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RESEARCH INTERESTS	Computer vision, machine learning, statistical signal processing <ul style="list-style-type: none"> <li>• Multi-object tracking</li> <li>• Object detection</li> <li>• Image forensic</li> <li>• Deep learning</li> <li>• Generative adversarial learning</li> <li>• Dimensionality reduction</li> <li>• Online learning</li> <li>• Medical image analysis</li> <li>• Bayesian filtering</li> </ul>	
EDUCATION	<b>Gwangju Institute of Science and Technology</b> , Gwangju, Korea  Ph.D., Computer Vision, Aug, 2015 <ul style="list-style-type: none"> <li>• Thesis Topic: <i>Confidence-Based Data Association and Discriminative Appearance Learning for Robust Online Multi-Object Tracking</i></li> <li>• Advisor: Kuk-Jin Yoon, Ph.D</li> </ul> M.S., Statistical Signal Processing, Aug, 2010 <ul style="list-style-type: none"> <li>• Topic: <i>Linear and Nonlinear Filtering using Kinematic and Non-Kinematic Information in Cluttered Environment</i></li> <li>• Advisor: Vladimir Shin, Ph.D</li> </ul> <b>Chung-Buk National University</b> , Cheongju, Korea  B.S., Information and Communication engineering, Feb, 2009	
RESEARCH EXPERIENCE	<b>Assistant Professor</b> Department of Computer Engineering, Inha University <b>Assistant Professor</b> Department of Computer Science and Engineering, Incheon National University <b>Senior Researcher</b> SW·Content Research Laboratory, Electronics and Telecommunications Research Institute <b>Research Assistant</b> School of Information and Communications, Gwangju Institute of Science and Technology Supervisor: Kuk-Jin Yoon, Ph.D <b>Visiting Researcher</b>	Mar, 2020 to Present   Sep, 2017 to Feb, 2020  Dec, 2015 to Aug. 2017  Mar, 2009 to Aug, 2015  Jan, 2012 to Feb, 2012

Computer Vision and Learning Lab., Imperial College London

Supervisors: Tae-Kyun Kim, Ph.D

**Research Internship**

June, 2008 to Sep, 2008

Continental Automotive Electronics LLC

**RESEARCH  
PROJECTS**

1. 4단계 두뇌한국(BK)21 사업,  
한국연구재단, Sep, 2020. to Aug, 2027.
2. 다중 모델을 결합한 사물 추적 기술 개발,  
한국전자통신연구원, May, 2020. to Nov, 2020.
3. 인공지능융합연구센터 지원사업,  
정보통신기획평가원, Apr, 2020. to Dec, 2022.
4. 시각장애인 및 저시력자를 위한 영상기반 주변 안내 기술,  
과학기술정보통신부, Apr, 2018. to Feb, 2021..
5. 자율 주행을 위한 딥러닝 기반 실시간 다중 객체 인식 기술개발 ,  
현대엔지비, Aug, 2019. to Feb, 2020.
6. 보간을 통한 끊김 없는 사물 추적 기술 연구  
한국전자통신연구원, May, 2019. to Nov, 2019.
7. 객체 중복에 강인한 사물 추적기 개발  
한국전자통신연구원, Apr, 2018. to Nov, 2018.
8. Development of High Performance Visual BigData Discovery Platform for Large-Scale Realtime Data Analysis,  
Ministry of Science, ICT and Future Planning, Dec, 2015. to Aug, 2017.
9. Novel Computer Vision and Machine Learning Technology with the Ability to Predict and Forecast,  
Ministry of Science, ICT and Future Planning, Apr, 2014. to Feb, 2015.
10. Automated Polyp Detection in Endoscope,  
Samsung Electronics, Mar, 2013. to Dec, 2013.
11. Medical Image Processing in Endoscope: Polyp Detection,  
Samsung Electronics, Apr, 2012. to Dec, 2012.
12. A Study on the Multiple Moving Object Tracking and Prediction Algorithm using Short-range FMCW Radar mounted on Autonomous Ground Vehicle,  
Agency for Defence Development, July, 2009. to Dec, 2010.
13. Development of Classifier for Road Surface Condition Using Radiometer,  
Korea Express Corp., Jan, 2009. to June, 2010.

**PATENTS**

**Domestic**

1. Seung-Hwan Bae, 특징맵에 대한 영역 분할과 병합을 통해 기계학습 기반의 객체 식별을 수행하는 전자 장치 및 그 동작 방법, KR 등록번호 제10-2026139호, September, 2019.
2. Seung-Hwan Bae, 다중 객체 추적을 위한 트랙렛의 특징 벡터 할당이 가능한 전자 장치 및 그 동작 방법, KR 등록번호 제10-1991307호, June, 2019.
3. 배승환, 조영준, 김성현, 김태경, 정지운, 윤국진, 용종 김출 장치 및 그 동작방법, KR, 출원 번호 10-2013-0130334, Oct, 2013.

## International

1. Sung-Hyun Kim, Kuk-Jin Yoon, Seung-Hwan Bae, Yeong-Jun Cho, Tae-Kyung Kim, Ji-Woon Jung, "POLYP DETECTION APPARATUS AND METHOD OF OPERATING THE SAME", Approved, US, 2014.

REFEREED  
PUBLICATIONS  
(INTERNATIONAL)

1. **Seung-Hwan Bae\***, Online Multi-Object Tracking with Visual and Radar Features, *IEEE Access*, Vol. 8, pp. 90324-90339, May, 2020.
2. Jae-Yong Baek, Yong-Sang Yoo, and **Seung-Hwan Bae\***, Generative Adversarial Ensemble Learning for Face Forensics, *IEEE Access*, Vol. 8, pp. 45421-45431, March, 2020.
3. Jae-Yong Baek, Yong-Sang Yoo, and **Seung-Hwan Bae\***, Adversarial Learning with Knowledge of Image Classification for Improving GANs, *IEEE Access*, Vol. 7, No. 1, pp. 56591-56605, April, 2019.
4. **Seung-Hwan Bae**, Object Detection based on Region Decomposition and Assembly, *AAAI Conference on Artificial Intelligence (AAAI)*, January, 2019 (Accept rate 16.2%)
5. **Seung-Hwan Bae**, Survey of amplitude-aided multi-target tracking methods, *IET Radar, Sonar and Navigation (RSN)*, Vol. 13, No. 2, pp. 243-253, February, 2019.
6. Seong-Ho Lee, Myung-Yun KIM, and **Seung-Hwan Bae\***, Learning Discriminative Appearance Models for Online Multi-Object Tracking with Appearance Discriminability Measures, *IEEE Access*, Vol. 6, No. 1, pp. 67316-67328, December, 2018.
7. **Seung-Hwan Bae** Youngwan Lee, Youngjoo Jo, Yuseok Bae, and Joong-won Hwang, Rank of Experts: Detection Network Ensemble, *Computing Research Repository (CoRR)*, Dec, 2017.
8. **Seung-Hwan Bae** and Kuk-Jin Yoon, Confidence-Based Data Association and Discriminative Deep Appearance Learning for Robust Online Multi-Object Tracking, *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, Vol. 40, No. 3, pp. 595-610, March, 2018.
9. **Seung-Hwan Bae**, Jong-Youl Park, and Kuk-Jin Yoon, Joint estimation of multi-target signal-to-noise ratio and dynamic states in cluttered environment, *IET Radar, Sonar and Navigation (RSN)*, Vol. 11, No. 3, pp. 539-549, April, 2017.
10. Yeong-Jun Cho, **Seung-Hwan Bae**, and Kuk-Jin Yoon, Multi-Classier-based Automatic Polyp Detection in Endoscopic Images, *Journal of Medical and Biological Engineering (JMBE)*, Vol. 36, No. 6, pp. 871-882, November, 2016.
11. **Seung-Hwan Bae** and Kuk-Jin Yoon, Polyp Detection via Imbalanced Learning and Discriminative Feature Learning, *IEEE Transactions on Medical Imaging (TMI)*, Vol. 34, No. 11, pp., 2379-2393, November, 2015.
12. **Seung-Hwan Bae** and Kuk-Jin Yoon, Robust Online Multi-Object Tracking with Data Association and Track Management, *IEEE Transactions on Image Processing (TIP)*, Vol. 23, No. 7, p.p. 2820 - 2833, July, 2014.
13. **Seung-Hwan Bae** and Kuk-Jin Yoon, Robust Online Multi-Object Tracking based on Tracklet Confidence and Online Discriminative Appearance Learning, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, June, 2014.

14. Il Young Song, Ju Hong Yoon, **Seung-Hwan Bae**, Moon Gu Jeon, and Vladimir Shin, Classification of road surface status using a 94 GHz dual-channel polarimetric radiometer, *International Journal of Remote Sensing (IJRS)*, Vol. 33, No.18, p.p. 5746- 5767, Sep, 2012.
15. **Seung-Hwan Bae**, Du Yong Kim, Ju Hong Yoon, Vladimir Shin, and Kuk-Jin Yoon, Automated Multi-target Tracking with Kinematic and Non-kinematic Information, *IET Radar, Sonar and Navigation (RSN)*, Vol. 6, No.4, p.p. 272-281, April, 2012.
16. Ju Hong Yoon, Du Yong Kim, **Seung-Hwan Bae**, and Vladimir Shin, Joint Initialization and tracking of multiple moving objects using Doppler information, *IEEE Transactions on Signal Processing (TSP)*, vol. 59. No.7, p.p. 3447- 3452, July, 2011.
17. **Seung Hwan Bae**, Yong Hoon Kim, Seok Jae Lee, Ju-Hong Yoon, Vladimir Shin, Algorithm for unknown SNR estimation based on sequential monte Carlo method in cluttered environment, *International Conference on Control, Automation and Systems (ICCAS)*, Seoul, Korea, Oct, 2010.
18. **Seung Hwan Bae**, Ju Hong Yoon, Il Young Song, Yong Hoon Kim, Vladimir Shin\*, Monitoring of road surface status using a passive millimeter wave sensor, *17th ITS World Congress*, Busan, Korea, Oct, 2010.
19. **Seung Hwan Bae**, Du Yong Kim, Ju Hong Yoon, Vladimir Shin, Maximum probability data association particle filter with amplitude information, *International Journal of Systems Control*, Vol. 1, p.p.138-145, May, 2010.
20. **Seung Hwan Bae**, Tae Sun Choi, Vladimir Shin, Probabilistic data association with amplitude information filter based with unknown SNR information in cluttered environment, *Proc. Information and Communication Field Union Congress*, Oct, 2010.
21. Ju Hong Yoon, **Seung Hwan Bae**, and Vladimir Shin, Comparison of distributed receding horizon filtering for linear discrete-time systems with uncertainties, *Proc. Intern. Conf. on Computer and Automation Engineering*, Feb, 2010.
22. **Seung Hwan Bae**, Ju Hong Yoon, Vladimir Shin\*, Comparison and analysis of distributed fusion filtering algorithm, *Proc. Information and Communication Field Union Congress*, pp. 37-43, Gwangju, Korea, Nov, 2009 (Outstanding Paper Awarded).
23. Ju Hong Yoon, **Seung Hwan Bae**, and Vladimir Shin, Comparison of distributed fusion filters for linear dynamic system with uncertainty, *Proc. 2nd Intern. Conf. on Computer and Network Technology*, Oct, 2009.

REFEREED  
PUBLICATIONS  
(DOMESTIC)

1. Seong-Ho Lee, and **Seung-Hwan Bae\***, Online Multi-Object Tracking by Learning Discriminative Appearance with Fourier Transform and Partial Least Square Analysis, *Journal of The Korea Society of Computer and Information (한국컴퓨터정보학회 논문)*, Vol. 25, No. 2, pp. 49-58, February, 2020.
2. **Seung-Hwan Bae** and Kuk-Jin Yoon, 강인한 온라인 다중 객체 추적을 위한 신뢰도 기반 데이터 연관 및 딥러닝기반 외형 학습, 제30회 영상처리 및 이해에 관한 워크샵, February, 2018.
3. **Seung Hwan Bae**, Tae Sun Choi, and Vladimir Shin, Probabilistic data association with amplitude information filter based with unknown SNR information in cluttered environment, *Proc. Information and Communication Field Union Congress*, October, 2010.

4. **Seung Hwan Bae**, Ju Hong Yoon, Vladimir Shin\*, Comparison and analysis of distributed fusion filtering algorithm, Proc. Information and Communication Field Union Congress, pp. 37-43, Gwangju, Korea, November, 2009 (Outstanding Paper Awarded).

#### HONOUR AND AWARDS

- 2020 KCCV Sang-Uk Lee Prize (이상욱 논문상) Aug, 2020.
- Outstanding Paper: Un-Chul Paek scholarship in GIST Feb, 2016.
- **Silver Prize: Samsung Humantech Thesis Prize**, Feb, 2015.  
- Seung-Hwan Bae, Robust Multi-Object Tracking based on Discriminative Deep Appearance Model Learning
- Outstanding Paper: Global university project (GUP) in GIST Dec, 2014.
- **Bronze Prize: Samsung Humantech Thesis Prize**, Feb, 2014.  
- Seung-Hwan Bae, Tracklet Confidence and Online Discriminative Appearance Learning for Robust Online Multi-Object Tracking.
- Outstanding Paper: Da-San scholarship in GIST Nov, 2013.
- Outstanding Grade: Da-San scholarship in GIST Sep, 2011.
- Outstanding Paper Award Nov, 2009.  
Information and Communication Field Union Congress.
- Outstanding Grade: Jan, 2008.  
EEC Scholarship in Chung-Buk National University.
- Outstanding Grade: July, 2007.  
EEC Scholarship in Chung-Buk National University.
- Full scholarship: Chung-Buk National University: Mar, 2002 to Feb, 2009.

#### PROGRAM SKILL

- Python, C/C++ and MATLAB

#### INVITED TALKS AND PAPERS

- 2019년도 한국방송미디어공학회(KICS) 영상처리 및 컴퓨터비전의 응용 및 실제, 비디오 다중 객체 추적 이해 실습, August, 2019.
- 2019년도 한국정보통신기술협회(TTA), Multiple Object Tracking and Detection with Convolutional Neural Network, July, 2019.
- 2018년도 한국통신학회(KICS) 하계종합학술발표회, Object Tracking and Detection Based on Deep Learning, June, 2018.
- 빅데이터 기반 스마트 서비스 워크샵, 영상 빅데이터와 딥러닝을 기반한 관심 객체 인식 기술, May, 2018.
- 30th Workshop on Image Processing and Image Understanding (IPIU): Young researcher talks, Multi-Object Tracking and Detection with Convolutional Neural Network, Feb, 2018.
- 컴퓨터비전 연구자 모임: Multi-Object Tracking and Detection with Convolutional Neural Network, Nov, 2017
- 현대자동차: 딥러닝을 이용한 다중 객체 추적 외형 학습 및 ILSVRC 2017 성능향상 방법, Nov, 2017

#### ACTIVITIES

- Member of IEEE
- Reviewer of Computer Vision and Image Understanding (CVIU)
- Reviewer of IEEE Transactions on Cybernetics (IEEE-SMC)
- Reviewer of IET Radar, Sonar and Navigation (IET-RNS)
- Reviewer of IEEE Transactions on Multimedia (IEEE-MM)
- Reviewer of IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-PAMI)

TEACHING

- Fall 2020: Data structure, computer vision
- Spring 2020: Discrete mathematics, problem Solving
- Fall 2019: Computer vision
- Spring 2019: Introduction to Programming
- Fall 2018: Computer vision
- Spring 2018: Introduction to Programming
- Spring 2018: Machine learning
- Fall 2017: Creative design & engineering