Ming-Chun Huang

Research Interests

My research interests are sensing system, biodetector and biometrics, and human factors design. During my Ph.D. study, I particularly focus on rapid prototyping, system modeling, and effective feedback methods analysis for healthcare improvement.

Related Areas

Personalized healthcare, mobile sensing and computing, human-computer interaction, body sensor networks, visualization, data mining, and virtual/augmented reality

Education

University of California at Los Angeles, Los Angeles, California USA

Ph.D. Candidate, Computer Science Department, Exp Grad: 7/23/2014
Advisor: Majid Sarrafzadeh
Thesis Topic: Sensor Analystics for Healthcare Improvement

University of Southern California, Los Angeles, California USA

M.S., Electrical Engineering, 2010
Advisor: Alexander A. Sawchuk

National Tsing-Hua University, Hsinchu, Taiwan

B.S., Electrical Engineering, 2007
Advisor: Bor-Sen Chen

Research Experiences

Fellowship, UCLA 2011 - present

- Bedsore Reduction System
- Cardiopulmonary Detection
- Human Factors Design

Co-founder and Principle Engineer, Medisens Wireless Inc. (startup), CA June 2010 - present

- Leading a technical team for innovative product development in tele-medicine applications
- Responsible for system architecture, hardware and software development
- Innovated and patented a series of cutting-edge techniques in medical informatics analysis
- Related products have been clinically evaluated in several top-rank hospitals in U.S

Research Assistant, UCLA, Funded by Bill & Melinda Gates Foundation June 2011- August 2012

- Biodetector Design for Rapid Malaria Diagnosis;
- Proposal and Progress Report Preparation;

Awards and Honors

- Nominated as Outstanding Graduate Researcher at UCLA Computer Science, 2013
- Best Paper Award, IEEE Conference on Wearable and Implantable Body Sensor Networks, 2013
- NSF Doctoral Consortium Scholarship, International Conference on Pervasive Technologies Related to Assistive Environments, 2012, 2013 Best Demonstration Paper Award, IEEE Conference on Wearable and Implantable Body Sen- sor Networks, 2012
- Best Contributor Award, Bruin Innovation & Technology Magazine, 2011
- Best Demonstration Paper Award, ACM Conference on Wireless Health, 2011

Grants

- 2013 " *SCH:EXP:SleepSens: A Usability-Centric In-home Monitoring System for Sleep Disorder Detection Using e-Textile and SmartPhone*" , submitted to NSF, co-written with Wenyao Xu (SUNY Buffalo) as a co-PI
- 2012" *Smart Environment Design for in-home Patients*" , China Scholarly Council, $80,000.00/2yrs. Sennotech Inc, co-written with Wenyao Xu (SUNY Buffalo) as a co-PI
- 2011 " *A SIM-card based Biosensor for Rapid Malaria Detection*" , Grand Challenges Explorations grant from the Bill & Melinda Gates Foundation, $100,000.00/2yrs. UCLA, co-written with Peter Lillehoj (MSU) and Chih-Ming Ho (UCLA)
- 2011 " *Small: Protecting Wireless Medical Devices*" , National Science Foundation, $498,563.00/3yrs. UCLA, co-written with Majid Sarrafzadeh (UCLA) and Peter Reiher (UCLA)
- 2011 " *Smart Insole and its applications in rehabilitation and sport training*" , industrial funding, $1,500,000.00/3yrs. Medisens Wireless Inc., co-written with Majid Sarrafzadeh (UCLA) and Behrooz Yagedar (Medisens Inc.)

Journal Articles Published or Accepted

J11. Peter B. Lillehoj, Ming-Chun. Huang, Newton Truong, and Chih-Ming Ho, " *Rapid electrochemical detection on a mobile phone*" , **Lab on a Chip**, vol. 13, Pages 2950 - 2955

J10. Ming-Chun Huang, Jason J. Liu, Wenyao Xu, Nabil Alshurafa, and Majid Sarrafzadeh, " *Using Pressure Map Sequences for Recognition of On Bed Rehabilitation Exercises*" , accepted by Journal of Biomedical and Health Informatics (**J-BHI**)

J09. Nabil Alshurafa, Wenyao Xu, Jason J. Liu, Ming-Chun Huang, Bobak Mortazavi Christian K. Roberts, and Majid Sarrafzadeh, " *Designing a Robust Activity Recognition Framework for Health and Exergaming using Wearable Sensors*" , accepted by Journal of Biomedical and Health Informatics (**J-BHI**)

J08. Ming-Chun Huang, Shuya Chen, Pa-Chun Wang, Mu-Chun Su, Yen-Po Hung, and Chia-Huang Chang, and Shih-Ching Yeh, " *Automate Virtual Reality Rehabilitation Evaluation for Chronic Imbalance and Vestibular Dysfunction Patients*" , accepted by Journal of Applied Science and Engineering (**JASE**)

J07. Shih-Ching Yeh, Ming-Chun Huang, Pa-Chun Wang, Te-Yung Fang, Mu-Chun Su, Po-Yi Tsai, and Albert Rizzo, " *Machine Learning-based Assessment Tool for Imbalance and Vestibular Dysfunction with Virtual Reality Rehabilitation System*" , accepted by Computer Methods and Programs in Biomedicine (**CMPB**)

J06. Wenyao Xu, Ming-Chun Huang, Navid Amini, Lei He, and Majid Sarrafzadeh, " *eCushion: A Textile Pressure Sensor Array Design and Calibration for Sitting Posture Analysis*" , IEEE Sensors Journal (**SJ**), Volume 13, Number 10, 2013, Pages 3926 - 3924

J05. Lauren Samy, Ming-Chun Huang, Jason J. Liu, Wenayo Xu, Xiaoyi Zhang, and Majid Sarrafzadeh, " *Unobtrusive Sleep Stage Identification Using a Pressure Sensitive Bed Sheet*", accepted by IEEE Sensors Journal (**SJ**)

J04. Jason J. Liu, Ming-Chun Huang, Wenyao Xu, Nabil Alshurafa, Majid Sarrafzadeh, NitinRaut, and Behrooz Yadegar, " *Sleep Posture Analysis using using a Dense Pressure Sensitive Bedsheet* " , accepted by Pervasive and Mobile Computing Journal (**PMC**)

Journal Articles in Review

J03. Ming-Chun Huang, Sunghoon I. Lee, Xiaoyi Zhang, Wenyao Xu, and Majid Sarrafzadeh, "*High Resolution Hand-Pose Estimation System for Automatic Lecture Notes Transcription*", IEEE Sensor Journal (**SJ**)

J02. Ming-Chun Huang, Si-Huei Lee, Shih-Ching Yeh, Rai-Chi Chan, Albert Rizzo, and Wenyao Xu, "*Intelligent Frozen Shoulder Rehabilitation*", IEEE Intelligent Systems (**IS**) (minor revision)

J01. Jason J. Liu, Ming-Chun Huang, Xiaoyi Zhang, Wenyao Xu, and Majid Sarrafzadeh, "*Breath-Sens: Respiration Monitoring using an E-textile Bedsheet*", Journal of Biomedical and Health Informatics (**J-BHI**)

Conference Papers Published or Accepted

C19. Ming-Chun Huang, Wenyao Xu, Xiaoyi Zhang, Jason J. Liu, and Majid Sarrafzadeh, "*EZwake-up: a sleep environment design for sleep quality improvement*", Conference on Human Factors in Computing Systems (**CHI'14**), Toronto, Canada, May 2014

C18. Jason Liu, Wenyao Xu, Ming-Chun Huang, Nabil Alshurafa, and Majid Sarrafzadeh, "*A Dense Pressure Sensitive Bedsheet Design for Unobtrusive Sleep Posture Monitoring*", IEEE International Conference on Pervasive Computing and Communication (**PerCom'13**), San Diego, CA, USA, March 2013

C17. Ming-Chun Huang, Wenyao Xu, Jason Liu, Lei He, and Majid Sarrafzadeh, "*Inconspicuous Personal Computer Protection with Touch-Mouse*", International Conference on Human Computer Interaction (**HCI'13**), Las Vegas, Nevada, USA, July 2013

C16. Ming-Chun Huang, Shuya Chen, Pa-Chun Wang, Mu-Chun Su, Yen-Po Hung, Chia-Huang Chang, and Shih-Ching Yeh, "*Automate Virtual Reality Rehabilitation Evaluation for Chronic Imbalance and Vestibular Dysfunction Patients*", Advanced Technologies, Embedded and Multimedia for Human-centric Computing (**EMC'13**), Taipei, Taiwan, August 2013

C15. Ming-Chun Huang, Wenyao Xu, Jason Liu, Lauren Samy, Amir Vajid, and Majid Sarrafzadeh, "*Inconspicuous on-Bed Respiratory Rate Monitoring*", International Conference on Pervasive Technologies Related to Assistive Environments (**PETRA'13**), Rhodes Island, Greece, May 2013

C14. Wenyao Xu, Ming-Chun Huang, Jason J. Liu, Fengbo Ren, Xinchen Shen, Xiao Liu, and Majid Sarrafzadeh, "*mCOPD: Mobile Phone Based Lung Function Diagnosis and Exercise System for COPD*", International Conference on Pervasive Technologies Related to Assistive Environments (**PETRA'13**), Rhodes Island, Greece, May 2013

C13. Peter. B. Lillehoj, Ming-Chun Huang, and Chih-Ming Ho, "*A Handheld Cell Phone-Based Electrochemical Biodetector*", Proc. of 26th **IEEE MEMS'13**

C12. Jason J. Liu, Ming-Chun Huang, Wenyao Xu, Nabil Alshurafa, and Majid Sarrafzadeh, "*On-bed Monitoring for Range of Motion Exercises with a Pressure Sensitive Bedsheet*", IEEE International Conference on Implantable and Wearable Body Sensor Networks (**BSN'13**), Boston, MA, May 2013

C11. Nabil Alshurafa, Wenyao Xu, Jason J. Liu, Ming-Chun Huang, Bobak Mortazavi, Christian Roberts, and Majid Sarrafzadeh, "*Robust Human Intensity-Varying Activity Recognition using Stochastic Approximation in Wearable Sensors*", IEEE International Conference on Implantable and Wearable Body Sensor Networks (**BSN'13**), Boston, MA, May 2013

C10. Xiaoyi Zhang, Ming-Chun Huang, Fengbo Ren, Wenyao Xu, Nan Guan, and Wang Yi, "*Proper Running Posture Guide: Wearable Biomechanics Capture System*", 8th International Conference on Body Area Networks (**BodyNet'13**), Boston, USA, October 2013

C09. Xiaoyi Zhang, Wenyao Xu, Ming-Chun Huang, Navid Amini, and Fengbo Ren, "*See UV on Your Skin: An Ultraviolet Sensing and Visualization System*", 8th International Conference on Body Area Networks (**BodyNet'13**), Boston, USA, October 2013

C08. Ming-Chun Huang, Wenyao Xu, Yi Su, Chien-Yen Chang, Belinda Lange, and Majid Sarrafzadeh, "*Smart Glove for Upper Extremities Rehabilitative Gaming Assessment*", International Conference on Pervasive Technologies Related to Assistive Environments (**PETRA'12**), Crete Island, Greece, June 2012

C07. Wenyao Xu, Ming-Chun Huang, Navid Amini, Jason Liu, Lei He, and Majid Sarrafzadeh, "*SmartInsole: A Wearable System for Gait Analysis*", International Conference on Pervasive Technologies Related to Assistive Environments (**PETRA'12**), Crete Island, Greece, June 2012

C06. Ming-Chun Huang, Ethan Chen, Wenyao Xu, and Majid Sarrafzadeh, "*Gaming for Upper Extremities Rehabilitation*", ACM Conference on Wireless Health (**WH'11**), San Diego, CA, October 2011

C05. Wenyao Xu, Zhinan Li, Ming-Chun Huang, Navid Amini, and Majid Sarrafzadeh. "*eCushion: An eTextile Device for Sitting Posture Analysis*", IEEE Conference on Body Sensor Networks (**BSN'11**), Dallas, TX, May 2011

C04. Navid Amini, Wenyao Xu, Zhinan Li, Ming-Chun Huang, and Majid Sarrafzadeh. "*Experimental Analysis of IEEE 802.15.4 for On/Off Body Communications*", IEEE Symposium on Personal Indoor Mobile Radio Communications (**PIMRC'11**), Toronto, Canada, September 2011

Conference Papers in Review

C03. Ming-Chun Huang, Xiaoyi Zhang, and Wenyao Xu, "*FridgeNet: A Networked Nutrition Monitoring System to Promote Social Activity for Living-alone Senior Adults*", ACM Symposium on User Interface Software and Technology (**UIST'14**), Honolulu, Hawaii, October 2014

C02. Jason J. Liu, Wenyao Xu, Ming-Chun Huang, Shuang Luan, and Fengbo Ren, "*Behavioral Selective Sensing for Efficient Wearable Systems: A Case Study*", IEEE Engineering in Medicine and Biology Society (**EMBC'14**), Chicago, Illinois, August 2014

C01. Jason J. Liu, Ming-Chun Huang, Wenyao Xu, and Majid Sarrafzadeh, "*Bodyparts Localization for Pressure Ulcer Prevention*", IEEE Engineering in Medicine and Biology Society (**EMBC'14**), Chicago, Illinois, August 2014

US Patents

P05. "*Data Fusion and Mutual Calibration for a Sensor Network and a Vision System*", USSN 20/130,113,704, November 2012

P04. "*Fabric-Based Pressure Sensor Arrays and Methods for Data Analysis*", USSN 13/475,654, May 2012 (Licensed to a startup company in California)

P03. "*A Handheld Cell Phone-Based Electrochemical Biodetector*", USSN 61/746,343, November 2011

P02. "*Unobtrusive Sleep Stage Identification Using a Pressure-Sensitive Bed Sheet*", Foly Ref. 2014-348, November 2013

P01. "*Method of Evaluating On-Bed Rehabilitation Exercise Using Dense Pressure Sensor Array*", Foley Ref. 2012-258-2, December 2012

Selected Public Media Reports

R06. "*Radar Research Targets Floating Tumors*", Medicalxpress, March 19, 2012

R05. "*New Radar to Better Treat Mobile Tumors*", Dailytoreader, November 8, 2011

R04. "*UCLA Students Helping Mobility Impaired to Move the World*", the New Medial Journal, February 26, 2011

R03. "*Cultivating Innovation*", Alaska Airlines Magazine, January 2011

R02. "*UC-Supported start-ups gain foothold despite recession*", Today News, April 27, 2010

R01. "*FDA greenlights MediSens body area monitoring*", Mobihealthnews, January, 2010

Activities

- Memberships:
  Association for Computing Machinery (**ACM**)
  Institute of Electrical and Electronic Engineers (**IEEE**)
  Society for Industrial and Applied Mathematics (**SIAM**)
  IEEE Engineering in Medicine & Biology Society (**IEEE EMBS**)
- Reviewer for Journals and Conferences:
  Journal of Biomedical and Health Informatics (**J-BHI**)
  IEEE Sensors Journal (**SJ**)
  IEEE International Conference on Body Sensor Networks (**BSN**)
  IEEE International Conference on Body Area Networks (**BodyNets**)
  ACM International Conference on Wireless Health (**WH**)
  International Conference on Pervasive Technologies Related to Assistive Environments (**PETRA**)

Teaching Experiences

- CS259: *Wireless Health Research Mentor*
  Undergraduate Students Advised
  Yi Su, Grad: May 2012, Enrolled in University of Florida, Computer Science Master
  Xiaoyi Zhang, Exp Grad: May 2014, 3rd year computer Science Student
  PhD Students Advised
  Jason J. Liu, Oral Qualifying Exam passed:
  " Pressure Sensitive Bedsheet System for Sleep Posture Monitoring"
  Lauren Samy, Written Qualifying Exam passed:
  " Unobtrusive Sleep Stage Identification Using a Pressure-Sensitive Bed Sheet"
- CS152/EE116: *Digital Circuit Design Lab* (Served as an instructor of the class for 9-quarters/3yrs.)
  Have been promoted to Teaching Fellow position since Fall 2013
- CS35: *Software Construction*, Spring 2011