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■教育背景：

- 2004 年 9 月~2008 年 6 月：清华大学计算机系计算机科学与技术：博士
- 2000 年 9 月~2003 年 6 月：重庆大学自动化学院控制理论与工程：硕士
- 1993 年 9 月~1997 年 7 月：　重庆大学自动化系自动控制专业：本科

■工作经历：

- 2012 年 10 月~至今：西安交通大学电信学院自动化科学与技术系，教授，博导
- 2010 年 10 月~2012 年 9 月：　美国佛罗里达大学 (University of Florida) 电气与计算机工程系，博士后研究员（合作导师为国际著名信号处理与神经网络科学家 Jose C. Principe 教授）
- 2008 年 7 月~2010 年 9 月：清华大学精仪系，博士后（合作导师为朱煜教授）。
- 2003 年 7 月~2004 年 8 月：广州安凯 (Anyka) 软件有限公司，软件工程师
- 1997 年 7 月~2000 年 5 月：四川长虹电子集团公司，助理工程师

■ 科研项目经历：

- 2012 年 10 月至今：作为项目负责人承担以下项目：
  - 973 项目（2015CB351703）---“视觉认知的脑工作机理及高级脑机交互关键技术研究”项目中课题“高级脑机交互中视觉认知编解码”（630 万）
  - 国家自然科学基金 (61372152) ---“再生核希尔伯特空间中自适应滤波新方法”（80 万）
- 2010 年 10 月至 2012 年 9 月：作为博士后研究员参与美国国家自然科学基金项目：NSF grant ECCS 0856441, NSF IIS 0964197，研究核自适应滤波及信息理论学习。
- 2008 年 7 月至 2010 年 8 月：
  - 973 项目（2009CB724205）---“IC 制造装备基础问题研究”项目中课题“大惯量多体系统的多场多尺度建模与纳米精度运动生成”
  - 国家自然科学基金 (60904054) ---“基于误差熵准则非线性系统参数辨识算法研究”. (项目负责人)
  - 中国博士后基金 (20080440384) ---“六自由度磁浮精密工件台的非线性建模与控制研究”. (项目负责人)
- 2004 年 9 月至 2008 年 6 月参与项目情况：
  - 973 国家重大基础理论课题---“复杂生产制造过程实时智能控制与优化理论和方法研究”.
  - 国家自然科学基金项目（10577012）---“纵列式无人直升机智能故障诊断与自修复控制”.
- 2003 年 7 月~2004 年 8 月：自适应多率（AMR）语音压缩算法研究及其 DSP 实现（Anyka 公司移动多媒体项目）。
- 2000 年 9 月~2003 年 6 月：国家自然科学基金项目（60073047）---“可穿戴式计算机软件支撑模式与系统关键技术的探索”。

■ 研究兴趣：

- 计算神经科学、认知科学与工程、脑机接口
- 机器学习（机器学习的信息准则、模式识别、深度学习）
- 自适应信号处理（鲁棒自适应滤波、核自适应滤波、分布式滤波与优化）;
- 系统辨识、智能控制；
- 先进人机交互、可穿戴计算、增强现实

■ 学术活动及兼职

- IEEE 高级会员
- 陕西省生物医学工程学会康复医学工程专业委员会常委
- 陕西省自动化学会控制理论及应用专业委员会委员
- 中国人工智能学会脑机融合与生物机器智能专业委员会委员

- 担任国际期刊编委：

  Associate Editor of *Journal of The Franklin Institute*

  Guest Editor of Special Issue "Information Theoretic Learning" in *Entropy*

  Editorial Board of *Entropy*

  Associate Editor of *IEEE Trans. on Neural Networks and Learning Systems*

  Editorial Board of *Applied Mathematics*

- 担任国际杂志审稿人:

  IEEE Trans. on Signal Processing, IEEE Trans. on Neural Networks and Learning Systems, IEEE Trans. on Control System Technology, Automatica, Neurocomputing, Digital Signal Processing.

- 组织国际会议：

  Technical Program Co-Chair, International Workshop on Vision, Communications and Circuits, Keio University, Japan, 2015

  Scientific Advisory Committee, The 2nd International Electronic Conference on Entropy and Its Applications, 15-30, November, 2015.

  *Special Session Organizer***,** 2015 IEEE International Conference on Digital Signal Processing (DSP 2015), Singapore.

  Member of the Program Committee, Workshop on Graph-based Representations in Pattern Recognition (GbR2015), Beijing, China, 2015.

  Member of the Program Committee, IJCNN, Beijing, China, 2014.

  Publicity Chair, The Brain-Mind Workshop (BMW) , Beijing, China, 2013.

■ 业绩综述

- 研究成果主要集中在自适应信号处理与机器学习方向，在国际著名刊物及会议发表学术论文近 100 篇，其中 SCI 期刊论文 40 多篇。同时，撰写学术章节 3 章，学术专著 2 部，其中以第一作者撰写中文学术专著 1 部，由清华大学出版社于 2011 年 5 月 1 日正式出版：《系统参数辨识信息准则及算法》。以第一作者撰写的英文专著由 Elsevier 出版社于 2013 年正式出版：System Parameter Identification: Information Criteria and Algorithms, 该书被国际计算评论（Computing Reviews）评选为 2013 年最佳学术书籍。Google Scholar Citations 显示学术论文被引用 400 多次，单篇最高被引 80 多次。

- 围绕信息论准则开展了深入研究，取得了系统性研究成果：1）深入研究了基于误差熵准则（MEE）的系统参数辨识、自适应滤波与机器学习算法；2）研究了基于最大互相关熵准则（MCC）的鲁棒及稀疏自适应滤波算法，从理论上深入分析了算法性能；3）提出生存信息势（survival information potential）测度，并成功应用于机器学习，包括数据回归、特征选取、独立量分析等。相关成果发表在 IEEE Trans. on Neural Networks, IEEE Trans. on Signal Processing, IEEE Signal processing Letter, Entropy，Signal Processing 等著名期刊。该方向研究获得国家自然科学基金(60904054)支持。

- 与美国佛罗里达大学 Jose C. Principe 教授合作开展基于再生核希尔伯特空间（RKHS）自适应滤波算法研究，取得系列成果：1）严格证明了 KLMS 算法的均方收敛性；2）开创性地提出了降低算法复杂度的量化(quantization)方法；3）基于 L_1 范数推导出稀疏核自适应滤波算法；4）推导出基于 RKHS 卡尔曼滤波算法。相关成果发表在 IEEE Trans. on Neural Networks and Learning Systems, IEEE Trans. on Signal Processing, IEEE Computational Intelligence Magazine, Signal Processing, Neural Networks, Neurocomputing. 该方向研究获得国家自然科学基金(61372152)支持。

- 近年来研究脑认知科学与脑机接口（BMI），重点开展脑信号（EEG, fMRI, Spikes 等）处理与分析，并取得初步成果：1）提出了加权的排序熵（WPE），成功应用于视觉认知解码； 2）提出基于核滤波的自适应逆控制方法，实现精确控制老鼠触觉神经元的放电活动，该方法具有跟踪环境及神经元自身特性变化的能力。相关成果发表在 Physical Review E, IEEE Trans. on Neural Systems and

Rehabilitation Engineering. 该方向研究获得 973 项目(2015CB351703)支持

■ 论文及专著：

✧ 期刊论文

1) Wentao Ma, **Badong Chen***, Haiquan Zhao, Guan Gui, Jiandong Duan, Jose C. Principe, Sparse least logarithmic absolute difference algorithm with correntropy induced metric penality. Accepted by *Circuit, Systems and Signal Processing.*
2) Zongze Wu, Siyuan Peng, Wentao Ma, **Badong Chen***, Jose C. Principe, Minimum Error Entropy Algorithms with Sparsity Penalty Constraints. To appear in *Entropy*.
3) **Badong Chen,** Jianji Wang, Haiquan Zhao, Nanning Zheng, Jose C. Principe, Convergence of a Fixed-Point Algorithm under Maximum Correntropy Criterion. *IEEE Signal Processing Letters*, 22 (10): 1723-1727, 2015.
4) Zongze Wu, Jiahao Shi, Xie Zhang, Wentao Ma, **Badong Chen***, Kernel Recursive Maximum Correntropy. To appear in *Signal Processing*.
5) Liangjun Chen, Hua Qu, Jihong Zhao, **Badong Chen*,** Jose C. Principe, Efficient and Robust Deep Learning with Correntropy Induced Loss Function. To appear in *Neural Computing and Applications*.
6) Wentao Ma, Hua Qu, Guan Gui, Li Xu, Jihong Zhao, **Badong Chen*,** Maximum correntropy criterion based sparse adaptive filtering algorithms for robust channel estimation under non-Gaussian environments. To appear in *Journal of the Franklin Institute*.
7) Yi Yu, Haiquan Zhao, **Badong Chen,** Sparseness Controlled Proportionate Affine Projection Sign Algorithms for Acoustic Echo Cancellation. To appear in *Circuit, Systems and Signal Processing.*
8) **Badong Chen,** Lei Xing, Zongze Wu, Junli Liang,Jose C. Principe, Nanning Zheng, Smoothed Least Mean p-Power Error Criterion for Adaptive Filtering. *Digital Signal Processing*, vol. 40, 154-163, 2015.
9) Jose C. Principe, **Badong Chen**, Universal Approximation with Convex

Optimization: Gimmick or Reality? *IEEE Computational Intelligence Magazine*, vol. 10, no. 2, pp. 68-77, 2015.

10) Wentao Ma, **Badong Chen**, Hua Qu, Jihong Zhao, Sparse least mean p-power algorithms for channel estimation in the presence of impulsive noise. To appear in *Signal, Image and Video Processing.*
11) Lei Sun, **Badong Chen,** Kar-Ann Toh, Zhiping Lin, Sequential Extreme Learning Machine Incorporating Survival Error Potential. *Neurocomputing*, vol 155, 194-204, 2015.
12) **Badong Chen,** Lei Xing, Junli Liang, Nanning Zheng, Jose C. Principe, Steady-state Mean-square Error Analysis for Adaptive Filtering under the Maximum Correntropy Criterion. *IEEE Signal Processing Letters*, 21 (7): 880-884, 2014.
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15) Pingping Zhu, **Badong Chen,** Jose C. Principe, Learning Nonlinear Generative Models of Time Series with a Kalman Filter in RKHS. *IEEE Trans. on Signal Processing*, vol. 62, 141-155, 2014.
16) Hua Qu, Wentao Ma, Jihong Zhao, **Badong Chen**, Kernel Least Mean Kurtosis Based Online Chaotic Time Series Prediction, *CHIN. PHYS. LETT.* Vol. 30, No. 11, 2013.
17) **Badong Chen**, Zejian Yuan, Nanning Zheng, Jose. C. Principe, Kernel minimum error entropy algorithm. *Neurocomputing*, vol. 121, 160-169, 2013.
18) Songlin Zhao, **Badong Chen**, Jose. C. Principe, Fixed budget quantized kernel least mean square algorithm, *Signal Processing*, vol. 93, 2759-2770, 2013.
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21) **Badong Chen**, Jose. C. Principe, On the Smoothed Minimum Error Entropy Criterion, *Entropy*. 2012; 14(11):2311-2323.
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23) **Badong Chen**, Jose. C. Principe, Maximum correntropy estimation is a smoothed MAP estimation, *IEEE Signal Processing Letters.*, vol. 19, no. 8, 2012.
24) **Badong Chen**, Jose. C. Principe, Some further results on the minimum error entropy estimation, *Entropy*, 14, 966-977, 2012.
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26) Pingping Zhu, **Badong Chen,** Jose. C. Principe, A novel extended kernel recursive least squares algorithm, *Neural Networks*, vol. 32, 349-357, 2012.
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29) **Badong Chen**, Jinchun Hu, Yu Zhu, Jose. C. Principe, Stochastic information gradient algorithm with generalized Gaussian distribution model, *Journal of Circuits, Systems, and Computers*, vol. 21, no. 1, DOI: 10.1142/S0218126612500065, 2012.
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identification of Wiener system with maximum mutual information criterion, *IET Signal Processing*, vol. 5, 589-597, 2011.

31) **Badong Chen**, Yu Zhu, Jinchun Hu, Jose. C. Principe, A Variable Step-Size SIG Algorithm for Realizing the Optimal Adaptive FIR Filter, *International Journal of Control, Automation and Systems*, vol.9, no. 6, pp. 1049-1055, 2011.
32) Yu Liu, Ming Zhang, Yu Zhu, Jin Yang, **Badong Chen**, Optimization of voice coil motor to enhance dynamic response based on an improved magnetic equivalent circuit model, *IEEE Transactions on Magnetics, v*ol. 47, 2247-2251, 2011.
33) **Badong Chen,** Yu Zhu, Jinchun Hu, Jose. C. Principe, Delta-entropy: Definition, properties and applications in system identification with quantized data, *Information Science*, vol. 181, 1384-1402, 2011.
34) Yu Zhu, **Badong Chen**, Jinchun Hu, Adaptive Filtering with Adaptive p-Power Error Criterion, *International Journal of Innovative Computing, Information and Control*, vol. 7, 1725-1738, 2011.
35) **Badong Chen,** Yu Zhu, Jinchun Hu, Mean-Square Convergence Analysis of ADALINE Training with Minimum Error Entropy Criterion, *IEEE Transactions on Neural Networks*, vol.27, no.1, 1168-1179, 2010.
36) **Badong Chen**, Yu Zhu, Jinchun Hu, Ming Zhang, A New Interpretation on the MMSE as a Robust MEE Criterion, *Signal Processing*, vol.90, no.12, 3313-3316, 2010.
37) **Badong Chen**, Jinchun Hu, Yu Zhu, Computing Maximum Entropy Densities: A Hybrid Approach, *Signal Processing: An International Journal*, vol.4, no.2, 114-122, 2010.
38) **Badong Chen**, Yu Zhu, Jinchun Hu, Ming Zhang, On optimum estimations with minimum error entropy criterion, *Journal of the Franklin Institute*, vol.347, no.2, 545-558, 2010.
39) Wei Min, Ming Zhang, Yu Zhu, **Badong Chen**, Guanghong Duan, Jinchun Hu, and Wensheng Yin, Analysis and Optimization of a New 2-D Magnet Array for Planar Motor. *IEEE Transactions on Magnetics*, vol. 46, no. 5, 2010.

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Tsinghua Science and Technology, 2008, 13(1): 71-77.

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✧ **ArXiv 论文**

51) **Badong Chen,** Lei Xing, Haiquan Zhao, Nanning Zheng, Jose C. Principe, Generalized Correntropy for Robust Adaptive Filtering. arXiv:1504.02931v1

52) **Badong Chen,** Junli Liang, Nanning Zheng, Jose C. Principe (2014). Kernel Least Mean Square with Adaptive Kernel Size. arXiv:1401.5899v3

✧ 会议论文

53) Weihua Wang, Jihong Zhao, Hua Qu, **Badong Chen**, Jose C. Principe, An Adaptive Kernel Width Update Method of Correntropy for Channel Estimation.*2015 IEEE International Conference on Digital Signal Processing* (DSP 2015) , Singapore, July 21-24, 2015.

54) **Badong Chen**, Ren Wang, Risk-Sensitive Loss in Kernel Space for Robust Adaptive Filtering. *2015 IEEE International Conference on Digital Signal Processing* (DSP 2015) , Singapore, July 21-24, 2015.

55) Xiaowei Ren, Qihang Yu, **Badong Chen**, Nanning Zheng, Pengju Ren, A Reconfigurable Parallel FPGA Accelerator for the Kernel Affine Projection Algorithm. *2015 IEEE International Conference on Digital Signal Processing* (DSP 2015) , Singapore, July 21-24, 2015.

56) Wentao Ma, Hua Qu, Jihong Zhao, **Badong Chen**, Guan Gui, Sparsity Aware Normalized Least Mean p-power Algorithms with Correntropy Induced Metric Penalty. *2015 IEEE International Conference on Digital Signal Processing* (DSP 2015) , Singapore, July 21-24, 2015.

57) Guan Gui, Li Xu, Wentao Ma, **Badong Chen**, Robust Adaptive Sparse Channel Estimation in the Presence of Impulsive Noises. *2015 IEEE International*

Conference on Digital Signal Processing (DSP 2015) , Singapore, July 21-24, 2015.

58) Hong Ji, Xiaohan Yang, **Badong Chen**, Trimmed Diffusion Least Mean Squares for Distributed Estimation. *2015 IEEE International Conference on Digital Signal Processing* (DSP 2015) , Singapore, July 21-24, 2015.

59) Lei Sun, **Badong Chen**, Shengyu Nan, Zhiping Lin, Kar-Ann Toh, A Dictionary Updating Scheme Incorporating Words Elimination into Quantized Kernel Least-Mean-Squares for Changing Environments. *2015 IEEE International Conference on Digital Signal Processing* (DSP 2015) , Singapore, July 21-24, 2015.

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61) Ren wang, **Badong Chen**, Nanning Zheng, Jose C. Principe, A Variable Step-Size Adaptive Algorithm under Maximum Correntropy Criterion. *The International Joint Conference on Neural Networks, 2015* (*IJCNN 2015*), Killarney, Ireland, July 12-17, 2015.

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63) **Badong Chen**, Ren wang, Nanning Zheng, Jose C. Principe, Exponential C-loss for Data Fitting. *The International Joint Conference on Neural Networks, 2015* (*IJCNN 2015*), Killarney, Ireland, July 12-17, 2015.

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66) Xiaowei Ren, Qihang Yu, **Badong Chen**, Nanning Zheng, Pengju Ren, A 128-way FPGA Platform for the Acceleration of KLMS Algorithm. *The 20th Asia and South Pacific Design Automation Conference (ASP-DAC) 2015*, Chiba/Tokyo, Japan, Jan. 19-22, 2015.

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70) Hong Ji, **Badong Chen**, Zejian Yuan, Nanning Zheng, Andreas Keil, Jose C. Principe, Online nonlinear Granger causality detection by quantized kernel least mean square. *The 21st International Conference on Neural Information Processing (ICONIP2014)*, Kuching, Sarawak, Malaysia, 03-06 November 2014.

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72) Xiaowei Ren, Pengju Ren, **Badong Chen**, Jose. C. Principe, Nanning Zheng, A Reconfigurable Parallel Acceleration Platform for Evaluation of Permutation Entropy. *The 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'14)*, Chicago, Illinois, USA, August 26-30,

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