

Sinan Kalkan, Prof.

CONTACT INFORMATION

KOVAN Research Lab
Dept. of Computer Engineering,
Middle East Technical University
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PERSONAL INFORMATION

Nationality : Turkish

BRIEF OVERVIEW

Dr. Kalkan, with an h-index of 20+ and 100+ publications on the subject, is an expert on developing machine learning (mostly deep learning) solutions to real-world problems which require an automated system making decisions based on sensory data. Over the last 7 years, he has been working on several computer vision and robotics problems such as object detection, contextual modeling and lifelong learning. Dr. Kalkan's research has been supported by EU Research Council and TUBITAK (Technological Research Council of Turkey). His work has been recognized by many awards, including Science Academy, Turkey Young Scientist Award (2020), Outstanding Paper Award at IEEE Transactions on Cognitive and Developmental Systems (2019) and METU Best Thesis Award (2018, 2022). He serves an associated editor at IEEE Robotics and Automation Letters and a board member at TUBITAK.

SELECTED PAPERS

- K. Oksuz, B. C. Cam, **S. Kalkan***, E. Akbas*, "One Metric to Measure them All: Localisation Recall Precision (LRP) for Evaluating Visual Detection Tasks", *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 44(12):9446-9463, 2022. * Equal senior contribution.
- K. Oksuz, B. C. Cam, **S. Kalkan***, E. Akbas*, "Imbalance Problems in Object Detection: A Review", *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 43(10):3388-3415, 2021. * Equal senior contribution.
- K. Oksuz, B. C. Cam, E. Akbas*, **S. Kalkan***, "Rank & Sort Loss for Object Detection and Instance Segmentation", *International Conference on Computer Vision (ICCV)*, oral presentation, 2021. * Equal senior contribution.
- K. Oksuz, B. C. Cam, E. Akbas*, **S. Kalkan***, "A Ranking-based, Balanced Loss Function Unifying Classification and Localisation in Object Detection", *Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS)*, spotlight paper, 2020. * Equal senior contribution.
- I. Bozcan, **S. Kalkan**, "What is (missing or wrong) in the scene? A Hybrid Deep Boltzmann Machine For Contextualized Scene Modeling", *International Conference on Robotics and Automation (ICRA)*, Sydney, 2018.
- H. Celikkanat, G. Orhan, N. Pugeault, F. Guerin, E. Sahin, **S. Kalkan**, "Learning Context on a Humanoid Robot using Incremental Latent Dirichlet Allocation", *IEEE Transactions on Cognitive and Developmental Systems*, 8(1):42-59, 2016.
Recipient of the Outstanding Paper Award (2019).
- F. Gokce, G. Ucoluk, E. Sahin, **S. Kalkan**, "Vision-based Detection and Distance Estimation of Micro Unmanned Aerial Vehicles", *Sensors*, 15(9), 23805-23846, 2015.
- N. Krueger, P. Janssen, **S. Kalkan**, M. Lappe, A. Leonardis, J. Piater, A. J. Rodriguez-Sanchez, L. Wiskott, "Deep Hierarchies in the Primate Visual Cortex: What Can We Learn For Computer Vision?", *IEEE Transactions on Pattern Anal-*

ysis and Machine Intelligence (PAMI), 35(8):1847–1871, August 2013.

- M. Felsberg, **S. Kalkan** and N. Krüger, Continuous Dimensionality Characterization of Image Structures, *Image and Vision Computing*, 27(6), pg. 628–636, 2009.

EDUCATION

Ph.D, Institute for Computer Science, University of Göttingen, 2008

- Thesis Topic: Analysis and rectification of ambiguity in visual information.
- Advisors:
 - Prof. Florentin Wörgötter, BCCN, Göttingen, Germany
 - Assoc. Prof. Norbert Krüger, Cognitive Vision Lab, Odense, Denmark
- Area of Study: Cognitive and Computer Vision.

M.Sc., Computer Eng. Dept., Middle East Technical University (METU), 2003

- Thesis Topic: Multi-objective optimization for network design.
- Advisors:
 - Dr. Onur Tolga Şehitoğlu, METU, Ankara, Turkey
 - Assoc. Prof. Göktürk Üçoluk, METU, Ankara, Turkey
- Area of Study: Genetic Algorithms.
- Cumulative GPA: 3.64/4.00.

B.Sc., Computer Engineering Dept., Middle East Technical University, 2001

- Graduation project: online course evaluation forms.
- Cumulative GPA: 3.70/4.00.

ACADEMIC EXPERIENCE

Prof. **April 2023 to Present**
- Dept. of Computer Engineering, METU

Visiting Researcher **2019 to 2020**
- University of Cambridge, Dept. of Computer Science and Technology, Cambridge, UK
- Collaborating with Dr. Hatice Gunes on uncertainty-guided lifelong learning in social robots and facial emotion recognition.

Assoc. Prof. **April 2016 to April 2023**
- Dept. of Computer Engineering, METU

Asst. Prof. **May 2010 to April 2016**
- Dept. of Computer Engineering, METU

Postdoc **August 2009 to May 2010**
- KOVAN Research Lab, Dept. of Computer Engineering, METU
o Participated on an EU project, called ROSSI.

Research Fellow **June 2005 to June 2008**
- Bernstein Center for Computational Neuroscience
o Includes the second half of the Ph.D. time.

Ph.D. Student **Sept. 2003 to June 2005**
- University of Stirling
o Includes the first half of the Ph.D. time (the same supervisors).

Visiting Researcher **Sept. 2003 to present**
- Collaborated and visited Assoc. Prof. Norbert Krüger three times a year for a duration of 3 weeks each.
- Aalborg University Esbjerg, Denmark **2003 to 2005**

- Aalborg University Copenhagen, Denmark **2005 to 2006**
- University of Southern Denmark, Denmark **2005 to present**
- Co-supervised a master student, Shi Yan, from Aalborg University Copenhagen, leading to two conference publications and Dibyendusakhar Goswami, from University of Southern Denmark, leading to a conference publication.

Teaching Assistant **Sept. 2001 to August 2003**

- Computer Engineering Dept., METU
 - o Includes the M.Sc. work.
 - o Lectured “Programming in C” in summer school to non-computer engineering students.
 - o Assisted “Data Structures” and “Logic Design”.

Summer School **March 2002**

- International school on Neural Nets, Ettore Majorana Foundation and Centre for Scientific Culture, Erice, Sicily, Italy.
- Received full scholarship from the organizers of the school.

Summer School **August 2005**

- Cognitive Vision Summer School, University of Bonn, Bonn.

RESEARCH
PROJECTS

H2020: LegoFit - Adaptable technological solutions based on early design actions for the construction and renovation of Energy Positive Homes.

2023-2027

- Researcher.

H2020: UP2030 - Urban Planning and design ready for 2030.

2022-2025

- Researcher.

TUBITAK: Addressing Class Imbalance in Visual Recognition Problems by Measuring Class Imbalance and Using Epistemic, TUBITAK 1001 Project

2021-2023

- Coordinator.

TUBITAK: KALFA: New Methods for Assembly Scenarios with Collaborative Robots, TUBITAK 1001 Project

2021-2024

- Researcher.

TUBITAK: Uncertainty Guided Lifelong Learning in Robots, BIDEB 2219 Scholarship Project

2020

- Coordinator.

TUBITAK: Object Detection in Videos with Deep Neural Networks, 117E054

2018 - 2021

- Researcher.

TUBITAK-British Newton Fund: SISER: A Stakeholder-Oriented Intelligent System for Building Energy Retrofitting, 217M519

2018 - 2021

- Researcher.

TUBITAK: CIRAK: Compliant robot manipulator support for montage workers in factories, 117E002

2017 - 2020

- Researcher.

**TUBITAK: Multiuser Eyetracking Platform for Social Gaze, 116E570
2017 - 2020**

- Researcher.

**TUBITAK: 3D Scene Segmentation and Synthesis, 215E255
2016 - 2019**

- Researcher.

**TUBITAK: Context in Humanoid Robots, 215E133
2016 - 2018**

- Principal Investigator.

**SANTEZ: Similar Logo Retrieval in Large Databases, 0029.STZ.2013-1
2013 - 2015**

- Principal Investigator.

**TUBITAK: Development of Hierarchical Concepts in Humanoid Robots, 111E287
2012 - 2015**

- Principal Investigator.

**TUBITAK: Acquiring Accurate Visual Information from Images Using Border Ownership, 111E155
2012 - 2015**

- Principal Investigator.

**TUBITAK: TEYDEB Project on Developing a Wireless-Sensor Network with Embedded Data Fusion and Image Processing Capabilities
2013 - 2014**

- Consultant (for Gate Elektronik).

**TUBITAK: TEYDEB Project on A Portable Biometric Identification System
2012 - 2013**

- Consultant (for SoSoft Information Technologies).

**TUBITAK: 11. Math-Science Summer School, 111B019
Summer 2011**

- Principal Investigator.

European Emergence of Communication in Robots through Sensorimotor and Social Interaction Project (ROSSI), FP7-216125

August 2009 – 2011

- Senior Researcher through KOVAN Research Lab (METU).

- Leading the track in the emergence of language through interactions.

**European Driving School Project (Drivsco), IST-FET-016276-2
January 2006 – May 2008**

- Research participant through BCCN, Göttingen.

- Analyzed better extraction of image structures, resulting in 2 conference and 1 journal papers.

- I will continue collaborating in this project with Prof. Wörgötter, Prof. Krüger and the project partners from University of Granada (Spain) and University of Genoa (Italy).

**European Perception Action Complexes Project (PACO-plus), IST-FP6-IP-027657
January 2006 – May 2008**

- Research participant through BCCN, Göttingen.

- Analyzed and modeled depth prediction from edge-like structures, resulting in 3 conference and 2 journal papers.
- I will continue collaborating in this project with Prof. Wörgötter, Prof. Krüger and the project partners from University of Liege (Belgium) and KTH (Sweden).

European Early Cognitive Vision Project (Ecovision), IST-2001-32114

Sept. 2003 – 2005

- Research participant through University of Stirling, Scotland.
- Evaluated ambiguity in optic flow estimation methods, resulting in 3 conference and 1 journal papers.

PUBLICATIONS

Books, Edited Volumes

- **S. Kalkan**, O. T. Şehitoğlu, G. Üçoluk. Programming with Python for Engineers, open and interactive book at <https://pp4e-book.github.io/>, 2023.
- **S. Kalkan**, U. Saranlı, “Proceedings of the 17th International Conference on Advanced Robotics (ICAR), 27-31 July”, September, 2015, IEEE. ISBN: 978-1-4673-7509-2.
- G. Üçoluk, **S. Kalkan**. Introduction to Programming Concepts with Case Studies in Python, October 30, Springer, 2012. ISBN-10: 3709113423.

Journal Publications

- K. Oksuz, B. C. Cam, **S. Kalkan***, E. Akbas*, “One Metric to Measure them All: Localisation Recall Precision (LRP) for Evaluating Visual Detection Tasks”, IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), 44(12):9446-9463, 2022.
* Equal senior contribution.
[Science Citation Index Expanded (A list)]
- S. E. Kucukbay, A. Yazici, **S. Kalkan**, “Hand-crafted versus Learned Representations for Audio Event Detection”, Multimedia Tools and Applications, 81:30911-30930, 2022.
[Science Citation Index Expanded (A list)]
- I. G. Dino, E. Kalfaoglu, O. K. Iseri, B. Erdogan, **S. Kalkan**, A. Alatan, “Vision-based estimation of the number of occupants using video cameras”, Advanced Engineering Informatics, 53:101662, 2022.
[Science Citation Index Expanded (A list)]
- B. Cetinkaya, **S. Kalkan**, E. Akbas, “Does Depth Estimation Help Object Detection?”, Image and Vision Computing, 122(104427):1-12, 2022.
[Science Citation Index Expanded (A list)]
- J. Tjomsland, **S. Kalkan**, H. Gunes, “Mind Your Manners! A Dataset and A Continual Learning Approach for Assessing Social Appropriateness of Robot Actions”, Frontiers in Robotics and AI, Special Issue on Lifelong Learning and Long-term Human-Robot Interaction, 9:1-18,2022.
[Science Citation Index Expanded (A list)]
- J. Cheong, **S. Kalkan**, H. Gunes, “The Hitchhiker’s Guide to Bias and Fairness in Facial Affective Signal Processing”, *IEEE Signal Processing Magazine*, 38(6):39-49, 2021.
[Science Citation Index Expanded (A list)]
- H. I. Ugurlu, **S. Kalkan**, A. Saranlı, “Reinforcement Learning versus Conventional Control for Controlling a Planar Bi-rotor Platform with Tail Appendage”, *Journal of Intelligent & Robotic Systems*, 102(77), 2021.
[Science Citation Index Expanded (A list)]

- U. A. Aydin, S. Kalkan, C. Acarturk, "Speech Driven Gaze in a Face-to-Face Interaction", *Frontiers in Neurorobotics*, 15:8, 2021.
[Science Citation Index Expanded (A list)]
- K. Oksuz, B. C. Cam, **S. Kalkan***, E. Akbas*, Imbalance Problems in Object Detection: A Review, *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 43(10):3388-3415, 2021.
* Equal senior contribution.
[Science Citation Index Expanded (A list)]
- I. G. Dino, A. E. Sari, O. K. Iseri, S. Akin, E. Kalfaoglu, B. Erdogan, **S. Kalkan**, A. Alatan, "Image-based construction of building energy models using computer vision", *Automation in Construction*, 116(103231), 2020.
[Science Citation Index Expanded (A list)]
- I. Bozcan, **S. Kalkan**, COSMO: Contextualized Scene Modeling with Boltzmann Machines, *Robotics and Autonomous Systems journal*, 113:132-148, 2019.
[Science Citation Index Expanded (A list)]
- A. Abbasi, **S. Kalkan**, Y. Sahillioglu, Deep 3D semantic scene extrapolation, *The Visual Computer Journal*, 35(2):271-279, 2019.
[Science Citation Index Expanded (A list)]
- U. A. Aydin, **S. Kalkan**, C. Acarturk, MAGiC: A multimodal framework for analysing gaze in dyadic communication, *Journal of Eye Movement Research*, 11(6), 2018.
[Science Citation Index Expanded (A list)]
- M. Yaman, **S. Kalkan**, Performance Evaluation of similarity measures for dense multimodal stereo vision, *J. Electron. Imaging*, 25(3), 033013, 2016.
[Science Citation Index Expanded (A list)]
- H. Celikkanat, G. Orhan, N. Pugeault, F. Guerin, E. Sahin, **S. Kalkan**, Learning Context on a Humanoid Robot using Incremental Latent Dirichlet Allocation, *IEEE Transactions on Cognitive and Developmental Systems*, 8(1):42-59, 2016.
[Science Citation Index Expanded (A list)]
- B. Logoglu, **S. Kalkan**, A. Temizel, CoSPAIR: Colored Histograms of Spatial Concentric Surflet-Pairs for 3D Object Recognition, *Robotics and Autonomous Systems*, 75(B):558-570, 2016.
[Science Citation Index (A list)]
- F. Gokce, G. Ucoluk, E. Sahin, **S. Kalkan**, Vision-based Detection and Distance Estimation of Micro Unmanned Aerial Vehicles, *Sensors*, 15(9), 23805-23846, 2015. [Science Citation Index Expanded (A list)]
- H. Celikkanat, G. Orhan, **S. Kalkan**, A Probabilistic Concept Web in a Humanoid Robot, *IEEE Transactions on Autonomous Mental Development (TAMD)*, (7)2:92-106, 2015.
[Science Citation Index Expanded (A list)]
- I. Atil, **S. Kalkan**, Towards an Embodied Developing Vision System, *Kuenstliche Intelligenz (German Journal of Artificial Intelligence)*, Invited paper for a special issue on "Bio-inspired Vision Systems", Springer Berlin Heidelberg, 29(1):41-50, 2015.
- M. Yaman, **S. Kalkan**, An Iterative Adaptive Multi-modal Stereo-vision Method using Mutual Information, *Journal of Visual Communication and Image Representation*, 26(0):115-131, 2015.
[Science Citation Index Expanded (A list)]
- **S. Kalkan**, N. Dag, O. Yuruten, A. M. Borghi, E. Sahin, Verb Concepts from Affordances, *Interaction Studies*, 15(1):1-37, 2014.
[Social Science Citation Index (A list)]

- O. Yuruten, E. Sahin, **S. Kalkan** The Learning of Adjectives and Nouns from Affordance and Appearance Features, *Adaptive Behavior*, 21(6):437-451, 2013.
[Science Citation Index (A list)]
- N. Krueger, P. Janssen, **S. Kalkan**, M. Lappe, A. Leonardis, J. Piater, A. J. Rodriguez-Sanchez, L. Wiskott, Deep Hierarchies in the Primate Visual Cortex: What Can We Learn For Computer Vision?, *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, 35(8):1847-1871, August 2013.
[Science Citation Index (A list)]
- J. Ralli, J. Diaz, E. Ros, **S. Kalkan** and N. Krüger, Disparity Disambiguation by Fusion of Signal- and Symbolic-Level Information, *Machine Vision and Applications*, 23(1):65-77, 2012.
[Science Citation Index Expanded (A list)]
- E. Başeski, N. Pugeault, **S. Kalkan**, L. Bodenhagen, J. Piater and N. Krüger, Using Multi-Modal 3D Contours and Their Relations for Vision and Robotics, *Journal of Visual Communication and Image Representation*, 21(8):850-864, 2010.
[Science Citation Index Expanded (A list)]
- M. Felsberg, **S. Kalkan** and N. Krüger, Continuous Dimensionality Characterization of Image Structures, *Image and Vision Computing*, 27(6), pg. 628-636, 2009.
[Science Citation Index (A list)]
- D. Kraft, E. Başeski, M. Popovic, N. Krüger, N. Pugeault, D. Kragic, **S. Kalkan** and F. Wörgötter, Birth of the Object: Detection of Objectness and Extraction of Object Shape through Object Action Complexes, *International Journal of Humanoid Robotics*, 5(2), pg. 247-265, 2008.
[Science Citation Index Expanded (B list)]
- **S. Kalkan**, F. Wörgötter and N. Krüger, First-order and Second-order Statistical Analysis of 3D and 2D Structure, *Network: Computation in Neural Systems*, 18(2), pg. 129-160, 2007.
[Science Citation Index (A list)]
- **S. Kalkan**, D. Calow, F. Wörgötter, M. Lappe and N. Krueger. Local Image Structures and Optic Flow Estimation, *Network: Computation in Neural Systems*, 16(4), pg. 341-356, 2005.
[Science Citation Index (A list)]

Conference Publications

- F. Kahraman, K. Oksuz, **S. Kalkan***, E. Akbas*, “Correlation Loss: Enforcing Correlation between Classification and Localization”, Thirty-Seventh AAAI Conference on Artificial Intelligence, accepted, 2023.
* Equal senior contribution.
- J. Cheong, S. Kalkan, H. Gunes, ”Causal Structure Learning of Bias for Fair Affect Recognition”, The Fourth Workshop on Demographic Variations in Performance of Biometrics and Related Technology, IEEE/CVF Winter Conference on Applications of Computer Vision (WACV 2023) Workshops, 2023.
- O. Aslan, B. Bolat, B. Bal, T. Tumer, E. Sahin, **S. Kalkan**, “AssembleRL: Learning to Assemble Furniture from Their Point Clouds”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.
- J. Cheong, **S. Kalkan**, H. Gunes, “Counterfactual Fairness for Facial Expression Recognition”, ECCV 2022 Workshop and Challenge on People Analysis: From Face, Body and Fashion to 3D Virtual Avatars, 2022.

- I.H. Kocdemir, A.O. Akyuz, A. Koz, A. Chalmers, A. Alatan, **S. Kalkan**, “Object Detection for Autonomous Driving: High-Dynamic Range vs. Low-Dynamic Range Images”, IEEE 24th International Workshop on Multimedia Signal Processing (MMSP), 2022.
- F. Yavuz, **S. Kalkan**, “Segment Augmentation and Differentiable Ranking for Logo Retrieval”, 26th International Conference on Pattern Recognition (ICPR), 2022.
- K. Oksuz, B. C. Cam, E. Akbas*, **S. Kalkan***, “Rank & Sort Loss for Object Detection and Instance Segmentation”, International Conference on Computer Vision (ICCV), oral presentation, 2021.
Equal senior contribution.
- N. Churamani, **S. Kalkan**, H. Gunes, “Spatio-Temporal Analysis of Facial Actions using Lifecycle-Aware Capsule Networks”, IEEE International Conference on Automatic Face and Gesture Recognition (FG), 2021.
- K. Oksuz, B. C. Cam, F. Kahraman, Z. S. Baltaci, **S. Kalkan***, E. Akbas, “Mask-aware IoU for Anchor Assignment in Real-time Instance Segmentation”, British Machine Vision Conference (BMVC), 2021.
Equal senior contribution.
- A. Koz, B. Demirkilic, Y. B. Kurt, A. O. Akyuz, **S. Kalkan**, A. Alatan, A. Chalmers, “HDR Image Construction from Trifocal Multiexposure Images”, IEEE 23rd International Workshop on Multimedia Signal Processing (MMSP), 2021.
- Y. Terzioglu, O. Aslan, B. Bolat, B. Bal, T. Tumer, F. C. Kurnaz, **S. Kalkan**, E. Sahin, “APPRENTICE: Towards a Cobot Helper in Assembly Lines”, ICRA2021 Workshop on Unlocking the Potential of HRC for Industrial Applications, 2021.
- K. Oksuz, B. C. Cam, E. Akbas*, **S. Kalkan***, “A Ranking-based, Balanced Loss Function Unifying Classification and Localisation in Object Detection”, Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS), spotlight paper, 2020.
Equal senior contribution.
- F. Alamri, **S. Kalkan**, N. Pugeault, “Transformer-Encoder Detector Module: Using Context to Improve Robustness to Adversarial Attacks on Object Detection”, 25th International Conference on Pattern Recognition (ICPR), 2020.
- T. Xu, J. White, **S. Kalkan**, H. Gunes, “Investigating Bias and Fairness in Facial Expression Recognition”, ECCV2020 Workshop: ChaLearn Looking at People workshop ECCV: Fair Face Recognition and Analysis, 2020.
- E. Kalfaoglu, **S. Kalkan**, A. Alatan, “Late Temporal Modeling in 3D CNNs with BERT”, ECCV2020 2nd Workshop on Video Turing Test: Toward Human-Level Video Story Understanding, 2020.
- F. C. Kurnaz, B. Hocaoglu, M. K. Yilmaz, I. Sulo, **S. Kalkan**, “ALET (Automated Labeling of Equipment and Tools): A Dataset, a Baseline and a Use-case for Tool Detection in the Wild”, ECCV2020 Workshop on International Workshop on Assistive Computer Vision and Robotics, 2020.
- N. Churamani, **S. Kalkan**, H. Gunes, “Continual Learning for Affective Robotics: Why, What and How?”, The 29th IEEE International Conference on Robot and Human Interactive Communication (Ro-Man), 2020.
- K. Oksuz, B. C. Cam, E. Akbas*, **S. Kalkan***, Generating Positive Bounding Boxes for Balanced Training of Object Detectors, IEEE Winter Conference on Applications of Computer Vision (WACV), 2020. * Equal senior contribution.

- H. Anayurt, S. A. Ozyegin, U. Cetin, U. Aktas, **S. Kalkan**, Searching for Ambiguous Objects in Videos using Relational Referring Expressions, 30th British Machine Vision Conference (BMVC), 2019.
- F. I. Dogan, H. Celikkanat, I. Bozcan, **S. Kalkan**, Learning to Increment a Contextual Model, Continual Learning Workshop at Neural Processing Systems Conference (NIPS), 2018.
- F.I. Dogan, **S. Kalkan**, I. Leite, "Learning to Generate Unambiguous Spatial Referring Expressions for Real-World Environments", IEEE/RJS Int. Conference on Intelligent Robots and Systems (IROS), 2019.
- I. Bozcan, I. Dogan, M. Celik, **S. Kalkan**, CINet: A Learning Based Approach to Incremental Context Modeling in Robots, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Madrid, 2018.
- K. Oksuz, B. C. Cam, E. Akbas, **S. Kalkan**, Localization Recall Precision (LRP): A New Performance Metric for Object Detection, European Conference on Computer Vision (ECCV), 2018.
- I. Bozcan, **S. Kalkan**, What is (missing or wrong) in the scene? A Hybrid Deep Boltzmann Machine For Contextualized Scene Modeling, International Conference on Robotics and Automation (ICRA), Sydney, 2018.
- I. Dogan, **S. Kalkan**, A Deep Incremental Boltzmann Machine for Modeling Context in Robots, International Conference on Robotics and Automation (ICRA), Sydney, 2018.
- U. A. Aydin, **S. Kalkan**, C. Acarturk, Dynamic Gaze Analysis, International Artificial Intelligence and Data Processing Symposium, 2017 (in Turkish).
- C. Aker, **S. Kalkan**, Using Deep Networks for Drone Detection, International Workshop on Small-Drone Surveillance, Detection and Counteraction Techniques organised within AVSS, 2017.
- U. A. Aydin, S. Kalkan, C. Acarturk, A Gaze-Centered Multimodal Approach to Human-Human Social Interaction, 3rd IEEE International Conference on Cybernetics Workshop on Cognition in Mixed Realities, Exeter, UK, 2017.
- C. Aker, O. Tursun, **S. Kalkan**, Analyzing Deep Features for Trademark Retrieval, 25th Conference on Signal Processing and Applications (SIU), Turkey, 2017 (in Turkish).
- F. I. Dogan, S. Kalkan, The hierarchical nature of context, Turkiye Robotbilim Konferansi (ToRK), Istanbul Gedik University Publications, ISBN: 9786058557215, pp. 48-51, 2-3 November, 2016 (in Turkish)
- M. Celik, S. Kalkan, Contexts and concepts in robots: Too far, too close, Turkiye Robotbilim Konferansi (ToRK), Istanbul Gedik University Publications, ISBN: 9786058557215, pp. 52-55, 2-3 November, 2016 (in Turkish)
- H. Celikkanat, E. Sahin, **S. Kalkan**, Integrating Spatial Concepts into a Probabilistic Concept Web, 17th International Conference on Advanced Robotics (ICAR), IEEE, Istanbul, 2015.
- O. Oztimur, M. A. Akkus, **S. Kalkan**, F. Yarman Vural, An MRF Framework For Co-Solving Image Segmentation and Border Ownership, IEEE 23rd Conference on Signal Processing and Communication Applications, Malatya, Turkey, 2015 (in Turkish).
- W. Tuerxun, **S. Kalkan**, A Challenging Big Dataset for Benchmarking Trademark Retrieval, 14th IAPR Conference on Machine Vision and Applications, Tokyo, 2015.

- H. Celikkanat, G. Orhan, E. Sahin and **S. Kalkan**, İnsansi Robotlarda Baglamin Ogrenilmesi, *1nci Turkiye Otonom Robotlar Konferansi (TORK)*, ODTU, 6-7 Kasim 2014.
- F. Gokce, S. Olgunsoylu, G. Ucoluk, E. Sahin and **S. Kalkan**, Goruntu Isleme ile Mikro İnsansiz Hava Araclarinin Algilanmasi, *1nci Turkiye Otonom Robotlar Konferansi (TORK)*, ODTU, 6-7 Kasim 2014.
- H. Celikkanat, G. Orhan, N. Pugeault, F. Guerin, E. Sahin and **S. Kalkan**, Learning and Using Context on a Humanoid Robot Using Latent Dirichlet Allocation, *Int. Conference on Development and Learning and Epigenetic Robotics (ICDL-Epirob)*, 2014.
- H. Celikkanat, **S. Kalkan**, Using Slowness Principle for Feature Selection: Relevant Feature Analysis, *22nd IEEE Conference on Signal Processing and Applications (Special Session on Cognitive Robotics and Applications)*, Trabzon, Turkey, 2014 (in Turkish).
- F. Yousefi, E. Sivri, O. Kaya, S. Suloglu, **S. Kalkan**, Analysis of Widely-used Descriptors for Finger-vein Recognition, *Int. Conf. on Computer Vision Theory and Applications*, 2014.
- H. Celikkanat, E. Sahin, **S. Kalkan**, Recurrent Slow Feature Analysis for Developing Object Permanence in Robots, *IROS Workshop on Neuroscience and Robotics*, Tokyo, Japan, November, 2013.
- Uyanik K.F., Caliskan Y., Bozcuoglu A.K., Yuruten O., **S. Kalkan** and Sahin, E., Learning Social Affordances and Using Them for Planning, *35th Annual Conference of the Cognitive Science Society*, 2013.
- G. Orhan, S. Olgunsoylu, E. Sahin, **S. Kalkan**, Co-learning nouns and adjectives, *IEEE Joint Conference on Developmental Learning and on Epigenetic Robotics, Japan*, 2013.
- E. Sivri, **S. Kalkan**, Global Binary Patterns, *13th IAPR Conference on Machine Vision Applications*, 2013.
- M. Yaman, **S. Kalkan**, Multimodal Stereo Vision Using Mutual Information with Adaptive Windowing, *13th IAPR Conference on Machine Vision Applications*, 2013.
- E. Sivri, **S. Kalkan**, A Novel Shape Descriptor: Intersection Consistency Histograms, *IEEE 21st Conference on Signal Processing and Communication Applications*, Girne, KKTC, 2013 (in Turkish).
- M. A. Akkus, M. Aydinlilar, **S. Kalkan**, Analysis of Junctions with Underlying Range Images, *IEEE 21st Conference on Signal Processing and Communication Applications*, Girne, KKTC, 2013 (in Turkish).
- M. A. Akkus, G. Topuz, B. Ozkan, **S. Kalkan**, A Comprehensive Database for Border Ownership, *IEEE 21st Conference on Signal Processing and Communication Applications*, Girne, KKTC, 2013 (in Turkish).
- B. Ozkan, **S. Kalkan**, Extraction of Border Ownership Information by Conditional Random Field Model, *IEEE 21st Conference on Signal Processing and Communication Applications*, Girne, KKTC, 2013 (in Turkish).
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- K. F. Uyanik, O. Yuruten, **S. Kalkan**, E. Sahin, Towards Context-aware Adjective Learning, *ICRA Workshop on The Future of Human-Robot Interaction*, 2012.
- O. Yuruten, K. F. Uyanik, Y. Caliskan, A. K. Bozcuoglu, E. Sahin, **S. Kalkan**, Learning Adjectives and Nouns from Affordances on the iCub Humanoid Robot, *12th International Conference on Simulation of Adaptive Behavior (SAB)*, From Animals to Animats 12, Lecture Notes in Computer Science Volume 7426, pp 330-340, 2012.
- I. Atil, N. Dag, **S. Kalkan**, E. Sahin. Affordances and Emergence of Concepts, *10th International Conference on Epigenetic Robotics*, 2010.
- N. Krüger, N. Pugeault, E. Baseski, L.B.W. Jensen, **S. Kalkan**, D. Kraft, J.B. Jessen, F. Pilz, A. Kjaer-Nielsen, M. Popovic, T. Asfour, J. Piater, D. Kragic, F. Wörgötter, *Early Cognitive Vision as a Front-end for Cognitive Systems*, ECCV 2010 Workshop on 'Vision for Cognitive Tasks', 2010.
- N. Dag, I. Atil, **S. Kalkan**, E. Sahin, *Learning Affordances for Categorizing Objects and Their Properties*, International Conference on Pattern Recognition (ICPR), pp. 3089-3092, 2010.
- E. Başeski, L. Bodenhausen, N. Pugeault, **S. Kalkan**, J. Piater, N. Krüger. Using 3D Contours and Their Relations for Cognitive Vision and Robotics, *Proc. of the 24th International Symposium on Computer and Information Sciences (ISCIS 2009), Special Session on Cognitive Cybernetics and Brain Modeling*, 2009.
- D. Goswami, **S. Kalkan** and N. Krüger. Bayesian Classification of Image Structures, *16th Scandinavian Conference on Image Analysis - SCIA*, Oslo, Norway, 2009.
- L. B. W. Jensen, E. Başeski, **S. Kalkan**, N. Pugeault, F. Wörgötter and N. Krüger. Semantic Reasoning for Scene Interpretation, *4th Int. Cognitive Vision Workshop - ICVW*, Santorini, Greece, 2008.
- D. Kraft, E. Baseski, M. Popovic, A. Batog, A. Kjaer-Nielsen, N. Krueger, R. Petrick, C. Geib, N. Pugeault, M. Steedman, T. Asfour, R. Dillmann, **S. Kalkan**, F. Woergoetter, B. Hommel, R. Detry, J. Piater, Exploration and Planning in a Three-Level Cognitive Architecture, *International Conference on Cognitive Systems*, 2008.
- N. Pugeault, **S. Kalkan**, E. Başeski, F. Wörgötter and N. Krüger. Reconstruction uncertainty and 3D relations, *Int. Conf. on Computer Vision Theory and Applications (VISAPP)*, Portugal, January, 2008.
- **S. Kalkan**, F. Wörgötter and N. Krüger, Depth Prediction at Homogeneous Image Structures, *Int. Conf. on Computer Vision Theory and Applications (VISAPP)*, Portugal, January, 2008.
- **S. Kalkan**, S. Yan, V. Krüger, F. Wörgötter and N. Krüger, A Signal-Symbol Loop Mechanism For Enhanced Edge Extraction, *Int. Conf. on Computer Vision Theory and Applications (VISAPP)*, Portugal, January, 2008.
- F. Pilz, Y. Shi, D. Grest, N. Pugeault, **S. Kalkan** and N. Krüger, Utilizing Semantic Interpretation of Junctions for 3D-2D Pose Estimation. *In G. Bebis et al. (Eds.): ISVC 2007, Part I, LNCS 4841*, pp. 692–701, 2007. Springer-Verlag Berlin Heidelberg 2007.
- D. Aarno, J. Sommerfeld, D. Kragic, N. Pugeault, **S. Kalkan**, F. Wörgötter, D. Kraft, N. Krüger, Early Reactive Grasping with Second Order 3D Feature Relations, *ICAR 07: The IEEE International Conference on Advanced Robotics*, Jeju Island, Korea, 2007.

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- E. Başeski, N. Pugeault, **S. Kalkan**, D. Kraft, F. Wörgötter and N. Krüger. A Scene Representation Based on Multi-Modal 2D and 3D Features, *ICCV 2007 Workshop on 3D Representation for Recognition 3dRR-07*, Brasil, October, 2007.
- **S. Kalkan**, F. Wörgötter and N. Krüger, Statistical Analysis of Second-order Relations of 3D Structures, *Int. Conf. on Computer Vision Theory and Applications (VISAPP)*, Spain, March, 2007.
- **S. Kalkan**, S. Yan, F. Pilz and N. Krüger, Improving Junction Detection by Semantic Interpretation, *Int. Conf. on Computer Vision Theory and Applications (VISAPP)*, Spain, March, 2007.
- **S. Kalkan**, F. Wörgötter and N. Krüger, Statistical Analysis of Local 3D Structure in 2D Images, *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, New York, USA, June, 2006.
- **S. Kalkan**, D. Calow, M. Felsberg and F. Wörgötter, M. Lappe and N. Krüger, Optic Flow Statistics and Intrinsic Dimensionality, *Proc. Brain Inspired Cognitive Systems*, Stirling, Scotland, 2004.
(This work was presented as a poster in the Dynamic Perception Workshop (2004) and Early Cognitive Vision Workshop (2004))

Technical Reports

- F. I. Dogan, **S. Kalkan**, Hierarchical Context Modeling Using Incremental Deep Boltzmann Machines, Technical Report No: METU-CENG-TR-2017-01, Dept. of Computer Engineering, Middle East Technical University, 2017.
- I. Bozcan, S. Kalkan, Combining Different Knowledge-bases into a Single Partially-grounded Robotic Knowledge-base, Technical Report No: METU-CENG-TR-2017-02, Dept. of Computer Engineering, Middle East Technical University, 2017.
- M. Celik, S. Kalkan, An Approach to Modeling Context Using Semantic Maps, Technical Report No: METU-CENG-TR-2017-03, Dept. of Computer Engineering, Middle East Technical University, 2017.
- N. Pugeault, **S. Kalkan**, E. Başeski, F. Wörgötter and N. Krüger. Reconstruction uncertainty and 3D relations. *TR of the Robotics Group, Maersk Institute, University of Southern Denmark*, No: 2007-6, 2007.
- **S. Kalkan**, N. Pugeault and N. Krüger, Perceptual Operations and Relations between 2D or 3D Visual Entities, *TR of the Robotics Group, Maersk Institute, University of Southern Denmark*, No: 2007-3, 2007.
- **S. Kalkan**, F. Wörgötter and N. Krüger, Depth Prediction at Homogeneous Image Structures, *TR of the Robotics Group, Maersk Institute, University of Southern Denmark*, No: 2007-2, 2007.
- M. Kjaergaard, A. Bierbaum, D. Kraft, **S. Kalkan**, N. Krüger, T. Asfour, R. Dillmann, Using Tactile Sensors for Multisensorial Scene Explorations, *TR of the Robotics Group, Maersk Institute, University of Southern Denmark*, No: 2007-5, 2007.

RELATED COURSE WORK Deep Learning – Advanced Deep Learning – Fundamentals of Image Processing – Introduction to Artificial Intelligence – Distributed Artificial Intelligence – Machine Learning – Neurocomputing – Cognitive Aspects of Natural Language Processing – Computational Linguistics – Operating Systems – Logic for Computer Science – Language Processors – Formal Languages & Abstract Machines.

WORK

EXPERIENCE

Comodo Group Inc., Ankara, Turkey **2016 to present**
- Providing consulting services on using OCR and deep learning.

Arcelik Inc., Ankara, Turkey **2022 to present**
- Providing consulting services on using automating washing programs.

Novit.ai, Ankara, Turkey **2022 to present**
- Providing consulting services on using object detection.

Netcad Inc., Ankara, Turkey **2022 to present**
- Providing consulting services on using ML for mining software.

Esen System, Ankara, Turkey **May 2021 to 2022**
- Providing consulting services on vision and deep learning.

SoSoft Information Technologies, Ankara, Turkey **Jan 2012 to 2020**
- Providing consulting services on (i) a wearable-sensor based home-care system, and (ii) a finger-vein-based person identification system.

Gate Electronics, Ankara, Turkey **2013 to 2015**
- Providing consulting services on using cameras to recognize objects in wireless sensor nodes.

Global Voices, Stirling Innovation Park, Scotland **2003 to 2005**
- Worked as an external part-time translator between English and Turkish.

Automated Injection of Salmons, University of Stirling, Scotland **2004 to 2005**
- Worked as a part-time researcher for automated determination of injection site of Salmons from camera images.

Computer Engineering Dept., METU **2001 to 2003**
- One of the three system administrators for the maintenance and administration of five student labs and approx. 50 staff PC.

YÜCE Bilgi Akademisi, Ankara, Turkey **January 2003**
- Translated two Java books into Turkish.

Tetra Bilgisayar, Ankara, Turkey **June–July 2001**
- Participant on an Embedded Linux Project.

METU Informatics Institute, Ankara, Turkey **June–July 2000**
- Summer intern.
- Worked on the implementation of online course system using Java Servlets.

ASELSAN INC., Ankara, Turkey **June–July 1999**
- Summer intern.
- Worked on the integration of GPS information with a given map using Visual C++.

OTHER ACTIVITIES

Talks, Seminars, Workshops [since 2017]

- EuroCC Workshop on “Advances in Object Detection” co-organized with Dr. Gokberk Cinbis and Dr. Emre Akbas, November 2022.
- CVPR2022 Tutorial on “Performance Measures in Visual Detection and Their Optimization”, June 2022.
- “Artificial Intelligence and Main Concepts”, Setur Hackathon, December 2021.
- “Bias and Fairness in Machine Learning”, Tutorial seminar at 29th Signal Processing and Applications Conference, June 2021.
- “Artificial Intelligence and Main Concepts”, Artificial Intelligence and Child Development Symposium, Aydin Andan Menderes University, May 2021.
- “Artificial Intelligence and Main Concepts”, CodeFest, 2021.
- “Introduction to Computer Vision and Deep Learning”, EuroCC@Turkey High Performance Computing Winter School, February 2021.
- “Artificial Intelligence and Main Concepts”, AI and Education Workshop, Hasan Kalyoncu University, December 2020.
- “Context in Robots”, Rainbow Group Seminar, University of Cambridge, November 2019.
- “Three Musketeers of Intelligence: Perception, Action and Language”, Turkish Computer Engineering Society (BMO), May 2019.
- “Context in Robots”, Dept. of Computer Engineering Seminar, Ankara University, April 2019.
- “Context in Robots”, Dept. of Electrical and Electronics Engineering Graduate Seminar, Bilkent University, April 2019.
- “A Shallow Introduction to Deep Learning”, Dept. of Computer Engineering Graduate Seminar, Gazi University, December 2018.
- “Context in Robots”, METU International Symposium on Human-Robot Interaction, December 2018.
- “Context in Robots”, Dept. of Electrical and Electronics Engineering Graduate Seminar, METU, November 2018.
- “Context in Robots”, IROS Workshop on Semantic Policy and Action Representations for Autonomous Robots (SPAR), IROS, October 2018.
- “Context in Robots”, Dept. of Computer Engineering Graduate Seminar, TOBB Economy and Technology University, February 2018.
- “Context in Robots”, The Maersk Mc-Kinney Moller Institute, University of Southern Denmark, January 2018.
- “Introduction to Deep Learning”, Summer School on Artificial Intelligence in Steppe, Hacettepe University, 2017.
- “Context in Robots”, Summer School on Artificial Intelligence in Steppe, Hacettepe University, 2017.

Reviewer Experience

- Top conferences such as NeurIPS, CVPR, ECCV (outstanding reviewer award at 2020), ICCV, ICRA, IROS ICLR, AAAI.
- Various journals such as IEEE Robotics and Automation Letters; IEEE Transactions on Image Processing; Systems, Man and Cybernetics; PLOS One; Robotics and Autonomous Systems; Adaptive Behaviour, Neural Processing Letters, ...

AWARDS AND HONORS

METU Best Thesis Award

- Mustafa Parlar Vakfi - Best Thesis Award - 2021 (for Kemal Oksuz, co-supervised with Dr. Emre Akbas).

Young Scientists Award 2020

- The Science Academy, Turkey – Young Scientists Award (BAGEP)

Outstanding Paper Award

- IEEE Transactions on Cognitive and Developmental Systems - Outstanding Paper Award (2019) for our following paper:
H. Celikkanat, G. Orhan, N. Pugeault, F. Guerin, E. Sahin, S. Kalkan, "Learning Context on a Humanoid Robot using Incremental Latent Dirichlet Allocation", IEEE Transactions on Cognitive and Developmental Systems, 8(1):42-59, 2016.

METU Best Thesis Award

- Mustafa Parlar Vakfi - Best Thesis Award - 2018 (for My M.Sc. student Ilker Bozcan).

METU Lecturer of the Year Award

- Mustafa Parlar Vakfi - Lecturer of the Year [2013-2014].

TUBITAK Career Project Award, Turkey

- 3501 Career Project Award [2012-2015].

University of Stirling, Scotland

- Ph.D. Scholarship [Sept. 2003 – June 2005].

Computer Engineering Department, METU

- High honor graduation from B.Sc. and M.Sc. degrees.

Computer Vision Project, Brown University, USA

- My CVPR-2006 conference paper is given as a project in the Computer Vision course.

Magical Music Decoder

- A student graduation project, which I proposed and supervised four undergraduate students for, received the best project award at Computer Eng. Dept., METU [2002].

ASSOCIATIONS

METU Computer Club **1998 to 2003**

- Web and system administrator between 1998 and 2001.
- Trained new system administrators between 2001 and 2003.

METU Turkish Folklore Club **1998 to 2003**

- I have taken and given courses on the folk instrument Baglama.

ILKYAR – Aid Foundation for Elementary Schools **2001 to present**

- Contributed to the Science and the Music courses.
- Played Baglama at the concerts to the school children.

LANGUAGES

- English – Fluent in speaking, reading and writing
- German – Beginner Level
- Turkish – Native language

HOBBIES

- Writing short stories and poems.
- Playing Turkish folk instrument Baglama.

REFERENCES

Prof. Göktürk Üçoluk, ucoluk@ceng.metu.edu.tr, +90-(0)312-2105584
- Professor in Computer Engineering Dept., METU, Ankara.

Assoc. Prof. Erol Şahin, erol@ceng.metu.edu.tr, +90-(0)312-2105539
- Assoc. Professor in Computer Engineering Dept., METU, Ankara.

Prof. Norbert Krüger, norbert@mip.sdu.dk, +45-65-507483

- Group leader of the Cognitive Vision Lab, University of Southern Denmark, Odense.

Prof. Florentin Wörgötter, worgott@bccn-goettingen.de, +49-(0)551-5176-528

- Group leader in the Bernstein Center for Computational Neuroscience, Göttingen.