

# Wei Pan

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## EDUCATION

**University of Science and Technology of China (USTC)** Sep 2008 - present

Department of Electronic Science and Technology

M.S., Biomedical Engineering.

**Harbin Institute of Technology (HIT)** Sep 2004 - Jun 2008

Department of Control Science and Engineering

B.S.E., Automatic Control. Overall GPA: 87/100, Major GPA: 91/100

## SUMMARY OF TECHNICAL QUALIFICATIONS

- **Laboratory Skills:** Bacterial cell culture, experience with *E. coli*, single-cell microscopy, cloning, site-directed mutagenesis, plasmid and chromosomal integration
- **Modeling:** State space model, nonlinear ordinary differential equations, stochastic differential equations
- **Analysis:** Linear Matrix Inequality; time-delay systems, switched systems, Lyapunov-Krasovskii functional theory; filter design method, neural network analysis, parameter and system identification, sensitivity analysis
- **Programming Languages:** C/C++, Java, Matlab, XML (SBML), Perl
- **Software:** Matlab, Simulink, LaTeX, MySQL, Eclipse, Qt, Protel, AutoCAD

## PROFESSIONAL & TEACHING EXPERIENCE

Sep 2008 – present: Master graduate student and research assistant in Prof. Huanqing Feng Group, Department of Electronic Science and Technology, USTC.

Feb 2009 – present: Captain for the international Genetically Engineered Machine competition (iGEM) USTC software team, Department of Biology, USTC.

Jul 2009: Information processes in biological systems summer school in Peking University.

Mar 2009 – Jul 2009: Teaching assistant for Biochemistry, Department of Biology, USTC.

Jan 2007 – Jul 2008: Research undergraduate student in Prof. Huijun Gao Group, Space Control and Inertial Technology Research Center, HIT.

## PROFESSIONAL ACTIVITIES

Reviewer for the following journals:

Journal of Computational Biology; IEEE Transactions on Systems, Man, and Cybernetics--Part B: Cybernetics; International Journal of Systems Science; Neurocomputing.

## RESEARCH EXPERIENCE

**University of Science and Technology of China** Feb 2009 - present

**Captain for iGEM USTC software team**

*Project:* Develop software to automatically design synthetic genetic regulatory networks with desired functions

*Advisors:* Prof. Haiyan Liu and Prof. Jiarui Wu

- Develop system identification algorithm for linear and nonlinear genetic regulatory networks.
- Construct a database of Biobricks with specific functions, DNA sequences and structures to facilitate the

design procedure.

- Sensitivity and reliability analysis of designed genetic regulatory networks.
- Develop friendly interface using Qt platform.
- Embed SBML compiler to make model input and output in a standard form.
- Extend to Eclipse plug-in in Java for cross platforms.
- Construct website for the product and provide service on line.
- Help USTC wet team to perform simulation and modeling.

## **University of Science and Technology of China**

Sep 2008 - present

### **Graduate Research Assistant**

*Project:* Research on computer-aided diagnosis system for brain tumors and cerebral hemorrhage (National Natural Science Foundation of China, Grant No. 60771007)

*Advisors:* Prof. Huanqing Feng.

- Study pattern recognition technique and relevant algorithm.
- Implement meanshift algorithm in C++.

## **Harbin Institute of Technology**

### **Undergraduate Independent Research**

Jan 2007 - Jul 2008

*Advisors:* Prof. Huijun Gao and Prof. Zidong Wang

*Project 1:* Multistability of Genetic Regulatory Networks

- Apply switched system theory and multiple Lyapunov function to investigate multistability of genetic regulatory networks [1].
- Genetic Regulatory Networks are modeled as nonlinear differential equations with time delay. Both monostability and multistability are analyzed in a uniform framework [2].
- Multivariable regulation functions which different variables multiply together are considered in genetic regulatory networks. Apply Linear Matrix Inequality and Lyapunov-Krasovskii functional theory to investigate multistability of genetic regulatory networks [3].

*Project 2:* Robust Stability of Stochastic Genetic Regulatory Networks

- Noise is ubiquitous in gene expression and genetic regulatory networks are formulated as nonlinear stochastic differential equations with time delays. Both intrinsic and extrinsic noises are considered in this formulation to model the uncertainty and fluctuation of kinetic parameters and time delays. A novel Lyapunov - Krasovskii functional has been proposed using the stochastic analysis approach. The theorem is formulated in the form of Linear Matrix Inequality [4].

*Project 3:*  $H_\infty$  Feedback Control for Genetic Regulatory Networks

- Robust synthetic gene circuits have been designed to attenuate the noise in genetic regulatory networks with time delays using  $H_\infty$  control theory [5].

## **PUBLICATIONS**

- [1]. W. Pan\*, Z. Zhang and H. Liu, "Multistability of Genetic Regulatory Networks", *International Journal of Systems Science*. (In press)
- [2]. W. Pan, Z. Wang and H. Gao, "Monostability and Multistability of Genetic Regulatory Networks with Different Types of Regulation Functions". *Nonlinear Analysis: Real World Applications*. (Revised)
- [3]. W. Pan, Z. Wang and H. Gao, "On Multistability of Delayed Genetic Regulatory Networks with Multivariable Regulation Functions". *Journal of Mathematical Biology*. (Revised)

- [4]. W. Pan, Z. Wang and H. Gao, "Robust Stability of Genetic Regulatory Networks with Stochastic Time Delays Under Intrinsic and Extrinsic Noise". *48th IEEE Conference on Decision and Control*. (Submitted)
- [5]. W. Pan, Z. Wang and H. Gao, "Robust  $H_\infty$  Feedback Control for Uncertain Stochastic Delayed Genetic Regulatory Networks with Additive and Multiplicative Noise", *International Journal of Robust and Nonlinear Control*. (Submitted)

\* - Corresponding author

#### **HONORS & AWARDS**

- *Eligible for the Graduate Program in USTC, free of admission test* 2008
- *Excellent Basketball Referee* 2006
- *Excellent Undergraduate Student* 2005
- *Numerous scholarships* 2005-2008