[['Game-Theoretic Constrained Policy Optimization for Safe Reinforcement Learning',
  'http://ieeexplore.ieee.org/document/11095811',
  'Safe reinforcement learning (RL) aims to optimize the task performance with safety guarantees. One common modeling scheme to study safe RL problems is the constrained Markov decision process (CMDP). However, current safe RL methods within the CMDP framework face challenges in tradeoffs among various objectives and gradient conflicts of policy updating. To cope with these challenges, this article presents a novel safe RL approach called game-theoretic constrained policy optimization (GCPO). The proposed approach formulates the CMDP problem as a general-sum Markov game with multiple players, where a task player seeks to maximize the reward objective, while constraint players aim to minimize constraint objectives until they are fulfilled. By doing so, GCPO adopts the learning mode with multiple subpolicies, each aligned with a distinct objective, that collectively constitute the overall behavior of the agent. The learning convergence of the GCPO can be ensured with the contraction mapping to the Nash equilibrium. Furthermore, a novel dominant timescale update rule is presented for multiplayer policy learning to guarantee constraint satisfaction. The learning convergence and constraint satisfaction of GCPO are theoretically analyzed. Consequently, GCPO eliminates the necessity of tuning tradeoff parameters and mitigates gradient conflicts during multiobjective policy updating. Experimental results show that GCPO outperforms state-of-the-art safe RL algorithms in a quadrotor trajectory tracking task and various high-dimensional robot locomotion benchmarks. Moreover, GCPO exhibits robustness to diverse scales of task rewards and constraint costs without the need for intricate tradeoffs.',
  'Changxin Zhang, Xinglong Zhang, Yixing Lan, Hao Gao, Xin Xu',
  '5',
  '2025',
  '10'],
 ['An Advanced Optimal Tracking Control for Nonlinear Discrete-Time Systems Based on (N + 1)-Step Gradient Learning',
  'http://ieeexplore.ieee.org/document/11099017',
  'In this article, to address the issue of accelerating convergence performance and eliminating the tracking error, an advanced optimal control method for nonlinear discrete-time systems is investigated based on an improved N-step [(${N} +1$)-step] gradient learning algorithm. Independent of the discount factor, this article introduces a novel tracking error index without quadratic input terms for the steady-state and convergence performances, which obtains the optimal control policy without calculating the reference control input. Compared with classic N-step gradient learning algorithms with infinite future reward assumption, the proposed algorithm investigates the (N +1)-step return with a fixed N and a step forward for finite tracking problems based on a long-term weighting parameter. Based on the above theory, value iteration (VI) and policy iteration (PI) methods are utilized to derive the convergence, monotonicity, optimality, and stability properties of the proposed algorithm, which can be conducted without the traditional assumption of zero initial functions. In the implementation of the algorithms, the actor–critic structure, constructed by four neural networks, is established to approximate the states, the value functions, and the control policy, respectively. Three simulation experiments on a helicopter system validate the efficacy and practicality of the control methods in addressing nonlinear optimal tracking challenges.',
  'Zeyu Zhou, Yuhui Wang, Qingxian Wu',
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  '10'],
 ['Video Prediction of Dynamic Physical Simulations With Pixel-Space Spatiotemporal Transformers',
  'http://ieeexplore.ieee.org/document/11089993',
  'Inspired by the performance and scalability of autoregressive large language models (LLMs), transformer-based models have seen recent success in the visual domain. This study investigates a transformer adaptation for video prediction with a simple end-to-end approach, comparing various spatiotemporal self-attention layouts. Focusing on causal modeling of physical simulations over

time; a common shortcoming of existing video-generative approaches, we attempt to isolate spatiotemporal reasoning via physical object tracking metrics and unsupervised training on physical simulation datasets. We introduce a simple yet effective pure transformer model for autoregressive video prediction, utilizing continuous pixel-space representations for video prediction. Without the need for complex training strategies or latent feature-learning components, our approach significantly extends the time horizon for physically accurate predictions by up to 50% when compared with existing latent-space approaches, while maintaining comparable performance on common video quality metrics. In addition, we conduct interpretability experiments to identify network regions that encode information useful to perform accurate estimations of PDE simulation parameters via probing models, and find that this generalizes to the estimation of out-of-distribution simulation parameters. This work serves as a platform for further attention-based spatiotemporal modeling of videos via a simple, parameter efficient, and interpretable approach.',
  'Dean L. Slack, G. Thomas Hudson, Thomas Winterbottom, Noura Al Moubayed',
  '5',
  '2025',
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 ['ShipsMOT: A Comprehensive Benchmark and Framework for Multiobject Tracking of Ships',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70042?af=R',
  'A new dataset designed for ship detection and tracking and a new tracking framework designed for ship features.\n\n\n\n\n\nABSTRACT\nMultiobject tracking of ships is crucial for various applications, such as maritime security and the development of ship autopilot systems. However, existing ship visual datasets primarily focus on ship detection tasks, lacking a fully open-source dataset for multiobject tracking research. Furthermore, current methods often struggle with extracting appearance features under complex sea conditions, varying scales and different ship types, affecting tracking precision. To address these issues, we propose ShipsMOT, a new benchmark dataset containing 121 video sequences with an average of 15.45\xa0s per sequence, covering 15 distinct ship types and a total of 237,999 annotated bounding boxes. Additionally, we propose JDR-CSTrack, a ship multiobject tracking framework that improves feature extraction at different scales by optimising a joint detection and Re-ID network. JDR-CSTrack utilises the fusion of appearance and motion features for multilevel data association, thereby minimising track loss and ID switches. Experimental results confirm that ShipsMOT can serve as a benchmark for future research in ship multiobject tracking and validate the superiority of the proposed JDR-CSTrack framework. The dataset and code can be found on https://github.com/jpj0916/ShipsMOT.',
  'Fang Luo, Pengju Jiang, George To Sum Ho, Wenjing Zeng',
  '6',
  '2025',
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 ['A Review of Multi-Object Tracking in Recent Times',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70010?af=R',
  'This paper discusses many recent deep-learning MOT methods. Moreover, to highlight their contributions, these methods are categorised into four main groups: detection-based, SOT-based, and segmentation-based methods according to the integrated core technologies.\n\n\n\n\n\nABSTRACT\nMulti-object tracking (MOT) is a fundamental problem in computer vision that involves tracing the trajectories of foreground targets throughout a video sequence while establishing correspondences for identical objects across frames. With the advancement of deep learning techniques, methods based on deep learning have significantly improved accuracy and efficiency in MOT. This paper reviews several recent deep learning-based MOT methods and categorises them into three main groups: detection-based, single-object tracking (SOT)-based, and segmentation-based methods, according to their core technologies. Additionally, this paper discusses the metrics and datasets used for evaluating MOT performance, the challenges faced in the field, and future directions for research.',
  'Suya Li, Hengyi Ren, Xin Xie, Ying Cao',
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'2025',
'3'],
['A New Large-Scale Dataset for Marine Vessel Re-Identification Based on Swin Transformer Network in Ocean Surveillance Scenario',
'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70007?af=R',
'A new large-scale marine vessel dataset with well-annotated vessel orientation, vessel colour, and vessel type labels has been collected and created in a real marine environment for vessel Re-ID research. (2)A side information embedding module is introduced through the learnable embedding layer to encode more kinds of information, including marine vessel orientation, type and colour. (3)A deep neural network framework based on Swin Transformer for marine vessel Re-ID task is proposed to learn and extract discriminative features, and achieves SOTA performance on vessel, vehicle and person Re-ID benchmark datasets.\n\n\n\n\n\n\nABSTRACT\nIn recent years, there has been an upward trend that marine vessels, an important object category in marine monitoring, have gradually become a research focal point in the field of computer vision, such as detection, tracking, and classification. Among them, marine vessel re-identification (Re-ID) emerges as a significant frontier research topics, which not only faces the dual challenge of huge intra-class and small inter-class differences, but also has complex environmental interference in the port monitoring scenarios. To propel advancements in marine vessel Re-ID technology, SwinTransReID, a framework grounded in the Swin Transformer for marine vessel Re-ID, is introduced. Specifically, the project initially encodes the triplet images separately as a sequence of blocks and construct a baseline model leveraging the Swin Transformer, achieving better performance on the Re-ID benchmark dataset in comparison to convolution neural network (CNN)-based approaches. And it introduces side information embedding (SIE) to further enhance the robust feature-learning capabilities of Swin Transformer, thus, integrating non-visual cues (orientation and type of vessel) and other auxiliary information (hull colour) through the insertion of learnable embedding modules. Additionally, the project presents VesselReID-1656, the first annotated large-scale benchmark dataset for vessel Re-ID in real-world ocean surveillance, comprising 135,866 images of 1656 vessels along with 5 orientations, 12 types, and 17 colours. The proposed method achieves 87.1% $\\%$ mAP and 96.1% $\\%$ Rank-1 accuracy on the newly-labelled challenging dataset, which surpasses the state-of-the-art (SOTA) method by 1.9% $\\%$ mAP regarding to performance. Moreover, extensive empirical results demonstrate the superiority of the proposed SwinTransReID on the person Market-1501 dataset, vehicle VeRi-776 dataset, and Boat Re-ID vessel dataset.',
'Zhi Lu, Liguo Sun, Pin Lv, Jiuwu Hao, Bo Tang, Xuanzhen Chen',
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['Unlocking the power of multi-modal fusion in 3D object tracking',
'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.12335?af=R',
'3D Single Object Tracking plays a vital role in autonomous driving and robotics, yet traditional approaches have predominantly focused on using pure LiDAR-based point cloud data, often neglecting the benefits of integrating image modalities. To address this gap, we propose a novel Multi-modal Image-LiDAR Tracker (MILT) designed to overcome the limitations of single-modality methods by effectively combining RGB and point cloud data. Our key contribution is a dual-branch architecture that separately extracts geometric features from LiDAR and texture features from images. These features are then fused in a BEV perspective to achieve a comprehensive representation of the tracked object. A significant innovation in our approach is the Image-to-LiDAR Adapter module, which transfers the rich feature representation capabilities of the image modality to the 3D tracking task, and the BEV-Fusion module, which facilitates the interactive fusion of geometry and texture features. By validating MILT on public datasets, we demonstrate substantial performance improvements over traditional methods, effectively showcasing the advantages of our multi-modal fusion strategy. This work advances the state-of-the-art in SOT by integrating complementary information from RGB and LiDAR modalities, resulting in enhanced tracking accuracy and robustness.',
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 ['Representation alignment contrastive regularisation for multi-object
tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.12331?af=R',
  "Achieving high-performance in multi-object tracking algorithms heavily relies
on modelling spatial-temporal relationships during the data association stage.
Mainstream approaches encompass rule-based and deep learning-based methods for
spatial-temporal relationship modelling. While the former relies on physical
motion laws, offering wider applicability but yielding suboptimal results for
complex object movements, the latter, though achieving high-performance, lacks
interpretability and involves complex module designs. This work aims to simplify
deep learning-based spatial-temporal relationship models and introduce
interpretability into features for data association. Specifically, a lightweight
single-layer transformer encoder is utilised to model spatial-temporal
relationships. To make features more interpretative, two contrastive
regularisation losses based on representation alignment are proposed, derived
from spatial-temporal consistency rules. By applying weighted summation to
affinity matrices, the aligned features can seamlessly integrate into the data
association stage of the original tracking workflow. Experimental results
showcase that our model enhances the majority of existing tracking networks'
performance without excessive complexity, with minimal increase in training
overhead and nearly negligible computational and storage costs.",
  'Shujie Chen, Zhonglin Liu, Jianfeng Dong, Xun Wang, Di Zhou',
  '6',
  '2025',
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 ['Real-Time Underwater Vision Sensing System for AUV Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70183?af=R',
  'In this article, we developed an underwater real-time visual sensing system
for AUV tracking based on the edge embedded-device NVIDIA Jetson Xavier NX.
After experimental verification, compared with other algorithms, the UW-Siam
tracking algorithm we proposed not only has a higher success rate and accuracy,
but also has the best speed performance, and can easily cope with underwater
object tracking tasks in different scenarios.\n\n\n\n\n\n\n\n\nABSTRACT\nWith
the continuous development of emerging technologies such as big data and
artificial intelligence, the related technologies of perception tasks on which
underwater object tracking relies have made great progress. However, a
significant barrier still exists in implementing high-performance real-time
underwater object tracking on low-power edge devices. To achieve real-time
tracking of underwater objects for edge devices, this article develops an
underwater real-time visual sensing system applied to AUV tracking. First, an
underwater object tracking device is designed in this article employing a stereo
binocular camera, an edge embedded NVIDIA Jetson Xavier NX and an STM32 control
board. Then, after preprocessing, the input image with the effective USM
algorithm, we propose a quick approach for detecting underwater objects based on
SIoU-YOLOv8n, which enables automatic object recognition and selection. At the
same time, this article proposes a twin network UW-Siam for continuous tracking
of underwater objects, which achieves more accurate underwater object tracking.
Finally, the algorithm is deployed to the designed real-time underwater vision
sensing system and tested in real-world scenarios. The tracking accuracy reached
0.652, and the detection mAP reached 0.97. The results indicate that the system
can rapidly detect and continuously monitor objects, performing well in real-
world scenarios with high accuracy and\xa0robustness.',
  'Canrong Chen, Tingzhuang Liu, Linglu He, Yi Zhu, Fei Yuan',
  '7',
  '2025',
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 ['Spatiotemporal Context Adapting Framework for Visual Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70150?af=R',
  'Due to noise interference, existing methods often partially exploit auxiliary
data, leading to underutilisation of spatiotemporal information. To address
these issues, we propose a novel and concise tracking framework, uniformly
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encoding all auxiliary data and mitigating the unstable factors.\n\n\n\n\n\n\n\nABSTRACT\nVisual object tracking is widely applied in intelligent transportation systems and visual surveillance systems that serve smart cities, as well as in autonomous vehicles. Existing methods usually utilise a relation-modelling framework to model the visual object tracking problem, with auxiliary spatial context and temporal information. The spatial context is often extracted by enlarging the target template, which can introduce more background and positional information. The temporal correlation is obtained by associating the search image with previous images. However, due to noise interference, existing methods often partially exploit auxiliary data, leading to underutilisation of spatiotemporal information. To address these issues, we propose a novel and concise tracking framework, uniformly encoding all auxiliary data, including the enlarged target template, previous images, and corresponding target bounding boxes. Specifically, to mitigate the unstable factors introduced by these raw inputs, we propose a spatiotemporal context adaptive encoder, which can adaptively select appropriate information in noisy data. Extensive experiments show that the proposed method achieves state-of-the-art performance on various benchmarks, demonstrating its\xa0superiority.',
  'Kunlong Zhao, Dawei Zhao, Xu Wang, Liang Xiao, Yulong Huang, Yiming Nie, Yonggang Zhang, Bin Dai',
  '7',
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 ['A Two-Stage Homography Matrix Prediction Approach for Trajectory Generation in Multi-Object Tracking on Sports Fields',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70136?af=R',
  'To overcome the limitations of existing homography matrix prediction methods, we developed a two-stage prediction approach by optimizing the pixel position feature extraction structure. In the first stage, 4-key-point coordinate deviation is leveraged to indirectly estimate the macroscopic values of the homography matrix, followed by direct fine-tuning of the microscopic 8-DOF numerical components in the second stage. We validated the effectiveness of this approach in three competitive sports scenarios: basketball, ice hockey, and handball.\n\n\n\n\n\n\n\nABSTRACT\nHomography estimation is a fundamental topic in computer vision, especially in scenarios that require perspective changes for intelligent analysis of sports fields, where it plays a crucial role. Existing methods predict the homography matrix either indirectly by evaluating the 4-key-point coordinate deviation in paired images with the same visual content or directly by fine-tuning the 8 degrees of freedom numerical values that define the matrix. However, these approaches often fail to effectively incorporate coordinate positional information and overlook optimal application scenarios, leading to significant accuracy bottlenecks, particularly for paired images with differing visual content. To address these issues, we propose an approach that integrates both methods in a staged manner, leveraging their respective advantages. In the first stage, positional information is embedded to enhance convolutional computations, replacing serial concatenation in traditional feature fusion with parallel concatenation, while using 4-key-point coordinate deviation to predict the macroscopic homography matrix. In the second stage, positional information is further integrated into the input images to refine the direct 8 degrees of freedom numerical predictions, improving matrix fine-tuning accuracy. Comparative experiments with state-of-the-art methods demonstrate that our approach achieves superior performance, yielding a root mean square error as low as 1.25 and an average corner errror as low as 14.1 in homography transformation of competitive sports image\xa0pairs.',
  'Pan Zhang, Jiangtao Luo, Guoliang Xu, Xupeng Liang',
  '7',
  '2025',
  '6'],
 ['Vorticity Transport Equation-Based Shadow Removal Approach for Image Inpainting',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70114?af=R',
  '(1) A new image inpainting algorithm using the VTE is developed; (2) FMM is introduced as an alternative to the iterative numerical solution of the VTE to improve the speed of image in painting; and (3) the VTE equation is transformed

into a weighted-average equation to be used in conjunction with FMM.\n\n\n\n\n\n\n\nABSTRACT\nShadows are common in many types of images, causing information loss or disturbance. Shadow removal can help improve the quality of the digital image. If there is no effective information available to restore the original image in the shaded area, the interpolation-based inpainting technique can be used to remove the shadow from the digital image. This image inpainting technique typically involves establishing and solving partial differential equations (PDEs), an iterative solving process that is very time-consuming. To solve the time-consuming problem, a method that introduces the fast marching method (FMM) into the vorticity transport equation (VTE) is demonstrated. VTE is a type of partial differential equation describing two-dimensional fluids. FMM is a numerical scheme for tracking the evolution of monotonically advancing interfaces via finite difference solution of the eikonal equation. The proposed method contains three main steps: (a) by investigating the relationship between VTE and the traditional PDE-based image inpainting method, a new image inpainting model using VTE is developed;(b) the area to be inpainted is divided into boundaries that shrink in layers from the outside inwards using FMM; and (c) the VTE image inpainting model is converted into a weighted average form to coordinate with FMM. The visual and quantitative evaluation of the experimental results of shadow removal shows that the proposed method outperforms PDE-based and state-of-the-art methods in terms of shadow-removal effect and running time. The results also show that our method excels at inpainting images with near-smooth textures and simple geometric structures and where the pixels to be inpainted are continuous with neighbouring pixels.',
  'Xiaoying Ti, Li Yu, Quanhua Zhao',
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 ['Structure-Aware Transformer for Shadow Detection',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70031?af=R',
  'We propose a structure-aware transformer network for robust shadow detection. An edge-guided multi-task learning framework is designed to predict shadow maps with rich structures. An auxiliary semantic-aware learning is introduced to overcome the interference from complex\xa0scenes.\n\n\n\n\n\n\n\nABSTRACT\nShadow detection helps reduce ambiguity in object detection and tracking. However, existing shadow detection methods tend to misidentify complex shadows and their similar patterns, such as soft shadow regions and shadow-like regions, since they treat all cases equally, leading to an incomplete structure of the detected shadow regions. To alleviate this issue, we propose a structure-aware transformer network (STNet) for robust shadow detection. Specifically, we first develop a transformer-based shadow detection network to learn significant contextual information interactions. To this end, a context-aware enhancement (CaE) block is also introduced into the backbone to expand the receptive field, thus enhancing semantic interaction. Then, we design an edge-guided multi-task learning framework to produce intermediate and main predictions with a rich structure. By fusing these two complementary predictions, we can obtain an edge-preserving refined shadow map. Finally, we introduce an auxiliary semantic-aware learning to overcome the interference from complex scenes, which facilitates the model to perceive shadow and non-shadow regions using a semantic affinity loss. By doing these, we can predict high-quality shadow maps in different scenarios. Experimental results demonstrate that our method reduces the balance error rate (BER) by 4.53%, 2.54%, and 3.49% compared to state-of-the-art (SOTA) methods on the benchmark datasets SBU, ISTD, and UCF,\xa0respectively.',
  'Wanlu Sun, Liyun Xiang, Wei Zhao',
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 ['An intelligent retrievable object-tracking system with real-time edge inference capability',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.13297?af=R',
  "An intelligent retrievable object-tracking system assists users in quickly and accurately locating lost objects. However, challenges such as real-time processing on edge devices, low image resolution, and small-object detection

significantly impact the accuracy and efficiency of video-stream-based systems, especially in indoor home environments. To overcome these limitations, a novel real-time intelligent retrievable object-tracking system is designed. The system incorporates a retrievable object-tracking algorithm that combines DeepSORT and sliding window techniques to enhance tracking capabilities. Additionally, the YOLOv7-small-scale model is proposed for small-object detection, integrating a specialized detection layer and the convolutional batch normalization LeakyReLU spatial-depth convolution module to enhance feature capture for small objects. TensorRT and INT8 quantization are used for inference acceleration on edge devices, doubling the frames per second. Experiments on a Jetson Nano (4 GB) using YOLOv7-small-scale show an 8.9% improvement in recognition accuracy over YOLOv7-tiny in video stream processing. This advancement significantly boosts the system's performance in efficiently and accurately locating lost objects in indoor home\xa0settings.",
  'Yujie Li, Yifu Wang, Zihang Ma, Xinghe Wang, Benying Tan, Shuxue Ding',
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  '2024',
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 ['QMBOC-HFM: Enhanced QMBOC for Large-Scale LEO Navigation Augmentation Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70398?af=R',
  'A novel QMBOC signal with improved code tracking performance, multipath suppression, and anti-jamming capabilities.\n\n\n\n\n\n\n\nABSTRACT\nLarge-scale low earth orbit (LEO) constellations can enhance traditional global navigation satellite systems (GNSS) in many ways, but the rapid increase in the number of LEO satellites also poses challenges to the anti-interference performance of navigation signals. To improve the performance of the B1C signal in the future BeiDou global navigation satellite system, this paper proposes a modulation method: it enhances the existing quadrature-multiplexed binary offset carrier (QMBOC) by using periodic binary hyperbolic frequency modulation (HFM) signals as subcarriers. The enhanced QMBOC signal (QMBOC-HFM) demonstrates superior anti-interference and positioning accuracy compared to the original QMBOC signal. The proposed QMBOC-HFM provides a potential signal design for future LEO navigation-augmented global satellite navigation systems.',
  'Shugan Zhang, Xinming Huang, Bofang Chen',
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  '2025',
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 ['Maximum Circumnavigation Radius for a Class of Bearings-Only Target Tracking Problem',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70390?af=R',
  'Under a virtual intersecting localization and tracking algorithm, the maximum circumnavigation radius is proposed for the bearings-only observer by analysing the relationship between the target position estimation error, observation error and the velocity of the observer and the target. The proposed method can provide an engineering application guidance for a class of bearings-only circumnavigation tracking problems. \n\n\n\n\n\n\n\nABSTRACT\nFor the problem of bearings-only target tracking using circumnavigation method, to enhance the safety and stealth, the observer needs to maintain the maximum possible distance from the target. But an excessively large circumnavigation radius may lead to significant tracking error or even no solution in target localization. Under a virtual intersecting localization and tracking algorithm, the maximum circumnavigation radius is proposed for the bearings-only observer by analysing the relationship between the target position estimation error, observation error and the velocity of the observer and the target, which offers theoretical guidance for the engineering implementation of such circumnavigation tracking problem.',
  'Guoqing Qi, Yinya Li, Andong Sheng',
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 ['Research on Extended Target Tracking Algorithm Based on RHM and RMM Fusion',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70371?af=R',
  'This paper addresses the extended target tracking problem with irregular

shapes. A fusion algorithm combining random hypersurface model (RHM) and random matrix model (RMM) for extended target tracking is proposed. By leveraging the fast convergence and strong robustness of RMM, the tracking efficiency of RHM is improved. Through simulation experiments, the effectiveness of the algorithm proposed in this paper is verified. The extended target fusion method proposed in this paper can provide a more accurate means for precise tracking and state prediction in practical engineering.\n\n\n\n\n\n\n\n\nABSTRACT\nAiming at the extended target tracking problem with irregular shapes, an extended target tracking algorithm that fuses random hypersurface model (RHM) and random matrix model (RMM) is proposed in the case where the priori shape of the target is unknown. First, the algorithm adopts the RMM method to track the extended target and then takes the reference points on the elliptical shape contour and constructs an ordered sequence. Second, the discrete Fourier transform (DFT) is performed on the sequence to find the coefficients of the harmonic components to obtain the elliptical shape parameters. Then, the ellipsoidal shape parameter is used as the a priori shape parameter of the star-convex RHM. Finally, the effectiveness of the proposed algorithm is verified by simulation experiments. The proposed extended target fusion method provides a more accurate means for precise tracking and state prediction of extended targets.',
  'Guoqing Qi, Zixuan Xu, Yinya Li, Andong Sheng',
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 ['Longitudinal and Feedforward Controller Design Based on Linear Matrix Inequalities for a Mini Aerial Vehicle',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70365?af=R',
  'In this paper, the design of a MIMO optimal PID controller and a feedforward controller to enhance disturbance rejection and reference tracking for an MAV system is proposed. The feedback controller employs LMI constraints for iterative variable tuning, while a feedforward strategy is developed to further optimise performance. \n\n\n\n\n\n\n\n\nABSTRACT\nThis paper presents the design of a multi-input multi-output (MIMO) optimal proportional–integral–derivative (PID) controller and a feedforward controller to enhance disturbance rejection and reference tracking in a mini aerial vehicle (MAV). The feedback controller is developed using linear matrix inequality (LMI) constraints within an iterative framework for tuning the PID parameters. In addition, a feedforward control strategy is proposed to further improve performance in reference tracking and disturbance rejection. The feedforward controller is designed under LMI constraints to minimise the H∞ norm of the transfer function matrix relating disturbances (or set-points) to the output (error). This optimisation problem is challenging due to its non-convex and nonlinear nature. Therefore, the main contribution of this paper is to propose a method based on utilising frequency sampling techniques, iterative algorithms and convex optimisation formulation to guarantee optimal solutions for reference tracking and disturbance rejection within specified constraints, which is crucial for preventing irreversible damage in control systems and also enhances the manoeuvrability of the MAV.',
  'Saeedreza Tofighi',
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 ['FPGA Implementation of a Chopper Controller in PV Systems for IoT Applications',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70364?af=R',
  'A digital control system based on FPGA is developed to generate a chopping frequency ranging from 12.5\xa0kHz to 100\xa0kHz, adjusting its output voltage, frequency, and duty cycle accordingly. The proposed digital controller, with optimisations in architecture and process technology, will improve chip area, decrease delay, and enhance the power efficiency of the converter compared to past researches.\n\n\n\n\n\n\n\n\nABSTRACT\nThis work presents the design and simulation of an Field-Programmable Gate Array (FPGA) based digital controller for a micro-power photovoltaic (PV) energy harvesting system tailored to Internet of Things (IoT) applications. The proposed system features a DC-DC boost converter with an H-bridge topology, designed to interface effectively with low-power PV sources and deliver regulated output to IoT loads. A constant

voltage maximum power point tracking (CV-MPPT) algorithm is implemented to maintain optimal energy extraction under variable irradiance. The controller dynamically adjusts the chopping frequency, duty cycle, and output voltage. Leveraging the parallelism and reconfigurability of FPGAs, a high-speed digital control architecture is developed and synthesised on a Cyclone IV FPGA platform. Compared to conventional microcontroller or DSP-based solutions, this approach offers significantly improved response time, power efficiency, and scalability. The final implementation achieves a chip area of 0.92 mm2, a control loop delay of 106\xa0ms, and an overall efficiency of 92.36%, demonstrating its advantages over existing designs in terms of compactness, performance, and energy efficiency.',
  'Keyvan Barati, Abdolsamad Hamidi',
  '8',
  '2025',
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 ['High-Impedance Dipoles for Auto-Receiver Tracking Wireless Power Transfer Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70339?af=R',
  'This study presents a self-tuning multi-transmitter (multi-Tx) wireless power transfer (WPT) system designed for applications requiring freely positioned receivers (Rxs).\n\n\n\n\n\n\n\nABSTRACT\nThis study presents a self-tuning multi-transmitter (multi-Tx) wireless power transfer (WPT) system designed for applications requiring freely positioned receivers (Rxs). The system leverages high-impedance dipole (HID) as Txs to dynamically activate the nearest Tx to a simple dipole antenna as the Rx while deactivating other Txs without additional control circuits. The Txs design incorporates a modified coaxial cable dipole antenna featuring symmetrical gaps over the shield and inductive tuning elements between the central wire and the shield to optimise the resonance frequency and ensure effective power transfer. The feeding point is connected to the central wire via a small cut in the shield. This autonomous behaviour simplifies system operation, enhances flexibility, and ensures acceptable efficient power transfer. Experimental evaluation demonstrates that the system achieves a power transfer efficiency of approximately 65% while maintaining consistent performance as the Rx rotates over two orthogonally located Txs. The dynamic self-tuning mechanism adapts to the position of the Rx, proving particularly advantageous on curved surfaces.',
  'Ali Sharifian Mazraeh Mollaei, Ilkka Laakso, Masoud Sharifian Mazraeh Mollaei',
  '8',
  '2025',
  '7'],
 ['Fine-Grained Temporal Encoding and Decoding-Based Underwater Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70346?af=R',
  'This study focuses on this domain and proposes an innovative fine-grained temporal encoding and decoding-based underwater object tracking method.\n\n\n\n\n\n\n\nABSTRACT\nUnderwater object tracking is a highly challenging task in the field of computer vision. This study focuses on this domain and proposes an innovative fine-grained temporal encoding and decoding-based underwater object tracking method. Due to the complex and dynamic underwater environment, such as uneven lighting, turbid water quality, and complex target motion patterns, existing underwater object tracking methods face significant limitations in accuracy and stability. By carefully designing a refinement module that combines fine-grained consistency and candidate elimination, this method can accurately extract fine-grained features of the target and effectively mitigate the interference of various underwater complexities during feature extraction, thereby improving the precision of target features. Furthermore, leveraging the temporal encoding–decoding module, the target features are continuously propagated along the temporal sequence, allowing full utilization of the relational information between frames, which further enhances tracking stability. Experiments were conducted on the UVOT400 dataset, which is large-scale and rich in attributes with diverse target categories. The results demonstrate that, compared to existing methods, this approach significantly outperforms in both accuracy and stability of underwater object tracking, providing new insights and effective solutions for the

advancement of underwater object tracking\xa0technology.',
  'Zhen Sun, Zhenggang Guan, Qinghua Li, Mengyang Yuan, Haonan Sun',
  '8',
  '2025',
  '6'],
 ['Full-Space Scanning Leaky-Wave Antenna Utilising Spoof Surface Plasmon Polaritons',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70328?af=R',
  'In this paper, we present a novel spoof surface plasmon polariton leaky-wave antenna (SSPP-LWA) capable of full-space beam scanning. The proposed antenna achieves full-space beam scanning from -90° to +90° across the frequency band of 9.8–13.3\xa0GHz, with a high scanning rate of 5.94° per 1% frequency variation. Additionally, the design features a simplified structure conducive to practical fabrication. \n\n\n\n\n\n\n\nABSTRACT\nA novel spoof surface plasmon polariton leaky-wave antenna (SSPP-LWA) capable of full-space beam scanning is proposed in this letter. First, the surface plasmon polariton (SPPs) unit and its corresponding transmission line are carefully designed, and the underlying mechanism to achieve full-space scanning is analysed based on a monopole array structure. Specifically, a spoof surface plasmon polariton (SSPP) transmission line combined with a semicircular, three-dimensionally loaded radiating patch is introduced and equivalently modelled as a monopole radiating element. Subsequently, the proposed LWA is realised by employing a monopole array composed of 12 identical radiating elements. Simulation results verify that the antenna achieves continuous beam scanning from -90° to +90° within the frequency range of 9.8–13.3\xa0GHz, exhibiting a high scanning rate of up to 5.94°/%, with an average gain of approximately 9 dBi. Benefiting from its excellent scanning capability and stable radiation characteristics, this antenna demonstrates significant potential for target detection and tracking applications in radar systems.',
  'Ran Yu, Leilei Liu',
  '8',
  '2025',
  '6'],
 ['Implementation and Performance Analysis of RTK-GNSS in Wearable Devices for Athletes in Harsh Environments',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70289?af=R',
  'This study investigates the implementation of real-time kinematic global navigation satellite system (RTK-GNSS) technique in wearable electronic performance and tracking system for football players to obtain highly accurate positioning data, even in harsh environments. The experiment results demonstrate that the utilization of RTK-GNSS can significantly improve positioning accuracy in various stadium environments, which is crucial for evaluating player performance.\n\n\n\n\n\n\n\nABSTRACT\nThis study presents the performance analysis of RTK-GNSS (real-time kinematic global navigation satellite system) mounted on wearable devices for athletes in harsh environments. GNSS signal can deteriorate by obstacles, i.e. stadium roofs, due to the high GDOP (geometric dilution of precision). RTK-GNSS is used to overcome harsh environment problems in this study. Hardware experiments are performed to analyse the performance of RTK-GNSS in sports wearable devices in harsh environments. The full pitch tracking test results of a wearable device equipped with RTK-GNSS demonstrate the best performance among three different wearable devices in a harsh environment; the maximum positioning error of 1.56 m$\\text{m}$ is approximately 3–30 times smaller than that of wearable devices equipped with stand-alone GNSS. The distance test results of the wearable device equipped with RTK-GNSS validate the most accurate performance, 98.97%$\\%$, compared to the true value in harsh\xa0environment.',
  'Mingu Kim, Bit Kim, Chulwoo Park, Jinsung Yoon',
  '8',
  '2025',
  '5'],
 ['Robust Beam Tracking for 3D Manoeuvrable UAV in DFRC Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70211?af=R',
  "This letter presents a novel 3D robust manoeuvrable unmanned aerial vehicle (UAV) beam tracking algorithm within the dual-functional radar-communication

framework. Specifically, we propose the interacting multiple model algorithm to accommodate multiple potential UAV motion models and improve the unscented Kalman filter algorithm to enhance its stability.\n\n\n\n\n\n\n\n\nABSTRACT\nDual-functional radar-communication (DFRC) will be a key technology in future sixth-generation (6G) network. Specifically, an integrated radar and communication platform (IRCP) equipped with full-dimensional antenna arrays can execute 3D beamforming, which can effectively minimize interference for communicating with unmanned aerial vehicles (UAVs). However, a significant challenge in fully exploiting 3D beamforming gain is the IRCP's ability to precisely track manoeuvrable UAVs. In this letter, we propose a novel interacting multiple model with enhanced unscented Kalman filter algorithm to realize 3D beam tracking for one manoeuvrable UAV within the framework of DFRC. To be specific, we build multiple state transition models to adopt the manoeuvrability of the UAV. Meanwhile, the stability of the unscented Kalman filter is improved by using the singular value decomposition. Simulation results show that the proposed algorithm has higher tracking accuracy and better transmission performance for one manoeuvrable UAV than the traditional single-motion model based beam tracking\xa0algorithm.",
  'Yuhang Tang, Wei Liu, Jinkun Zhu, Jing Lei, Haoying Mo',
  '8',
  '2025',
  '3'],
 ['Optimal Performance Analysis for Networked System with Quantitative Control Input Over Feedback Channel',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70183?af=R',
  "This paper focuses on the performance analysis of networked control systems, specifically addressing the optimal tracking performance with quantitative control inputs over feedback channels. A dual-degree-of-freedom controller is designed using the Youla parameterization method, and the system's performance is assessed through numerical simulations. The findings highlight the impact of unstable poles, non-minimum phase zeros, and quantization errors on tracking performance, offering insights for practical control system design.\n\n\n\n\n\n\n\n\nABSTRACT\nNetworked control systems (NCS) have become an emerging and important research area given the rapidly developing network communication technology. Numerous studies in this area concentrate on the stability of control systems, while little has been done on its performance analysis, especially the index of an optimal control system. We fill this gap here by analysing the optimal tracking performance for an NCS that has quantitative control inputs over feedback channels. We design a dual-degree-of-freedom controller along with an optimal control system, by applying the Youla parameterization method based on the time domain and coprime decompositions. The proposed methodology is assessed by numerical simulations. The system's tracking performance is found to be deteriorated by the unstable poles and non-minimum phase zeros of the controlled object, as well as by quantization signal errors. These findings are beneficial for analysing and designing practical control\xa0systems.",
  'Fang Han, Xiaowei Jiang',
  '8',
  '2025',
  '3'],
 ['Applying Adaptive Wavelet Neural Network and Sliding Mode Control for Tracking Control of MEMS Gyroscope',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70187?af=R',
  'In this letter, an algorithm applying an adaptive wavelet neural network (AWNN) and sliding-mode control (SMC) is proposed, investigated and exploited for tracking control of micro-electromechanical system (MEMS) gyroscope. Such an AWNN model can be regarded as a special radius basis function neural network and utilizes Mexican hat function as activation function. Besides, Taylor expansion is used for analyzing activation radius, which is considered as an adaptive variable. The parameters of the MEMS gyroscope model are hard to obtain in engineering applications; thus, AWNN is designed to approximate the uncertain function of MEMS gyroscope and the unknown asymmetrical dead zone in the control scheme. The weights updating laws and the activation radius adaptive laws in AWNN are derived from the Lyapunov stability analysis, which results in the

control error converging to the desired value and the weights and activation radius converging to its real value. To achieve the effect of error acceleration, a power function is used to design a sliding mode function. Computer simulation results substantiate the theoretical analysis and further demonstrate the efficacy of such an algorithm combined with AWNN and SMC for MEMS gyroscope control.',
  'Guo Luo, Bingling Chen',
  '8',
  '2025',
  '3'],
 ['A GGIW PMBM Smoother for Multiple Extended Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70188?af=R',
  'A gamma Gaussian inverse Wishart Poisson multi-Bernoulli mixture (PMBM) filter that uses multiple time scans for smoothing is proposed. The results of continuous tracking are smoothed and corrected at regular intervals, resulting in more accurate tracking performance. Simulation results show that the proposed algorithm effectively reduces generalized optimal sub-pattern assignment errors compared to the original PMBM filter. \n\n\n\n\n\n\n\nABSTRACT\nPoisson multi-Bernoulli mixture (PMBM) filtering is an effective method for multi-extended target tracking. However, it has a low utilization of information from multiple time scans, leading to potential errors such as jumps and discontinuities in the target trajectories. To address this, propose a gamma Gaussian inverse Wishart PMBM filter that uses multiple time scans for smoothing. The results of continuous tracking are smoothed and corrected at regular intervals, resulting in more accurate tracking performance. Simulation results show that the proposed algorithm effectively reduces generalized optimal sub-pattern assignment errors compared to the original PMBM filter.',
  'Wenhui Wang, Ye Xu, Kejie Zhang, YouPeng Sun, Peng Li',
  '8',
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  '2'],
 ['A Novel D-InSAR and Offset Tracking Fusion Algorithm Based on Variance-Masked Mean Filtering',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70173?af=R',
  'This paper proposes a novel fusion algorithm based on variance-masked mean filtering to combine the strengths of both methods. The algorithm filters noise in gentle regions of the offset map and fuses refined results with D-InSAR to enhance accuracy. Applied to the 2023 Türkiye earthquake, the method effectively reduces noise, corrects unwrapping errors, and achieves superior accuracy in high-gradient deformation scenarios such as earthquakes and landslides.\n\n\n\n\n\n\n\nABSTRACT\nAccurate ground deformation monitoring is crucial for understanding geophysical activities and mitigating disaster risks. D-InSAR and offset tracking are widely used but face limitations: D-InSAR struggles with phase unwrapping errors in large-scale deformation regions, while offset tracking lacks precision in small-scale deformation. This paper proposes a fusion algorithm based on variance-masked mean filtering to combine the strengths of both methods. The algorithm filters noise in gentle regions of the offset map and fuses refined results with D-InSAR to enhance accuracy. Applied to the 2023 Türkiye earthquake, the method effectively reduces noise, corrects unwrapping errors, and achieves superior accuracy in large-scale deformation scenarios such as earthquakes and landslides.',
  'Yifan Wang, Gen Li, Zihan Hu, Chuanxu Sun, Zhe Li',
  '8',
  '2025',
  '2'],
 ['Extended target tracking using neural network and Gaussian process',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70151?af=R',
  "In extended target tracking, Gaussian Process (GP) is utilized to model unknown contour functions based on the model-predicted target center and contour measurements. However, model prediction relies on accurate prior knowledge. When the model-predicted target center is inaccurate, it will affect the modelling of the measurement model. To address issue, this letter introduces a hybrid-driven approach that combines extended Kalman filter using GP with neural network; proposes an extended target tracking algorithm using neural network and GP. The

algorithm predicts the target center according to the neural network and the target's kinematic model, and takes the prediction center and the contour measurements at the current moment as the input of the neural network, which in turn provides real-time estimates for the predicted center compensation. The simulation results show that the algorithm has a significant improvement in tracking performance and better accuracy in estimating the center position and extent state of the target.",
  'Hao Wang, Liping Song',
  '8',
  '2025',
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  'https://www.sciencedirect.com/science/article/pii/S1077314225002760',
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  'Yifan Jiao, Xinran Liu, Xiaoqiong Liu, Xiaohui Yuan, Heng Fan, Libo Zhang',
  '1',
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  '12'],
 ['Visual object tracking via adaptive feature fusion and two-stage channel selection',
  'https://www.sciencedirect.com/science/article/pii/S0031320325013457',
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  'Ke Nai, Guiji Li',
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  '2026',
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 ['MeViS: A Multi-Modal Dataset for Referring Motion Expression Video Segmentation',
  'http://ieeexplore.ieee.org/document/11130435',
  'This paper proposes a large-scale multi-modal dataset for referring motion expression video segmentation, focusing on segmenting and tracking target objects in videos based on language description of objects’ motions. Existing referring video segmentation datasets often focus on salient objects and use language expressions rich in static attributes, potentially allowing the target object to be identified in a single frame. Such datasets underemphasize the role of motion in both videos and languages. To explore the feasibility of using motion expressions and motion reasoning clues for pixel-level video understanding, we introduce MeViS, a dataset containing 33,072 human-annotated motion expressions in both text and audio, covering 8,171 objects in 2,006 videos of complex scenarios. We benchmark 15 existing methods across 4 tasks supported by MeViS, including 6 referring video object segmentation (RVOS) methods, 3 audio-guided video object segmentation (AVOS) methods, 2 referring multi-object tracking (RMOT) methods, and 4 video captioning methods for the newly introduced referring motion expression generation (RMEG) task. The results demonstrate weaknesses and limitations of existing methods in addressing motion expression-guided video understanding. We further analyze the challenges and propose an approach LMPM++ for RVOS/AVOS/RMOT that achieves new state-of-the-art results. Our dataset provides a platform that facilitates the development of motion expression-guided video understanding algorithms in complex video scenes.',
  'Henghui Ding, Chang Liu, Shuting He, Kaining Ying, Xudong Jiang, Chen Change Loy, Yu-Gang Jiang',
  '3',
  '2025',
  '11'],
 ['ShipsMOT: A Comprehensive Benchmark and Framework for Multiobject Tracking of Ships',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70042?af=R',
  'A new dataset designed for ship detection and tracking and a new tracking framework designed for ship features.\n\n\n\n\n\n\nABSTRACT\nMultiobject tracking of ships is crucial for various applications, such as maritime security

and the development of ship autopilot systems. However, existing ship visual datasets primarily focus on ship detection tasks, lacking a fully open-source dataset for multiobject tracking research. Furthermore, current methods often struggle with extracting appearance features under complex sea conditions, varying scales and different ship types, affecting tracking precision. To address these issues, we propose ShipsMOT, a new benchmark dataset containing 121 video sequences with an average of 15.45\xa0s per sequence, covering 15 distinct ship types and a total of 237,999 annotated bounding boxes. Additionally, we propose JDR-CSTrack, a ship multiobject tracking framework that improves feature extraction at different scales by optimising a joint detection and Re-ID network. JDR-CSTrack utilises the fusion of appearance and motion features for multilevel data association, thereby minimising track loss and ID switches. Experimental results confirm that ShipsMOT can serve as a benchmark for future research in ship multiobject tracking and validate the superiority of the proposed JDR-CSTrack framework. The dataset and code can be found on https://github.com/jpj0916/ShipsMOT.',
  'Fang Luo, Pengju Jiang, George To Sum Ho, Wenjing Zeng',
  '6',
  '2025',
  '10'],
 ['A Review of Multi-Object Tracking in Recent Times',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70010?af=R',
  'This paper discusses many recent deep-learning MOT methods. Moreover, to highlight their contributions, these methods are categorised into four main groups: detection-based, SOT-based, and segmentation-based methods according to the integrated core technologies.\n\n\n\n\n\n\nABSTRACT\nMulti-object tracking (MOT) is a fundamental problem in computer vision that involves tracing the trajectories of foreground targets throughout a video sequence while establishing correspondences for identical objects across frames. With the advancement of deep learning techniques, methods based on deep learning have significantly improved accuracy and efficiency in MOT. This paper reviews several recent deep learning-based MOT methods and categorises them into three main groups: detection-based, single-object tracking (SOT)-based, and segmentation-based methods, according to their core technologies. Additionally, this paper discusses the metrics and datasets used for evaluating MOT performance, the challenges faced in the field, and future directions for research.',
  'Suya Li, Hengyi Ren, Xin Xie, Ying Cao',
  '6',
  '2025',
  '3'],
 ['A New Large-Scale Dataset for Marine Vessel Re-Identification Based on Swin Transformer Network in Ocean Surveillance Scenario',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70007?af=R',
  'A new large-scale marine vessel dataset with well-annotated vessel orientation, vessel colour, and vessel type labels has been collected and created in a real marine environment for vessel Re-ID research. (2)A side information embedding module is introduced through the learnable embedding layer to encode more kinds of information, including marine vessel orientation, type and colour. (3)A deep neural network framework based on Swin Transformer for marine vessel Re-ID task is proposed to learn and extract discriminative features, and achieves SOTA performance on vessel, vehicle and person Re-ID benchmark datasets.\n\n\n\n\n\n\nABSTRACT\nIn recent years, there has been an upward trend that marine vessels, an important object category in marine monitoring, have gradually become a research focal point in the field of computer vision, such as detection, tracking, and classification. Among them, marine vessel re-identification (Re-ID) emerges as a significant frontier research topics, which not only faces the dual challenge of huge intra-class and small inter-class differences, but also has complex environmental interference in the port monitoring scenarios. To propel advancements in marine vessel Re-ID technology, SwinTransReID, a framework grounded in the Swin Transformer for marine vessel Re-ID, is introduced. Specifically, the project initially encodes the triplet images separately as a sequence of blocks and construct a baseline model leveraging the Swin Transformer, achieving better performance on the Re-ID

benchmark dataset in comparison to convolution neural network (CNN)-based approaches. And it introduces side information embedding (SIE) to further enhance the robust feature-learning capabilities of Swin Transformer, thus, integrating non-visual cues (orientation and type of vessel) and other auxiliary information (hull colour) through the insertion of learnable embedding modules. Additionally, the project presents VesselReID-1656, the first annotated large-scale benchmark dataset for vessel Re-ID in real-world ocean surveillance, comprising 135,866 images of 1656 vessels along with 5 orientations, 12 types, and 17 colours. The proposed method achieves 87.1% $\\%$ mAP and 96.1% $\\%$ Rank-1 accuracy on the newly-labelled challenging dataset, which surpasses the state-of-the-art (SOTA) method by 1.9% $\\%$ mAP regarding to performance. Moreover, extensive empirical results demonstrate the superiority of the proposed SwinTransReID on the person Market-1501 dataset, vehicle VeRi-776 dataset, and Boat Re-ID vessel dataset.',
  'Zhi Lu, Liguo Sun, Pin Lv, Jiuwu Hao, Bo Tang, Xuanzhen Chen',
  '6',
  '2025',
  '3'],
 ['Unlocking the power of multi-modal fusion in 3D object tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.12335?af=R',
  '3D Single Object Tracking plays a vital role in autonomous driving and robotics, yet traditional approaches have predominantly focused on using pure LiDAR-based point cloud data, often neglecting the benefits of integrating image modalities. To address this gap, we propose a novel Multi-modal Image-LiDAR Tracker (MILT) designed to overcome the limitations of single-modality methods by effectively combining RGB and point cloud data. Our key contribution is a dual-branch architecture that separately extracts geometric features from LiDAR and texture features from images. These features are then fused in a BEV perspective to achieve a comprehensive representation of the tracked object. A significant innovation in our approach is the Image-to-LiDAR Adapter module, which transfers the rich feature representation capabilities of the image modality to the 3D tracking task, and the BEV-Fusion module, which facilitates the interactive fusion of geometry and texture features. By validating MILT on public datasets, we demonstrate substantial performance improvements over traditional methods, effectively showcasing the advantages of our multi-modal fusion strategy. This work advances the state-of-the-art in SOT by integrating complementary information from RGB and LiDAR modalities, resulting in enhanced tracking accuracy and robustness.',
  'Yue Hu',
  '6',
  '2025',
  '2'],
 ['Representation alignment contrastive regularisation for multi-object tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.12331?af=R',
  "Achieving high-performance in multi-object tracking algorithms heavily relies on modelling spatial-temporal relationships during the data association stage. Mainstream approaches encompass rule-based and deep learning-based methods for spatial-temporal relationship modelling. While the former relies on physical motion laws, offering wider applicability but yielding suboptimal results for complex object movements, the latter, though achieving high-performance, lacks interpretability and involves complex module designs. This work aims to simplify deep learning-based spatial-temporal relationship models and introduce interpretability into features for data association. Specifically, a lightweight single-layer transformer encoder is utilised to model spatial-temporal relationships. To make features more interpretative, two contrastive regularisation losses based on representation alignment are proposed, derived from spatial-temporal consistency rules. By applying weighted summation to affinity matrices, the aligned features can seamlessly integrate into the data association stage of the original tracking workflow. Experimental results showcase that our model enhances the majority of existing tracking networks' performance without excessive complexity, with minimal increase in training overhead and nearly negligible computational and storage costs.",
  'Shujie Chen, Zhonglin Liu, Jianfeng Dong, Xun Wang, Di Zhou',

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  '6',
  '2025',
  '2'],
 ['AI-Powered Human Activity Detection and Tracking in Dense Crowds Using YOLOv8-
DeepSORT',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70227?af=R',
  'This study presents a real-time human activity detection and recognition
system that combines YOLOv8l with deep simple online real-time tracking for
enhanced performance in crowded and dynamic environments. Evaluated on over
10,000 frames from public and experimental datasets, the system achieves a mean
average precision of 96.1%, with the Adam optimiser outperforming stochastic
gradient descent. The model demonstrates robustness and scalability, offering a
significant advancement in intelligent public
surveillance.\n\n\n\n\n\n\n\n\nABSTRACT\nMany organisations face challenges in
accurately and efficiently identifying human activities using manually operated
CCTV cameras and small datasets, particularly in densely populated and dynamic
environments. This paper presents a real-time human activity detection and
recognition system that leverages You Only Look Once version 8 (YOLOv8) for
object detection and integrates the deep simple online real-time tracking
algorithm for associate frames, robust tracking and individual identity
preservation. Evaluated on a combination of public and experimental datasets
containing over 10,000 frames, the system achieves notable enhancements in
efficiency along with accuracy. Through data preprocessing and algorithm
optimisation, the Adam optimiser outperformed stochastic gradient descent (SGD)
by more than 5% in accuracy. K-fold cross-validation was applied to reduce
overfitting, while anchor boxes of varying scales and aspect ratios improved the
detection of objects of different sizes. The aspect ratio, which is used to
mitigate the effect of object size and control edge-orientation issues by
computing the ratio of width to height of the bounding boxes in YOLOv8, plays a
crucial role in object detection.YOLOv8l, combined with DeepSORT, delivers
state-of-the-art results, achieving a mean average precision of 96.1% in mixed
datasets. The system assigns unique IDs to track individuals, enabling precise
frame association during motion in crowded areas, which is crucial for
maintaining accuracy in complex environments. This study presents a robust and
scalable model, offering a significant improvement for public surveillance
technology.',
  'Abebe Belay Adege, Muluye Fentie Admas, Yitayal Tehone, Boaz Berhanu Tulu,
Eyosiyas Tibebu Endalamaw',
  '7',
  '2025',
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 ['Real-Time Underwater Vision Sensing System for AUV Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70183?af=R',
  'In this article, we developed an underwater real-time visual sensing system
for AUV tracking based on the edge embedded-device NVIDIA Jetson Xavier NX.
After experimental verification, compared with other algorithms, the UW-Siam
tracking algorithm we proposed not only has a higher success rate and accuracy,
but also has the best speed performance, and can easily cope with underwater
object tracking tasks in different scenarios.\n\n\n\n\n\n\n\n\nABSTRACT\nWith
the continuous development of emerging technologies such as big data and
artificial intelligence, the related technologies of perception tasks on which
underwater object tracking relies have made great progress. However, a
significant barrier still exists in implementing high-performance real-time
underwater object tracking on low-power edge devices. To achieve real-time
tracking of underwater objects for edge devices, this article develops an
underwater real-time visual sensing system applied to AUV tracking. First, an
underwater object tracking device is designed in this article employing a stereo
binocular camera, an edge embedded NVIDIA Jetson Xavier NX and an STM32 control
board. Then, after preprocessing, the input image with the effective USM
algorithm, we propose a quick approach for detecting underwater objects based on
SIoU-YOLOv8n, which enables automatic object recognition and selection. At the
same time, this article proposes a twin network UW-Siam for continuous tracking
of underwater objects, which achieves more accurate underwater object tracking.
Finally, the algorithm is deployed to the designed real-time underwater vision
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sensing system and tested in real-world scenarios. The tracking accuracy reached 0.652, and the detection mAP reached 0.97. The results indicate that the system can rapidly detect and continuously monitor objects, performing well in real-world scenarios with high accuracy and\xa0robustness.',
  'Canrong Chen, Tingzhuang Liu, Linglu He, Yi Zhu, Fei Yuan',
  '7',
  '2025',
  '8'],
 ['Spatiotemporal Context Adapting Framework for Visual Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70150?af=R',
  'Due to noise interference, existing methods often partially exploit auxiliary data, leading to underutilisation of spatiotemporal information. To address these issues, we propose a novel and concise tracking framework, uniformly encoding all auxiliary data and mitigating the unstable factors.\n\n\n\n\n\n\n\nABSTRACT\nVisual object tracking is widely applied in intelligent transportation systems and visual surveillance systems that serve smart cities, as well as in autonomous vehicles. Existing methods usually utilise a relation-modelling framework to model the visual object tracking problem, with auxiliary spatial context and temporal information. The spatial context is often extracted by enlarging the target template, which can introduce more background and positional information. The temporal correlation is obtained by associating the search image with previous images. However, due to noise interference, existing methods often partially exploit auxiliary data, leading to underutilisation of spatiotemporal information. To address these issues, we propose a novel and concise tracking framework, uniformly encoding all auxiliary data, including the enlarged target template, previous images, and corresponding target bounding boxes. Specifically, to mitigate the unstable factors introduced by these raw inputs, we propose a spatiotemporal context adaptive encoder, which can adaptively select appropriate information in noisy data. Extensive experiments show that the proposed method achieves state-of-the-art performance on various benchmarks, demonstrating its\xa0superiority.',
  'Kunlong Zhao, Dawei Zhao, Xu Wang, Liang Xiao, Yulong Huang, Yiming Nie, Yonggang Zhang, Bin Dai',
  '7',
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  '7'],
 ['A Two-Stage Homography Matrix Prediction Approach for Trajectory Generation in Multi-Object Tracking on Sports Fields',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70136?af=R',
  'To overcome the limitations of existing homography matrix prediction methods, we developed a two-stage prediction approach by optimizing the pixel position feature extraction structure. In the first stage, 4-key-point coordinate deviation is leveraged to indirectly estimate the macroscopic values of the homography matrix, followed by direct fine-tuning of the microscopic 8-DOF numerical components in the second stage. We validated the effectiveness of this approach in three competitive sports scenarios: basketball, ice hockey, and handball.\n\n\n\n\n\n\n\nABSTRACT\nHomography estimation is a fundamental topic in computer vision, especially in scenarios that require perspective changes for intelligent analysis of sports fields, where it plays a crucial role. Existing methods predict the homography matrix either indirectly by evaluating the 4-key-point coordinate deviation in paired images with the same visual content or directly by fine-tuning the 8 degrees of freedom numerical values that define the matrix. However, these approaches often fail to effectively incorporate coordinate positional information and overlook optimal application scenarios, leading to significant accuracy bottlenecks, particularly for paired images with differing visual content. To address these issues, we propose an approach that integrates both methods in a staged manner, leveraging their respective advantages. In the first stage, positional information is embedded to enhance convolutional computations, replacing serial concatenation in traditional feature fusion with parallel concatenation, while using 4-key-point coordinate deviation to predict the macroscopic homography matrix. In the second stage, positional information is further integrated into the input images to refine the direct 8 degrees of freedom numerical predictions, improving matrix fine-tuning accuracy. Comparative experiments with state-of-the-art methods

demonstrate that our approach achieves superior performance, yielding a root mean square error as low as 1.25 and an average corner errror as low as 14.1 in homography transformation of competitive sports image\xa0pairs.',
  'Pan Zhang, Jiangtao Luo, Guoliang Xu, Xupeng Liang',
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 ['Vorticity Transport Equation-Based Shadow Removal Approach for Image Inpainting',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70114?af=R',
  '(1) A new image inpainting algorithm using the VTE is developed; (2) FMM is introduced as an alternative to the iterative numerical solution of the VTE to improve the speed of image in painting; and (3) the VTE equation is transformed into a weighted-average equation to be used in conjunction with FMM.\n\n\n\n\n\n\n\n\nABSTRACT\nShadows are common in many types of images, causing information loss or disturbance. Shadow removal can help improve the quality of the digital image. If there is no effective information available to restore the original image in the shaded area, the interpolation-based inpainting technique can be used to remove the shadow from the digital image. This image inpainting technique typically involves establishing and solving partial differential equations (PDEs), an iterative solving process that is very time-consuming. To solve the time-consuming problem, a method that introduces the fast marching method (FMM) into the vorticity transport equation (VTE) is demonstrated. VTE is a type of partial differential equation describing two-dimensional fluids. FMM is a numerical scheme for tracking the evolution of monotonically advancing interfaces via finite difference solution of the eikonal equation. The proposed method contains three main steps: (a) by investigating the relationship between VTE and the traditional PDE-based image inpainting method, a new image inpainting model using VTE is developed;(b) the area to be inpainted is divided into boundaries that shrink in layers from the outside inwards using FMM; and (c) the VTE image inpainting model is converted into a weighted average form to coordinate with FMM. The visual and quantitative evaluation of the experimental results of shadow removal shows that the proposed method outperforms PDE-based and state-of-the-art methods in terms of shadow-removal effect and running time. The results also show that our method excels at inpainting images with near-smooth textures and simple geometric structures and where the pixels to be inpainted are continuous with neighbouring pixels.',
  'Xiaoying Ti, Li Yu, Quanhua Zhao',
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 ['Structure-Aware Transformer for Shadow Detection',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70031?af=R',
  'We propose a structure-aware transformer network for robust shadow detection. An edge-guided multi-task learning framework is designed to predict shadow maps with rich structures. An auxiliary semantic-aware learning is introduced to overcome the interference from complex\xa0scenes.\n\n\n\n\n\n\n\n\nABSTRACT\nShadow detection helps reduce ambiguity in object detection and tracking. However, existing shadow detection methods tend to misidentify complex shadows and their similar patterns, such as soft shadow regions and shadow-like regions, since they treat all cases equally, leading to an incomplete structure of the detected shadow regions. To alleviate this issue, we propose a structure-aware transformer network (STNet) for robust shadow detection. Specifically, we first develop a transformer-based shadow detection network to learn significant contextual information interactions. To this end, a context-aware enhancement (CaE) block is also introduced into the backbone to expand the receptive field, thus enhancing semantic interaction. Then, we design an edge-guided multi-task learning framework to produce intermediate and main predictions with a rich structure. By fusing these two complementary predictions, we can obtain an edge-preserving refined shadow map. Finally, we introduce an auxiliary semantic-aware learning to overcome the interference from complex scenes, which facilitates the model to perceive shadow and non-shadow regions using a semantic affinity loss. By doing these, we can predict high-quality shadow maps in different scenarios. Experimental results

demonstrate that our method reduces the balance error rate (BER) by 4.53%, 2.54%, and 3.49% compared to state-of-the-art (SOTA) methods on the benchmark datasets SBU, ISTD, and UCF,\xa0respectively.',
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 ['An intelligent retrievable object-tracking system with real-time edge inference capability',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.13297?af=R',
  "An intelligent retrievable object-tracking system assists users in quickly and accurately locating lost objects. However, challenges such as real-time processing on edge devices, low image resolution, and small-object detection significantly impact the accuracy and efficiency of video-stream-based systems, especially in indoor home environments. To overcome these limitations, a novel real-time intelligent retrievable object-tracking system is designed. The system incorporates a retrievable object-tracking algorithm that combines DeepSORT and sliding window techniques to enhance tracking capabilities. Additionally, the YOLOv7-small-scale model is proposed for small-object detection, integrating a specialized detection layer and the convolutional batch normalization LeakyReLU spatial-depth convolution module to enhance feature capture for small objects. TensorRT and INT8 quantization are used for inference acceleration on edge devices, doubling the frames per second. Experiments on a Jetson Nano (4 GB) using YOLOv7-small-scale show an 8.9% improvement in recognition accuracy over YOLOv7-tiny in video stream processing. This advancement significantly boosts the system's performance in efficiently and accurately locating lost objects in indoor home\xa0settings.",
  'Yujie Li, Yifu Wang, Zihang Ma, Xinghe Wang, Benying Tan, Shuxue Ding',
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  '2024',
  '12'],
 ['QMBOC-HFM: Enhanced QMBOC for Large-Scale LEO Navigation Augmentation Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70398?af=R',
  'A novel QMBOC signal with improved code tracking performance, multipath suppression, and anti-jamming capabilities.\n\n\n\n\n\n\n\nABSTRACT\nLarge-scale low earth orbit (LEO) constellations can enhance traditional global navigation satellite systems (GNSS) in many ways, but the rapid increase in the number of LEO satellites also poses challenges to the anti-interference performance of navigation signals. To improve the performance of the B1C signal in the future BeiDou global navigation satellite system, this paper proposes a modulation method: it enhances the existing quadrature-multiplexed binary offset carrier (QMBOC) by using periodic binary hyperbolic frequency modulation (HFM) signals as subcarriers. The enhanced QMBOC signal (QMBOC-HFM) demonstrates superior anti-interference and positioning accuracy compared to the original QMBOC signal. The proposed QMBOC-HFM provides a potential signal design for future LEO navigation-augmented global satellite navigation systems.',
  'Shugan Zhang, Xinming Huang, Bofang Chen',
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 ['Maximum Circumnavigation Radius for a Class of Bearings-Only Target Tracking Problem',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70390?af=R',
  'Under a virtual intersecting localization and tracking algorithm, the maximum circumnavigation radius is proposed for the bearings-only observer by analysing the relationship between the target position estimation error, observation error and the velocity of the observer and the target. The proposed method can provide an engineering application guidance for a class of bearings-only circumnavigation tracking problems. \n\n\n\n\n\n\n\nABSTRACT\nFor the problem of bearings-only target tracking using circumnavigation method, to enhance the safety and stealth, the observer needs to maintain the maximum possible distance from the target. But an excessively large circumnavigation radius may lead to significant tracking error or even no solution in target localization. Under a

virtual intersecting localization and tracking algorithm, the maximum circumnavigation radius is proposed for the bearings-only observer by analysing the relationship between the target position estimation error, observation error and the velocity of the observer and the target, which offers theoretical guidance for the engineering implementation of such circumnavigation tracking problem.',
  'Guoqing Qi, Yinya Li, Andong Sheng',
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 ['Research on Extended Target Tracking Algorithm Based on RHM and RMM Fusion',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70371?af=R',
  'This paper addresses the extended target tracking problem with irregular shapes. A fusion algorithm combining random hypersurface model (RHM) and random matrix model (RMM) for extended target tracking is proposed. By leveraging the fast convergence and strong robustness of RMM, the tracking efficiency of RHM is improved. Through simulation experiments, the effectiveness of the algorithm proposed in this paper is verified. The extended target fusion method proposed in this paper can provide a more accurate means for precise tracking and state prediction in practical engineering.\n\n\n\n\n\n\n\nABSTRACT\nAiming at the extended target tracking problem with irregular shapes, an extended target tracking algorithm that fuses random hypersurface model (RHM) and random matrix model (RMM) is proposed in the case where the priori shape of the target is unknown. First, the algorithm adopts the RMM method to track the extended target and then takes the reference points on the elliptical shape contour and constructs an ordered sequence. Second, the discrete Fourier transform (DFT) is performed on the sequence to find the coefficients of the harmonic components to obtain the elliptical shape parameters. Then, the ellipsoidal shape parameter is used as the a priori shape parameter of the star-convex RHM. Finally, the effectiveness of the proposed algorithm is verified by simulation experiments. The proposed extended target fusion method provides a more accurate means for precise tracking and state prediction of extended targets.',
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 ['Longitudinal and Feedforward Controller Design Based on Linear Matrix Inequalities for a Mini Aerial Vehicle',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70365?af=R',
  'In this paper, the design of a MIMO optimal PID controller and a feedforward controller to enhance disturbance rejection and reference tracking for an MAV system is proposed. The feedback controller employs LMI constraints for iterative variable tuning, while a feedforward strategy is developed to further optimise performance. \n\n\n\n\n\n\n\nABSTRACT\nThis paper presents the design of a multi-input multi-output (MIMO) optimal proportional–integral–derivative (PID) controller and a feedforward controller to enhance disturbance rejection and reference tracking in a mini aerial vehicle (MAV). The feedback controller is developed using linear matrix inequality (LMI) constraints within an iterative framework for tuning the PID parameters. In addition, a feedforward control strategy is proposed to further improve performance in reference tracking and disturbance rejection. The feedforward controller is designed under LMI constraints to minimise the H∞ norm of the transfer function matrix relating disturbances (or set-points) to the output (error). This optimisation problem is challenging due to its non-convex and nonlinear nature. Therefore, the main contribution of this paper is to propose a method based on utilising frequency sampling techniques, iterative algorithms and convex optimisation formulation to guarantee optimal solutions for reference tracking and disturbance rejection within specified constraints, which is crucial for preventing irreversible damage in control systems and also enhances the manoeuvrability of the MAV.',
  'Saeedreza Tofighi',
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Applications',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70364?af=R',
  'A digital control system based on FPGA is developed to generate a chopping frequency ranging from 12.5\xa0kHz to 100\xa0kHz, adjusting its output voltage, frequency, and duty cycle accordingly. The proposed digital controller, with optimisations in architecture and process technology, will improve chip area, decrease delay, and enhance the power efficiency of the converter compared to past researches.\n\n\n\n\n\n\n\nABSTRACT\nThis work presents the design and simulation of an Field-Programmable Gate Array (FPGA) based digital controller for a micro-power photovoltaic (PV) energy harvesting system tailored to Internet of Things (IoT) applications. The proposed system features a DC-DC boost converter with an H-bridge topology, designed to interface effectively with low-power PV sources and deliver regulated output to IoT loads. A constant voltage maximum power point tracking (CV-MPPT) algorithm is implemented to maintain optimal energy extraction under variable irradiance. The controller dynamically adjusts the chopping frequency, duty cycle, and output voltage. Leveraging the parallelism and reconfigurability of FPGAs, a high-speed digital control architecture is developed and synthesised on a Cyclone IV FPGA platform. Compared to conventional microcontroller or DSP-based solutions, this approach offers significantly improved response time, power efficiency, and scalability. The final implementation achieves a chip area of 0.92 mm2, a control loop delay of 106\xa0ms, and an overall efficiency of 92.36%, demonstrating its advantages over existing designs in terms of compactness, performance, and energy efficiency.',
  'Keyvan Barati, Abdolsamad Hamidi',
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  '2025',
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 ['High-Impedance Dipoles for Auto-Receiver Tracking Wireless Power Transfer Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70339?af=R',
  'This study presents a self-tuning multi-transmitter (multi-Tx) wireless power transfer (WPT) system designed for applications requiring freely positioned receivers (Rxs).\n\n\n\n\n\n\n\nABSTRACT\nThis study presents a self-tuning multi-transmitter (multi-Tx) wireless power transfer (WPT) system designed for applications requiring freely positioned receivers (Rxs). The system leverages high-impedance dipole (HID) as Txs to dynamically activate the nearest Tx to a simple dipole antenna as the Rx while deactivating other Txs without additional control circuits. The Txs design incorporates a modified coaxial cable dipole antenna featuring symmetrical gaps over the shield and inductive tuning elements between the central wire and the shield to optimise the resonance frequency and ensure effective power transfer. The feeding point is connected to the central wire via a small cut in the shield. This autonomous behaviour simplifies system operation, enhances flexibility, and ensures acceptable efficient power transfer. Experimental evaluation demonstrates that the system achieves a power transfer efficiency of approximately 65% while maintaining consistent performance as the Rx rotates over two orthogonally located Txs. The dynamic self-tuning mechanism adapts to the position of the Rx, proving particularly advantageous on curved surfaces.',
  'Ali Sharifian Mazraeh Mollaei, Ilkka Laakso, Masoud Sharifian Mazraeh Mollaei',
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 ['Fine-Grained Temporal Encoding and Decoding-Based Underwater Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70346?af=R',
  'This study focuses on this domain and proposes an innovative fine-grained temporal encoding and decoding-based underwater object tracking method.\n\n\n\n\n\n\n\nABSTRACT\nUnderwater object tracking is a highly challenging task in the field of computer vision. This study focuses on this domain and proposes an innovative fine-grained temporal encoding and decoding-based underwater object tracking method. Due to the complex and dynamic underwater environment, such as uneven lighting, turbid water quality, and complex target motion patterns, existing underwater object tracking methods face

significant limitations in accuracy and stability. By carefully designing a refinement module that combines fine-grained consistency and candidate elimination, this method can accurately extract fine-grained features of the target and effectively mitigate the interference of various underwater complexities during feature extraction, thereby improving the precision of target features. Furthermore, leveraging the temporal encoding–decoding module, the target features are continuously propagated along the temporal sequence, allowing full utilization of the relational information between frames, which further enhances tracking stability. Experiments were conducted on the UVOT400 dataset, which is large-scale and rich in attributes with diverse target categories. The results demonstrate that, compared to existing methods, this approach significantly outperforms in both accuracy and stability of underwater object tracking, providing new insights and effective solutions for the advancement of underwater object tracking\xa0technology.',
  'Zhen Sun, Zhenggang Guan, Qinghua Li, Mengyang Yuan, Haonan Sun',
  '8',
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 ['Full-Space Scanning Leaky-Wave Antenna Utilising Spoof Surface Plasmon Polaritons',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70328?af=R',
  'In this paper, we present a novel spoof surface plasmon polariton leaky-wave antenna (SSPP-LWA) capable of full-space beam scanning. The proposed antenna achieves full-space beam scanning from -90° to +90° across the frequency band of 9.8–13.3\xa0GHz, with a high scanning rate of 5.94° per 1% frequency variation. Additionally, the design features a simplified structure conducive to practical fabrication. \n\n\n\n\n\n\n\n\nABSTRACT\nA novel spoof surface plasmon polariton leaky-wave antenna (SSPP-LWA) capable of full-space beam scanning is proposed in this letter. First, the surface plasmon polariton (SPPs) unit and its corresponding transmission line are carefully designed, and the underlying mechanism to achieve full-space scanning is analysed based on a monopole array structure. Specifically, a spoof surface plasmon polariton (SSPP) transmission line combined with a semicircular, three-dimensionally loaded radiating patch is introduced and equivalently modelled as a monopole radiating element. Subsequently, the proposed LWA is realised by employing a monopole array composed of 12 identical radiating elements. Simulation results verify that the antenna achieves continuous beam scanning from -90° to +90° within the frequency range of 9.8–13.3\xa0GHz, exhibiting a high scanning rate of up to 5.94°/%, with an average gain of approximately 9 dBi. Benefiting from its excellent scanning capability and stable radiation characteristics, this antenna demonstrates significant potential for target detection and tracking applications in radar systems.',
  'Ran Yu, Leilei Liu',
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 ['Implementation and Performance Analysis of RTK-GNSS in Wearable Devices for Athletes in Harsh Environments',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70289?af=R',
  'This study investigates the implementation of real-time kinematic global navigation satellite system (RTK-GNSS) technique in wearable electronic performance and tracking system for football players to obtain highly accurate positioning data, even in harsh environments. The experiment results demonstrate that the utilization of RTK-GNSS can significantly improve positioning accuracy in various stadium environments, which is crucial for evaluating player performance.\n\n\n\n\n\n\n\n\nABSTRACT\nThis study presents the performance analysis of RTK-GNSS (real-time kinematic global navigation satellite system) mounted on wearable devices for athletes in harsh environments. GNSS signal can deteriorate by obstacles, i.e. stadium roofs, due to the high GDOP (geometric dilution of precision). RTK-GNSS is used to overcome harsh environment problems in this study. Hardware experiments are performed to analyse the performance of RTK-GNSS in sports wearable devices in harsh environments. The full pitch tracking test results of a wearable device equipped with RTK-GNSS demonstrate the best performance among three different wearable devices in a harsh

environment; the maximum positioning error of 1.56 m$\\text{m}$ is approximately 3–30 times smaller than that of wearable devices equipped with stand-alone GNSS. The distance test results of the wearable device equipped with RTK-GNSS validate the most accurate performance, 98.97%$\\%$, compared to the true value in harsh\xa0environment.',
  'Mingu Kim, Bit Kim, Chulwoo Park, Jinsung Yoon',
  '8',
  '2025',
  '5'],
 ['Robust Beam Tracking for 3D Manoeuvrable UAV in DFRC Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70211?af=R',
  "This letter presents a novel 3D robust manoeuvrable unmanned aerial vehicle (UAV) beam tracking algorithm within the dual-functional radar-communication framework. Specifically, we propose the interacting multiple model algorithm to accommodate multiple potential UAV motion models and improve the unscented Kalman filter algorithm to enhance its stability.\n\n\n\n\n\n\n\n\nABSTRACT\nDual-functional radar-communication (DFRC) will be a key technology in future sixth-generation (6G) network. Specifically, an integrated radar and communication platform (IRCP) equipped with full-dimensional antenna arrays can execute 3D beamforming, which can effectively minimize interference for communicating with unmanned aerial vehicles (UAVs). However, a significant challenge in fully exploiting 3D beamforming gain is the IRCP's ability to precisely track manoeuvrable UAVs. In this letter, we propose a novel interacting multiple model with enhanced unscented Kalman filter algorithm to realize 3D beam tracking for one manoeuvrable UAV within the framework of DFRC. To be specific, we build multiple state transition models to adopt the manoeuvrability of the UAV. Meanwhile, the stability of the unscented Kalman filter is improved by using the singular value decomposition. Simulation results show that the proposed algorithm has higher tracking accuracy and better transmission performance for one manoeuvrable UAV than the traditional single-motion model based beam tracking\xa0algorithm.",
  'Yuhang Tang, Wei Liu, Jinkun Zhu, Jing Lei, Haoying Mo',
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 ['Optimal Performance Analysis for Networked System with Quantitative Control Input Over Feedback Channel',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70183?af=R',
  "This paper focuses on the performance analysis of networked control systems, specifically addressing the optimal tracking performance with quantitative control inputs over feedback channels. A dual-degree-of-freedom controller is designed using the Youla parameterization method, and the system's performance is assessed through numerical simulations. The findings highlight the impact of unstable poles, non-minimum phase zeros, and quantization errors on tracking performance, offering insights for practical control system design.\n\n\n\n\n\n\n\n\nABSTRACT\nNetworked control systems (NCS) have become an emerging and important research area given the rapidly developing network communication technology. Numerous studies in this area concentrate on the stability of control systems, while little has been done on its performance analysis, especially the index of an optimal control system. We fill this gap here by analysing the optimal tracking performance for an NCS that has quantitative control inputs over feedback channels. We design a dual-degree-of-freedom controller along with an optimal control system, by applying the Youla parameterization method based on the time domain and coprime decompositions. The proposed methodology is assessed by numerical simulations. The system's tracking performance is found to be deteriorated by the unstable poles and non-minimum phase zeros of the controlled object, as well as by quantization signal errors. These findings are beneficial for analysing and designing practical control\xa0systems.",
  'Fang Han, Xiaowei Jiang',
  '8',
  '2025',
  '3'],
 ['Applying Adaptive Wavelet Neural Network and Sliding Mode Control for

Tracking Control of MEMS Gyroscope',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70187?af=R',
  'In this letter, an algorithm applying an adaptive wavelet neural network (AWNN) and sliding-mode control (SMC) is proposed, investigated and exploited for tracking control of micro-electromechanical system (MEMS) gyroscope. Such an AWNN model can be regarded as a special radius basis function neural network and utilizes Mexican hat function as activation function. Besides, Taylor expansion is used for analyzing activation radius, which is considered as an adaptive variable. The parameters of the MEMS gyroscope model are hard to obtain in engineering applications; thus, AWNN is designed to approximate the uncertain function of MEMS gyroscope and the unknown asymmetrical dead zone in the control scheme. The weights updating laws and the activation radius adaptive laws in AWNN are derived from the Lyapunov stability analysis, which results in the control error converging to the desired value and the weights and activation radius converging to its real value. To achieve the effect of error acceleration, a power function is used to design a sliding mode function. Computer simulation results substantiate the theoretical analysis and further demonstrate the efficacy of such an algorithm combined with AWNN and SMC for MEMS gyroscope control.',
  'Guo Luo, Bingling Chen',
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  '2025',
  '3'],
 ['A GGIW PMBM Smoother for Multiple Extended Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70188?af=R',
  'A gamma Gaussian inverse Wishart Poisson multi-Bernoulli mixture (PMBM) filter that uses multiple time scans for smoothing is proposed. The results of continuous tracking are smoothed and corrected at regular intervals, resulting in more accurate tracking performance. Simulation results show that the proposed algorithm effectively reduces generalized optimal sub-pattern assignment errors compared to the original PMBM filter. \n\n\n\n\n\n\n\nABSTRACT\nPoisson multi-Bernoulli mixture (PMBM) filtering is an effective method for multi-extended target tracking. However, it has a low utilization of information from multiple time scans, leading to potential errors such as jumps and discontinuities in the target trajectories. To address this, propose a gamma Gaussian inverse Wishart PMBM filter that uses multiple time scans for smoothing. The results of continuous tracking are smoothed and corrected at regular intervals, resulting in more accurate tracking performance. Simulation results show that the proposed algorithm effectively reduces generalized optimal sub-pattern assignment errors compared to the original PMBM filter.',
  'Wenhui Wang, Ye Xu, Kejie Zhang, YouPeng Sun, Peng Li',
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 ['A Novel D-InSAR and Offset Tracking Fusion Algorithm Based on Variance-Masked Mean Filtering',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70173?af=R',
  'This paper proposes a novel fusion algorithm based on variance-masked mean filtering to combine the strengths of both methods. The algorithm filters noise in gentle regions of the offset map and fuses refined results with D-InSAR to enhance accuracy. Applied to the 2023 Türkiye earthquake, the method effectively reduces noise, corrects unwrapping errors, and achieves superior accuracy in high-gradient deformation scenarios such as earthquakes and landslides.\n\n\n\n\n\n\n\nABSTRACT\nAccurate ground deformation monitoring is crucial for understanding geophysical activities and mitigating disaster risks. D-InSAR and offset tracking are widely used but face limitations: D-InSAR struggles with phase unwrapping errors in large-scale deformation regions, while offset tracking lacks precision in small-scale deformation. This paper proposes a fusion algorithm based on variance-masked mean filtering to combine the strengths of both methods. The algorithm filters noise in gentle regions of the offset map and fuses refined results with D-InSAR to enhance accuracy. Applied to the 2023 Türkiye earthquake, the method effectively reduces noise, corrects unwrapping errors, and achieves superior accuracy in large-scale deformation scenarios such as earthquakes and landslides.',

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  '2025',
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 ['Extended target tracking using neural network and Gaussian process',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70151?af=R',
  "In extended target tracking, Gaussian Process (GP) is utilized to model
unknown contour functions based on the model-predicted target center and contour
measurements. However, model prediction relies on accurate prior knowledge. When
the model-predicted target center is inaccurate, it will affect the modelling of
the measurement model. To address issue, this letter introduces a hybrid-driven
approach that combines extended Kalman filter using GP with neural network;
proposes an extended target tracking algorithm using neural network and GP. The
algorithm predicts the target center according to the neural network and the
target's kinematic model, and takes the prediction center and the contour
measurements at the current moment as the input of the neural network, which in
turn provides real-time estimates for the predicted center compensation. The
simulation results show that the algorithm has a significant improvement in
tracking performance and better accuracy in estimating the center position and
extent state of the target.",
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  'Riran Cheng, Xupeng Wang, Ferdous Sohel, Hang Lei',
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  'https://www.sciencedirect.com/science/article/pii/S0031320325009574',
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  'Long Gao, Yunhe Zhang, Langkun Chen, Yan Jiang, Gang He, Weiying Xie, Yunsong
Li',
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 ['Tracing Intricate Cues in Dialogue: Joint Graph Structure and Sentiment
Dynamics for Multimodal Emotion Recognition',
  'http://ieeexplore.ieee.org/document/11045091',
  'Multimodal emotion recognition in conversation (MERC) has garnered
substantial research attention recently. Existing MERC methods face several
challenges: (1) they fail to fully harness direct inter-modal cues, possibly
leading to less-than-thorough cross-modal modeling; (2) they concurrently
extract information from the same and different modalities at each network
layer, potentially triggering conflicts from the fusion of multi-source data;
(3) they lack the agility required to detect dynamic sentimental changes,
perhaps resulting in inaccurate classification of utterances with abrupt
sentiment shifts. To address these issues, a novel approach named GraphSmile is
proposed for tracking intricate emotional cues in multimodal dialogues.
GraphSmile comprises two key components, i.e., GSF and SDP modules. GSF
ingeniously leverages graph structures to alternately assimilate inter-modal and
intra-modal emotional dependencies layer by layer, adequately capturing cross-
modal cues while effectively circumventing fusion conflicts. SDP is an auxiliary
task to explicitly delineate the sentiment dynamics between utterances,
promoting the model’s ability to distinguish sentimental discrepancies.
GraphSmile is effortlessly applied to multimodal sentiment analysis in
conversation (MSAC), thus enabling simultaneous execution of MERC and MSAC
tasks. Empirical results on multiple benchmarks demonstrate that GraphSmile can
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handle complex emotional and sentimental patterns, significantly outperforming baseline models.',
  'Jiang Li, Xiaoping Wang, Zhigang Zeng',
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  '2025',
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 ['Associate Everything Detected: Facilitating Tracking-by-Detection to the Unknown',
  'http://ieeexplore.ieee.org/document/11105000',
  'Multi-object tracking (MOT) emerges as a pivotal and highly promising branch in the field of computer vision. Classical closed-vocabulary MOT (CV-MOT) methods aim to track objects of predefined categories. Recently, some open-vocabulary MOT (OV-MOT) methods have successfully addressed the problem of tracking unknown categories. However, we found that the CV-MOT and OV-MOT methods each struggle to excel in the tasks of the other. In this paper, we present a unified framework, Associate Everything Detected (AED), that simultaneously tackles CV-MOT and OV-MOT by integrating with any off-the-shelf detector and supports unknown categories. Different from existing tracking-by-detection MOT methods, AED gets rid of prior knowledge (e.g., motion cues) and relies solely on highly robust feature learning to handle complex trajectories in OV-MOT tasks while keeping excellent performance in CV-MOT tasks. Specifically, we model the association task as a similarity decoding problem and propose a sim-decoder with an association-centric learning mechanism. The sim-decoder calculates similarities in three aspects: spatial, temporal, and cross-clip. Subsequently, association-centric learning leverages these threefold similarities to ensure that the extracted features are appropriate for continuous tracking and robust enough to generalize to unknown categories. Compared with existing powerful OV-MOT and CV-MOT methods, AED achieves superior performance on TAO, SportsMOT, and DanceTrack without any prior knowledge. Our code is available at https://github.com/balabooooo/AED',
  'Zimeng Fang, Chao Liang, Xue Zhou, Shuyuan Zhu, Xi Li',
  '4',
  '2025',
  '9'],
 ['CloCap-GS: Clothed Human Performance Capture With 3D Gaussian Splatting',
  'http://ieeexplore.ieee.org/document/11104970',
  'Capturing the human body and clothing from videos has obtained significant progress in recent years, but several challenges remain to be addressed. Previous methods reconstruct the 3D bodies and garments from videos with self-rotating human motions or capture the body and clothing separately based on neural implicit fields. However, the reconstruction methods for self-rotating motions may cause instable tracking on dynamic videos with arbitrary human motions, while implicit fields based methods are limited to inefficient rendering and low quality synthesis. To solve these problems, we propose a new method, called CloCap-GS, for clothed human performance capture with 3D Gaussian Splatting. Specifically, we align 3D Gaussians with the deforming geometries of body and clothing, and leverage photometric constraints formed by matching Gaussians renderings with input video frames to recover temporal deformations of the dense template geometry. The geometry deformations and Gaussians properties of both the body and clothing are optimized jointly, achieving both dense geometry tracking and novel-view synthesis. In addition, we introduce a physics-aware material-varying cloth model to preserve physically-plausible cloth dynamics and body-clothing interactions that is pre-trained in a self-supervised manner without preparing training data. Compared with the existing methods, our method improves the accuracy of dense geometry tracking and quality of novel-view synthesis for a variety of daily garment types (e.g., loose clothes). Extensive experiments in both quantitative and qualitative evaluations demonstrate the effectiveness of CloCap-GS on real sparse-view or monocular videos.',
  'Kangkan Wang, Chong Wang, Jian Yang, Guofeng Zhang',
  '4',
  '2025',
  '9'],
 ['Enhancing the Two-Stream Framework for Efficient Visual Tracking',

'http://ieeexplore.ieee.org/document/11131531',
'Practical deployments, especially on resource-limited edge devices, necessitate high speed for visual object trackers. To meet this demand, we introduce a new efficient tracker with a Two-Stream architecture, named ToS. While the recent one-stream tracking framework, employing a unified backbone for simultaneous processing of both the template and search region, has demonstrated exceptional efficacy, we find the conventional two-stream tracking framework, which employs two separate backbones for the template and search region, offers inherent advantages. The two-stream tracking framework is more compatible with advanced lightweight backbones and can efficiently utilize benefits from large templates. We demonstrate that the two-stream setup can exceed the one-stream tracking model in both speed and accuracy through strategic designs. Our methodology rejuvenates the two-stream tracking paradigm with lightweight pre-trained backbones and the proposed three efficient strategies: 1) A feature-aggregation module that improves the representation capability of the backbone, 2) A channel-wise approach for feature fusion, presenting a more effective and lighter alternative to spatial concatenation techniques, and 3) An expanded template strategy to boost tracking accuracy with negligible additional computational cost. Extensive evaluations across multiple tracking benchmarks demonstrate that the proposed method sets a new state-of-the-art performance in efficient visual tracking.',
'Chengao Zong, Xin Chen, Jie Zhao, Yang Liu, Huchuan Lu, Dong Wang',
'4',
'2025',
'9'],
['Complex Dual-Tree Pyramid Scattering Transformer',
'http://ieeexplore.ieee.org/document/11008720',
'Attention-based transformer networks have recently played an increasingly important role in computer vision tasks. However, since pixel-by-pixel attention multiplication does not involve constraint assumptions such as spatial invariance, the computational complexity grows quadratically with the increase of input pixels. Therefore, this article proposes a complex pyramid scattering Transformer in dense scale space, which introduces sparse scattering constraints with a small number of wavelet basis parameters. It enhances the Transformer’s flexibility and sparsity in multiscale space and, to a certain extent, slows down the increase in computational complexity caused by multiresolution input. In addition, compared with the general single-tree real wavelet transform, the dual-tree complex scattering method improves the aliasing of the scattering attention layer and helps obtain a more robust feature representation. At the same time, the multihead stepwise pyramid scattering coupling mechanism helps increase the abundance of directional priors. We conduct experiments in image classification and video tracking scenarios and verify the reliability and superiority of our dual-tree complex pyramid scattering Transformer for visual tasks with different scale requirements. The performance is better than that of the baseline Transformer and other advanced wavelet scattering networks at the same parameter scale. The code is available at https://github.com/Dawn5786/CPSTFormer',
'Xiaotong Li, Licheng Jiao, Lingling Li, Fang Liu, Hao Zhu, Xin Zhang, Xu Liu, Shuyuan Yang',
'5',
'2025',
'9'],
['A Review of Multi-Object Tracking in Recent Times',
'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70010?af=R',
'This paper discusses many recent deep-learning MOT methods. Moreover, to highlight their contributions, these methods are categorised into four main groups: detection-based, SOT-based, and segmentation-based methods according to the integrated core technologies.\n\n\n\n\n\n\nABSTRACT\nMulti-object tracking (MOT) is a fundamental problem in computer vision that involves tracing the trajectories of foreground targets throughout a video sequence while establishing correspondences for identical objects across frames. With the advancement of deep learning techniques, methods based on deep learning have significantly improved accuracy and efficiency in MOT. This paper reviews several recent deep learning-based MOT methods and categorises them into three

main groups: detection-based, single-object tracking (SOT)-based, and segmentation-based methods, according to their core technologies. Additionally, this paper discusses the metrics and datasets used for evaluating MOT performance, the challenges faced in the field, and future directions for research.',
  'Suya Li, Hengyi Ren, Xin Xie, Ying Cao',
  '6',
  '2025',
  '3'],
 ['A New Large-Scale Dataset for Marine Vessel Re-Identification Based on Swin Transformer Network in Ocean Surveillance Scenario',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.70007?af=R',
  'A new large-scale marine vessel dataset with well-annotated vessel orientation, vessel colour, and vessel type labels has been collected and created in a real marine environment for vessel Re-ID research. (2)A side information embedding module is introduced through the learnable embedding layer to encode more kinds of information, including marine vessel orientation, type and colour. (3)A deep neural network framework based on Swin Transformer for marine vessel Re-ID task is proposed to learn and extract discriminative features, and achieves SOTA performance on vessel, vehicle and person Re-ID benchmark datasets.\n\n\n\n\n\n\nABSTRACT\nIn recent years, there has been an upward trend that marine vessels, an important object category in marine monitoring, have gradually become a research focal point in the field of computer vision, such as detection, tracking, and classification. Among them, marine vessel re-identification (Re-ID) emerges as a significant frontier research topics, which not only faces the dual challenge of huge intra-class and small inter-class differences, but also has complex environmental interference in the port monitoring scenarios. To propel advancements in marine vessel Re-ID technology, SwinTransReID, a framework grounded in the Swin Transformer for marine vessel Re-ID, is introduced. Specifically, the project initially encodes the triplet images separately as a sequence of blocks and construct a baseline model leveraging the Swin Transformer, achieving better performance on the Re-ID benchmark dataset in comparison to convolution neural network (CNN)-based approaches. And it introduces side information embedding (SIE) to further enhance the robust feature-learning capabilities of Swin Transformer, thus, integrating non-visual cues (orientation and type of vessel) and other auxiliary information (hull colour) through the insertion of learnable embedding modules. Additionally, the project presents VesselReID-1656, the first annotated large-scale benchmark dataset for vessel Re-ID in real-world ocean surveillance, comprising 135,866 images of 1656 vessels along with 5 orientations, 12 types, and 17 colours. The proposed method achieves 87.1% $\\%$ mAP and 96.1% $\\%$ Rank-1 accuracy on the newly-labelled challenging dataset, which surpasses the state-of-the-art (SOTA) method by 1.9% $\\%$ mAP regarding to performance. Moreover, extensive empirical results demonstrate the superiority of the proposed SwinTransReID on the person Market-1501 dataset, vehicle VeRi-776 dataset, and Boat Re-ID vessel dataset.',
  'Zhi Lu, Liguo Sun, Pin Lv, Jiuwu Hao, Bo Tang, Xuanzhen Chen',
  '6',
  '2025',
  '3'],
 ['Unlocking the power of multi-modal fusion in 3D object tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.12335?af=R',
  '3D Single Object Tracking plays a vital role in autonomous driving and robotics, yet traditional approaches have predominantly focused on using pure LiDAR-based point cloud data, often neglecting the benefits of integrating image modalities. To address this gap, we propose a novel Multi-modal Image-LiDAR Tracker (MILT) designed to overcome the limitations of single-modality methods by effectively combining RGB and point cloud data. Our key contribution is a dual-branch architecture that separately extracts geometric features from LiDAR and texture features from images. These features are then fused in a BEV perspective to achieve a comprehensive representation of the tracked object. A significant innovation in our approach is the Image-to-LiDAR Adapter module, which transfers the rich feature representation capabilities of the image modality to the 3D tracking task, and the BEV-Fusion module, which facilitates

the interactive fusion of geometry and texture features. By validating MILT on public datasets, we demonstrate substantial performance improvements over traditional methods, effectively showcasing the advantages of our multi-modal fusion strategy. This work advances the state-of-the-art in SOT by integrating complementary information from RGB and LiDAR modalities, resulting in enhanced tracking accuracy and robustness.',
  'Yue Hu',
  '6',
  '2025',
  '2'],
 ['Representation alignment contrastive regularisation for multi-object tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/cvi2.12331?af=R',
  "Achieving high-performance in multi-object tracking algorithms heavily relies on modelling spatial-temporal relationships during the data association stage. Mainstream approaches encompass rule-based and deep learning-based methods for spatial-temporal relationship modelling. While the former relies on physical motion laws, offering wider applicability but yielding suboptimal results for complex object movements, the latter, though achieving high-performance, lacks interpretability and involves complex module designs. This work aims to simplify deep learning-based spatial-temporal relationship models and introduce interpretability into features for data association. Specifically, a lightweight single-layer transformer encoder is utilised to model spatial-temporal relationships. To make features more interpretative, two contrastive regularisation losses based on representation alignment are proposed, derived from spatial-temporal consistency rules. By applying weighted summation to affinity matrices, the aligned features can seamlessly integrate into the data association stage of the original tracking workflow. Experimental results showcase that our model enhances the majority of existing tracking networks' performance without excessive complexity, with minimal increase in training overhead and nearly negligible computational and storage costs.",
  'Shujie Chen, Zhonglin Liu, Jianfeng Dong, Xun Wang, Di Zhou',
  '6',
  '2025',
  '2'],
 ['Real-Time Underwater Vision Sensing System for AUV Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70183?af=R',
  'In this article, we developed an underwater real-time visual sensing system for AUV tracking based on the edge embedded-device NVIDIA Jetson Xavier NX. After experimental verification, compared with other algorithms, the UW-Siam tracking algorithm we proposed not only has a higher success rate and accuracy, but also has the best speed performance, and can easily cope with underwater object tracking tasks in different scenarios.\n\n\n\n\n\n\n\n\nABSTRACT\nWith the continuous development of emerging technologies such as big data and artificial intelligence, the related technologies of perception tasks on which underwater object tracking relies have made great progress. However, a significant barrier still exists in implementing high-performance real-time underwater object tracking on low-power edge devices. To achieve real-time tracking of underwater objects for edge devices, this article develops an underwater real-time visual sensing system applied to AUV tracking. First, an underwater object tracking device is designed in this article employing a stereo binocular camera, an edge embedded NVIDIA Jetson Xavier NX and an STM32 control board. Then, after preprocessing, the input image with the effective USM algorithm, we propose a quick approach for detecting underwater objects based on SIoU-YOLOv8n, which enables automatic object recognition and selection. At the same time, this article proposes a twin network UW-Siam for continuous tracking of underwater objects, which achieves more accurate underwater object tracking. Finally, the algorithm is deployed to the designed real-time underwater vision sensing system and tested in real-world scenarios. The tracking accuracy reached 0.652, and the detection mAP reached 0.97. The results indicate that the system can rapidly detect and continuously monitor objects, performing well in real-world scenarios with high accuracy and\xa0robustness.',
  'Canrong Chen, Tingzhuang Liu, Linglu He, Yi Zhu, Fei Yuan',
  '7',

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  '2025',
  '8'],
 ['Spatiotemporal Context Adapting Framework for Visual Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70150?af=R',
  'Due to noise interference, existing methods often partially exploit auxiliary
data, leading to underutilisation of spatiotemporal information. To address
these issues, we propose a novel and concise tracking framework, uniformly
encoding all auxiliary data and mitigating the unstable
factors.\n\n\n\n\n\n\n\nABSTRACT\nVisual object tracking is widely applied in
intelligent transportation systems and visual surveillance systems that serve
smart cities, as well as in autonomous vehicles. Existing methods usually
utilise a relation-modelling framework to model the visual object tracking
problem, with auxiliary spatial context and temporal information. The spatial
context is often extracted by enlarging the target template, which can introduce
more background and positional information. The temporal correlation is obtained
by associating the search image with previous images. However, due to noise
interference, existing methods often partially exploit auxiliary data, leading
to underutilisation of spatiotemporal information. To address these issues, we
propose a novel and concise tracking framework, uniformly encoding all auxiliary
data, including the enlarged target template, previous images, and corresponding
target bounding boxes. Specifically, to mitigate the unstable factors introduced
by these raw inputs, we propose a spatiotemporal context adaptive encoder, which
can adaptively select appropriate information in noisy data. Extensive
experiments show that the proposed method achieves state-of-the-art performance on
various benchmarks, demonstrating its\xa0superiority.',
  'Kunlong Zhao, Dawei Zhao, Xu Wang, Liang Xiao, Yulong Huang, Yiming Nie,
Yonggang Zhang, Bin Dai',
  '7',
  '2025',
  '7'],
 ['A Two-Stage Homography Matrix Prediction Approach for Trajectory Generation
in Multi-Object Tracking on Sports Fields',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70136?af=R',
  'To overcome the limitations of existing homography matrix prediction methods,
we developed a two-stage prediction approach by optimizing the pixel position
feature extraction structure. In the first stage, 4-key-point coordinate
deviation is leveraged to indirectly estimate the macroscopic values of the
homography matrix, followed by direct fine-tuning of the microscopic 8-DOF
numerical components in the second stage. We validated the effectiveness of this
approach in three competitive sports scenarios: basketball, ice hockey, and
handball.\n\n\n\n\n\n\n\nABSTRACT\nHomography estimation is a fundamental
topic in computer vision, especially in scenarios that require perspective
changes for intelligent analysis of sports fields, where it plays a crucial
role. Existing methods predict the homography matrix either indirectly by
evaluating the 4-key-point coordinate deviation in paired images with the same
visual content or directly by fine-tuning the 8 degrees of freedom numerical
values that define the matrix. However, these approaches often fail to
effectively incorporate coordinate positional information and overlook optimal
application scenarios, leading to significant accuracy bottlenecks, particularly
for paired images with differing visual content. To address these issues, we
propose an approach that integrates both methods in a staged manner, leveraging
their respective advantages. In the first stage, positional information is
embedded to enhance convolutional computations, replacing serial concatenation
in traditional feature fusion with parallel concatenation, while using 4-key-
point coordinate deviation to predict the macroscopic homography matrix. In the
second stage, positional information is further integrated into the input images
to refine the direct 8 degrees of freedom numerical predictions, improving
matrix fine-tuning accuracy. Comparative experiments with state-of-the-art methods
demonstrate that our approach achieves superior performance, yielding a root
mean square error as low as 1.25 and an average corner errror as low as 14.1 in
homography transformation of competitive sports image\xa0pairs.',
  'Pan Zhang, Jiangtao Luo, Guoliang Xu, Xupeng Liang',
  '7',
  '2025',
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['Vorticity Transport Equation-Based Shadow Removal Approach for Image Inpainting',
'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70114?af=R',
'(1) A new image inpainting algorithm using the VTE is developed; (2) FMM is introduced as an alternative to the iterative numerical solution of the VTE to improve the speed of image in painting; and (3) the VTE equation is transformed into a weighted-average equation to be used in conjunction with FMM.\n\n\n\n\n\n\n\nABSTRACT\nShadows are common in many types of images, causing information loss or disturbance. Shadow removal can help improve the quality of the digital image. If there is no effective information available to restore the original image in the shaded area, the interpolation-based inpainting technique can be used to remove the shadow from the digital image. This image inpainting technique typically involves establishing and solving partial differential equations (PDEs), an iterative solving process that is very time-consuming. To solve the time-consuming problem, a method that introduces the fast marching method (FMM) into the vorticity transport equation (VTE) is demonstrated. VTE is a type of partial differential equation describing two-dimensional fluids. FMM is a numerical scheme for tracking the evolution of monotonically advancing interfaces via finite difference solution of the eikonal equation. The proposed method contains three main steps: (a) by investigating the relationship between VTE and the traditional PDE-based image inpainting method, a new image inpainting model using VTE is developed;(b) the area to be inpainted is divided into boundaries that shrink in layers from the outside inwards using FMM; and (c) the VTE image inpainting model is converted into a weighted average form to coordinate with FMM. The visual and quantitative evaluation of the experimental results of shadow removal shows that the proposed method outperforms PDE-based and state-of-the-art methods in terms of shadow-removal effect and running time. The results also show that our method excels at inpainting images with near-smooth textures and simple geometric structures and where the pixels to be inpainted are continuous with neighbouring pixels.',
'Xiaoying Ti, Li Yu, Quanhua Zhao',
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'2025',
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['Structure-Aware Transformer for Shadow Detection',
'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.70031?af=R',
'We propose a structure-aware transformer network for robust shadow detection. An edge-guided multi-task learning framework is designed to predict shadow maps with rich structures. An auxiliary semantic-aware learning is introduced to overcome the interference from complex\xa0scenes.\n\n\n\n\n\n\n\nABSTRACT\nShadow detection helps reduce ambiguity in object detection and tracking. However, existing shadow detection methods tend to misidentify complex shadows and their similar patterns, such as soft shadow regions and shadow-like regions, since they treat all cases equally, leading to an incomplete structure of the detected shadow regions. To alleviate this issue, we propose a structure-aware transformer network (STNet) for robust shadow detection. Specifically, we first develop a transformer-based shadow detection network to learn significant contextual information interactions. To this end, a context-aware enhancement (CaE) block is also introduced into the backbone to expand the receptive field, thus enhancing semantic interaction. Then, we design an edge-guided multi-task learning framework to produce intermediate and main predictions with a rich structure. By fusing these two complementary predictions, we can obtain an edge-preserving refined shadow map. Finally, we introduce an auxiliary semantic-aware learning to overcome the interference from complex scenes, which facilitates the model to perceive shadow and non-shadow regions using a semantic affinity loss. By doing these, we can predict high-quality shadow maps in different scenarios. Experimental results demonstrate that our method reduces the balance error rate (BER) by 4.53%, 2.54%, and 3.49% compared to state-of-the-art (SOTA) methods on the benchmark datasets SBU, ISTD, and UCF,\xa0respectively.',
'Wanlu Sun, Liyun Xiang, Wei Zhao',
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'2025',

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  '3'],
 ['An intelligent retrievable object-tracking system with real-time edge
inference capability',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ipr2.13297?af=R',
  "An intelligent retrievable object-tracking system assists users in quickly
and accurately locating lost objects. However, challenges such as real-time
processing on edge devices, low image resolution, and small-object detection
significantly impact the accuracy and efficiency of video-stream-based systems,
especially in indoor home environments. To overcome these limitations, a novel
real-time intelligent retrievable object-tracking system is designed. The system
incorporates a retrievable object-tracking algorithm that combines DeepSORT and
sliding window techniques to enhance tracking capabilities. Additionally, the
YOLOv7-small-scale model is proposed for small-object detection, integrating a
specialized detection layer and the convolutional batch normalization LeakyReLU
spatial-depth convolution module to enhance feature capture for small objects.
TensorRT and INT8 quantization are used for inference acceleration on edge
devices, doubling the frames per second. Experiments on a Jetson Nano (4 GB)
using YOLOv7-small-scale show an 8.9% improvement in recognition accuracy over
YOLOv7-tiny in video stream processing. This advancement significantly boosts
the system's performance in efficiently and accurately locating lost objects in
indoor home\xa0settings.",
  'Yujie Li, Yifu Wang, Zihang Ma, Xinghe Wang, Benying Tan, Shuxue Ding',
  '7',
  '2024',
  '12'],
 ['Maximum Circumnavigation Radius for a Class of Bearings-Only Target Tracking
Problem',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70390?af=R',
  'Under a virtual intersecting localization and tracking algorithm, the maximum
circumnavigation radius is proposed for the bearings-only observer by analysing
the relationship between the target position estimation error, observation error
and the velocity of the observer and the target. The proposed method can provide
an engineering application guidance for a class of bearings-only
circumnavigation tracking problems. \n\n\n\n\n\n\n\nABSTRACT\nFor the problem
of bearings-only target tracking using circumnavigation method, to enhance the
safety and stealth, the observer needs to maintain the maximum possible distance
from the target. But an excessively large circumnavigation radius may lead to
significant tracking error or even no solution in target localization. Under a
virtual intersecting localization and tracking algorithm, the maximum
circumnavigation radius is proposed for the bearings-only observer by analysing
the relationship between the target position estimation error, observation error
and the velocity of the observer and the target, which offers theoretical
guidance for the engineering implementation of such circumnavigation tracking
problem.',
  'Guoqing Qi, Yinya Li, Andong Sheng',
  '8',
  '2025',
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 ['Research on Extended Target Tracking Algorithm Based on RHM and RMM Fusion',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70371?af=R',
  'This paper addresses the extended target tracking problem with irregular
shapes. A fusion algorithm combining random hypersurface model (RHM) and random
matrix model (RMM) for extended target tracking is proposed. By leveraging the
fast convergence and strong robustness of RMM, the tracking efficiency of RHM is
improved. Through simulation experiments, the effectiveness of the algorithm
proposed in this paper is verified. The extended target fusion method proposed
in this paper can provide a more accurate means for precise tracking and state
prediction in practical engineering.\n\n\n\n\n\n\n\nABSTRACT\nAiming at the
extended target tracking problem with irregular shapes, an extended target
tracking algorithm that fuses random hypersurface model (RHM) and random matrix
model (RMM) is proposed in the case where the priori shape of the target is
unknown. First, the algorithm adopts the RMM method to track the extended target
and then takes the reference points on the elliptical shape contour and
constructs an ordered sequence. Second, the discrete Fourier transform (DFT) is
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performed on the sequence to find the coefficients of the harmonic components to obtain the elliptical shape parameters. Then, the ellipsoidal shape parameter is used as the a priori shape parameter of the star-convex RHM. Finally, the effectiveness of the proposed algorithm is verified by simulation experiments. The proposed extended target fusion method provides a more accurate means for precise tracking and state prediction of extended targets.',
  'Guoqing Qi, Zixuan Xu, Yinya Li, Andong Sheng',
  '8',
  '2025',
  '7'],
 ['Longitudinal and Feedforward Controller Design Based on Linear Matrix Inequalities for a Mini Aerial Vehicle',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70365?af=R',
  'In this paper, the design of a MIMO optimal PID controller and a feedforward controller to enhance disturbance rejection and reference tracking for an MAV system is proposed. The feedback controller employs LMI constraints for iterative variable tuning, while a feedforward strategy is developed to further optimise performance. \n\n\n\n\n\n\n\nABSTRACT\nThis paper presents the design of a multi-input multi-output (MIMO) optimal proportional–integral–derivative (PID) controller and a feedforward controller to enhance disturbance rejection and reference tracking in a mini aerial vehicle (MAV). The feedback controller is developed using linear matrix inequality (LMI) constraints within an iterative framework for tuning the PID parameters. In addition, a feedforward control strategy is proposed to further improve performance in reference tracking and disturbance rejection. The feedforward controller is designed under LMI constraints to minimise the H∞ norm of the transfer function matrix relating disturbances (or set-points) to the output (error). This optimisation problem is challenging due to its non-convex and nonlinear nature. Therefore, the main contribution of this paper is to propose a method based on utilising frequency sampling techniques, iterative algorithms and convex optimisation formulation to guarantee optimal solutions for reference tracking and disturbance rejection within specified constraints, which is crucial for preventing irreversible damage in control systems and also enhances the manoeuvrability of the MAV.',
  'Saeedreza Tofighi',
  '8',
  '2025',
  '7'],
 ['FPGA Implementation of a Chopper Controller in PV Systems for IoT Applications',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70364?af=R',
  'A digital control system based on FPGA is developed to generate a chopping frequency ranging from 12.5\xa0kHz to 100\xa0kHz, adjusting its output voltage, frequency, and duty cycle accordingly. The proposed digital controller, with optimisations in architecture and process technology, will improve chip area, decrease delay, and enhance the power efficiency of the converter compared to past researches.\n\n\n\n\n\n\n\nABSTRACT\nThis work presents the design and simulation of an Field-Programmable Gate Array (FPGA) based digital controller for a micro-power photovoltaic (PV) energy harvesting system tailored to Internet of Things (IoT) applications. The proposed system features a DC-DC boost converter with an H-bridge topology, designed to interface effectively with low-power PV sources and deliver regulated output to IoT loads. A constant voltage maximum power point tracking (CV-MPPT) algorithm is implemented to maintain optimal energy extraction under variable irradiance. The controller dynamically adjusts the chopping frequency, duty cycle, and output voltage. Leveraging the parallelism and reconfigurability of FPGAs, a high-speed digital control architecture is developed and synthesised on a Cyclone IV FPGA platform. Compared to conventional microcontroller or DSP-based solutions, this approach offers significantly improved response time, power efficiency, and scalability. The final implementation achieves a chip area of 0.92 mm2, a control loop delay of 106\xa0ms, and an overall efficiency of 92.36%, demonstrating its advantages over existing designs in terms of compactness, performance, and energy efficiency.',
  'Keyvan Barati, Abdolsamad Hamidi',
  '8',

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  '2025',
  '7'],
 ['High-Impedance Dipoles for Auto-Receiver Tracking Wireless Power Transfer
Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70339?af=R',
  'This study presents a self-tuning multi-transmitter (multi-Tx) wireless power
transfer (WPT) system designed for applications requiring freely positioned
receivers (Rxs).\n\n\n\n\n\n\n\nABSTRACT\nThis study presents a self-tuning
multi-transmitter (multi-Tx) wireless power transfer (WPT) system designed for
applications requiring freely positioned receivers (Rxs). The system leverages
high-impedance dipole (HID) as Txs to dynamically activate the nearest Tx to a
simple dipole antenna as the Rx while deactivating other Txs without additional
control circuits. The Txs design incorporates a modified coaxial cable dipole
antenna featuring symmetrical gaps over the shield and inductive tuning elements
between the central wire and the shield to optimise the resonance frequency and
ensure effective power transfer. The feeding point is connected to the central
wire via a small cut in the shield. This autonomous behaviour simplifies system
operation, enhances flexibility, and ensures acceptable efficient power
transfer. Experimental evaluation demonstrates that the system achieves a power
transfer efficiency of approximately 65% while maintaining consistent
performance as the Rx rotates over two orthogonally located Txs. The dynamic
self-tuning mechanism adapts to the position of the Rx, proving particularly
advantageous on curved surfaces.',
  'Ali Sharifian Mazraeh Mollaei, Ilkka Laakso, Masoud Sharifian Mazraeh
Mollaei',
  '8',
  '2025',
  '7'],
 ['Fine-Grained Temporal Encoding and Decoding-Based Underwater Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70346?af=R',
  'This study focuses on this domain and proposes an innovative fine-grained
temporal encoding and decoding-based underwater object tracking
method.\n\n\n\n\n\n\n\nABSTRACT\nUnderwater object tracking is a highly
challenging task in the field of computer vision. This study focuses on this
domain and proposes an innovative fine-grained temporal encoding and decoding-
based underwater object tracking method. Due to the complex and dynamic
underwater environment, such as uneven lighting, turbid water quality, and
complex target motion patterns, existing underwater object tracking methods face
significant limitations in accuracy and stability. By carefully designing a
refinement module that combines fine-grained consistency and candidate
elimination, this method can accurately extract fine-grained features of the
target and effectively mitigate the interference of various underwater
complexities during feature extraction, thereby improving the precision of
target features. Furthermore, leveraging the temporal encoding–decoding module,
the target features are continuously propagated along the temporal sequence,
allowing full utilization of the relational information between frames, which
further enhances tracking stability. Experiments were conducted on the UVOT400
dataset, which is large-scale and rich in attributes with diverse target
categories. The results demonstrate that, compared to existing methods, this
approach significantly outperforms in both accuracy and stability of underwater
object tracking, providing new insights and effective solutions for the
advancement of underwater object tracking\xa0technology.',
  'Zhen Sun, Zhenggang Guan, Qinghua Li, Mengyang Yuan, Haonan Sun',
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  '2025',
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 ['Full-Space Scanning Leaky-Wave Antenna Utilising Spoof Surface Plasmon
Polaritons',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70328?af=R',
  'In this paper, we present a novel spoof surface plasmon polariton leaky-wave
antenna (SSPP-LWA) capable of full-space beam scanning. The proposed antenna
achieves full-space beam scanning from -90° to +90° across the frequency band of
9.8–13.3\xa0GHz, with a high scanning rate of 5.94° per 1% frequency variation.
Additionally, the design features a simplified structure conducive to practical
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fabrication. \n\n\n\n\n\n\n\nABSTRACT\nA novel spoof surface plasmon polariton leaky-wave antenna (SSPP-LWA) capable of full-space beam scanning is proposed in this letter. First, the surface plasmon polariton (SPPs) unit and its corresponding transmission line are carefully designed, and the underlying mechanism to achieve full-space scanning is analysed based on a monopole array structure. Specifically, a spoof surface plasmon polariton (SSPP) transmission line combined with a semicircular, three-dimensionally loaded radiating patch is introduced and equivalently modelled as a monopole radiating element. Subsequently, the proposed LWA is realised by employing a monopole array composed of 12 identical radiating elements. Simulation results verify that the antenna achieves continuous beam scanning from -90° to +90° within the frequency range of 9.8–13.3\xa0GHz, exhibiting a high scanning rate of up to 5.94°/%, with an average gain of approximately 9 dBi. Benefiting from its excellent scanning capability and stable radiation characteristics, this antenna demonstrates significant potential for target detection and tracking applications in radar systems.',
  'Ran Yu, Leilei Liu',
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  '2025',
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 ['Implementation and Performance Analysis of RTK-GNSS in Wearable Devices for Athletes in Harsh Environments',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70289?af=R',
  'This study investigates the implementation of real-time kinematic global navigation satellite system (RTK-GNSS) technique in wearable electronic performance and tracking system for football players to obtain highly accurate positioning data, even in harsh environments. The experiment results demonstrate that the utilization of RTK-GNSS can significantly improve positioning accuracy in various stadium environments, which is crucial for evaluating player performance.\n\n\n\n\n\n\n\nABSTRACT\nThis study presents the performance analysis of RTK-GNSS (real-time kinematic global navigation satellite system) mounted on wearable devices for athletes in harsh environments. GNSS signal can deteriorate by obstacles, i.e. stadium roofs, due to the high GDOP (geometric dilution of precision). RTK-GNSS is used to overcome harsh environment problems in this study. Hardware experiments are performed to analyse the performance of RTK-GNSS in sports wearable devices in harsh environments. The full pitch tracking test results of a wearable device equipped with RTK-GNSS demonstrate the best performance among three different wearable devices in a harsh environment; the maximum positioning error of 1.56 m$\\text{m}$ is approximately 3–30 times smaller than that of wearable devices equipped with stand-alone GNSS. The distance test results of the wearable device equipped with RTK-GNSS validate the most accurate performance, 98.97%$\\%$, compared to the true value in harsh\xa0environment.',
  'Mingu Kim, Bit Kim, Chulwoo Park, Jinsung Yoon',
  '8',
  '2025',
  '5'],
 ['Robust Beam Tracking for 3D Manoeuvrable UAV in DFRC Systems',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70211?af=R',
  "This letter presents a novel 3D robust manoeuvrable unmanned aerial vehicle (UAV) beam tracking algorithm within the dual-functional radar-communication framework. Specifically, we propose the interacting multiple model algorithm to accommodate multiple potential UAV motion models and improve the unscented Kalman filter algorithm to enhance its stability.\n\n\n\n\n\n\n\nABSTRACT\nDual-functional radar-communication (DFRC) will be a key technology in future sixth-generation (6G) network. Specifically, an integrated radar and communication platform (IRCP) equipped with full-dimensional antenna arrays can execute 3D beamforming, which can effectively minimize interference for communicating with unmanned aerial vehicles (UAVs). However, a significant challenge in fully exploiting 3D beamforming gain is the IRCP's ability to precisely track manoeuvrable UAVs. In this letter, we propose a novel interacting multiple model with enhanced unscented Kalman filter algorithm to realize 3D beam tracking for one manoeuvrable UAV within the framework of DFRC. To be specific, we build multiple state transition models to

adopt the manoeuvrability of the UAV. Meanwhile, the stability of the unscented Kalman filter is improved by using the singular value decomposition. Simulation results show that the proposed algorithm has higher tracking accuracy and better transmission performance for one manoeuvrable UAV than the traditional single-motion model based beam tracking\xa0algorithm.",
  'Yuhang Tang, Wei Liu, Jinkun Zhu, Jing Lei, Haoying Mo',
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 ['Optimal Performance Analysis for Networked System with Quantitative Control Input Over Feedback Channel',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70183?af=R',
  "This paper focuses on the performance analysis of networked control systems, specifically addressing the optimal tracking performance with quantitative control inputs over feedback channels. A dual-degree-of-freedom controller is designed using the Youla parameterization method, and the system's performance is assessed through numerical simulations. The findings highlight the impact of unstable poles, non-minimum phase zeros, and quantization errors on tracking performance, offering insights for practical control system design.\n\n\n\n\n\n\n\nABSTRACT\nNetworked control systems (NCS) have become an emerging and important research area given the rapidly developing network communication technology. Numerous studies in this area concentrate on the stability of control systems, while little has been done on its performance analysis, especially the index of an optimal control system. We fill this gap here by analysing the optimal tracking performance for an NCS that has quantitative control inputs over feedback channels. We design a dual-degree-of-freedom controller along with an optimal control system, by applying the Youla parameterization method based on the time domain and coprime decompositions. The proposed methodology is assessed by numerical simulations. The system's tracking performance is found to be deteriorated by the unstable poles and non-minimum phase zeros of the controlled object, as well as by quantization signal errors. These findings are beneficial for analysing and designing practical control\xa0systems.",
  'Fang Han, Xiaowei Jiang',
  '8',
  '2025',
  '3'],
 ['Applying Adaptive Wavelet Neural Network and Sliding Mode Control for Tracking Control of MEMS Gyroscope',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70187?af=R',
  'In this letter, an algorithm applying an adaptive wavelet neural network (AWNN) and sliding-mode control (SMC) is proposed, investigated and exploited for tracking control of micro-electromechanical system (MEMS) gyroscope. Such an AWNN model can be regarded as a special radius basis function neural network and utilizes Mexican hat function as activation function. Besides, Taylor expansion is used for analyzing activation radius, which is considered as an adaptive variable. The parameters of the MEMS gyroscope model are hard to obtain in engineering applications; thus, AWNN is designed to approximate the uncertain function of MEMS gyroscope and the unknown asymmetrical dead zone in the control scheme. The weights updating laws and the activation radius adaptive laws in AWNN are derived from the Lyapunov stability analysis, which results in the control error converging to the desired value and the weights and activation radius converging to its real value. To achieve the effect of error acceleration, a power function is used to design a sliding mode function. Computer simulation results substantiate the theoretical analysis and further demonstrate the efficacy of such an algorithm combined with AWNN and SMC for MEMS gyroscope control.',
  'Guo Luo, Bingling Chen',
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  '2025',
  '3'],
 ['A GGIW PMBM Smoother for Multiple Extended Object Tracking',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70188?af=R',
  'A gamma Gaussian inverse Wishart Poisson multi-Bernoulli mixture (PMBM)

filter that uses multiple time scans for smoothing is proposed. The results of continuous tracking are smoothed and corrected at regular intervals, resulting in more accurate tracking performance. Simulation results show that the proposed algorithm effectively reduces generalized optimal sub-pattern assignment errors compared to the original PMBM filter. \n\n\n\n\n\n\n\nABSTRACT\nPoisson multi-Bernoulli mixture (PMBM) filtering is an effective method for multi-extended target tracking. However, it has a low utilization of information from multiple time scans, leading to potential errors such as jumps and discontinuities in the target trajectories. To address this, propose a gamma Gaussian inverse Wishart PMBM filter that uses multiple time scans for smoothing. The results of continuous tracking are smoothed and corrected at regular intervals, resulting in more accurate tracking performance. Simulation results show that the proposed algorithm effectively reduces generalized optimal sub-pattern assignment errors compared to the original PMBM filter.',
  'Wenhui Wang, Ye Xu, Kejie Zhang, YouPeng Sun, Peng Li',
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 ['A Novel D-InSAR and Offset Tracking Fusion Algorithm Based on Variance-Masked Mean Filtering',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70173?af=R',
  'This paper proposes a novel fusion algorithm based on variance-masked mean filtering to combine the strengths of both methods. The algorithm filters noise in gentle regions of the offset map and fuses refined results with D-InSAR to enhance accuracy. Applied to the 2023 Türkiye earthquake, the method effectively reduces noise, corrects unwrapping errors, and achieves superior accuracy in high-gradient deformation scenarios such as earthquakes and landslides.\n\n\n\n\n\n\n\nABSTRACT\nAccurate ground deformation monitoring is crucial for understanding geophysical activities and mitigating disaster risks. D-InSAR and offset tracking are widely used but face limitations: D-InSAR struggles with phase unwrapping errors in large-scale deformation regions, while offset tracking lacks precision in small-scale deformation. This paper proposes a fusion algorithm based on variance-masked mean filtering to combine the strengths of both methods. The algorithm filters noise in gentle regions of the offset map and fuses refined results with D-InSAR to enhance accuracy. Applied to the 2023 Türkiye earthquake, the method effectively reduces noise, corrects unwrapping errors, and achieves superior accuracy in large-scale deformation scenarios such as earthquakes and landslides.',
  'Yifan Wang, Gen Li, Zihan Hu, Chuanxu Sun, Zhe Li',
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  '2025',
  '2'],
 ['Extended target tracking using neural network and Gaussian process',
  'https://ietresearch.onlinelibrary.wiley.com/doi/10.1049/ell2.70151?af=R',
  "In extended target tracking, Gaussian Process (GP) is utilized to model unknown contour functions based on the model-predicted target center and contour measurements. However, model prediction relies on accurate prior knowledge. When the model-predicted target center is inaccurate, it will affect the modelling of the measurement model. To address issue, this letter introduces a hybrid-driven approach that combines extended Kalman filter using GP with neural network; proposes an extended target tracking algorithm using neural network and GP. The algorithm predicts the target center according to the neural network and the target's kinematic model, and takes the prediction center and the contour measurements at the current moment as the input of the neural network, which in turn provides real-time estimates for the predicted center compensation. The simulation results show that the algorithm has a significant improvement in tracking performance and better accuracy in estimating the center position and extent state of the target.",
  'Hao Wang, Liping Song',
  '8',
  '2025',
  '1']]