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## Research Topics & Related Publications

### [ROBOTICS] Robot Body Schema Learning

Imperial College London

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June 2014 – Present

- Hyung Jin Chang, Tobias Fischer, Maxime Petit, Martina Zambelli, Yiannis Demiris, **Learning Kinematic Structure Correspondences Using Multi-Order Similarities**, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, under review.
- Hyung Jin Chang, and Yiannis Demiris, **Highly Articulated Kinematic Structure Estimation combining Motion and Skeleton Information**, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, under major revision.
- Hyung Jin Chang, Tobias Fischer, Maxime Petit, Martina Zambelli, Yiannis Demiris, **Kinematic Structure Correspondences via Hypergraph Matching**, *IEEE Proc. Computer Vision and Pattern Recognition (CVPR)*, June, 2016
- Hyung Jin Chang and Yiannis Demiris, **Unsupervised Learning of Complex Articulated Kinematic Structures combining Motion and Skeleton Information**, *IEEE Proc. Computer Vision and Pattern Recognition (CVPR)*, June, 2015

### [ROBOTICS] Personalised Assistance Robot

Imperial College London

FUNDED BY THE EU FP7 PROJECT WYSIWYD UNDER GRANT 612139

June 2014 – Present

- Yixing Gao, Hyung Jin Chang, Yiannis Demiris, **Personalised Dressing Humanoid Assistance using Vision and Force Information**, *IEEE Transactions on Robotics (TRO)*, in preparation.
- Yixing Gao, Hyung Jin Chang, Yiannis Demiris, **Iterative Path Optimisation for Personalised Dressing Assistance using Vision and Force Information**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, September, 2016. **Oral**
- Yixing Gao, Hyung Jin Chang, Yiannis Demiris, **Personalised Assistive Dressing by Humanoid Robots using Multi-modal Information**, (*IEEE ICRA Workshop on Human-Robot Interfaces for Enhanced Physical Interactions*), May, 2016.
- Yixing Gao, Hyung Jin Chang, Yiannis Demiris, **User Modelling for Personalised Dressing Assistance by Humanoid Robots**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, September, 2015. **Oral**

### [COMPUTER VISION] Hand Posture and Hand Gesture Recognition

Imperial College London

FUNDED BY SAMSUNG ADVANCED INSTITUTE OF TECHNOLOGY

June 2013 – May 2014

- Danhang Tang, Hyung Jin Chang, Alykhan Tejani, and Tae-Kyun Kim, **Latent Regression Forest: Structured Estimation of 3D Hand Poses**, *IEEE Transactions on Pattern Analysis and Machine Learning (TPAMI)*, accepted for publication
- Danhang Tang, Hyung Jin Chang\*, Alykhan Tejani\*, Tae-Kyun Kim, **Latent Regression Forest: Structural Estimation of 3D Articulated Hand Posture**, *IEEE Proc. Computer Vision and Pattern Recognition (CVPR)*, June, 2014. **Oral** (\* indicates equal contribution)
- Hyung Jin Chang\*, Guillermo Garcia-Hernando\*, Danhang Tang, and Tae-Kyun Kim, **Spatio-Temporal Hough Forest for Efficient Detection-Localisation-Recognition of Fingerwriting in Egocentric Camera**, *Computer Vision and Image Understanding (CVIU)*, vol.148, pages 87-96, 2016. (\* indicates equal contribution)
- Youngkyoon Jang, Seung-Tak Noh, Hyung Jin Chang, Tae-Kyun Kim, and Woontack Woo, **3D Finger CAPE: Clicking Action and Position Estimation under Self-Occlusions in Egocentric Viewpoint**, *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, vol.21, no.4, 2015
- Youngkyoon Jang, Seung-Tak Noh, Hyung Jin Chang, Tae-Kyun Kim, Woontack Woo, **3D Finger CAPE: Clicking Action and Position Estimation under Self-Occlusions in Egocentric Viewpoint**, *IEEE Virtual Reality (VR)*, March, 2015. [full paper, accept rate=13.8%]
- Hyung Jin Chang, Guillermo Garcia-Hernando, Danhang Tang, and Tae-Kyun Kim, **Spatio-Temporal Hough Forest for Efficient Detection-Localisation-Recognition of Fingerwriting in Egocentric Camera**, *CVPR Workshop on Observing and understanding hands in action (HANDS 2015)*, June, 2015
- Danhang Tang, Hyung Jin Chang\*, Alykhan Tejani\*, Tae-Kyun Kim, **Latent Regression Forest: Structural Estimation of 3D Articulated Hand Posture**, *CVPR Workshop on Observing and understanding hands in action (HANDS 2015)*, June, 2015. (\* indicates equal contribution)
- US Patent [Granted] [US9311713 B2](#) Estimator Training Method and Pose Estimating Method using Depth Image

### [COMPUTER VISION] Object Tracking

Seoul National University & Imperial  
College London

FUNDED BY SAMSUNG TECHWIN CO., LTD.

Mar 2008 – Present

- Jongwon Choi, Hyung Jin Chang, Jiyeoup Jeong, Yiannis Demiris, Jin Young Choi, **Attention-Modulated Visual Tracker Inspired by Structuralism Cognitive Model**, *IEEE Proc. Computer Vision and Pattern Recognition (CVPR)*, June, 2016
- Kwang Yi, Hawook Jeong, Byeongho Heo, Hyung Jin Chang, Jin Young Choi, **Initialization-Insensitive Visual Tracking Through Voting with Salient Local Features**, *International Conference on Computer Vision (ICCV)*, December, 2013
- Moonsub Byeon, Hyung Jin Chang, and Jin Young Choi, **Hierarchical Feature Grouping for Multiple Object Segmentation and Tracking**, *IVCNZ*, Nov. 26-28, 2012
- Hyung Jin Chang, Myoung Soo Park, Hawook Jeong, and Jin Young Choi, **Tracking Failure Detection by Imitating Human Visual Perception**, *IEEE International Conference on Image Processing (ICIP)*, September 11-14, 2011

## [COMPUTER VISION] Human Action Recognition

Seoul National University & Imperial  
College London

FUNDED BY **SAMSUNG TECHWIN CO., LTD.**

Mar 2008 – Present

- Kyuhwa Lee\*, Dimitri Ognibene, Hyung Jin Chang\*, Tae-Kyun Kim, and Yiannis Demiris, **STARE: Spatio-Temporal Attention RElocation for Multiple Structured Activities Detection**, *IEEE Transactions on Image Processing (TIP)*, vol.24, no.12, 2015. (\* indicates corresponding author)
- Jungchan Cho, Minsik Lee, Hyung Jin Chang, and Songhwa Oh, **Robust Action Recognition using Local Motion and Group Sparsity**, *Pattern Recognition (PR)*, vol.47, pages 1813-1825, 2014
- Hawook Jeong, Hyung Jin Chang, and Jin Young Choi, **Unsupervised Motion Learning for Abnormal Behavior Detection in Visual Surveillance**, *Journal of the Institute of Electronics Engineers of Korea SC*, Vol.48, Issue 5, pages 45-51, September 2011
- Guillermo Garcia-Hernando, Hyung Jin Chang, Ismael Serrano, Oscar Deniz, Tae-Kyun Kim, **Transition Hough Forest for Trajectory-based Action Recognition**, *IEEE Winter Conference on Applications of Computer Vision (WACV)*, March, 2016
- Hyung Jin Chang, Jiyun Kim, Jungchan Cho, Songhwa Oh, Kwang Moo Yi, and Jin Young Choi, **Action Chart: A Representation for Efficient Recognition of Complex Activities**, *British Machine Vision Conference (BMVC)*, September, 2013
- Hawook Jeong, Hyung Jin Chang, and Jin Young Choi, **Modeling of Moving Object Trajectory by Spatio-temporal Learning for Abnormal Behavior Detection**, *IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS)*, Aug 30 - Sep 2, 2011
- D. Pokrajac, N. Reljin, N. Pejic, T. Vance, S. McDaniel, A. Lazarevic, H. J. Chang, J. Y. Choi, and R. Miezianko, **Detection of Suspicious Activity Using Incremental Outlier Detection Algorithms**, *SPIE Signal and Data Processing on Small Targets 2009 conference*, August, 2009

## [COMPUTER VISION] Moving Object Detection

Seoul National University & Imperial  
College London

FUNDED BY **SAMSUNG TECHWIN CO., LTD.**

Mar 2008 – Present

- JinMin Choi, Hyung Jin Chang, Yung Jun Yoo, and Jin Young Choi, **Robust Moving Object Detection against Fast Illumination Change**, *Computer Vision and Image Understanding (CVIU)*, pages 179-193, Vol.116, Issue 2, February 2012
- Hyung Jin Chang, Hawook Jeong, and Jin Young Choi, **Active Attentional Sampling for Speed-up of Background Subtraction**, *IEEE Proc. Computer Vision and Pattern Recognition (CVPR)*, June 16-21, 2012
- Kwang Moo Yi, Kimin Yun, Soo Wan Kim, Hyung Jin Chang, Hawook Jeong, and Jin Young Choi, **Detection of Moving Objects with Non-Stationary Cameras in 5.8ms: Bringing Motion Detection to your Mobile Device**, *CVPR Workshop on Mobile Vision*, June 2013. **Best paper award**
- US Patent [Granted] [US9256958B2](#) Active Attentional Sampling Method for Accelerating Background Subtraction
- KR Patent [Granted] [10-14688610000](#) Active Attentional Sampling Method for Accelerating Foreground Detection from Video, and Computer-Readable Recording Medium for the same
- KR Patent [Granted] [1014384510000](#) Method of Providing Fast Detection of Moving Objects from Non-stationary Camera Video by Dual-mode SGM, and Computer-readable Recording Medium for the same

## [COMPUTER VISION] Optical Image Stabilizer

Seoul National University

FUNDED BY **SAMSUNG ELECTRONICS CO., LTD.**

Jan 2006 – Aug 2006

- Hyung Jin Chang, Pyo Jae Kim, Dong Sung Song, and Jin Young Choi, **Optical Image Stabilizing System using Multirate Fuzzy PID Controller for Mobile Device Camera**, *IEEE Transactions on Consumer Electronics*, Vol.55, No.2, May 2009
- US Patent [Granted] [US8009971](#) Hand-Shake Correction Method and Apparatus of Camera Module for Use in Mobile Device
- EU Patent [Granted] [EP1936956](#) Hand-Shake Correction Method and Apparatus of Camera Module for Use in Mobile Device
- CN Patent [Granted] [CN101236307 B](#) Hand-Shake Correction Method and Apparatus of Camera Module for Use in Mobile Device
- US Patent [Granted] [US7979143](#) Apparatus and Method for Proportional-Integral-Derivative Control
- EU Patent [Granted] [EP1956447](#) Apparatus and Method for Proportional-Integral-Derivative Control
- CN Patent [Granted] [CN101241352 B](#) Apparatus and Method for Proportional-Integral-Derivative Control
- KR Patent [Granted] [10-0866213](#) Proportional-integrate-derivative control apparatus and method
- KR Patent [Granted] [10-0819301](#) Method and apparatus for optical image stabilizer on mobile camera module

- Hyung Jin Chang, Dong Sung Song, Pyo Jae Kim, and Jin Young Choi, **Spatio-temporal Pattern Modeling for Fault Detection and Classification in Semiconductor Manufacturing**, *IEEE Transaction on Semiconductor Manufacturing*, Vol.25, No 1, February 2012
- Tushar Sandhan, Hyung Jin Chang, and Jin Young Choi, **Abstracted Radon Profiles for Fingerprint Recognition**, *International Conference on Image Processing (ICIP)*, September 2013
- Hyung Jin Chang, Kwang Moo Yi, Shimin Yin, Soo Wan Kim, Young Min Baek, Ho Seok Ahn, and Jin Young Choi, **PIL-EYE: Integrated System for Sustainable Development of Intelligent Visual Surveillance Algorithms**, *IEEE Digital Image Computing: Techniques and Applications (DICTA)*, December 6-8, 2011. **Oral**
- Pyo Jae Kim, Hyung Jin Chang, and Jin Young Choi, **Fast Incremental Learning for One-class Support Vector Classifier using Sample Margin Information**, *19th International Conference on Pattern Recognition (ICPR)*, Tampa, Florida, Dec. 2008. **Oral**
- Pyo Jae Kim, Hyung Jin Chang, Dong Sung Song, and Jin Young Choi, **Fast Support Vector Data Description Using K-Means Clustering**, *Lecture Notes in Computer Science (LNCS)*, Vol. 4493, *Proceeding of the 4th International Symposium on Neural Networks: Advances in Neural Networks*, pp. 506-514, June 2007
- Hyung Jin Chang, Pyo Jae Kim, Jung Hwan Choi, and Jin Young Choi, **Support Vector Data Description Using Clustering Method**, *International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC 2007)*, Vol. 3, pp. 1079-1080, July 2007. **Oral**
- Ho Seok Ahn, Pyo Jae Kim, Jeong Hwan Choi, Bin Mansoor, S., Woo-Sung Kang, Seok Min Yoon, Jin Hee Na, Young Min Baek, Hyung Jin Chang, Dong Sung Song, Jin Young Choi, Hyeong-Seok Ko, **Emotional head robot with behavior decision model and face recognition**, *Control, Automation and Systems, ICCAS*, 2007
- Hyung Jin Chang, Pyo Jae Kim, Jeong Hwan Choi, and Jin Young Choi, **Support Vector Data Description using Mean Shift Clustering**, *Information and Control Symposium (ICS)*, April, 2007. **Oral**
- Pyo Jae Kim, Hyung Jin Chang, Dong Sung Song, and Jin Young Choi, **KMSVDD: Support Vector Data Description using K-means Clustering**, *Information and Control Symposium (ICS)*, April, 2007. **Best paper award**
- KR Patent [Granted] 10-0980603 Fault detection method using sequential one class classifier chain.