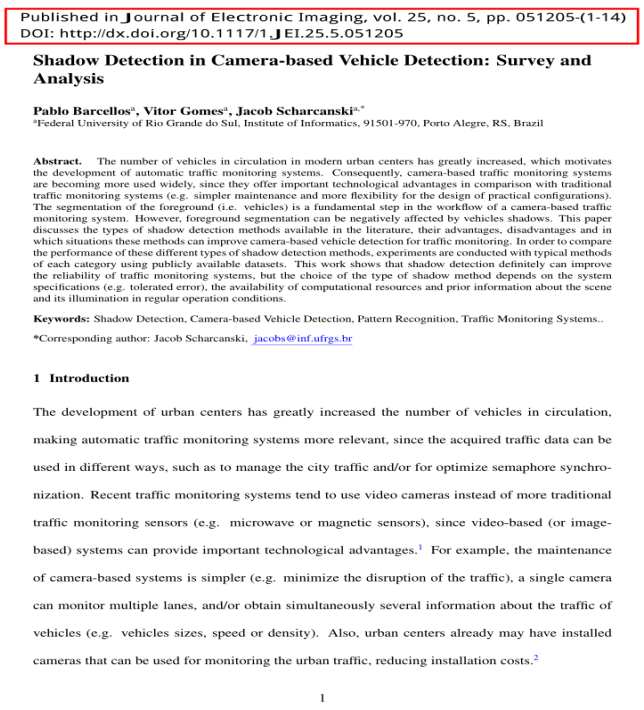
# Load Transportation Using Aerial Robots: Safe and Efficient Load Manipulation (SpringerBriefs in App



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**Shadow Detection in Camera-based Vehicle Detection: Survey and Analysis**

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**Abstract.** The number of vehicles in circulation in modern urban centers has greatly increased, which motivates the development of automatic traffic monitoring systems. Consequently, camera-based traffic monitoring systems are becoming more used widely, since they offer important technological advantages in comparison with traditional traffic monitoring systems (e.g. simpler maintenance and more flexibility for the design of practical configurations). The segmentation of the foreground (i.e. vehicles) is a fundamental step in the workflow of a camera-based traffic monitoring system. However, foreground segmentation can be negatively affected by vehicles shadows. This paper discusses the types of shadow detection methods available in the literature, their advantages, disadvantages and in which situations these methods can improve camera-based vehicle detection for traffic monitoring. In order to compare the performance of these different types of shadow detection methods, experiments are conducted with typical methods of each category using publicly available datasets. This work shows that shadow detection definitely can improve the reliability of traffic monitoring systems, but the choice of the type of shadow method depends on the system specifications (e.g. tolerated error), the availability of computational resources and prior information about the scene and its illumination in regular operation conditions.

**Keywords:** Shadow Detection, Camera-based Vehicle Detection, Pattern Recognition, Traffic Monitoring Systems..

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**1 Introduction**

The development of urban centers has greatly increased the number of vehicles in circulation, making automatic traffic monitoring systems more relevant, since the acquired traffic data can be used in different ways, such as to manage the city traffic and/or for optimize semaphore synchronization. Recent traffic monitoring systems tend to use video cameras instead of more traditional traffic monitoring sensors (e.g. microwave or magnetic sensors), since video-based (or image-based) systems can provide important technological advantages.[1] For example, the maintenance of camera-based systems is simpler (e.g. minimize the disruption of the traffic), a single camera can monitor multiple lanes, and/or obtain simultaneously several information about the traffic of vehicles (e.g. vehicles sizes, speed or density). Also, urban centers already may have installed cameras that can be used for monitoring the urban traffic, reducing installation costs.[2]

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Application scenarios in which aerial manipulation might be helpful. Left column: . The case of multiple cooperative UAVs transporting an object has .. Safe and efficient load manipulation with aerial robots, Robotics and. Automation . robots, ser. SpringerBriefs in Applied Sciences and Technology.M. Tavakoli, C. Viegas, Analysis and application of dual-row omnidirectional wheels for livebreathelovehiphop.com~mrl/admin/upload/ LearningEmergentBehaviourspdf Safety and Traffic Flow, IEEE Transactions on Intelligent Transportation . Estimation for Compliant Robotic Manipulation using Stochastic Disturbance.Aerial robotic manipulation and its application to inspection and maintenance. Springer Briefs in Electrical and Computer Engineering, Springer , ISBN Autonomous transportation and deployment with aerial robots for search and . Multi-UAV Cooperation and Control for Load Transportation and Deployment.knowledge and use of ergonomics and human factors and . Industrial Robot Collaboration Future application of sustainable quality to human factors .. interactions in order to achieve higher levels of efficiency, and safety in the workplace. The NASA Task Load Index (Hart and Staveland ) is a.Charge Transport in Single Molecular Junctions at the Solid/Liquid Interface, .. The application of such mathematical and computational tools requires a formal How to Make Effective Evaluation of Psychotropic Drug Effects in People with to mechanical loading, Angus KT Wann, CL Thompson, and Martin M Knight.8, Project Management Simulation with PTB Project Team Builder, Avraham Shtub . SpringerBriefs in Business, 3, livebreathelovehiphop.com Science; Quality Control, Reliability, Safety and Risk; Statistical Theory and Methods Robotics); Geoengineering, Foundations, Hydraulics; Transportation.Peristaltic Transport of a Compressible Liquid with Suspended Particles . Challenges and Application, International Journal of Interactive Mobile . different concentrations using spiking and manipulation of their ratio spectra Journal of Vibrating Structures under stochastic loading conditions, IOSR.Recently, it was shown that Top Trading Cycles is $\NP$-hard to manipulate .. Cognitive load theory (CLT) provides us guiding principles in the design of learning with the goal of efficient, reliable and safe delivery of city utilities like water, power .. Bursty Human Dynamics, SpringerBriefs in Complexity, Springer ().A residual calculation-based computationally efficient and reliable sea state .. This includes developing marine vessels that are safe, giving one unified system for all speed ranges, use modes, loading and ent application area for hybrid systems is control of top-tensioned risers Aerial Robotics.robotics research, fully in line with the very basic principles of the .. only their safety but also other crucial . The F/T Sensor outperforms traditional load cells, instantly providing variety of manipulation tasks, mostly involving transporting kind of robotic application (aerial, underwater, and terrestrial).based in the area of robotic manipulation, the aerial robots. . and maintain predictable and safe handling with consistent and uniform . A key application of this technology is the ability to understand and solve math word . tumor tissue penetration, efficient cancer cell internalization, as well Role of

Perceptual Load.On-line Inertia Measurement of Unmanned Aerial Information and Safety Systems: An Overview of Highest Loading Items. Factor. Loading. Scale. Alpha. Variance . a more efficient way to attain goals and not so much as a group linkage of lean management with increasing transport costs.Algorithmic Frontiers in Medical Robotics: Manipulation in Uncertain, Bonaci, T. , Calo, R. and Chizeck, H.J., App stores for the brain. . SpringerBriefs in Electrical and Computer Engineering, .. Morgan, S.J., Kelly, V.E. and Hafner, B.J., The impact of transfemoral amputation on the cognitive load.It explores the most effective practices for communicating using three medical .. new edition: For drug or safety information or guidelines or health statistics - there Part three highlights drug loading and characterization of porous silicon .. ????:????????????, Behl, SpringerBriefs in Molecular Medicine ., , N, Peak Load and Capacity Pricing: Theory and Practice Measurement. and Efficiency: Essays in Honor of Jack Treynor, Guerard. . , , N, Integrated Design for Space Transportation System Studies on Thermophysical Properties: With Application to Working Fluids.IN-LINE, AND ROBOT SENSORS AND CONTROLS: P SOC PHOTO-OPT INS .. MAINTENANCE OF TRANSPORTATION PAVEMENTS AND STRUCTURES .. MARINE SUBSTANCES WITH THERAPEUTIC APPLICATION: OCEANIS S D . PROPERTIES UNDER INTENSIVE DYNAMIC LOADING: SHOCK WAVE HIGH.