Changsun Ahn

+82-51-510-2979   School of Mechanical Engineering
+82-10-9113-5188   Pusan National University
sunahn@pusan.ac.kr   2, Busandaehak-ro 63beon-gil, Geumjeong-gu, Busan
http://vdec.pusan.ac.kr   609-735, Korea

BIOGRAPHY

Changsun Ahn is an Assistant Professor in School of Mechanical Engineering at Pusan National University. He received his Ph.D.(2011) in Mechanical Engineering from the University of Michigan, USA, M.S.(2005) and B.S.(1999) in Mechanical Engineering from Seoul National University, South Korea. He worked at Korea Institute of Machinery and Materials from 2012 to 2013 and was in charge of design control systems for magnetic levitation applications. He worked for Hyundai Motors from 2005 to 2007 and developed integrated chassis control systems to improve vehicle safety and performance. During his doctoral program, he studied on state estimation for automotive applications and the charging control of plug-in electric vehicles on the Smart Grid. His research interests are the modeling and control of automotive systems and energy systems.

EDUCATION

THE UNIVERSITY OF MICHIGAN, Ann Arbor, MI, USA   Sep. 2007 ~ Apr. 2011
Ph.D., Mechanical Engineering
- Dissertation: Robust Estimation of Road Friction Coefficient for Vehicle Active Safety Systems
- Advisor: Prof. Huei Peng (hpeng@umich.edu)
- Committee: Prof. Huei Peng(Michigan-ME), Prof. Jeffrey L. Stein(Michigan-ME), Prof. Timothy Gordon(Michigan-ME), Prof. Ryan Eustice(Michigan-NAME)

SEOUL NATIONAL UNIVERSITY, Seoul, Republic of Korea
M.S., School of Mechanical and Aerospace Engineering   Mar. 2003 ~ Feb. 2005
- Thesis: Tool Path Generation Algorithm for a Parallel Mechanism Micro Positioning Platform
- Advisor: Prof. Jongwon Kim (jongkim@snu.ac.kr)

B.S., School of Mechanical and Aerospace Engineering   Mar. 1995 ~ Feb. 1999
- Thesis: Modeling of excavator hydraulic circuit and attachment, controller design for horizontal automation
- Advisor: Prof. Kyoil Lee (lki@snu.ac.kr)

PROFESSIONAL EXPERIENCE

PUSAN NATIONAL UNIVERSITY, Pusan, South Korea   Sep. 2013 ~ Current
Assistant Professor, School of Mechanical Engineering

KOREA INSTITUTE OF MACHINERY AND MATERIALS, Korea   Dec. 2012 ~ Oct. 2013
Senior Researcher, Department of Magnetic Levitation and Linear Drive
- **Development of Magnetic Levitation Tray for OLED Manufacturing**
  - Control System Design
  - Development of Control Algorithm
- **Development of Super-speed Maglev Train**
  - Levitation Control Algorithm

THE UNIVERSITY OF MICHIGAN, Ann Arbor, MI, USA   Sep. 2007 ~ Dec. 2012
- *Postdoc Fellow, Department of Mechanical Engineering* (Jan. 2011 ~ Dec. 2012)
  Control system implement for HEV Dynamometer Lab. (May 2012 ~ Dec. 2012)
  - Set-up HIL system (motor-in-the loop, engine in the loop)
  - Implement HEV Control Algorithm in the system.
  - Develop Vehicle Model in Matlab/Simulink Environment
  Control of vehicle supported microgrid (Jan. 2011 ~ Dec. 2012)
  - Modeling of electrified vehicle and renewable power sources

- Modeling of vehicle supported Smart Grid/microgrid
- Power and voltage control of distributed power sources (plug-in electric vehicles) in microgrid
- **Research Assistant, Department of Mechanical Engineering**
  Control of plug-in electric vehicles connected on Smart Grid (Sep. 2009 ~Dec. 2010)
  - Modeling of renewable power sources and PEV charging patterns
  - Decentralized PEV charging control algorithm minimizing generation cost and maintaining grid power qualities under stochastic renewable energy sources
  Robust Estimation of Road Friction Coefficient (Sep. 2007 ~Dec. 2010)
  - Modeling ground vehicle and pneumatic tires
  - Develop a design synthesis of robust observer; design a tire-road friction coefficient estimator
  - Experimental validation of developed algorithm through winter vehicle tests

HYUNDAI MOTOR COMPANY, Republic of Korea   Feb. 2005 ~ Aug. 2007
Research Engineer, Advanced Technology Working Group, Platform Development Team 2
- **Development of Integrated Chassis Control System** (Dec. 2005 ~ Aug. 2007)
  - Vehicle Dynamic Modeling and Optimal Control for Integrated Chassis Control System
  - Test and Measurement of Vehicle movement
  - Matlab/dSpace based Rapid Control Prototyping
- **Development of ESP(Electronic Stability Program)** (Apr. 2005 ~ Nov. 2005)
  - Modeling of Brake System
  - Design a Controller for Stabilizing Yaw Movement

<u>PUBLICATIONS</u>

JOURNAL PAPERS

1. Shengbo Eben Li, Kun Deng, Keqiang Li, **Changsun Ahn**, "Terminal sliding mode control of automated car-following system without reliance on longitudinal acceleration information", *Mechatronics*, In Press, doi:10.1016/j.mechatronics.2014.09.014
2. Shengbo Eben Li, Xiaosong Hu, Keqiang Li, **Changsun Ahn**, "Mechanism of vehicular periodic operation for optimal fuel economy in free-driving scenarios", *IET Intelligent Transport Systems*, In Press, 10.1049/iet-its.2014.0002
3. Jin-Woo Park, Chang-Hyun Kim, Doh Young Park, and **Changsun Ahn**, "Controller design with high fidelity model for a passive maglev tray system," *International Journal Of Precision Engineering And Manufacturing*, vol. 15, pp. 1521-1528, August 2014 2014. doi: 10.1007/s12541-014-0500-0
4. **Changsun Ahn**, Huei Peng, "Decentralized and real-time power dispatch control for an islanded microgrid supported by distributed power sources," *Energies*, Vol. 6, Issue 12, pp. 6439-6454, Dec. 2013. doi: 10.3390/en6126439
5. T. Ersal, **Changsun Ahn**, D. L. Peters, J. Whitefoot, A. R. Mechtenberg, I. A. Hiskens, H. Peng, A. Stefanopoulou, P. Y. Papalambros, and J. L. Stein, "Coupling between component sizing and regulation capability in microgrids," *IEEE Transactions on Smart Grid*, Vol. 4, Issue 3, pp. 1576-1585, Sep. 2013. doi: 10.1109/TSG.2013.2260363
6. **Changsun Ahn**, Huei Peng, "Decentralized voltage control to minimize distribution power loss of microgrid," *IEEE Transaction on Smart Grid*, **In Press**. 10.1109/TSG.2013.2248174
7. Chia-Ting Li, **Changsun Ahn**, Huei Peng, Jing Sun, "Synergic control of plug-in vehicle charging and wind power scheduling," *IEEE Transaction on Power Systems*, vol. 28, Issue 2, pp. 1113-1121. 10.1109/TPWRS.2012.2211900
8. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Robust estimation of road frictional coefficient," *IEEE Transaction on Control System Technology,* vol. 21, Issue 1, pp. 1-13. doi: 10.1109/TCST.2011.2170838
9. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Robust estimation of road friction coefficient using lateral and longitudinal vehicle dynamics," *Vehicle System Dynamics,* vol. 50, Issue 6, pp. 961-985, 2012. doi: 10.1080/00423114.2012.659740

10. **Changsun Ahn**, Beomjoo Kim, Minsoo Lee, "Modeling and control of an anti-lock brake system and a steering system for cooperative control on split-mu surfaces," *International Journal of Automotive* Technology, Vol. 13, No. 4, pp. 571−581, 2012. doi:10.1007/s12239-012-0055-y
11. **Changsun Ahn**, Chiao-Ting Li, Huei Peng, "Optimal decentralized charging control algorithm for electrified vehicles connected to smart grid," *Journal of Power Sources,* vol. 196, pp. 10369-10379, 2011. doi:10.1016/j.jpowsour.2011.06.093
12. **Changsun Ahn**, Taewon Seo, Jongwon Kim, Tae-wan Kim, "High-tilt parallel positioning mechanism development and cutter path simulation for laser micro-machining," *Computer-Aided Design,* vol. 39, pp. 218-228, 2007. doi:10.1016/j.cad.2006.04.013

INTERNATIONAL CONFERENCE PAPERS
1. **Changsun Ahn** and Jong-Hwa Yoon, "Estimation of Vehicle Sideslip Angle and Tire-Road Friction Coefficient Based on Magnetometer with GPS Signals," in *International Conference on Instrumentation, Control, Information Technology and System Integration*, Sapporo, Japan, 2014, pp. 213-218.
2. **Changsun Ahn**, Chang-Hyun Kim, Jin-Woo Park, Doh Young Park, "Controller Parameter Optimization for Passive Magnetic Levitation Tray Using Taguchi Method," in *International Conference on Electrical Machines and Systems*, Busan, Korea, 2013.
3. Chang-Hyun Kim, Jaewon Lim, **Changsun Ahn**, Jin-Woo Park, Doh Young Park, "Control Design of Passive Magnetic Levitation Tray," in *International Conference on Electrical Machines and Systems*, Busan, Korea, 2013.
4. Chang-Hyun Kim, **Changsun Ahn**, Jin-Woo Park, Doh Young Park, "Levitation and Guidance Control of Passive Magnetic Levitation Tray System," in *International Symposium on Robotics, Seoul*, Korea, 2013.
5. **Changsun Ahn**, Huei Peng, "Decentralized Voltage Control to Minimize distribution Losses in an Islanded Microgrid," *in ASME 2012 Dynamic Systems and Control Conference*, Ft. Lauderdale, FL, 2012
6. Tulga Ersal, **Changsun Ahn**, Ian A. Hiskens, Huei Peng, Anna Stefanopoulou, Jeffrey L. Stein, " On the Effect of DC Source Voltage on Inverter-Based Frequency and Voltage Regulation in a Military Microgrid," in *American Control Conference*, submitted, Montréal, Canada, 2012.
7. Chiao-Ting Li, **Changsun Ahn**, Huei Peng, Jing Sun, "Integration of plug-in electric vehicle charging and wind energy scheduling on electricity grid," *in IEEE PES Conference on Innovative Smart Grid Technologies, Washington, DC, USA, 2012*
8. Chiao-Ting Li, **Changsun Ahn**, Huei Peng, Jing Sun, "Decentralized charging of plug-in electric vehicles," *in ASME 2011 Dynamic Systems and Control Conference*, Arlington, VA, 2011
9. Tulga Ersal, **Changsun Ahn**, I. A. Hiskens, H. Peng, and J. L. Stein, "Impact of controlled plug-in EVs on microgrids: A military microgrid example," in *2011 IEEE Power & Energy Society General Meeting*, Detroit, MI USA, 2011
10. **Changsun Ahn**, Chiao-Ting Li, Huei Peng, "Decentralized charging algorithm for electrified vehicles connected to smart grid," in *2011 American Control Conference*, San Francisco, CA, 2011.
11. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Robust estimation of road friction coefficient," in *2011 American Control Conference*, San Francisco, CA, 2011.
12. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Robust nonlinear observer to estimate road friction coefficient and tire slip angle," in 10th International Symposium on Advanced Vehicle Control, Loughborough, UK, 2010. ***Best Paper***
13. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Estimation of road friction for enhanced active safety systems: Dynamic approach," in *ACC2009*, 2009, pp. 1110-1115.
14. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Estimation of road friction for enhanced active safety systems: Algebraic approach," in *ACC2009*, 2009, pp. 1104-1109.
15. Ji Yoel Joeng, **Changsun Ahn**, Minsu Lee, Sangho Lee, Sangwon Kim, Youngin Hyun, Sangdo Kwak, Young Ho oh, Unkoo Lee, "Improvement of vehicle dynamic performance by integration of braking and steering control," in *JSAE Annual Congress*, 2007, pp. 1-4.
16. Ji Yoel Joeng, Sangho Lee, **Changsun Ahn**, Young Ho Oh, Unkoo Lee, Kihong Park, Seung-Jin Heo, Taehun Hwang, "Improvement of vehicle stability by the integrated chassis control system

(ESC and CDC)", in *JSAE*, May, 2006, pp 9-12

17. D.S. Kang, T.W. Seo, J. Kim, X-J Liu, **C.S. Ahn** and Y.J. Kang, "A Parallel Mechanism Micro-Positioning Platform with a 100-degree Tilting Capability," in *International Conference on Precision Engineering and Micro/Nano Technology in Asia*, Nov. 12-14, 2005, Shenzhen, China.

DOMESTIC CONFERENCE PAPERS

1. 박세호, **안창선**, "에너지 기반 이산화 방법을 이용한 하이브리드 자동차의 효율 해석," in *KSAE 2014 Annual Conference*, 2014.
2. **Changsun Ahn**, "전기자동차를 기반으로 하는 초소형 전력망에서 구성품의 크기와 제어성능의 최적화," presented at the 2014 제29회 ICROS학술대회, 창원, 2014.
3. **Changsun Ahn**, "지능형전력망에서 플러그인 전기자동차의 충전제어," presented at the *대한기계학회 동역학 및 제어부문 2014년도 춘계학술대회*, 대전, 2014.
4. **안창선**,박진우, 한종부, 김창현, "고정도 프레임 모델을 이용한 무전원 자기부상 이송자용 제어기 설계," in *한국정밀공학회 2013년도 추계학술대회*, 부산, 2013.
5. 박진우, 김창현, **안창선**, 한형석, 양석조, "초고속 자기부상열차 축소 차량 개발 (Development of Small Scale Vehicle of Super-speed Maglev Train)," in *ICROS* 2013, 창원컨벤션센터, 2013.
6. Sangho Lee, **Changsun Ahn**, Ji Yoel Joeng, Minsu Lee, Young Ho Oh, Unkoo Lee, "Improvement of vehicle dynamic performance by integrated control of ESC and MPDS," in *KSAE*, 2007.
7. Sangho Lee, **Changsun Ahn**, Ji Yoel Joeng, Young Ho Oh, Unkoo Lee, "Development of integrated chassis control algorithm for improvement of vehicle stability," in *KSAE2006 Fall*, 2006, pp. 752-757.
8. Ji Yoel Joeng, **Changsun Ahn**, Sangho Lee, Young Ho Oh, Unkoo Lee, "Development of Integrated chassis control algorithm for improvement of vehicle stability," in *KSAE2006 Spring*, May, 2006, pp 641-646

TECHNICAL PRESENTATION

1. **Changsun Ahn**, Huei Peng, "Distributed optimal charging controller for electric vehicles connected to smart grid", Presented at *Engineering Graduate Symposium*, Ann Arbor, MI, 2010
2. **Changsun Ahn**, Huei Peng, H. Eric Tseng, "Road-tire friction coefficient estimation using tire brush model and vehicle lateral Dynamics", Presented at *Engineering Graduate Symposium*, Ann Arbor, MI, 2009

PATENT

1. **Error Supervision Method of CDC Sensor Using ESC Signal**, Korean Domestic Patent, Registration number: 100851384, Registration date: 2008.08.04
2. **Controlling method for tow angle of rear wheel in vehicle**, Korean Domestic Patent, Registration number: 100783935, Registration date: 2007.12.03
3. **A stabilizer having adjustable rigidity**, Korean Domestic Patent, Registration number: 100767511, Registration date: 2007.10.09
4. **Proposition valve for brake of vehicle**, Pending, Korean Domestic Patent, Application number: 1020060055144
5. **Brake system**, Pending, Korean Domestic Patent, Application number: 1020070098821

AWARDS AND HONORS

BEST PAPER AWARD, 10th International Symposium on Advanced Vehicle Control, UK, 2010
RESEARCH AID FUND, BK21 Program, Seoul National University   Mar. 2003 ~ Feb. 2005
FELLOWSHIP, Seoul National University   Sep. 1995 ~ Feb. 1998

ACADEMIC SERVICE

REVIEWER

Journals: IEEE Trans. on Control Systems Technology; IEEE Trans. on Smart Grid; Vehicle System Dynamics; Asian Journal of Control; International Journal of Vehicle Systems Modeling and Testing; Journal of Dynamic Systems, Measurement and Control; IEEE Vehicular Technology.

Conferences: ASME Dynamics Systems and Control Conference; IEEE American Control Conference; IFAC World Congress. IEEE Multi-conference on Systems and Control, IEEE Intelligent Vehicles Symposium

Organizing Committee

Exhibition Co-Chair in International Conference on Control, Automation and Systems 2015