

CONTACT INFORMATION	Department of Computer Engineering Inha University Address: 100 Inha-ro, Michuhol-gu, Incheon, 22212, Republic of Korea E-mail: shbae@inha.ac.kr, caegar07@gmail.com Phone: (office) +82-32-860-9430 Vision & Learnig Lab.: https://cvl.inha.ac.kr/	
RESEARCH INTERESTS	Computer vision, machine learning, statistical signal processing <ul style="list-style-type: none"> • Object tracking • Object detection • On-device AI • Transfer and continual learning • Generative model learning 	
EDUCATION	Gwangju Institute of Science and Technology , Gwangju, Korea Ph.D., Computer Vision, Aug, 2015 <ul style="list-style-type: none"> • Thesis Topic: <i>Confidence-Based Data Association and Discriminative Appearance Learning for Robust Online Multi-Object Tracking</i> • Advisor: Kuk-Jin Yoon, Ph.D M.S., Statistical Signal Processing, Aug, 2010 <ul style="list-style-type: none"> • Topic: <i>Linear and Nonlinear Filtering using Kinematic and Non-Kinematic Information in Cluttered Environment</i> • Advisor: Vladimir Shin, Ph.D Chung-Buk National University , Cheongju, Korea B.S., Information and Communication engineering, Feb, 2009	
RESEARCH EXPERIENCE	Associate Professor Department of Computer Engineering, Inha University Assistant Professor Department of Computer Engineering, Inha University Assistant Professor Department of Computer Science and Engineering, Incheon National University Senior Researcher SW-Content Research Laboratory, Electronics and Telecommunications Research Institute Research Assistant School of Information and Communications, Gwangju Institute of Science and Technology Supervisor: Kuk-Jin Yoon, Ph.D Visiting Researcher Computer Vision and Learning Lab., Imperial College London Supervisors: Tae-Kyun Kim, Ph.D	Sep, 2022 to Present Mar, 2020 to Aug, 2022 Sep, 2017 to Feb, 2020 Dec, 2015 to Aug. 2017 Mar, 2009 to Aug, 2015 Jan, 2012 to Feb, 2012

RESEARCH
PROJECTS

1. 3D 나노융합소자 연구센터,
한국연구재단, Jun, 2022. to May, 2031.
2. 인공지능융합혁신인재양성 사업,
과학기술정보통신부, Jul, 2022. to Dec, 2025.
3. 인간처럼 회상이 가능한 인공 신경망 지속학습 플랫폼,
과학기술정보통신부, Apr, 2022. to Dec, 2026.
4. 대규모 확장 가능한 On-Vision AI를 위한 E3-AI 네트워크와 협업 학습 연구,
한국연구재단, Mar, 2022. to Feb, 2027.
5. 고성능 사물 인지 지능을 위한 사물 특징 학습 원천 기술 개발,
한국연구재단, June, 2021. to May, 2022.
6. 4단계 두뇌한국(BK)21 사업,
한국연구재단, Sep, 2020. to Aug, 2027.
7. 다중 모델을 결합한 사물 추적 기술 개발,
한국전자통신연구원, May, 2020. to Nov, 2020.
8. 인공지능융합연구센터 지원사업,
정보통신기획평가원, Apr, 2020. to Dec, 2022.
9. 시각장애인 및 저시력자를 위한 영상기반 주변 안내 기술,
과학기술정보통신부, Apr, 2018. to Feb, 2021.
10. 자율 주행을 위한 딥러닝 기반 실시간 다중 객체 인식 기술개발,
현대엔지니어링, Aug, 2019. to Feb, 2020.
11. 보간을 통한 끊김 없는 사물 추적 기술 연구
한국전자통신연구원, May, 2019. to Nov, 2019.
12. 객체 중복에 강인한 사물 추적기 개발
한국전자통신연구원, Apr, 2018. to Nov, 2018.
13. 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.
14. 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.
15. Automated Polyp Detection in Endoscope,
Samsung Electronics, Mar, 2013. to Dec, 2013.
16. Medical Image Processing in Endoscope: Polyp Detection,
Samsung Electronics, Apr, 2012. to Dec, 2012.
17. 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.
18. Development of Classifier for Road Surface Condition Using Radiometer,
Korea Express Corp., Jan, 2009. to June, 2010.

PATENTS

Domestic

1. 배승환, 영상 및 레이더 특징 학습 기반 온라인 다중 객체 추적 방법 및 장치, KR 등록번호, 10-2589986, Oct, 2023.
2. 이성호, 배승환, 적대적 초해상도 다중 스케일 특징맵 학습 및 객체 검출기, KR 등록번호, 10-2589987, Oct, 2023.
3. 배승환, 보조 식별기가 추가된 기계학습을 통해 이미지의 생성을 가능하게 하는 생성적 적대 신경망 기반의 이미지 생성 처리 장치 및 방법, KR 등록번호, 10-2278215, July, 2021.
4. 배승환, 영상에서의 객체 추적을 위한 트랙렛의 특징 벡터 할당을 수행하는 전자 장치 및 그 동작 방법, KR 등록번호, 10-2278215, July, 2021.
5. 배승환, 특징맵에 대한 영역 분할과 병합을 통해 기계학습 기반의 객체 식별을 수행하는 전자 장치 및 그 동작 방법, KR 등록번호 제10-2026139호, September, 2019.
6. 배승환, 다중 객체 추적을 위한 트랙렛의 특징 벡터 할당이 가능한 전자 장치 및 그 동작 방법, KR 등록번호 제10-1991307호, June, 2019.
7. 배승환, 조영준, 김성현, 김태경, 정지운, 윤국진, 용종 검출 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)
* MEANS CA

1. Jae-Yong Baek, Yong-Sang Yoo, **Seung-Hwan Bae***, A New Multi-Source Light Detection Benchmark and Semi-Supervised Focal Light Detection, Thirty-Eighth Annual Conference on Neural Information Processing Systems (NeurIPS), December, 2024 (Accept rate: 25.3%).
2. **Seung-Hwan Bae**, Deformable Part Region Learning and Feature Aggregation Tree Representation for Object Detection, IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), Vol. 45, pp. 10817-10834, Sep, 2023.
3. Seong-Ho Lee, Dae-Hyeon Park, **Seung-Hwan Bae***, Decode-MOT: How Can We Hurdle Frames to Go Beyond Tracking-by-Detection?, IEEE Transactions on Image Processing (TIP), Vol. 32, pp. 4378-4392, Aug, 2023.
4. Seong-Ho Lee and **Seung-Hwan Bae***, AFI-GAN: Improving Feature Interpolation of Feature Pyramid Networks via Adversarial Training for Object Detection, Pattern Recognition, Vol. 138, pp. 1-14, June, 2023.
5. Yong-Sang Yoo, Seong-Ho Lee, and **Seung-Hwan Bae***, Effective Multi-Object Tracking via Global Object Models and Object Constraint Learning, Sensors, Vol. 22, No. 1, pp. 1-28, October, 2022.
6. Donghwa Kang, Seunghoon Lee, Hoon Sung Chwa, **Seung-Hwan Bae**, Chang Mook Kang, Jinkyu Lee and Hyeongboo Baek, RT-MOT: Confidence-Aware Real-Time Scheduling Framework for Multi-Object Tracking Tasks, IEEE Real-Time Systems Symposium (RTSS), December, 2022.
7. Vanchinbal Chinbat, and **Seung-Hwan Bae***, GA3N: Generative Adversarial AutoAugment Network, Pattern Recognition, Vol 127, pp. 1-11, July, 2022

8. **Seung-Hwan Bae**, Deformable Part Region Learning for Object Detection, AAAI Conference on Artificial Intelligence (AAAI), pp. 95-103, June, 2022 (Accept rate 15%)
9. **Seung-Hwan Bae**, Online Multi-Object Tracking with Visual and Radar Features, IEEE Access, Vol. 8, pp. 90324-90339, May, 2020.
10. 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.
11. 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.
12. **Seung-Hwan Bae**, Object Detection based on Region Decomposition and Assembly, AAAI Conference on Artificial Intelligence (AAAI), pp. 8094-8101, July, 2019 (Accept rate 16.2%)
13. **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.
14. 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.
15. **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.
16. **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.
17. **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.
18. 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.
19. **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.
20. **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, pp. 2820 - 2833, July, 2014.
21. **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.

22. 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, pp. 5746- 5767, Sep, 2012.
23. **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, pp. 272-281, April, 2012.
24. 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, pp. 3447- 3452, July, 2011.
25. **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.
26. **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.
27. **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, pp.138-145, May, 2010.
28. 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.
29. 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)
* MEANS CA

1. 허두환, 박대현, 김덕웅, 백재용, 박준형, **배승환***, Object Detection Performance Analysis between On-GPU and On-Board Analysis for Military Domain Images, 한국컴퓨터정보학회논문지, August, 2024.
2. 백재용, 허두환, 김덕웅, 유용상, 신혁진, 박대현, **배승환***, Bit-width Aware Generator and Intermediate Layer Knowledge Distillation using Channel-wise Attention for Generative Data-Free Quantization, 한국컴퓨터정보학회논문지, July, 2024.
3. 백재용, 박대현, 신혁진, 유용상, 김덕웅, 허두환, 배승환(LIG), 천준호, **배승환***, Research on Local and Global Infrared Image Pre-Processing Methods for Deep Learning Based Guided Weapon Target Detection 한국컴퓨터정보학회논문지, July, 2024.
4. 박대현, 이성호, **배승환***, Tracking and Scene Contextual Similarity Learning for Accelerating MOT, 제36회 영상처리 및 이해에 관한 워크샵, February, 2024 (우수 논문 동상).
5. 유용상, 백재용, **배승환***, Multi-Source Light Detection with Semi-Supervised Learning and Lightness Focal Loss, 제36회 영상처리 및 이해에 관한 워크샵, February, 2024.

6. 김덕웅, 박훈범, **배승환***, PM-ZSQ: Precision-Aware Generator and Multi-Layer Distillation for Zero-Shot Quantization, 제36회 영상처리 및 이해에 관한 워크샵, February, 2024.
7. Hun-Beom Bak, **Seung-Hwan Bae**, Knowledge Distillation based-on Internal/External Correlation Learning, 한국컴퓨터정보학회논문지 Vol. 28, No. 4, pp. 31-39, April, 2023.
8. 천세권, 유용상, **배승환***, Data-Free Knowledge Distillation via Hard Sample Generation, 제35회 영상처리 및 이해에 관한 워크샵, February, 2023.
9. 박훈범, 박대현, **배승환***, Internal, External 상관성 활용 가능한 이중 레이어간 지식 증류, 제35회 영상처리 및 이해에 관한 워크샵, February, 2023.
10. 박대현, 이성호, **배승환***, A Self-Supervised Detector Scheduler for Efficient Tracking-by-Detection Mechanism, 한국컴퓨터정보학회논문지, Vol. 27, No. 10, pp. 19-28, October, 2022.
11. 이성호, **배승환***, 객체 검출을 위한 적대적 학습 기반 Feature Pyramid Network 특징맵 보간 성능 향상 기법, 제34회 영상처리 및 이해에 관한 워크샵, February, 2022 (우수논문 동상).
12. 유용상, 이성호, 박대현, **배승환***, 효율적인 다중 객체 추적을 위한 다중 전역 모델 및 제한적 모델 업데이트 알고리즘, 2021 한국소프트웨어종합학술대회 (KSC2021), December, 2021.
13. 완친발, 박훈범, 김지범, **배승환***, 자동화된 데이터 증강을 위한 적대적 생성 신경망 네트워크, 2021 한국소프트웨어종합학술대회 (KSC2021), December, 2021.
14. Dae-Hyeon Park, Seong-Ho Lee and **Seung-Hwan Bae***, 외형 분별력 평가를 통한 온라인 다중 객체 추적에서의 외형 모델 학습, 제33회 영상처리 및 이해에 관한 워크샵, February, 2021.
15. Yong-Sang Yoo, and **Seung-Hwan Bae***, 적대적 앙상블 학습을 통한 합성 얼굴 이미지 판별, 제33회 영상처리 및 이해에 관한 워크샵, February, 2021 (우수논문 장려상).
16. 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.
17. **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.
18. **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.
19. **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

- 2024 IPIU 우수 논문상 동상 Feb, 2024.
- 2023 IPIU 우수포스터발표상 Feb, 2023.
- 2022 IPIU 학술대회 우수논문 동상 Feb, 2022.
- 2021 IPIU 학술대회 우수논문 장려상 Feb, 2021.
- 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

- 2024년도 한국방송미디어겨울학교: 영상 처리 및 이해를 위한 초/중급 딥러닝 강좌, Recent Detection Methods from Convolutional to Transformer Detectors, Feb, 2024.
- 36th Workshop on Image Processing and Image Understanding (IPIU), Tracking and Scene Contextual Similarity Learning for Accelerating MOT, Feb, 2024.
- 34th Workshop on Image Processing and Image Understanding (IPIU), 객체 검출을 위한 적대적 학습 기반 Feature Pyramid Network 특징맵 보간 성능 향상 기법, Feb, 2022.
- 인하대학교 산업융합형 차세대 인공지능 혁신인재 교육연구단 AI Summer School, Deep Convolutional Detectors , August, 2023.
- 2023 인하대학교 인공지능융합연구센터 융합혁신대학원 상반기 교수 워크샵 , 우수 연구 성과 사례, July, 2023.
- 2022년 영상신호처리연구회 겨울학교, 비전 및 학습 연구실 연구 내용 소개, February, 2022.
- 인하대학교 산업융합형 차세대 인공지능 혁신인재 교육연구단 AI Summer School, 기계학습의 이해, July, 2021.
- 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

- 편집위원, 정보과학회논문지(Journal of KIISE, JOK), 한국정보과학회
- Reviewer of Conference on Computer Vision and Pattern Recognition (CVPR)
- Reviewer of International Conference on Computer Vision (ICCV)
- Reviewer of European Conference on Computer Vision (ECCV)
- Member of IEEE
- Reviewer of IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE-TPAMI)
- Reviewer of IEEE Transactions on Image Processing (IEEE-TIP)
- Reviewer of Computer Vision and Image Understanding (CVIU)
- Reviewer of IEEE Transactions on Cybernetics (IEEE-TCB)
- Reviewer of IET Radar, Sonar and Navigation (IET-RNS)
- Reviewer of IEEE Transactions on Multimedia (IEEE-TMM)
- Reviewer of IEEE Access

TEACHING

- Fall 2024: Machine learning, Discrete structure
- Spring 2024: Machine learning, Data structure
- Fall 2023: Machine learning, Discrete structure
- Spring 2023: Machine learning, Data structure
- Fall 2022: Machine learning, Discrete Mathematics, Capstone Design in CSE
- Spring 2022: Machine learning, Data structure,
- Fall 2021: Discrete Mathematics, Capstone Design in CSE, Introduction to Machine Learning
- Spring 2021: Machine learning Data structure,
- 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