Vehicle Collision Detection And Lane Assist System Using Rtos

Object Detection, Collision Warning, and Avoidance Systems

Wireless Vehicular Networks for Car Collision Avoidance focuses on the development of the ITS (Intelligent Transportation Systems) in order to minimize vehicular accidents. The book presents and analyses a range of concrete accident scenarios while examining the causes of vehicular collision and proposing countermeasures based on wireless vehicular networks. The book also describes the vehicular network standards and quality of service mechanisms focusing on improving critical dissemination of safety information. With recommendations on techniques and protocols to consider when improving road safety policies in order to minimize crashes and collision risks.

Wireless Vehicular Networks for Car Collision Avoidance

This report presents the results of an analysis effort undertaken to address the following research question: What sensor(s) can be cost effectively added to vehicles on a wide scale to significantly improve our understanding and modeling of naturalistic near-crash/pre-crash driver performance? Current sensor and computer technology allows for the efficient collection and storage of driver and vehicle performance data on board vehicles. Crash data recorders or black boxes exist today on many vehicles though they are limited in number of recorded parameters and storage capacity. However, their capability is increasing. Recent field operational tests of advanced-technology crash avoidance systems and naturalistic driving data collection efforts have employed comprehensive data acquisition systems to characterize driver and vehicle performance as well as the driving environment. These projects gathered data on driver exposure to various environmental factors and on driver encounters with driving conflicts, near-crashes, and actual crashes. Unfortunately, the in-vehicle data acquisition packages in these projects cost over $10,000 per vehicle. It would be advantageous to build and install a very small, inexpensive package under $1,000 in a vehicle fleet of 5,000 or more. The presence of low-cost near-crash/crash event data recorders (EDRs) on thousands of vehicles would enable a more accurate assessment of safety benefits for intelligent vehicle crash avoidance technologies, and would greatly improve the quality of data in national crash databases such as the National Automotive Sampling System (NASS) Crashworthiness Data System (CDS) and General Estimates System (GES).

Development of Performance Specifications for Collision Avoidance Systems for Lane Change, Merging and Backing. Task 3: Human Factors Assessment of the
Drivers Interfaces of Existing Collision Avoidance Systems. Technical Report

Technology Development for Army Unmanned Ground Vehicles

Backing Crashes: Problem Size Assessment and Statistical Description

Location-Based Services

"This book aims at giving a complete panorama of the active and promising crossing area between traffic engineering and multi-agent system addressing both current status and challenging new ideas"--Provided by publisher.

Probabilistic Multi-object Tracking for Autonomous Vehicles

The book presents a remarkable collection of chapters covering a wide range of topics in the areas of intelligent systems and artificial intelligence, and their real-world applications. It gathers the proceedings of the Intelligent Systems Conference 2019, which attracted a total of 546 submissions from pioneering researchers, scientists, industrial engineers, and students from all around the world. These submissions underwent a double-blind peer-review process, after which 190 were selected for inclusion in these proceedings. As intelligent systems continue to replace and sometimes outperform human intelligence in decision-making processes, they have made it possible to tackle a host of problems more effectively. This branching out of computational intelligence in several directions and use of intelligent systems in everyday applications have created the need for an international conference as a venue for reporting on the latest innovations and trends. This book collects both theory and application based chapters on virtually all aspects of artificial intelligence; presenting state-of-the-art intelligent methods and techniques for solving real-world problems, along with a vision for future research, it represents a unique and valuable asset.

Algorithm Concept for Crash Detection in Passenger Cars

Interactive robots such as self-driving cars require accurate hardware and methods to locate relevant objects such as other traffic participants. They also must predict other participants' actions or understand their role in the environment. Given imperfect information about present objects at each time, a multi-object tracker maintains an estimate of all present relevant objects and infers motion or other information that can be deduced from viewing an object over time. Trackers are often built around a probabilistic model that includes known characteristics of object motion and sensor behavior. This thesis discusses several details for designing a probabilistic multi-object tracker for vehicular environments, as well as ways to utilize probabilistic tracked estimates for autonomous vehicle applications. The increasingly complex environments perceived by robots have demanded new paradigms of perception. In particular, camera and laser-based perception of urban settings is solved using learned algorithms that directly transform raw data into object estimates. We present a probabilistic model of modern object detectors that can be integrated with standard perception of urban settings is solved using learned algorithms that directly transform raw data into object estimates. We present a probabilistic model of modern object detectors that can be integrated with standard trackers. The primary effects that are modelled are line-of-sight limitations to sensor detection, and correlation in algorithmic detection errors over time. Each of these modifications are shown to improve performance on a public benchmark for vehicle tracking, without fundamental modifications to the tracking algorithm. Accurate tracking can require intensive computation on its own. We examine the implementation of multiple hypothesis tracking, a high-performance probabilistic tracker, and improve the computational efficiency of its data association algorithm in several ways. The modified algorithm is tested on vehicular tracking data as well as simulated large-scale and multisensor problems. The improved speed of the algorithm allows for more hypotheses to be propagated at a given speed, which in turn improves tracking performance. In addition to improving the current estimate of the environment, tracking enables prediction of the future environment by determining object motion and history. The uncertainty of these estimates can be quantified by a probabilistic tracker and should be considered when making predictions or deciding actions. However, probabilistic estimates are difficult to translate into interpretable and actionable concepts, such detection of impending collisions between objects. We disambiguate the error rate in collision detection into inevitable errors from uncertain object estimation and further errors incurred by fast approximate calculation of the probability of collision from these estimates. Various methods for collision detection from uncertain data are compared and tested on vehicle simulations. Automated overtaking assistants are studied as a specific application of collision detection. These assistants alert drivers in advance that entering the opposite lane to pass a slower vehicle will be unsafe. We characterize the expected design of these systems, including sensor or communication accuracy and limitations as well as driver variability and uncertainty in future motion. Overtaking assistant simulations demonstrate that the assistant can fulfill its purpose at expected levels of tracking and prediction uncertainty, provided that the chosen sensor or communicating device has a sufficient operating distance...
Development of Collision Avoidance Data for Light Vehicles

There is a growing social interest in developing vision-based vehicle guidance systems for improving traffic safety and efficiency and the environment. Examples of vision-based vehicle guidance systems include collision warning systems, steering control systems for tracking painted lane marks, and speed control systems for preventing rear-end collisions. Like other guidance systems for aircraft and trains, these systems are expected to increase traffic safety significantly. For example, safety improvements of aircraft landing processes after the introduction of automatic guidance systems have been reported to be 100 times better than prior to installment. Although the safety of human lives is beyond price, the cost for automatic guidance could be compensated by decreased insurance costs. It is becoming more important to increase traffic safety by decreasing the human driver’s load in our society, especially with an increasing population of senior people who continue to drive. The second potential social benefit is the improvement of traffic efficiency by decreasing the spacing between vehicles without sacrificing safety. It is reported, for example, that four times the efficiency is expected if the spacing between cars is controlled automatically at 90 cm with a speed of 100 km/h compared to today’s typical manual driving. Although there are a lot of technical, psychological, and social issues to be solved before realizing the high density, high-speed traffic systems described here, highly efficient highways are becoming more important because of increasing traffic congestion.

Handbook of Intelligent Vehicles

Contains 51 papers covering eight years of research on object detection, collision warning, and collision avoidance. Topics covered include: Parking aids; Target tracking with cameras; Sensor combinations; Blind spot detection; Imager chips; Lane tracking; Lane and road departure warning; Sensor fusion; Intersection collision warning; Front- and rear-end crash avoidance; Automatic collision avoidance systems; Braking systems for collision avoidance; and Driver-vehicle interface requirements.

Advances in Intelligent Vehicles

A compilation of papers and journal articles that cover research and development of electronic devices and their use in object detection, collision warning and avoidance systems. The papers included in this book cover the pros and cons of each of the three systems.

NHTSA's IVHS Collision Avoidance Research Program: Strategic Plan and Status Update

State-of-the-art airbag algorithms make a decision to fire restraint systems in a crash by evaluating the deceleration of the entire vehicle during the single events of the accident. In order to meet the ever-increasing requirements of consumer test organizations and global legislators, a detailed knowledge of the nature and direction of the crash would be of great benefit. The algorithms used in current vehicles can only do this to a limited extent. André Leschke presents a completely different algorithm concept to solve these problems. In addition to vehicle deceleration, the chronological sequence of an accident and the associated local and temporal destruction of the vehicle are possible indicators for an accident’s severity. About the Author: Dr. André Leschke has earned his doctoral degree from Tor-Vergata University of Rome, Italy. Currently, he is working as head of a team of vehicle safety developers in the German automotive industry.

Vehicle Crash Mechanics

While projections for the development of self-driving vehicles remains years out, advanced driver assistance systems that offer self-semi-autonomous driving capabilities are entering the marketplace today. Advanced driver assistance systems are crash avoidance technologies that can protect drivers, reduce crashes, and enhance the convenience of driving. Forward collision warning, blind spot detection, and lane departure warnings are examples of advanced driver assistance systems. These systems help drivers make safer decisions on the road by providing real-time information about surrounding roadway activity. The driver can receive this information through audible tones, steering wheel vibrations, or small flashing lights on side mirrors alerting the driver of potential safety hazards on the road. Increasingly, advanced driver assistance systems now entering the market are capable of taking a more active role in the driving task. Innovative systems such as automatic emergency braking and lane departure prevention can temporarily take control over parts of the vehicle’s critical safety functions such as braking or steering. This can occur by the system either applying the brakes without input from the driver or steering the vehicle back into marked lanes following unintended drifting. Through technological advances by manufacturers and equipment suppliers, basic driver assistance systems are taking on more advanced capabilities that assume greater control of the vehicle’s critical safety functions throughout a driving trip. The progression of these technologies is incrementally removing the human driver from the driving task and paving the way to full autonomy.

Development of Performance Specifications for Collision Avoidance Systems for


**Lane Change, Merging and Backing. Task 2: Functional Goals Establishment. Interim Report**

Location-based Services (LBSs) are mobile services for providing information that has been created, compiled, selected or filtered under consideration of the users’ current locations or those of other persons or mobile devices. Typical examples are restaurant finders, buddy trackers, navigation services or applications in the areas of mobile marketing and mobile gaming. The attractiveness of LBSs is due to the fact that users are not required to enter location information manually but are automatically pinpointed and tracked. This book explains the fundamentals and operation of LBSs and gives a thorough introduction to the key technologies and organizational procedures, offering comprehensive coverage of positioning methods, location protocols and service platforms, alongside an overview of interfaces, languages, APIs and middleware with examples demonstrating their usage. Explanation and comparison of all protocols and architectures for location services In-depth coverage of satellite, cellular and local positioning All embracing introduction to 3GPP positioning methods, such as Cell-Id, E-OTD, U-TdoA, OTDoA-IPDL and Assisted GPS Explains the operation of enhanced emergency services such as E-911 Identifies unsolved research issues and challenges in the area of LBSs This comprehensive guide will be invaluable to undergraduate and postgraduate students and lecturers in the area of telecommunications. It will also be a useful resource to developers and researchers seeking to expand their knowledge in this field.

**Applied Computer Vision and Image Processing**

Between 1999 and 2000, the National Transportation Safety Board investigated nine rear-end collisions in which 20 people died and 181 were injured. Common to all nine accidents was the rear following vehicle driver's degraded perception of traffic conditions ahead. As the Safety Board reported in 1995 and further discussed at its 1999 public hearing, existing technology in the form of intelligent Transportation Systems can prevent rear-end collisions. In the nine accidents investigated by the Board, one (and sometimes more) of the available technologies would have helped alert drivers to the vehicles ahead, so that they could slow their vehicles, and would have prevented or mitigated the circumstances of the collisions. The major issue addressed in this Safety Board special investigation report is the prevention of rear-end collisions through the use of Intelligent transportation systems. This report also discusses some of the challenges, including implementation, consumer acceptance, public perception, and training, associated with the deployment of vehicle-and infrastructure-based collision warning systems. As a result of its investigation, the Safety Board issues recommendations to the U.S. Department of Transportation; the Federal Highway Administration; the National Highway Traffic Safety Administration; truck, motorcoach, and automobile manufacturers; the Intelligent Transportation Society of America; the American Trucking Associations, Inc.; the Owner-Operator Independent Driver Association; and the National Private Truck Council.


This book constitutes the refereed proceedings of the 7th National Conference on Computer Vision, Pattern Recognition, Image Processing, and Graphics, NCVPRIPG 2019, held in Hubballi, India, in December 2019. The 55 revised full papers 3 short papers presented in this volume were carefully reviewed and selected from 210 submissions. The papers are organized in topical sections on vision and geometry, learning and vision, image processing and document analysis, detection and recognition.

**Computational Vision and Bio-Inspired Computing**

There are approximately 4,000 fatalities in crashes involving trucks and buses in the United States each year. Though estimates are wide-ranging, possibly 10 to 20 percent of these crashes might have involved fatigued drivers. The stresses associated with their particular jobs (irregular schedules, etc.) and the lifestyle that many truck and bus drivers lead, puts them at substantial risk for insufficient sleep and for developing short- and long-term health problems. Commercial Motor Vehicle Driver Fatigue, Long-Term Health and Highway Safety assesses the state of knowledge about the relationship of such factors as hours of driving, hours on duty, and periods of rest to the fatigue experienced by truck and bus drivers while driving and the implications for the safe operation of their vehicles. This report evaluates the relationship of these factors to drivers’ health over the longer term, and identifies improvements in data and research methods that can lead to better understanding in both areas.


In recent years, the control of Connected and Automated Vehicles (CAVs) has attracted strong attention for various automotive applications. One of the important features demanded of CAVs is collision avoidance,
whether it is a stationary or a moving obstacle. Due to complex traffic conditions and various vehicle
dynamics, the collision avoidance system should ensure that the vehicle can avoid collision with other
vehicles or obstacles in longitudinal and lateral directions simultaneously. The longitudinal collision
avoidance controller can avoid or mitigate vehicle collision accidents effectively via Forward Collision
Warning (FCW), Brake Assist System (BAS), and Autonomous Emergency Braking (AEB), which has been
commercially applied in many new vehicles launched by automobile enterprises. But in lateral motion
direction, it is necessary to determine a flexible collision avoidance path in real time in case of detecting any
obstacle. Then, a path-tracking algorithm is designed to assure that the vehicle will follow the predetermined
path precisely, while guaranteeing certain comfort and vehicle stability over a wide range of velocities. In
recent years, the rapid development of sensor, control, and communication technology has brought both
possibilities and challenges to the improvement of vehicle collision avoidance capability, so collision
avoidance system still needs to be further studied based on the emerging technologies. In this book, we
provide a comprehensive overview of the current collision avoidance strategies for traditional vehicles and
CAVs. First, the book introduces some emergency path planning methods that can be applied in global route
design and local path generation situations which are the most common scenarios in driving. A comparison is
made in the path-planning problem in both timing and performance between the conventional algorithms and
emergency methods. In addition, this book introduces and designs an up-to-date path-planning method based
on artificial potential field methods for collision avoidance, and verifies the effectiveness of this method in
complex road environment. Next, in order to accurately track the predetermined path for collision avoidance,
traditional control methods, humanlike control strategies, and intelligent approaches are discussed to solve
the path-tracking problem and ensure the vehicle successfully avoids the collisions. In addition, this book
designs and applies robust control to solve the path-tracking problem and verify its tracking effect in
different scenarios. Finally, this book introduces the basic principles and test methods of AEB system for
collision avoidance of a single vehicle. Meanwhile, by taking advantage of data sharing between vehicles
based on V2X (vehicle-to-vehicle or vehicle-to-infrastructure) communication, pile-up accidents in
longitudinal direction are effectively avoided through cooperative motion control of multiple vehicles.

Computer Vision, Pattern Recognition, Image Processing, and Graphics

Image Analysis and Processing -- ICIAP 2011

It is possible to eliminate death and serious injury from Canada’s roads. In other jurisdictions, the European
Union, centres in the United States, and at least one automotive company aim to achieve comparable results
as early as 2020. In Canada, though, citizens must turn their thinking on its head and make road safety a
national priority. Since the motor vehicle first went into mass production, the driver has taken most of the
blame for its failures. In a world where each person’s safety is dependent on a system in which millions of
drivers must drive perfectly over billions of hours behind the wheel, failure on a massive scale has been the
result. When we neglect the central role of the motor vehicle as a dangerous consumer product, the result is
one of the largest human-made means for physically assaulting human beings. It is time for Canadians to
embrace internationally recognized ways of thinking and enter an era in which the motor vehicle by-product
of human carnage is relegated to history. No Accident examines problems related to road safety and makes
recommendations for the way forward. Topics include types of drivers; human-related driving errors related
to fatigue, speed, alcohol, and distraction and roads; pedestrians, cyclists, and public transit; road
engineering; motor vehicle regulation; auto safety design; and collision-avoidance technologies such as radar
and camera-based sensors on vehicles that prevent crashes. This multi-disciplinary study demystifies the
world of road safety and provides a road map for the next twenty years.

Development of Performance Specifications for Collision Avoidance Systems for
Lane Change, Merging and Backing. Task 3: Test of Existing Hardware Systems,

This book covers advances in system, control and computing. This book gathered selected high-quality
research papers presented at the International Conference on Advances in Systems, Control and Computing
(AISCC 2020), held at MNIT Jaipur during February 27–28, 2020. The first part is advances in systems and it
is dedicated to applications of the artificial neural networks, evolutionary computation, swarm intelligence,
artificial immune systems, fuzzy system, autonomous and multi-agent systems, machine learning, other
intelligent systems and related areas. In the second part, machine learning and other intelligent algorithms
for design of control/control analysis are covered. The last part covers advancements, modifications,
improvements and applications of intelligent algorithms.

No Accident

Path Planning and Tracking for Vehicle Collision Avoidance in Lateral and
Longitudinal Motion Directions

Governed by strict regulations and the intricate balance of complex interactions among variables, the application of mechanics to vehicle crashworthiness is not a simple task. It demands a solid understanding of the fundamentals, careful analysis, and practical knowledge of the tools and techniques of that analysis. Vehicle Crash Mechanics sets forth the basic principles of engineering mechanics and applies them to the issue of crashworthiness. The author studies the three primary elements of crashworthiness: vehicle, occupant, and restraint. He illustrates their dynamic interactions through analytical models, experimental methods, and test data from actual crash tests. Parallel development of the analysis of actual test results and the interpretation of mathematical models related to the test provides insight into the parameters and interactions that influence the results. Detailed case studies present real-world crash tests, accidents, and the effectiveness of air bag and crash sensing systems. Design analysis formulas and two- and three-dimensional charts help in visualizing the complex interactions of the design variables. Vehicle crashworthiness is a complex, multifaceted area of study. Vehicle Crash Mechanics clarifies its complexities. The book builds a solid foundation and presents up-to-date techniques needed to meet the ultimate goal of crashworthiness analysis and experimentation: to satisfy and perhaps exceed the safety requirements mandated by law.

The 2021 International Conference on Machine Learning and Big Data Analytics for IoT Security and Privacy

This book presents works from world-class experts from academia, industry, and national agencies representing countries from across the world focused on automotive fields for in-vehicle signal processing and safety. These include cutting-edge studies on safety, driver behavior, infrastructure, and human-to-vehicle interfaces. Vehicle Systems, Driver Modeling and Safety is appropriate for researchers, engineers, and professionals working in signal processing for vehicle systems, next generation system design from driver-assisted through fully autonomous vehicles.

Self-Driving Cars

ICICN is an annual conference launched in the year of 2013. We had this conference successfully held in Bangkok, Thailand in 2017, Hong Kong in 2016, Florence, Italy in 2015, Phuket, Thailand in 2014, Singapore in 2013. It will provide a valuable opportunity for researchers, scholars, and some scientists to exchange their ideas face to face together. ICICN is very special for its strong organization team, dependable reputation, and wide sponsors all around the world, which is the leading annual conferences of Information, Communication and Network for all researchers home and abroad.

Final Report

Vehicles, Drivers, and Safety

Visibility and Confidence Estimation of an Onboard-camera Image for an Intelligent Vehicle

The Handbook of Intelligent Vehicles provides a complete coverage of the fundamentals, new technologies, and sub-areas essential to the development of intelligent vehicles; it also includes advances made to date, challenges, and future trends. Significant strides in the field have been made to date; however, so far there has been no single book or volume which captures these advances in a comprehensive format, addressing all essential components and subspecialties of intelligent vehicles, as this book does. Since the intended users are engineering practitioners, as well as researchers and graduate students, the book chapters do not only cover fundamentals, methods, and algorithms but also include how software/hardware are implemented, and demonstrate the advances along with their present challenges. Research at both component and systems levels are required to advance the functionality of intelligent vehicles. This volume covers both of these aspects in addition to the fundamentals listed above.

Computer Vision and Imaging in Intelligent Transportation Systems

This proceedings book presents state-of-the-art research innovations in computational vision and bio-inspired techniques. Due to the rapid advances in the emerging information, communication and computing technologies, the Internet of Things, cloud and edge computing, and artificial intelligence play a significant role in the computational vision context. In recent years, computational vision has contributed to enhancing the methods of controlling the operations in biological systems, like ant colony optimization, neural networks, and immune systems. Moreover, the ability of computational vision to process a large number of data streams...
by implementing new computing paradigms has been demonstrated in numerous studies incorporating computational techniques in the emerging bio-inspired models. The book reveals the theoretical and practical aspects of bio-inspired computing techniques, like machine learning, sensor-based models, evolutionary optimization, and big data modeling and management, that make use of effectual computing processes in the bio-inspired systems. As such it contributes to the novel research that focuses on developing bio-inspired computing solutions for various domains, such as human–computer interaction, image processing, sensor-based single processing, recommender systems, and facial recognition, which play an indispensable part in smart agriculture, smart city, biomedical and business intelligence applications.

**Autonomous Vehicles for Safer Driving**

**A Feature Based Tracking Method on Multiple-lane Vehicle Detection for Forward Collision Warning System Applications**

**Multi-agent Systems for Traffic and Transportation Engineering**

Acts as single source reference providing readers with an overview of how computer vision can contribute to the different applications in the field of road transportation This book presents a survey of computer vision techniques related to three key broad problems in the roadway transportation domain: safety, efficiency, and law enforcement. The individual chapters present significant applications within those problem domains, each presented in a tutorial manner, describing the motivation for and benefits of the application, and a description of the state of the art. Key features: Surveys the applications of computer vision techniques to road transportation system for the purposes of improving safety and efficiency and to assist law enforcement. Offers a timely discussion as computer vision is reaching a point of being useful in the field of transportation systems. Available as an enhanced eBook with video demonstrations to further explain the concepts discussed in the book, as well as links to publically available software and data sets for testing and algorithm development. The book will benefit the many researchers, engineers and practitioners of computer vision, digital imaging, automotive and civil engineering working in intelligent transportation systems. Given the breadth of topics covered, the text will present the reader with new and yet unconceived possibilities for application within their communities.

**Applications of Advanced Computing in Systems**

Advances in Intelligent Vehicles presents recent advances in intelligent vehicle technologies that enhance the safety, reliability, and performance of vehicles and vehicular networks and systems. This book provides readers with up-to-date research results and cutting-edge technologies in the area of intelligent vehicles and transportation systems. Topics covered include virtual and staged testing scenarios, collision avoidance, human factors, and modeling techniques. The Series in Intelligent Systems publishes titles that cover state-of-the-art knowledge and the latest advances in research and development in intelligent systems. Its scope includes theoretical studies, design methods, and real-world implementations and applications. Provides researchers and engineers with up-to-date research results and state-of-the art technologies in the area of intelligent vehicles and transportation systems Covers hot topics, including driver assistance systems; cooperative vehicle-highway systems; collision avoidance; pedestrian protection; image, radar and lidar signal processing; and V2V and V2I communications

**Autonomous Vehicle Technology**

Unmanned ground vehicles (UGV) are expected to play a key role in the Army’s Objective Force structure. These UGVs would be used for weapons platforms, logistics carriers, and reconnaissance, surveillance, and target acquisition among other things. To examine aspects of the Army’s UGV program, assess technology readiness, and identify key issues in implementing UGV systems, among other questions, the Deputy Assistant Secretary of the Army for Research and Technology asked the National Research Council (NRC) to conduct a study of UGV technologies. This report discusses UGV operational requirements, current development efforts, and technology integration and roadmaps to the future. Key recommendations are presented addressing technical content, time lines, and milestones for the UGV efforts.

**Vision-based Vehicle Guidance**

The two-volume set LNCS 6978 + LNCS 6979 constitutes the proceedings of the 16th International Conference on Image Analysis and Processing, ICIAP 2011, held in Ravenna, Italy, in September 2011. The total of 121 papers presented was carefully reviewed and selected from 175 submissions. The papers are divided into 10 oral sessions, comprising 44 papers, and three post sessions, comprising 77 papers. They deal with the following topics: image analysis and representation; image segmentation; pattern analysis and
classification; forensics, security and document analysis; video analysis and processing; biometry; shape analysis; low-level color image processing and its applications; medical imaging; image analysis and pattern recognition; image and video analysis and processing and its applications.

**Object Detection, Collision Warning, and Avoidance Systems**

**Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety**

More and more drivers nowadays enjoy the convenience brought by advanced driver assistances system (ADAS) including collision detection, lane keeping and ACC. However, many assistant functions are still constrained by weather and terrain. In the way towards automated driving, the need of an automatic condition detector is inevitable, since many solutions only work for certain conditions. When it comes to camera, which is most commonly used tool in lane detection, obstacle detection, visibility estimation is one of such important parameters we need to analyze. Although many papers have proposed their own ways to estimate visibility range, there is little research on the question of how to estimate the confidence of an image. In this thesis, we introduce a new way to detect visual distance based on a monocular camera, and thereby we calculate the overall image confidence. Much progress has been achieved in the past ten years from restoration of foggy images, real-time fog detection to weather classification. However, each method has its own drawbacks, ranging from complexity, cost, and inaccuracy. According to these considerations, the new way we proposed to estimate visibility range is based on a single vision system. In addition, this method can maintain a relatively robust estimation and produce a more accurate result.

**2019 7th International Conference on Information, Communication and Networks (ICICN)**

**Intelligent Systems and Applications**

This book gathers high-quality research papers presented at the International Conference on Computing in Engineering and Technology (ICCET 2020) [formerly ICCASP]. A flagship conference on engineering and emerging next-generation technologies, it was jointly organized by Dr. Babasaheb Ambedkar Technological University and MGMs College of Engineering, Nanded, India on 9–11 January 2020. Focusing on applied computer vision and image processing, this proceedings volume includes papers on image processing, computer vision, pattern recognition, and DSP/DIP applications in healthcare systems.

**Special Investigation Report**

The automotive industry appears close to substantial change engendered by “self-driving” technologies. This technology offers the possibility of significant benefits to social welfare—saving lives; reducing crashes, congestion, fuel consumption, and pollution; increasing mobility for the disabled; and ultimately improving land use. This report is intended as a guide for state and federal policymakers on the many issues that this technology raises.

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