. Weber, W. Wang, D. Crammond, and Z.-H. Mao. Quantizing and characterizing the variance of hand postures in a novel transformation task, in *Proceedings of the 31st IEEE EMBS Annual International Conference*, Minneapolis, MN, USA, 2009.
16. W. Wang, A. Degenhart, J. Collinger, R. Vinjamuri, G. Sudre, P. Adelson, D. Holder, E. Leuthardt, D. Moran, M. Boninger, A. Schwartz, D. Crammond, E. Tyler-Kabara and D. Weber. Human motor cortical activity recorded with micro-ECoG electrodes during individual finger movements, in *Proceedings of the 31st IEEE EMBS Annual International Conference*, Minneapolis, MN, USA, 2009.

#### **Other papers**

17. R. Vinjamuri, D. Crammond, D. Kondziolka, and Z.-H. Mao. Extraction of neural sources from kinematic profiles of hand movement, in *NSF Engineering Research and Innovation Conference*, Knoxville, TN, 2008.
18. R. Vinjamuri, Brian Dicks, Mingui Sun, Robert Sclabassi, and Z.-H. Mao. Graphical realization of time-varying synergies in velocity profiles of finger joints of the hand during reach and grasp, in *NSF Engineering Research and Innovation Conference*, Knoxville, TN, 2008.

19. R. Vinjamuri, M. Sun, R. Sciabassi, and Z. -H. Mao. Temporal variation of postural synergies of the human hand during grasping. *16th international conference on mechanics in medicine and biology*, Pittsburgh, PA, USA, 23rd-25th July 2008.
20. R. Vinjamuri, M. Sun, and Z.-H. Mao. A framework for extracting kinematic synergies of hand movement, in *NSF Engineering Research and Innovation Conference*, Hawaii, 2009.
21. R. Vinjamuri, A. Degenhart, J. L. Collinger, G. P. Sudre, E. Leuthardt, D. Moran, M. Boninger, A. B. Schwartz, D. J. Crammond, E. Tyler-Kabara, D. J. Weber, W. Wang. Human micro-electrocorticographic signals recorded during action execution and observation. *BMES Annual Fall Scientific Meeting*, Pittsburgh, PA, Oct. 7-10, 2009.
22. R. Vinjamuri, A. Degenhart, J. L. Collinger, G. P. Sudre, D. J. Crammond, E. Tyler-Kabara, D. J. Weber, W. Wang. Decoding hand posture based on human micro-electrocorticographic signals recorded during action observation. *Neuroscience*, Chicago, IL, Oct. 17-21, 2009.

## REFERENCES

1. Prof. Doug Weber, Assistant Professor, Department of Physical Medicine and Rehabilitation, University of Pittsburgh, ✉: djw50@pitt.edu.
2. Prof. Wei Wang, Assistant Professor, Department of Physical Medicine and Rehabilitation, University of Pittsburgh, ✉: wangw4@upmc.edu.
3. Prof. Zhi-Hong Mao, Assistant Professor, Department of Electrical and Compute Engineering University of Pittsburgh. ✉: maozh@enr.pitt.edu. ☎: 412-624-9674
4. Prof. Mingui Sun, Professor, Department of Neurological Surgery, University of Pittsburgh. ✉: mrsun@neuronet.pitt.edu. ☎: 412-648-9234
5. Prof. Donald Crammond, Assistant Professor, Department of Neurological Surgery, University of Pittsburgh. ✉: crammonddj@upmc.edu. ☎: 412-648-1385