

Curriculum Vitae

PERSONAL DETAILS

Name : Hsin Chen

Job title : Associate Professor

Address : The Dept. of Electrical Engineering,

The National Tsing Hua University

No.101, Sec.2, Kuang-Fu Road, Hsin-Chu, 30013, Taiwan

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Webpage : <http://www.ee.nthu.edu.tw/hchen/>

Lab: Neuro-Engineering Lab (<http://nel003.ee.nthu.edu.tw/nel/>)

EDUCATIONAL HISTORY

- 2000.10~2004.07: Ph.D in Electronics, *School of Engineering & Electronics, the University of Edinburgh, UK*. PhD thesis: “Probabilistic neural computation in mixed-mode VLSI”.
- 2003.6 : School of Neuroengineering, Telecom Italia Learning Service, Italy
- 1996.6~1998.6: Master of Science, *Department of Electrical Engineering, the National Tsing Hua University, Taiwan*. Master thesis: “Design of CMOS Low-voltage Rail-to-rail Operational Amplifiers”.
- 1992.10~1996.6: Bachelor of Science, *Department of Electrical Engineering, the National Tsing Hua University, Taiwan*. Final-year project: “Design of Solar Car’s Maximum power DC/DC converter.” Rank in class: 3/60

EXPERIENCES

- 2004.08~now : Assistant Professor in the Dept. of Electrical Engineering, the NTHU
- 2001.10~2002.6 : Lab demonstrator for C language, *School of Eng. and Elec., Edinburg Uni.*
- 2001.10~2002.10 Seminar organizer for *the Integrated System Group, Edinburgh University*
- 1999.10~2000.5: Lecturer in Electronics *in Taiwan Air Force*.
- 1998.8~2000.5: Technical Sergeant *in Taiwan Air Force in Hua-Lien Airport, Taiwan*.
- 1996.6~1996.9: Assistant Engineer *in Startek Engineering Inc., HsinChu, Taiwan*.
- 1995.6~1995.9: Assistant Engineer *in Startek Engineering Inc., HsinChu, Taiwan*.

PROFESSIONAL MEMBERSHIP

- IEEE member
- IEEE Engineering in Medicine and Biology Society member

PUBLICATIONS

List of publications at the NTHU is in **Sec.II.D**, and full copies of representative publications(♦) are in **App.A**, related publications(◇) in **App.B**, and patents in **App.C**. **The verification on Hsin's contribution to the representative publications are provided in the section next to the Curriculum Vitae.**

* marks the **corresponding author** of each publication

Journal :

1. Chen, H. and Murray, A.F.*, "A Continuous Restricted Boltzmann Machine with a Hardware-Amenable Learning Algorithm", *Lecture Notes in Computer Science* 2415, p.358-363, 2002.
2. Chen, H. and Murray, A.F.*, "A Continuous Restricted Boltzmann Machine with an Implementable Training Algorithm", *IEE Proceedings of Vision, Image and Signal Processing*, vol.150, no.3, p.153-158, 2003. (IF = 1.700, Rank : 26/52)
3. Tang, T.B., Chen, H. and Murray, A.F.*, "Adaptive Stochastic Classifier for Noisy pH-ISFET Measurements", *Lecture Notes in Computer Science* 2714, p.638-645, 2003.
4. Tang, T.B., Chen, H., Murray, A.F.*, "Adaptive, Integrated Sensor Processing to Compensate for Drift and Uncertainty: A Stochastic "Neural" Approach", *IEE Proceedings of Nanobiotechnology*, vol.151, no.1, p.28-34, 2004.(IF = 1.700, Rank : 26/52)
- ♦ 5. Chen, H.*, Fleury, P.C.D, and Murray, A.F., "Continuous-Valued Probabilistic Behaviour in a VLSI Generative Model", *IEEE Transactions on Neural Networks*, vol.17, no.3, p.755-770, 2006. (IF = 3.726, Rank : 4/94)
- ◇ 6. Ho, M.H., Chen, H., Tseng, F., Yeh, S.R., and Lu, M.S.C.* "CMOS Micromachined Probes by Die-Level Fabrication for Extracellular Neural Recording" *Journal of MicroMech. and MicroEng.*(17), no.2, p.283-290, 2007.(IF = 2.233, Rank : 12/112)
- ♦ 7. Chang, S.R., Chang, C.H., Lin, J.S., Lu, M.S.C., Lee, Y.T., Yeh, S.R., Chen, H.* "Die-level post-CMOS processes for fabricating open-gate, field-effect biosensor arrays with on-chip circuitry" *Journal of MicroMech. and MicroEng.*(18), no.11,115032(10pp), 2008.(IF = 2.233, Rank : 12/112)
- ♦ 8. Chang, C.H., Chang, S.R., Lin, J.S., Lee, Y.T., Yeh, S.R., Chen, H.* "A CMOS neuron-silicon interface based on two-dimensional transistor arrays with monolithically-integrated circuitry", *Biosensors and Bioelectronics*, no.24, p.1757-1764, 2009.(IF = 5.143, Rank : 3/70)
- ♦ 9. Yeh, S.R., Chen, Y.C., Su, H.C., Yew, T.R., Kao, H.H., Chen, H., Chang, Y.C., Chang, P., Chen, H.* "Interfacing Neurons both Extracellularly and Intracellularly Using Carbon-nanotube Probes with Long-term Endurance", *the Langmuir*, no.25(13), p.7718-7724, 2009. (IF = 4.097, Rank : 23/113)
- ♦ 10. Chang, S.R. and Chen, H.* "A CMOS-Compatible, Low-Noise ISFET Based on High Efficiency Ion-Modulated Lateral-Bipolar Conduction" *Sensors*, 9, p.8336-8348, 2009.(IF = 1.870, Rank : 11/56)
- ◇ 11. Su, H.C., Chen, C.H., Chen, Y.C., Yao, D.J., Chen, H., Chang, Y.C., and Yew, T.R.* "Improving the adhesion of carbon nanotubes to a substrate using microwave treatment" *Carbon*, 48, p.805-812, 2010.(IF = 4.373, Rank : 17/192)
- ◇ 12. Hsu, H.L., Teng, I.J., Chen, Y.C., Hsu, W.L., Lee, Y.U., Yen, S.J., Su, H.C., Yeh, S.R., Chen, H. and Yew, T.R.* "Flexible UV-Ozone Modified Carbon Nanotube Electrodes for Neuronal Recording," *Advanced Materials*, In Press, 2010. (IF = 8.191, Rank : 4/113)
- ♦ 13. Chen, H.*, Saighi, S., and Renaud, S. "Real-time Simulation of Biologically-realistic Stochastic Neurons in VLSI", the *IEEE Trans. on Neural Networks*, accepted subject to minor revision, 2010. (IF = 3.726, Rank : 4/94)
- ◇ 14. Lu, C.C, Chen, P.L., Huang, C.D. and Chen, H.* "An Embedded, Analogue Nonvolatile Memory with a Feedback-Controlled Programming Circuit On-chip", submitted to the *Electronics Letters*, 2010. (IF = 1.14 Rank : 108/229)
- ◇ 15. Chen, Y.C., Hsu, H.L., Lee, Y.T., Su, H.C., Chen, C.H., Yen, S.R., Yew, T.R., Yeh, S.R., Yao, D.J., Chang, Y.C., and Chen, H.* "An Active and Flexible Carbon-Nanotube-Coupled Microelectrode Array for Interfacing with Neurons Bidirectionally" submitted to *Biosensors and Bioelectronics*, 2010 .(IF = 5.143, Rank : 3/70)
- ◇ 16. Lu, C.C. and Chen, H.* "A Scalable and Programmable Continuous Restricted Boltzmann Machine in VLSI", submitted to *IEEE Trans. on Neural Networks*, 2010. (IF = 3.726, Rank : 4/94)

17. Chiu, T.J.[†], Gong, J.[†], King, Y.C.[†], Lu, C.C.[†], and Chen, H.* "An Octagonal, Dual-gate Transistor with Enhanced and Adaptable Low-frequency Noise" *submitted to the IEEE Electron Device Letters* (IF = 3.049, Rank : 23/229)
18. Huan-Chieh Su, Chia-Min Lin, Shiang-Jie Yen, Yung-Chan Chen[†], Chang-Hsiao Chen, Shih-Rung Yeh[†], Weileun Fang[†], Hsin Chen, Da-Jeng Yao[†], Yen-Chung Chang[†] and Tri-Rung Yew[†], "A Cone-shaped 3D Carbon Nanotube Probe for Neural Recording" *Biosensors and Bioelectronics*, no.26, p.220-227, 2010.(IF = 5.143, Rank : 3/70)

Book chapter :

1. Chen, H., Fleury, P., and Murray, A.F., "Unsupervised Probabilistic Neural Computation in Mixed-mode VLSI", in *Smart Adaptive Systems on Silicon.* (M. Valle ed.). Springer. ISBN: 1402027435. Oct, 2004.

Conference :

1. Chen, H., Fleury, P., and Murray, A.F.*, "Minimizing Contrastive Divergence in Noisy, Mixed-mode VLSI Neurons", *Advances in Neural Information Processing Systems*, vol.17, Vancouver, Canada, 2003.
2. Chen, H., Fleury, P., Tang, T.B., and Murray, A.F.*, "Adaptive Noisy Neural Computation in Mixed-mode VLSI", *Proc. of the 7th Inter. Conf. on Cognitive and Neural Systems*. p.68, Boston, USA, 2003.
3. Fleury, P., Chen, H., and Murray, A.F.*, "On-Chip Contrastive Divergence Learning in analogue VLSI", *Proc. of the Inter. Joint Conference on Neural Networks (IJCNN'2004)*, p.25-29 July 2004. (EI)
4. Chiang, P.C. and Chen, H.* "Training Probabilistic VLSI models On-chip to Recognise Biomedical Signals under Hardware Nonidealities" *28th IEEE Inter. Conf. of Eng. in Medicine and Biology Society*, p5354-5357, 2006. (EI)
5. Lu, C.C., Hong, C.Y., and Chen, H.* "A Scalable and Programmable Architecture for the Continuous Restricted Boltzmann Machine in VLSI" *IEEE Inter. Symp. on Circuits and Systems*, p1297-1300, 2007. (EI)
6. Lin, J.S., Chang, S.R., Chang, C.H., Lu, S.C. and Chen, H.* "CMOS-micromachined, Two-dimensional Transistor Arrays for Neural Recording and Stimulation", *29th IEEE Inter. Conf. of Eng. in Medicine and Biology Society*, 2007, p 2365-2368. (EI)
7. Lu, C.C. and Chen, H.* "A Scalable and Programmable Probabilistic Neural VLSI for Intelligent Sensing in Implantable Biomedical Devices" *the 12th Inter. Conf. on Cognitive and Neural Systems*, 2008.
8. Lu, C.C., Li, C.C. and Chen, H.* "How Robust is a Probabilistic Neural VLSI System against Environmental Noise", *The 3rd Inter. Workshop on Artificial Neural Networks for Pattern Recognition*, p 44-53, 2008. (EI)
- ◇9. Hsu, Y.S., Chiu, T.J., Chen, H.*, "Real-time Recognition of Continuous-time Biomedical Signals Using the Diffusion Network", *IEEE Inter. Joint Conf. on Neural Networks*, p2628-263, 2008. (EI)
10. Chen, Y.C., Lee, Y.T., Yeh, S.R., and Chen, H.*, "A Bidirectional, Flexible Neuro-electronic Interface Employing Localised Stimulation to Reduce Artifacts", *The 4th Inter. Conf. on Neural Eng.*, p 46-50, 2009 (EI)
11. Lu, C.C. and Chen, H.*, "Minimising Contrastive Divergence with Dynamic Current Mirrors", *the Inter. Conf. on Artificial Neural Networks*, 2009. (EI)
12. Lu, C.C. and Chen, H.*, "Current-mode Computation with Noise in a Scalable and Programmable Probabilistic Neural VLSI System", *the Inter. Conf. on Artificial Neural Networks*, 2009. (EI)
13. Ming-Yu Lin*, Sheng-Ren Chang, Jiann-Shiun Kao, Hsin Chen, Yuh-Shyong Yang "Construction and Detection of Long, Periodic, ssDNA nanostructures by CMOS Transistor Arrays" *IEEE Sensors Conference*, 2009 (EI)
14. Vigneron, V.*, Chen, H., and Chen, Y.Y. "Dictionary-based classification models. Applications for multichannel neural activity analysis" *The 11th Inter. Conf. on Engineering Applications of Neural Networks*, 2009
15. Chen, H.*, Chang, S.R., and Lai, Y.B. "CMOS-compatible Neuro-electronic Interfaces and Beyond" *IEEE Nano/Molecular Medicine and Engineering*, 2009.(EI)
16. Hsieh, H.Y.*, Tang, K.T., Tsai, Z.H. and Chen, H. "A Low-Power, High-Resolution WTA Utilizing Translinear-Loop Pre-Amplifier" *submitted to IEEE Inter. Joint Conf. on Neural Networks*, 2010 (EI)
- ◇17. Chien, C.H., Lu, C.C., and Chen, H.* "Mapping the Diffusion Network into a Stochastic System in Very Large Scale Integration" *submitted to IEEE Inter. Joint Conf. on Neural Networks*, 2010 (EI)
18. Wu, Y.D., Lin, S.C., and Chen, H.* "A Log-Domain Implementation of the Diffusion Network in Very Large Scale Integration", *Neural Information Processing Systems*, 2010
19. Chang, C.F., Chen, Y.C., and Chen, H.* "A Neuromorphic Microsystem on Glass for Monitoring Fly Behaviours Automatically" *IEEE Asia Pacific Conf. on Circuits and Systems*, 2010

Patent :

1. Su, H.C., Chen, H., Chen, H., Chang, Y.C., Yeh, S.R., Fang, W.L., Fu, C.C., and Yew, T.R. "Multifunctional Nano-probe Interface Structure for Neural Prostheses and Manufacturing Methods There of " *Taiwan, R.O.C. Patent, no.95141327. and U.S. patent*
2. Lin, J.S., Chang, S.R., Chang, C.H., Lu, S.C. and Chen, H. "The Processing Method of Ion-Sensitive Field-Effect Transistors" *Taiwan, R.O.C. Patent. (under review)*
3. Huang, C.D., Lu, C.C., Chen, H. "Nonvolatile Analogue Memory", *Taiwan, R.O.C. and the U.S. patents. (under review)*
4. Lin, M.Y., Yang, Y.S., and Chen, H. "Field-effect transistor type biosensor and bio-signal amplification method thereof" *Taiwan, R.O.C. and the U.S. patents. (under review)*

Other :

1. Chen, H., "Continuous-valued Probabilistic Neural Computation in VLSI", *PhD Thesis, Edinburgh University, UK, 2004.*
2. Chen, H. and Gong, J. "Design of CMOS Low-voltage Rail-to-rail Operational Amplifiers", *Master Thesis, National Tsing Hua University, Taiwan, 1998.*

RESEARCH GRANTS

- 2010.08-2013.07 (G1): **PI** in “The Development of a Low-power, Stochastic Neural Network On-chip for Preprocessing the Sensory Signals of an e-Nose” *subproject in “An Electronic Nose SoC that Monitors Hazardous Gases in Limited Work Space”, submitted to the National Science Council, Taiwan.*
- 2009.10-2012.09 (G2): **Co-PI** in “The Development of Control ICs for the Wind/PV Green-Energy System” *subproject in “Wind/PV Green-Energy Generation System”, funded by the National Science Council, Taiwan. (98-2218-E-007-011), NT\$9,532,000 for 2010 (NT\$920,475 for the subproject)*
- 2009.01-2010.12 (G3): **PI** in “Functional Repairing of Injured Nerves Using Machine Learning Embedded in a Customised Brain-Machine Interface”, *the Taiwan-France Orchid Program funded by the National Science Council, Taiwan. (98-2911-I-007 -029) NT\$288,160 for 2009 and NT\$440,000 for 2010*
- 2008.06-2008.09 (G4): **PI** in “The development of hybrid silicon-neuron systems towards restoring high-level brain functions” short-term, international research grant funded by the *the National Science Council, Taiwan. (97-2918-I-007-003), NT\$258,280*
- 2007.08~2010.07 (G5): **PI** in “Fabrication of Long-shank Carbon-nanotube Multi-electrode Array with CMOS Integrated Circuits” *subproject in “the Development of new generations of nano-multi-electrode arrays for biomedical Brain-Main-Interface Devices”, funded by the National Science Council, Taiwan. (96-2627-E-007 -002), NT\$5,000,000*
- 2007.08~2010.07 (G6): **PI** in “The Development of Stochastic System-on-a-Chip for Recognising High-dimensional, Time-variant Biomedical Signals” *funded by the National Science Council, Taiwan. (96-2221-E-007-167-MY3), NT\$2,808,000*
- 2007.01~2010.12 (G7): **Co-PI** in “MEMS/IC Fly Activities Monitoring Platform” *subproject in the Brain Research Center funded by the NTHU, Taiwan. NT\$1,200,000*
- 2008.01~2009.12 (G8): **PI** in “The Development of the Recording Circuits and Data-acquisition System for Neural Microprobes” Program for Incubating Interdisciplinary Undergraduates in Science and Technology, funded by the *Ministry of Education, Taiwan. NT\$250,160*
- 2007.01~2007.12 (G9): **PI** in “The Design of the Recording Circuits and Data-acquisition System for Neural Microprobes” undergraduate project funded by the *National Science Council, Taiwan. NT\$80,000*
- 2006.01~2006.12(G10): **Co-PI** in “Engineering a Miniaturised Multielectrode Array for Monitoring Fly Circuit Activities” *subproject in the Brain Research Center funded by the NTHU, Taiwan. NT\$300,000*
- 2005.08~2007.07 (G11): **PI** in “The development of a biomedical-inspection system-on-a-chip based on probabilistic behaviour in VLSI” funded by *National Science Council, Taiwan. 94-2213-E-007 -092, 95-2221-E-007 -115, NT\$836,000 NT\$723,000*
- 2004.09~2005.08 (G12): **Co-PI** in “Design and fabrication of the multi-electrode arrays with signal processing circuitry for high signal/noise ratio”, funded by *the University Systems of Taiwan.. NT\$400,000*

AWARDS AND HONORS

- 2009.12.04: Best paper award in the Biomedical Engineering Symposium on Biosignal, Biosensor, Bioelectronic, and Bioengineering (BES4B) 4B生醫工程研討會
- 2009.03.19-20: Best paper award in Inter. Conf. on Neural Prosthetic Devices 2009
- 2003: ICCNS fellowship, awarded by the Dept. of Cog. and Neural Sys., Boston University
- 2002: J. R. Beard Travel Grant, awarded by the IEE

- 2000-2003: Overseas Research Student Award, awarded by British Committee of Vice-Chancellors and Principals for universities in the UK.
- 2000-2003: Departmental studentships awarded by School of Engineering & Electronics, Edinburgh University.
- 1995: Mr. Shen, W.J. Scholarship, awarded by the NTHU, Taiwan
- 1994: Chung, Y.B. Alumnus Scholarship, awarded by the NTHU, Taiwan
- 1993: Mr. Chen, Chi Memorial Scholarship, awarded by the NTHU, Taiwan
- 1992: Taipei Exemplary Senior-high-school Student, awarded by Taipei Council, Taiwan

WORKSHOPS AND CONFERENCES

- 2006.08.01-15 : Program committee of **the School on Advanced Biotechnology**
- 2007.11.29-30 : Program committee and the webpage building of
the International Electron Devices and Materials Symposium 2007.
- 2009.05.20-22 : Organiser of **the International Workshop on Neuromorphic Systems and Neural Protheses.**
- 2010.06.28-07.01 :Organiser of **the School of IC Design for Biomedical Electronics**
- 2010.07.18-23: Technical Committee and the workshop co-organiser of
the IEEE World Congress on Computational Intelligence 2010, Barcelona
- 2010.10.27-28: Organiser of **the International Workshop on Bio-inspired Systems and Prosthetic Devices.**

INVITED TALKS IN ACADEMICS

- 2005.12.14 : The seminar of the Dept. of Communication Engineering, *the National Chiao Tung University (NCTU)*
- 2006.04.01-02 : The Workshop on Neural Electrophysiology, *held by the Inst. of Molecular Medicine, the NTHU.*
- 2006.08.05-06 : The Workshop on Advanced Biomedical Science and Technology, *held by the Inst. of Molecular Medicine, the NTHU.*
- 2006.08.01-15 : Lecturer in the School on Advanced Biotechnology, *held by the Inst. of Molecular Medicine and funded by the Ministry of Education*
- 2006.09.25 : The seminar of the Inst. of Nanoengineering and Microsystems, *the NTHU.*
- 2007.01.24-26 : The School on Integrated Circuit Design for Bioelectronics, *held by the System-on-Chip union, the Ministry of Education and the Dept. of Electrical Engineering, the National Taiwan University (NTU)*
- 2007.05.07 : The seminar of the Inst. of Electronics Engineering, *the NCTU.*
- 2007.07.02-05 : The School on Bioelectronics and Bioinformatics Camp, *held by the Inst. of Bioelectronics and the Inst. of Informatics, the NTU.*
- 2008.09.24 : “The development of neuro-electronic interfaces and beyond”, *IMS Lab, Bordeaux 1 University, France*
- 2008.09.25: “Qu’est-ce que vous pouvez faire à Taiwan”, *ENSEIRB, France*

- 2008.12.03: The seminar of the Dept. of Electrical and Control Engineering, *the NCTU*
- 2009.09.03: “Exploring How Neurons Compute with Noise by VLSI Implementation” Invited speaker of the 10th Anniversary of France-Taiwan Scientific Prize.
- 2009.10.09: Biophysics Journal Club, held by the Dept. of Physics, the National Chung Hsing University (<http://nchu-bjc.blogspot.com/>)
- 2009.10.21: “CMOS-compatible Neuro-electronic Interfaces and Beyond”, Invited speaker of the IEEE Nano/Molecular Medicine and Engineering 2009, *held by the National Cheng Kung Uni*

JOURNAL REVIEWERS

- Biosensors and Bioelectronics
- Frontiers in Neurorobotics
- IEE Proceedings - Circuits, Devices and Systems
- IEEE Transaction on Neural Networks
- International Journal of Neural Systems
- Journal on Advances in Signal Processing
- Neurocomputing
- IEEE Electron Device Letters

EXTRA-CURRICULUM ACTIVITIES

- 2009.05: Silver medal for 200m free-style swimming rally
- 2008.05: Gold medals for 100m breaststroke-style swimming race and 200m free-style rally
- 2007.05: Gold medal for 100m breaststroke-style swimming race in the NTHU.
Copper medal for 100m free-style swimming race in the NTHU.
- 2004~2008 : Gold and silver medals for the 1600m rally race of the NTHU.
- 2000.10~2004.07 : Vice President and member of Edinburgh Taiwan Student Society
- 2000.10~2004.07 : Member of Hillwalking Club, Edinburgh University.
- 1997~now: Member of National Water Lifesaving Association, R.O.C.
- 1992~1996 : President and member of the Bluesky Club in NTHU, voluntary consultants for teenagers in Hsin-Chu Teenagers' Prison
- 1992~1996: Member of Aboriginal Culture Club in NTHU, volunteers for social service for aboriginal people in Taiwan