

# HYEYGJEON CHANG

Department of Mechanical Engineering  
Boston University

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Room EMB 129  
15 Saint Mary's Street  
Brookline, MA 02446

Phone: (617) 358-0844  
E-mail: [hjchang@bu.edu](mailto:hjchang@bu.edu)  
[hj.chang05@imperial.ac.uk](mailto:hj.chang05@imperial.ac.uk)

## PERSONAL INFORMATION

Place of Birth: South Korea (ROK)  
Citizenship: South Korea (ROK)

## RESEARCH INTERESTS

Nonlinear systems analysis, Nonlinear control design, Mathematical biology

## EDUCATION

**Imperial College London, U.K.**

Ph.D. in Electrical and Electronic Engineering, March 2009

*Thesis:* "Control of Infection Dynamics, with Application to the HIV disease"

Supervisor: Professor Alessandro Astolfi

**Seoul National University, South Korea**

M.S. in Electrical Engineering and Computer Science, February 2004

*Thesis:* "Guaranteed excitement of immune response for HIV infection model via gradual reduction of drug dose"

**Seoul National University, South Korea**

B.S. in Electrical Engineering, February 1998

## PROFESSIONAL EXPERIENCE

**Department of Mechanical Engineering, Boston University, MA**

Postdoctoral Researcher, October 2010 - Present

**Department of Electrical and Electronic Engineering, Imperial College London, U.K.**

Research Associate, August 2009 - October 2010

**Department of Electrical and Electronic Engineering, Imperial College London, U.K.**

Research Assistant, May 2009 - July 2010

**Convergence Laboratory, Korea Telecom, South Korea**

Researcher, August 2004 – September 2009

**Automation and Systems Research Institute (ASRI), Seoul National University, South Korea**

Assistant Researcher, February 2004 – February 2005

**EO Technics, South Korea**

Assistant Manager of Hardware Design Team, February 1998 – November 2002

## **AWARDS**

**Best Application Paper Award**, IEEE Transactions on Automation Science and Engineering, for the paper “Activation of Immune Response in Disease Dynamics via Controlled Drug Scheduling” (awarded at 6<sup>th</sup> IEEE CASE, August 2010)

## **COMPUTING SKILLS**

Programming Languages : C, C++, MATLAB, Latex

## **THESIS**

“Guaranteed Excitement of Immune Response for HIV Infection Model via Gradual Reduction of Drug Dose”  
H. Chang, M.S. Thesis, Seoul National University, 2004

“Control of Infection Dynamics, with Applications to the HIV disease”  
H. Chang, Ph.D. Thesis, Imperial College London, 2009

## **JOURNAL PAPERS (SCI)**

**H. Chang**, A. Astolfi and H. Shim, “A Control Theoretic Approach to Malaria Immunotherapy with State Jumps”, Automatica, Special Issues on Systems Biology, 2011 (in print).

**H. Chang** and A. Astolfi, “Enhancement of the Immune System in HIV Dynamics by Output Feedback”, Automatica, vol. 45, pages 1765-1770, 2009.

H. Shim, N.H. Jo, **H. Chang** and J.H. Seo, “A System Theoretic Study on a Treatment of AIDS Patient by Achieving Long-term Non-progressor”, Automatica, vol. 45, pages 611-622, 2009.

**H. Chang** and A. Astolfi, “Activation of Immune Response in Disease Dynamics via Controlled Drug Scheduling”, IEEE Trans. Automation Science and Engineering, vol. 6, pages 248-255, 2009.

**H. Chang** and A. Astolfi, “Control of HIV Infection Dynamics”, IEEE Control Systems Magazine, vol. 28, pages 28-39, 2008.

## **CONFERENCE PAPERS (Peer-reviewed)**

**H. Chang**, G. Richard, A.A. Julius, C. Belta, and S. Amar, “An Application of Monotone Functions Decomposition for Reconstruction of Gene Regulatory Network”, 33<sup>rd</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2011 (submitted).

G. Richard, **H. Chang**, I. Cizelj, C. Belta, A.A. Julius, and S. Amar, “Integration of Large-scale Metabolic, Signaling, and Gene Regulatory Networks with Application to Infection Responses”, 50<sup>th</sup> IEEE Conference on Decision and Control, and European Control Conference, 2011 (submitted).

**H. Chang** and A. Astolfi, “Gaussian Based Classification with Application to the Iris Data set”, 18<sup>th</sup> IFAC World Congress, 2011 (to be presented).

**H. Chang**, A. Astolfi, and H. Shim, “A Control Theoretic Approach to Venom Immunotherapy with State Jumps”, In Proc. of 32<sup>nd</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pages 742-745, 2010.

**H. Chang**, A. Astolfi, and H. Shim, “Immunotherapy for HIV and Malaria: A Control Theoretic Approach with State Jumps”, In Proc. of American Control Conference, pages 474-479, 2010.

**H. Chang**, A. Astolfi, and H. Shim, “Control of Infection Dynamics with Application to HIV/AIDS Model”, In Proc. of 48<sup>th</sup> IEEE Conference on Decision and Control, pages 3533-3538, 2009.

**H. Chang** and A. Astolfi, “Enhancement of the Immune Response to Chronic Myeloid Leukaemia via Controlled Treatment Scheduling”, In Proc. of 31<sup>st</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pages 3889-3892, 2009.

**H. Chang**, A. Astolfi, and H. Shim, “HIV Treatment: With or Without Explicit Modeling of the Immune System”, In Proc. of European Control Conference, pages 2470-2475, 2009.

**H. Chang** and A. Astolfi, “Estimation of Immune States in HIV Dynamics”, In Proc. of 47<sup>th</sup> IEEE Conference on Decision and Control, pages 1759-1764, 2008.

**H. Chang** and A. Astolfi, “Control of the Transition to Long-Term Nonprogressor in Tristable HIV Dynamics”, In Proc. of 30<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pages 4940-4944, 2008.

**H. Chang** and A. Astolfi, “Control of HIV Infection Dynamics for the Enhancement of the Immune System”, In Proc. of 17<sup>th</sup> IFAC World Congress 2008.

**H. Chang** and A. Astolfi, “Immune Response’s Enhancement via Controlled Drug Scheduling”, In Proc. of 46<sup>th</sup> IEEE Conference on Decision and Control, pages 3919-3924, 2007.

**H. Chang** and A. Astolfi, “Leading to Long-Term Nonprogressor via Gradual Reduction of Drug Dose with Immune Dynamics Strongly Dependant on Target Cells”, In Proc. of 29<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pages 1094-1097, 2007.

**H. Chang** and A. Astolfi, “Control of the HIV Infection Dynamics with a Reduced Second Order Model”, In Proc. of American Control Conference, pages 4083-4088, 2007.

**H. Chang**, N.H. Jo and H. Shim, “An Application of Gradual Reduction of Drug Dose to HIV Infection Model in Consideration of Drug Resistance and Drug Dose”, In Proc. of SICE-ICASE International Joint Conference, pages 5236-5241, 2006.

H. Shim, **H. Chang** and J.H. Seo, “Non-Vanishing Basin of Attraction with Respect to a Parametric Variation and center Manifold”, In Proc. of 43<sup>rd</sup> IEEE Conference on Decision and Control, pages 2984-2989, 2004.

**H. Chang**, H. Shim and J.H. Seo, “Control of Immune Response of HIV Infection Model by Gradual Reduction of Drug Dose”, In Proc. of 43<sup>rd</sup> IEEE Conference on Decision and Control, pages 1048-1054, 2004.

#### **KOREAN JOURNAL (Peer-reviewed)**

**H. Chang**, N.H. Jo and H. Shim, “Gradual Reduction of Drug Dosage on an HIV Infection Model with Helper-independent CTL”, Journal of Control, Automation and System Engineering, vol. 10, no. 12, 2004.

## **PATENT**

“System of measuring position of rotor of galvanometer”, Korea Patent No. 10-0467745.

“Method for rapidly converting analog signal to digital signal with less noise and apparatus thereof”, Korea Patent No. 10-0328966.

“Apparatus and method for controlling galvanometer scanner device”, Korea Patent No. 10-0392466.

“Method and apparatus for calibrating the marking position with chip-scale marker”, Korea Patent No 10-0445974.

## **PROFESSIONAL ACTIVITIES**

### **Journal paper reviewer:**

- IEEE Transactions on Automation Science and Engineering, International Journal of Robust and Nonlinear Control, Journal of the Franklin Institute, European Journal of Control, Bulletin of Mathematical Biology, Biomedical Signal Processing and Control

### **Conference paper reviewer:**

- IEEE Conference on Decision and Control, Annual International Conference of the IEEE Engineering in Medicine and Biology Society, American Control Conference, IFAC World Congress, Mediterranean Conference on Control and Automation

## **ACADEMIC REFERENCES**

### **Professor Alessandro Astolfi**

Department of Electrical and Electronic Engineering, Imperial College London

Email : [a.astolfi@imperial.ac.uk](mailto:a.astolfi@imperial.ac.uk)

Phone : +44-(0)20-7594-6289

### **Professor Imad Jaimoukha**

Department of Electrical and Electronic Engineering, Imperial College London

Email : [i.jaimouka@imperial.ac.uk](mailto:i.jaimouka@imperial.ac.uk)

Phone : +44-(0)20-7594-6279

### **Professor Hyungbo Shim**

School of Electrical Engineering and Computer Science, Seoul National University

Email : [hshim@snu.ac.kr](mailto:hshim@snu.ac.kr)

Phone : +82-2-880-1745