

2019 19th International Conference on Advanced Robotics (ICAR 2019)

**Belo Horizonte, Brazil
2-6 December 2019**



**IEEE Catalog Number: CFP19ROB-POD
ISBN: 978-1-7281-2468-1**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP19ROB-POD
ISBN (Print-On-Demand):	978-1-7281-2468-1
ISBN (Online):	978-1-7281-2467-4

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

RESILIENT AUTONOMOUS EXPLORATION AND MAPPING OF UNDERGROUND MINES USING AERIAL ROBOTS	1
<i>Kostas Alexis</i>	
EXPLORE LOCALLY, PLAN GLOBALLY: A PATH PLANNING FRAMEWORK FOR AUTONOMOUS ROBOTIC EXPLORATION IN SUBTERRANEAN ENVIRONMENTS	9
<i>Tung Dang ; Shehryar Khattak ; Frank Mascarih ; Kostas Alexis</i>	
ESPELEOROBÔ - A ROBOTIC DEVICE TO INSPECT CONFINED ENVIRONMENTS	17
<i>Hector Azpurua ; Filipe Rocha ; Gabriel Garcia ; Alexandre Souza Santos ; Eduardo Cota ; Luiz G. Barros ; Alexandre S Thiago ; Gustavo Pessin ; Gustavo Medeiros Freitas</i>	
TOWARDS SOUND-SOURCE POSITION ESTIMATION USING MUTUAL INFORMATION FOR NEXT BEST VIEW MOTION PLANNING	24
<i>Mohammad Fattahi Sani ; Brendan Emery ; Darwin G. Caldwell ; Leonardo S. Mattos ; Nikhil Deshpande</i>	
PREDICTING UNOBSERVED SPACE FOR PLANNING VIA DEPTH MAP AUGMENTATION	30
<i>Marius Fehr ; Tim Taubner ; Yang Liu ; Roland Siegart ; Cesar Cadena</i>	
A KNOWLEDGE-BASED FRAMEWORK FOR TASK AUTOMATION IN SURGERY	37
<i>Michele Ginesi ; Daniele Meli ; Hirenkumar Nakawala ; Andrea Roberti ; Paolo Fiorini</i>	
IMPORTANCE SAMPLING FOR DEEP SYSTEM IDENTIFICATION	43
<i>Antoine Mahé ; Antoine Richard ; Benjamin Mouscadet ; Cédric Pradalier ; Matthieu Geist</i>	
FAST CONVOLUTIONAL NEURAL NETWORK FOR REAL-TIME ROBOTIC GRASP DETECTION	49
<i>Eduardo G. Ribeiro ; Valdir Grassi</i>	
TOWARDS BEAUTY: ROBOT FOLLOWING AESTHETICS GRADIENTS	55
<i>Mathias Franzius</i>	
A LIGHTWEIGHT TRANSRADIAL HAND PROSTHESIS WITH A VARIABLE POSITION THUMB AND THERMOREGULATION	61
<i>Anand Vazhapilli Sureshbabu ; David Rass ; Markus Zimmermann</i>	
A LOW-COST, COMPLIANT, UNDERACTUATED PROSTHETIC HAND WITH CUSTOM FLEX SENSORS FOR FINGER BENDING ESTIMATION	69
<i>Luíza Amador Pozzobon ; Rodrigo Da Silva Guerra ; Giovanni Rubert Librelotto</i>	
EVALUATING ENERGY CONSUMPTION OF AN ACTIVE MAGNETORHEOLOGICAL KNEE PROSTHESIS	75
<i>Rafhael M. Andrade ; Antônio B. Filho ; Claysson B. S. Vimeiro ; Marcos Pinotti</i>	
SIMULATION AND ANALYSIS OF A FULL-ACTIVE ELECTRO-HYDROSTATIC POWERED ANKLE PROSTHESIS	81
<i>Huajian Liu ; Qitao Huang ; Zhizhong Tong</i>	
NEURAL ADAPTIVE INTEGRAL-SLIDING-MODE CONTROLLER WITH A SSVEP-BASED BCI FOR EXOSKELETONS	87
<i>Ayoub Jebri ; Tarek Madani ; Karim Djouani</i>	
FLUX REGULATION FOR TORQUE-CONTROLLED ROBOTICS ACTUATORS	93
<i>Mobin Mohammadnia ; Navvab Kashiri ; Francesco Braghin ; Nikos G. Tsagarakis</i>	
ADAPTIVE CONTROL OF AN UNBALANCED TWO-AXIS GIMBAL FOR APPLICATION TO INERTIALLY STABILIZED PLATFORMS	99
<i>Andrei Battistel ; Tiago Roux Oliveira ; Victor Hugo Pereira Rodrigues</i>	
MAXIMIZING ROBOT MANIPULABILITY ALONG PATHS IN COLLISION-FREE MOTION PLANNING	105
<i>Sascha Kaden ; Ulrike Thomas</i>	
AN ADAPTIVE CONTROLLER WITH GUARANTEE OF BETTER CONDITIONING OF THE ROBOT MANIPULATOR JOINT-SPACE INERTIA MATRIX	111
<i>Mariana De Paula Assis Fonseca ; Bruno Vilhena Adorno ; Philippe Fraisse</i>	
A NOVEL APPROACH FOR PARAMETER EXTRACTION OF AN NMPC-BASED VISUAL FOLLOWER MODEL	117
<i>Iago José P. B. Franco ; Tiago T. Ribeiro ; André Gustavo S. Conceição</i>	
MODEL-BASED DYNAMIC POSE GRAPH SLAM IN UNSTRUCTURED DYNAMIC ENVIRONMENTS	123
<i>A. Deeb ; M. L. Seto ; Y. J. Pan</i>	

MAP POINT OPTIMIZATION IN KEYFRAME-BASED SLAM USING COVISIBILITY GRAPH AND INFORMATION FUSION	129
<i>Edison Kleiber T. Concha ; Diego Pittol ; Ricardo Westhauser ; Mariana Kolberg ; Renan Maffei ; Edson Prestes</i>	
VISUAL SLAM IN HUMAN POPULATED ENVIRONMENTS: EXPLORING THE TRADE-OFF BETWEEN ACCURACY AND SPEED OF YOLO AND MASK R-CNN.....	135
<i>João Carlos Virgolino Soares ; Marcelo Gattass ; Marco Antonio Meggiolaro</i>	
SIMSLAM 2D: A SIMULATION FRAMEWORK FOR TESTING AND BENCHMARKING OF TWO-DIMENSIONAL VISUAL-SLAM METHODS	141
<i>Juan Rodriguez ; Davinson Castano-Cano</i>	
REAL-TIME RGB-D SEMANTIC KEYFRAME SLAM BASED ON IMAGE SEGMENTATION LEARNING FROM INDUSTRIAL CAD MODELS	147
<i>Howard Mahé ; Denis Marraud ; Andrew I. Comport</i>	
NONLINEAR MODEL PREDICTIVE CONTROL ON SE(3) FOR QUADROTOR TRAJECTORY TRACKING AND OBSTACLE AVOIDANCE.....	155
<i>Jean C. Pereira ; Valter J. S. Leite ; Guilherme V. Raffo</i>	
MATHEMATICAL MODELING AND CONTROL OF A QUADROTOR AERIAL VEHICLE WITH TILTROTORS AIMED FOR INTERACTION TASKS	161
<i>Julio C. Vendrichoski ; Thamiris L. Costa ; Ebrahim S. El'Youssef ; Edson R. De Pieri</i>	
MODELING AND CONTROL OF AN UNMANNED AERIAL VEHICLE WITH TILT ROTORS EQUIPPED WITH A CAMERA.....	167
<i>Thamiris Lima Costa ; Julio Cezar Vendrichoski ; Ebrahim Samer El'Youssef ; Edson Roberto De Pieri</i>	
A STUDY ON CONFIGURATION OF PROPELLERS FOR MULTIROTOR-LIKE HYBRID AERIAL-AQUATIC VEHICLES	173
<i>Alexandre C. Horn ; Pedro M. Pinheiro ; Cesar B. Silva ; Armando Alves Neto ; Paulo L. J. Drews-Jr</i>	
NMPC STRATEGY FOR A QUADROTOR UAV IN A 3D UNKNOWN ENVIRONMENT.....	179
<i>Iuro B. P. Nascimento ; Antonio Ferramosca ; Luciano C. A. Pimenta ; Guilherme V. Raffo</i>	
PHYSICAL HUMAN-ROBOT INTERACTION UNDER JOINT AND CARTESIAN CONSTRAINTS	185
<i>Juan D. Muñoz Osorio ; Felix Allmendinger ; Mario D. Fiore ; Uwe E. Zimmermann ; Tobias Ortmaier</i>	
HAND-GUIDANCE OF A MOBILE MANIPULATOR USING ONLINE EFFECTIVE MASS OPTIMIZATION	192
<i>Christian Ritter ; Shashank Sharma</i>	
ADMITTANCE CONTROL FOR COLLABORATIVE DUAL-ARM MANIPULATION	198
<i>Sonny Tarbouriech ; Benjamin Navarro ; Philippe Fraisse ; André Crosnier ; Andrea Cherubini ; Damien Sallé</i>	
EXTENDED CALCULATION OF THE DYNAMIC SEPARATION DISTANCE FOR ROBOT SPEED ADAPTION IN THE HUMAN-ROBOT INTERACTION	205
<i>Paul Glogowski ; Kai Lemmerz ; Alfred Hypki ; Bernd Kuhlenkötter</i>	
ADVANCED USABILITY THROUGH CONSTRAINED MULTI MODAL INTERACTIVE STRATEGIES: THE COOKIEBOT	213
<i>Gabriele Bolano ; Pascal Becker ; Jacques Kaiser ; Arne Roennau ; Ruediger Dillmann</i>	
NONLINEAR DISTURBANCE OBSERVER FOR EXTERNAL FORCE ESTIMATION IN A COOPERATIVE ROBOT*	220
<i>Shirin Yousefzadeh ; Thomas Bak</i>	
ESTIMATING AND LOCALIZING EXTERNAL FORCES APPLIED ON FLEXIBLE INSTRUMENTS BY SHAPE SENSING	227
<i>Qiao Qiao ; Dries Willems ; Gianni Borghesan ; Mouloud Ourak ; Joris De Schutter ; Emmanuel Vander Poorten</i>	
DYNAMIC MOVEMENT PRIMITIVES: VOLUMETRIC OBSTACLE AVOIDANCE.....	234
<i>Michele Ginesi ; Daniele Meli ; Andrea Calanca ; Diego Dall'Alba ; Nicola Sansonetto ; Paolo Fiorini</i>	
TOWARDS THE USAGE OF SYNTHETIC DATA FOR MARKER-LESS POSE ESTIMATION OF ARTICULATED ROBOTS IN RGB IMAGES	240
<i>Jens Lambrecht ; Linh Kästner</i>	
VOTING BASED SYSTEM FOR ROBUST 3D HAND POSE ESTIMATION AND TRACKING	248
<i>Mohammad Asif ; Andreas Daasch ; Hendrik Unger ; Matthias Schultalbers</i>	
OBSTACLE AVOIDING PATH FOLLOWING BASED ON NONLINEAR MODEL PREDICTIVE CONTROL USING ARTIFICIAL VARIABLES.....	254
<i>Ignacio Sánchez ; Antonio Ferramosca ; Guilherme Raffo ; Alejandro H. González ; Agustina D'Jorge</i>	
A HEALTH MONITORING SYSTEM WITH HYBRID BAYESIAN NETWORK FOR AUTONOMOUS VEHICLE	260
<i>Iago Pachêco Gomes ; Denis Fernando Wolf</i>	
NULL SPACE-BASED FORMATION CONTROL WITH LEADER CHANGE POSSIBILITY	266
<i>Valentim Ernandes Netol ; Mário Sarcinelli-Filho ; Alexandre Santos Brandão</i>	

FAST AND PARALLEL WIRELESS COMMUNICATION BACKBONE DEPLOYMENT WITH NETWORKED ROBOTS	272
<i>Elerson R. S. Santos ; Marcos A. M. Vieira</i>	
A VISUAL METHOD TO STUDY THE ERROR FUNCTION OF ICP ALGORITHMS.....	278
<i>Sebastian Dinger ; Hannes Burrichter</i>	
TOWARDS A VIRTUAL REALITY INTERFACE FOR REMOTE ROBOTIC TELEOPERATION	284
<i>Abdeldjalil Naceri ; Dario Mazzanti ; Joao Bimbo ; Domenico Prattichizzo ; Darwin G. Caldwell ; Leonardo S. Mattos ; Nikhil Deshpande</i>	
REAL-TIME SYSTEMS EVALUATION FOR ROBOTICS USING THE HART-ROS BENCHMARK	290
<i>Matheus Leitzke Pinto ; André Schneider De Oliveira ; Marco Aurélio Wehrmeister</i>	
ROBOTITO: PROGRAMMING ROBOTS FROM PRESCHOOL TO UNDERGRADUATE SCHOOL LEVEL.....	296
<i>Gonzalo Tejera ; Guillermo Amarin ; Andrés Sere ; Nicolás Capricho ; Pablo Margenat ; Jorge Visca</i>	
A QUANTITATIVE STUDY OF TUNING ROS ADAPTIVE MONTE CARLO LOCALIZATION PARAMETERS AND THEIR EFFECT ON AN AGV LOCALIZATION	302
<i>Wallace Pereira Neves Dos Reis ; Orides Morandin ; Kelen Cristiane Teixeira Vivaldini</i>	
ANALYSIS OF ENERGY CONSUMPTION IN A TWO-ARM VERTICAL PLANAR ROBOT BY VARYING A DIMENSIONLESS DESIGN CONSTRUCTION PARAMETER	308
<i>Matheus U. Borges ; Fernando Augusto A. Pinto ; Eduardo J. Lima</i>	
AUTOMATIC CONFIGURATION OF THE STRUCTURE AND PARAMETERIZATION OF PERCEPTION PIPELINES	312
<i>Vincent Dietrich ; Bernd Kast ; Michael Fiegert ; Sebastian Albrecht ; Michael Beetz</i>	
ON THE ROBUST LONGITUDINAL TRAJECTORY TRACKING FOR LOAD TRANSPORTATION VEHICLES ON UNEVEN TERRAINS	320
<i>Victor R. F. Miranda ; Leonardo A. Mozelli ; Armando Alves Neto ; Gustavo M. Freitas</i>	
ROSI: A NOVEL ROBOTIC METHOD FOR BELT CONVEYOR STRUCTURES INSPECTION	326
<i>Gabriel Garcia ; Filipe Rocha ; Marcos Torre ; Wenderson Serrantola ; Fernando Lizarralde ; Andre Franca ; Gustavo Pessin ; Gustavo Freitas</i>	
WIRING OF CONTROL CABINETS USING A DISTRIBUTED CONTROL WITHIN A ROBOT-BASED PRODUCTION CELL	332
<i>Stefanie Spies ; Matthias Bartelt ; Bernd Kuhlenkötter</i>	
REAL-TIME SENSOR FUSION AND COMPENSATION FOR WIDE-BANDWIDTH MICRO VIBRATION USING GYROSCOPE AND CAMERA	338
<i>Yichang He ; Yunfeng Fan ; U-Xuan Tan</i>	
INCREMENTAL POLICY REFINEMENT BY RECURSIVE REGRESSION AND KINESTHETIC GUIDANCE	344
<i>Bojan Nemec ; Mihael Simonic ; Tadej Petric ; Aleš Ude</i>	
NEURAL NETWORK POSITION AND ORIENTATION CONTROL OF AN INVERTED PENDULUM ON WHEELS	350
<i>Christian Dengler ; Lohmann Boris</i>	
ECO-CRUISE NMPC CONTROL FOR AUTONOMOUS VEHICLES	356
<i>Kenny A. Q. Caldas ; Valdir Grassi</i>	
DEEP DETERMINISTIC POLICY GRADIENT FOR NAVIGATION OF MOBILE ROBOTS IN SIMULATED ENVIRONMENTS	362
<i>Junior C. Jesus ; Jair A. Bottega ; Marco A. S. L. Cuadros ; Daniel F. T. Gamarra</i>	
DEEP REINFORCEMENT LEARNING CONTROL OF AN AUTONOMOUS WHEELED ROBOT IN A CHALLENGE TASK: COMBINED VISUAL AND DYNAMICS SENSING	368
<i>Luiz Afonso Marão ; Larissa Casteluci ; Ricardo Godoy ; Henrique Garcia ; Daniel Varela Magalhães ; Glauco Caurin</i>	
COMPUTING MULTIPLE GUIDING PATHS FOR SAMPLING-BASED MOTION PLANNING	374
<i>Vojtech Vonásek ; Robert Penicka ; Barbora Kozlíková</i>	
CONTINUOUS DEEP MAXIMUM ENTROPY INVERSE REINFORCEMENT LEARNING USING ONLINE POMDP	382
<i>Júnior A. R. Silva ; Valdir Grassi ; Denis Fernando Wolf</i>	
AUGMENTED VECTOR FIELD NAVIGATION COST MAPPING USING INERTIAL SENSORS	388
<i>Felipe G. Oliveira ; Armando Alves Neto ; Paulo Borges ; Mario F. M. Campos ; Douglas G. Macharet</i>	
TRAJECTORY PLANNING FOR A DUAL-ARM PLANAR FREE-FLOATING MANIPULATOR USING RRTCONTROL	394
<i>Wenderson Gustavo Serrantola ; Valdir Grassi</i>	

LAZY STEERING RRT*: AN OPTIMAL CONSTRAINED KINODYNAMIC NEURAL NETWORK BASED PLANNER WITH NO IN-EXPLORATION STEERING	400
<i>Mohammadreza Yavari ; Kamal Gupta ; Mehran Mehrandezh</i>	
NON-STOP HANDOVER OF PARCEL TO AIRBORNE UAV BASED ON HIGH-SPEED VISUAL OBJECT TRACKING	408
<i>Satoshi Tanaka ; Taku Senoo ; Masatoshi Ishikawa</i>	
MONOCULAR VISION NAVIGATION FOR AERIAL SURVEILLANCE OF POWER LINES BASED ON DEEP NEURAL NETWORKS AND HOUGH TRANSFORM	414
<i>Victor Souza ; Alan Tavares ; Cesar Quiroz ; Paulo Kurka</i>	
CONVOLUTIONAL NEURAL NETWORK BASED OBJECT DETECTION FOR ADDITIVE MANUFACTURING.....	420
<i>Cézar B. Lemos ; Paulo C. M. A. Farias ; Eduardo F. Simas Filho ; André G. S. Conceição</i>	
COMBINED VISUAL AND TOUCH-BASED SENSING FOR THE AUTONOMOUS REGISTRATION OF OBJECTS WITH CIRCULAR FEATURES	426
<i>Arne Sachtler ; Korbinian Nottensteiner ; Michael Kaßecker ; Alin Albu-Schäffer</i>	
VISUAL ATTENTION SYSTEM BASED ON FUZZY CLASSIFIER TO DEFINE PRIORITY OF TRAFFIC SIGNS FOR INTELLIGENT ROBOTIC VEHICLE NAVIGATION PURPOSES	434
<i>Diego Renan Bruno ; Fernando Santos Osório</i>	
WALKING IN THE 2-STEP CAPTURE REGION; PUSHES, RAMPS AND SPEED MODULATION	449
<i>Ivan Fischman Ekman Simões ; Arturo Forner Cordero</i>	
MOTION GENERATION INTERFACE OF ROS TO PODO SOFTWARE FRAMEWORK FOR WHEELED HUMANOID ROBOT	456
<i>Moonyoung Lee ; Yujin Heo ; Saihim Cho ; Hyunsub Park ; Jun-Ho Oh</i>	
EVALUATION OF EXERCISE MOTIVATION COMPETENCE OF A HUMANOID ROBOT: A CASE STUDY IN BRAZIL	462
<i>Guilherme Da Silva Garcia ; Guilherme Henrique Galelli Christmann ; Rodrigo Da Silva Guerra ; Giovanni Rubert Librelotto ; Eduardo Rafael Hirt ; Marinara Rübenich Fumagalli</i>	
NEURAL CONTROL FOR GAIT GENERATION AND ADAPTATION OF A GECKO ROBOT.....	468
<i>Arthicha Srisuchinnawong ; Donghao Shao ; Potiwat Ngamkajornwiiwat ; Pitiwut Teerakittikul ; Zhendong Dai ; Aihong Ji ; Poramate Manoonpong</i>	
A COGNITIVE URBAN COLLISION AVOIDANCE FRAMEWORK BASED ON AGENTS PRIORITY USING RECURRENT NEURAL NETWORK.....	474
<i>Shenghao Jiang ; Macheng Shen</i>	
EVALUATION OF DOMAIN RANDOMIZATION TECHNIQUES FOR TRANSFER LEARNING	481
<i>Silas Grün ; Simon Höniger ; Paul Maria Scheikl ; Björn Hein ; Torsten Kröger</i>	
ANDA: A NOVEL DATA AUGMENTATION TECHNIQUE APPLIED TO SALIENT OBJECT DETECTION	487
<i>Daniel V. Ruiz ; Bruno A. Krinski ; Eduardo Todt</i>	
EXPERIMENTAL STUDY ON MODEL- VS. LEARNING-BASED SLIP DETECTION	493
<i>Luciano Menasse Rosset ; Monika Florek-Jasinska ; Michael Suppa ; Máximo A. Roa-Garzón</i>	
MULTI-VIEW 3D RECONSTRUCTION WITH SELF-ORGANIZING MAPS ON EVENT-BASED DATA.....	501
<i>Lea Steffen ; Stefan Ulbrich ; Arne Roennau ; Rüdiger Dillmann</i>	
AREA GRAPH: GENERATION OF TOPOLOGICAL MAPS USING THE VORONOI DIAGRAM.....	509
<i>Jiawei Hou ; Yijun Yuan ; Sören Schwertfeger</i>	
BOOM-VIO: BOOTSTRAPPED MONOCULAR VISUAL-INERTIAL ODOMETRY WITH ABSOLUTE TRAJECTORY ESTIMATION THROUGH UNSUPERVISED DEEP LEARNING	516
<i>Kyle Lindgren ; Sarah Leung ; William D. Nothwang ; E. Jared Shamwell</i>	
TIGHTLY COUPLED SEMANTIC RGB-D INERTIAL ODOMETRY FOR ACCURATE LONG-TERM LOCALIZATION AND MAPPING	523
<i>Naman Patel ; Farshad Khorrami ; Prashanth Krishnamurthy ; Anthony Tzes</i>	
SAFER UAV PILOTING: A ROBUST SENSE-AND-AVOID SOLUTION FOR REMOTELY PILOTED QUADROTOR UAVS IN COMPLEX ENVIRONMENTS	529
<i>Min Wang ; Holger Voos</i>	
PATH-FOLLOWING AND ATTITUDE CONTROL OF A PAYLOAD USING MULTIPLE QUADROTORS.....	535
<i>Daniel Khede Dourado Villa ; Alexandre Santos Brandão ; Mário Sarcinelli-Filho</i>	
VISION-BASED AUTONOMOUS LANDING FOR MICRO AERIAL VEHICLES ON TARGETS MOVING IN 3D SPACE.....	541
<i>Robson O. De Santana ; Leonardo A. Mozelli ; Armando Alves Neto</i>	

AUTONOMOUS SYSTEM FOR A RACING QUADCOPTER	547
<i>Adriano M. C. Rezende ; Victor R. F. Miranda ; Henrique N. Machado ; Antonio C. B. Chiella ; Vinicius M. Gonçalves ; Gustavo M. Freitas</i>	
ASSISTIVE METHOD THAT CONTROLS JOINT STIFFNESS AND ANTAGONIZED ANGLE BASED ON HUMAN JOINT STIFFNESS CHARACTERISTICS AND ITS APPLICATION TO AN EXOSKELETON	553
<i>Seigo Kimura ; Ryuji Suzuki ; Masashi Kashima ; Manabu Okui ; Rie Nishihama ; Taro Nakamura</i>	
STEP MODELING AND SAFE PATH PLANNING FOR A LOWER LIMB EXOSKELETON	560
<i>Vitor G. Santos ; Luís B. P. Nascimento ; Daniel H. S. Fernandes ; Diego S. Pereira ; Pablo J. Alsina ; Márcio V. Araújo</i>	
EVALUATING THE POTENTIAL BENEFIT OF AUTOSTEREOSCOPY IN LAPAROSCOPIC SACROCOLPOPEXY THROUGH VR SIMULATION	566
<i>Jef De Smet ; Vladimir Poliakov ; Kenan Niu ; Frédérique Chesterman ; Johan Fornier ; Mirza Awais Ahmad ; Mouloud Ourak ; Viktor Vörös ; Jan Deprest ; Emmanuel Vander Poorten</i>	
PRE-DIAGNOSIS OF PELVIC FLOOR DISORDERS-BASED IMAGE REGISTRATION AND CLUSTERING	572
<i>Cícero L. Costa ; Tília A. A. Macedo ; Celia A. Z. Barcelos</i>	
UNDERWATER SONAR AND AERIAL IMAGES DATA FUSION FOR ROBOT LOCALIZATION	578
<i>Matheus M. Dos Santos ; Giovanni G. De Giacomo ; Paulo L. J. Drews ; Silvia S. C. Botelho</i>	
EFFICIENT TRAVERSABILITY MAPPING FOR SERVICE ROBOTS USING A POINT-CLOUD FAST FILTER	584
<i>Carlos Medina Sánchez ; Matteo Zella ; Jesús Capitan ; Pedro J. Marron</i>	
OUTDOOR PARTICLE FILTER LOCALIZATION WITH SPARSE OBSERVATION	590
<i>Nils Einecke ; Andrej Robert</i>	
OBJECT-BASED DIFFERENTIAL LOCALIZATION OF MOBILE ROBOTS USING SPARSE 2D LIDAR DATA	598
<i>Marc Forstenhäusler ; Matthias Karl ; Klaus Dietmayer</i>	
OUTDOOR LOCALIZATION SYSTEM WITH AUGMENTED STATE EXTENDED KALMAN FILTER AND RADIO-FREQUENCY RECEIVED SIGNAL STRENGTH	604
<i>Renan Maidana ; Alexandre Amory ; Aurélio Salton</i>	
EXPLOITING HETEROGENEITY IN TEAMS OF ROBOTIC AGENTS USING HYBRID COMMUNICATIONS	610
<i>Jonathan West ; Rafael Fierro</i>	
MULTI-ROBOT ON-LINE SAMPLING SCHEDULER FOR PERSISTENT MONITORING	617
<i>Douglas G. Macharet ; Armando Alves Neto</i>	
AUTOMATED CONFLICT RESOLUTION OF LANE CHANGE UTILIZING PROBABILITY COLLECTIVES	623
<i>Tiago C. Dos Santos ; Denis F. Wolf</i>	
BARGAINING GAME APPROACH FOR LANE CHANGE MANEUVERS	629
<i>Tiago C. Dos Santos ; Denis F. Wolf</i>	
TASK-ORIENTED FUNCTION DETECTION BASED ON OPERATIONAL TASKS	635
<i>Yuchi Ishikawa ; Haruya Ishikawa ; Shuichi Akizuki ; Masaki Yamazaki ; Yasuhiro Taniguchi ; Yoshimitsu Aoki</i>	
THE CALM SYSTEM: NEW GENERATION COMPUTER-ASSISTED LASER MICROSURGERY	641
<i>Alperen Acemoglu ; Nikhil Deshpande ; Jino Lee ; Darwin G. Caldwell ; Leonardo S. Mattos</i>	
DESIGN AND SHARED CONTROL OF A FLEXIBLE ENDOSCOPE WITH AUTONOMOUS DISTAL TIP ALIGNMENT	647
<i>Mirza Awais Ahmad ; Mouloud Ourak ; Caspar Gruijthuijsen ; Julie Legrand ; Tom Vercauteren ; Jan Deprest ; Sebastien Ourselin ; Emmanuel Vander Poorten</i>	
CLOSED-LOOP CONTROL OF A MAGNETICALLY ACTUATED FIBER-COUPLED LASER FOR COMPUTER-ASSISTED LASER MICROSURGERY	654
<i>Hamed Mohammadbagherpoor ; Alperen Acemoglu ; Leonardo S. Mattos ; Darwin Caldwell ; James E. Johnson ; John Muth ; Edward Grant</i>	
AN AUTO-FOCUSING SYSTEM FOR ENDOSCOPIC LASER SURGERY BASED ON A HYDRAULIC MEMS VARIFOCAL MIRROR	660
<i>André Geraldès ; Paolo Fiorini ; Leonardo S. Mattos</i>	
TOWARDS REAL-TIME ESTIMATION OF A SPHERICAL EYE MODEL BASED ON A SINGLE FIBER OCT	666
<i>Philip Cornelissen ; Mouloud Ourak ; Gianni Borghesan ; Dominiek Reynaerts ; Emmanuel Vander Poorten</i>	
APPLYING THE POPOV-VERESHCHAGIN HYBRID DYNAMICS SOLVER FOR TELEOPERATION UNDER INSTANTANEOUS CONSTRAINTS	673
<i>Padmaja Kulkarni ; Sven Schneider ; Maren Bennewitz ; Dirk Schulz ; Paul Plöger</i>	

INVERSE KINEMATICS WITH FORWARD DYNAMICS SOLVERS FOR SAMPLED MOTION TRACKING	681
<i>Stefan Scherzinger ; Arne Roennau ; Rüdiger Dillmann</i>	
MULTI-SURFACE ADMITTANCE CONTROL APPROACH APPLIED ON ROBOTIC ASSEMBLY OF LARGE-SCALE PARTS IN AEROSPACE MANUFACTURING	688
<i>Sebastian Rendon Fernandez ; Adei Olabi ; Olivier Gibaru</i>	
MULTI-DOF TIME DOMAIN PASSIVITY APPROACH BASED DRIFT COMPENSATION FOR TELEMANIPULATION	695
<i>Andre Coelho ; Christian Ott ; Harsimran Singh ; Fernando Lizarralde ; Konstantin Kondak</i>	
AUTO-TUNING OF GPC WEIGHTS BASED ON PARTICLE SWARM OPTIMIZATION APPLIED TO A MANIPULATOR END-EFFECTOR TRAJECTORY TRACKING	702
<i>Felipe José De Sousa Vasconcelos ; Iury De Amorim Gaspar Filgueiras ; Wilkley Bezerra Correia</i>	
STOCHASTIC CELLULAR AUTOMATA ANT MEMORY MODEL FOR SWARM ROBOTS PERFORMING EFFICIENTLY THE GARBAGE COLLECTION TASK	708
<i>Danielli A. Lima ; Gina M. B. Oliveira</i>	
HYBRID MODEL FOR A PRIORI PERFORMANCE PREDICTION OF MULTI-JOB TYPE SWARM SEARCH AND SERVICE MISSIONS	714
<i>Meghan Chandarana ; Dana Hughes ; Michael Lewis ; Katia Sycara ; Sebastian Scherer</i>	
ADAPTABLE PLATFORM FOR INTERACTIVE SWARM ROBOTICS (APIS): A HUMAN-SWARM INTERACTION RESEARCH TESTBED	720
<i>Neel Dhanaraj ; Nathan Hewitt ; Casey Edmonds-Estes ; Rachel Jarman ; Jeongwoo Seo ; Henry Gunner ; Alexandra Hatfield ; Tucker Johnson ; Lunet Yifru ; Julietta Maffeo ; Guilherme Pereira ; Jason Gross ; Yu Gu</i>	
SWARMAP: OCCUPANCY GRID MAPPING WITH A ROBOTIC SWARM	727
<i>Rodrigo Chaves ; Paulo Rezeck ; Luiz Chaimowicz</i>	
SPRINTER: A DISCRETE LOCOMOTION ROBOT FOR PRECISION SWARM PRINTING	733
<i>Kedar Karpe ; Ayon Chatterjee ; Pranav Srinivas ; Dhanalakshmi Samiappan ; Kumar Ramamoorthy ; Lorenzo Sabattini</i>	
VISUAL-INERTIAL SLAM AIDED ESTIMATION OF ANCHOR POSES AND SENSOR ERROR MODEL PARAMETERS OF UWB RADIO MODULES	739
<i>Philipp Lutz ; Martin J. Schuster ; Florian Steidle</i>	
CONTROL OF FLYING ROBOTIC INSECTS: A PERSPECTIVE AND UNIFYING APPROACH	747
<i>A. A. Calderón ; Y. Chen ; X. Yang ; L. Chang ; X.- T. Nguyen ; E. K. Singer ; N. O. Pérez-Arancibia</i>	
GPS EMULATION VIA VISUAL-INERTIAL ODOMETRY FOR INSPECTION DRONES	755
<i>Duarte Dornellas ; Filipe Rosa ; Alexandre Bernardino ; Ricardo Ribeiro ; José Santos-Victor</i>	
A COMPARATIVE STUDY OF SENSOR FAULT DETECTION APPROACHES APPLIED TO AN AUTONOMOUS SOLAR-POWERED AIRCRAFT	761
<i>Paulo Padrao ; Liu Hsu ; Michael Vilzmann ; Konstantin Kondak</i>	
AEROVR: VIRTUAL REALITY-BASED TELEOPERATION WITH TACTILE FEEDBACK FOR AERIAL MANIPULATION	767
<i>Grigoriy A. Yashin ; Daria Trinitatova ; Ruslan T. Agishev ; Roman Ibrahimov ; Dzmityr Tsetserukou</i>	
VISUAL SALIENCY WITH FOVEATED IMAGES FOR FAST OBJECT DETECTION AND RECOGNITION IN MOBILE ROBOTS USING LOW-POWER EMBEDDED GPUS	773
<i>Uziel Jaramillo-Avila ; Jonathan M. Aitken ; Sean R. Anderson</i>	
PEDESTRIAN FLOW ESTIMATION USING SPARSE OBSERVATION FOR AUTONOMOUS VEHICLES	779
<i>Ranulfo P. Bezerra Neto ; Kazunori Ohno ; Thomas Westfechtel ; Satoshi Tadokoro</i>	
DETECTION AND LOCALIZATION OF PALLETS ON SHELVES USING A WIDE-ANGLE CAMERA	785
<i>Yasuyo Kita ; Ryuichi Takase ; Tatsuya Komuro ; Norihiko Kato ; Nobuyuki Kita</i>	
SPARSE-TO-CONTINUOUS: ENHANCING MONOCULAR DEPTH ESTIMATION USING OCCUPANCY MAPS	793
<i>Nicolas Dos Santos Rosa ; Vitor Guizilini ; Valdir Grassi</i>	
LASER-SUPPORTED MONOCULAR VISUAL TRACKING FOR NATURAL ENVIRONMENTS	801
<i>Georges Chahine ; Cédric Pradalier</i>	
Author Index	