

# Table of Contents – Part I

## Progress in Indoor UAV

On the Way to a Real-Time On-Board Orthogonal SLAM for an Indoor UAV .....	1
<i>Mirco Alpen, Klaus Frick, and Joachim Horn</i>	
Quadrocopter Localization Using RTK-GPS and Vision-Based Trajectory Tracking .....	12
<i>Ulf Pilz, Willem Gropengießer, Florian Walder, Jonas Witt, and Herbert Werner</i>	
Five-Axis Milling Simulation Based on B-rep Model .....	22
<i>Yongzhi Cheng, Caihua Xiong, Tao Ye, and Hongkai Cheng</i>	

## Robotics Intelligence

Exploration Strategies for Building Compact Maps in Unbounded Environments .....	33
<i>Matthias Nieuwenhuisen, Dirk Schulz, and Sven Behnke</i>	
The Basic Component of Computational Intelligence for KUKA KR C3 Robot .....	44
<i>Tadeusz Szkodny</i>	
An Experimental Comparison of Model-Free Control Methods in a Nonlinear Manipulator .....	53
<i>Mateusz Przybyla, Rafal Madonski, Marta Kordasz, and Przemyslaw Herman</i>	

## Industrial Robots

Research on Modular Design of Perpendicular Jointed Industrial Robots .....	63
<i>Lin Song and Suixian Yang</i>	
Online Path Planning for Industrial Robots in Varying Environments Using the Curve Shortening Flow Method .....	73
<i>Marcel Huptych, Konrad Groh, and Sascha Röck</i>	
Parallel-Populations Genetic Algorithm for the Optimization of Cubic Polynomial Joint Trajectories for Industrial Robots .....	83
<i>Fares J. Abu-Dakka, Iyad F. Assad, Francisco Valero, and Vicente Mata</i>	

## Robotics Assembly Applications

Integrative Path Planning and Motion Control for Handling Large Components .....	93
<i>Rainer Müller, Martin Esser, and Markus Janssen</i>	
Automatic Configuration of Robot Systems – Upward and Downward Integration .....	102
<i>Gunther Reinhart, Stefan Hüttner, and Stefan Krug</i>	
Process and Human Safety in Human-Robot-Interaction – A Hybrid Assistance System for Welding Applications .....	112
<i>Carsten Thomas, Felix Busch, Bernd Kuhlenkoetter, and Jochen Deuse</i>	
Operation Simulation of a Robot for Space Applications .....	122
<i>Hui Li, Giuseppe Carbone, Marco Ceccarelli, and Qiang Huang</i>	
Re-grasping: Improving Capability for Multi-Arm-Robot-System by Dynamic Reconfiguration .....	132
<i>Burkhard Corves, Tom Mannheim, and Martin Riedel</i>	
A Parallel Kinematic Concept Targeting at More Accurate Assembly of Aircraft Sections .....	142
<i>Christian Löchte, Franz Dietrich, and Annika Raatz</i>	
Dimensional Synthesis of Parallel Manipulators Based on Direction-Dependent Jacobian Indices .....	152
<i>Marwène Nefzi, Clément Gosselin, Martin Riedel, Mathias Hüsing, and Burkhard Corves</i>	

## Rehabilitation Robotics

EMG Classification for Application in Hierarchical FES System for Lower Limb Movement Control .....	162
<i>Dingguo Zhang, Ying Wang, Xinpu Chen, and Fei Xu</i>	
Situated Learning of Visual Robot Behaviors .....	172
<i>Krishna Kumar Narayanan, Luis-Felipe Posada, Frank Hoffmann, and Torsten Bertram</i>	
Humanoid Motion Planning in the Goal Reaching Movement of Anthropomorphic Upper Limb .....	183
<i>Wenbin Chen, Caihua Xiong, Ronglei Sun, and Xiaolin Huang</i>	
Human Sitting Posture Exposed to Horizontal Perturbation and Implications to Robotic Wheelchairs .....	192
<i>Karim A. Tahboub and Essameddin Badreddin</i>	

Automatic Circumference Measurement for Aiding in the Estimation of Maximum Voluntary Contraction (MVC) in EMG Systems .....	202
<i>James A.R. Cannan and Huosheng Hu</i>	

Classification of the Action Surface EMG Signals Based on the Dirichlet Process Mixtures Method .....	212
<i>Min Lei and Guang Meng</i>	

Displacement Estimation for Foot Rotation Axis Using a Stewart-Platform-Type Assist Device .....	221
<i>Ming Ding, Tomohiro Iida, Hiroshi Takemura, and Hiroshi Mizoguchi</i>	

## Mechanisms and their Applications

Inverse Kinematics Solution of a Class of Hybrid Manipulators .....	230
<i>Shahram Payandeh and Zhouming Tang</i>	

Stiffness Analysis of Clavel's DELTA Robot .....	240
<i>Martin Wahle and Burkhard Corves</i>	

Optimum Kinematic Design of a 3-DOF Parallel Kinematic Manipulator with Actuation Redundancy .....	250
<i>Fugui Xie, Xin-Jun Liu, Xiang Chen, and Jinsong Wang</i>	

Integrated Structure and Control Design for a Flexible Planar Manipulator .....	260
<i>Yunjia Lou, Yongsheng Zhang, Ruining Huang, and Zexiang Li</i>	

Effects of Clearance on Dynamics of Parallel Indexing Cam Mechanism .....	270
<i>Zongyu Chang, Lixin Xu, Yuhu Yang, Zhongqiang Zheng, and Tongqing Pan</i>	

Design and Compliance Experiment Study of the Forging Simulator ....	281
<i>Pu Zhang, Zhenqiang Yao, Zhengchun Du, Hao Wang, and Haidong Yu</i>	

Design of Compliant Bistable Mechanism for Rear Trunk Lid of Cars ...	291
<i>Shouyin Zhang and Guimin Chen</i>	

## Multi Robot Systems

DynaMOC: A Dynamic Overlapping Coalition-Based Multiagent System for Coordination of Mobile Ad Hoc Devices .....	300
<i>Vitor A. Santos, Giovanni C. Barroso, Mario F. Aguilar, Antonio de B. Serra, and Jose M. Soares</i>	

Design of a High Performance Quad-Rotor Robot Based on a Layered Real-Time System Architecture .....	312
<i>Jonas Witt, Björn Annighöfer, Ole Falkenberg, and Uwe Weltin</i>	
Simple Low Cost Autopilot System for UAVs .....	324
<i>S. Veera Ragavan, Velappa Ganapathy, and Chee Aiying</i>	
A Marsupial Relationship in Robotics: A Survey .....	335
<i>Hamido Hourani, Philipp Wolters, Eckart Hauck, and Sabina Jeschke</i>	
Multi-objective Robot Coalition Formation for Non-additive Environments .....	346
<i>Manoj Agarwal, Lovekesh Vig, and Naveen Kumar</i>	
Development of a Networked Multi-agent System Based on Real-Time Ethernet .....	356
<i>Xiong Xu, Zhenhua Xiong, Jianhua Wu, and Xiangyang Zhu</i>	
A Conceptual Agent-Based Planning Algorithm for the Production of Carbon Fiber Reinforced Plastic Aircrafts by Using Mobile Production Units .....	366
<i>Hamido Hourani, Philipp Wolters, Eckart Hauck, Annika Raatz, and Sabina Jeschke</i>	

## Robot Mechanism and Design

Trajectory Tracking and Vibration Control of Two Planar Rigid Manipulators Moving a Flexible Object .....	376
<i>Balasubramanian Esakki, Rama B. Bhat, and Chun-Yi Su</i>	
Concept and Design of the Modular Actuator System for the Humanoid Robot MYON .....	388
<i>Torsten Siedel, Manfred Hild, and Mario Weidner</i>	
Design of a Passive, Bidirectional Overrunning Clutch for Rotary Joints of Autonomous Robots .....	397
<i>Manfred Hild, Torsten Siedel, and Tim Geppert</i>	
DeWaLoP-Monolithic Multi-module In-Pipe Robot System .....	406
<i>Luis A. Mateos and Markus Vincze</i>	
Design and Control of a Novel Visco-elastic Braking Mechanism Using HMA .....	416
<i>Keith Gunura, Juanjo Bocanegra, and Fumiya Iida</i>	

## Parallel Kinematics, Parallel Kinematics Machines and Parallel Robotics

Topological Design of Weakly-Coupled 3-Translation Parallel Robots Based on Hybrid-Chain Limbs .....	426
<i>Huiping Shen, Tingli Yang, Lvzhong Ma, and Shaobin Tao</i>	
Working Space and Motion Analysis on a Novel Planar Parallel Manipulator with Three Driving Sliders .....	436
<i>Huiping Shen, Wei Wang, Changyu Xue, Jiaming Deng, and Zhenghua Ma</i>	
Optimal Kinematic Design of a 2-DoF Translational Parallel Manipulator with High Speed and High Precision .....	445
<i>Gang Zhang, PinKuan Liu, and Han Ding</i>	
Modeling and Control of Cable Driven Parallel Manipulators with Elastic Cables: Singular Perturbation Theory .....	455
<i>Alaleh Vafaei, Mohammad A. Khosravi, and Hamid D. Taghirad</i>	
CAD-2-SIM – Kinematic Modeling of Mechanisms Based on the Sheth-Uicker Convention .....	465
<i>Bertold Bongardt</i>	

## Handling and Manipulation

Non-rigid Object Trajectory Generation for Autonomous Robot Handling .....	478
<i>Honghai Liu and Hua Lin</i>	
Robotized Sewing of Fabrics Based on a Force Neural Network Controller .....	486
<i>Panagiotis N. Koustoumpardis and Nikos A. Aspragathos</i>	
Dynamic Insertion of Bendable Flat Cables with Variation Based on Shape Returning Points .....	496
<i>Yuuki Kataoka and Shinichi Hirai</i>	
A Vision System for the Unfolding of Highly Non-rigid Objects on a Table by One Manipulator .....	509
<i>Dimitra Triantafyllou and Nikos A. Aspragathos</i>	

## Tangibility in Human-Machine Interaction

Optimizing Motion of Robotic Manipulators in Interaction with Human Operators .....	520
<i>Hao Ding, Kurniawan Wijaya, Gunther Reißig, and Olaf Stursberg</i>	

Haptic Display of Rigid Body Contact Using Generalized Penetration Depth .....	532
<i>Jun Wu, Dangxiao Wang, and Yuru Zhang</i>	
Assistive Robots in Eldercare and Daily Living: Automation of Individual Services for Senior Citizens .....	542
<i>Alexander Mertens, Ulrich Reiser, Benedikt Brenken, Mathias Lüdtkke, Martin Hägele, Alexander Verl, Christopher Brandl, and Christopher Schlick</i>	
Key Factors for Freshmen Education Using MATLAB and LEGO Mindstorms .....	553
<i>Alexander Behrens, Linus Atorf, Dorian Schneider, and Til Aach</i>	
<b>Navigation and Localization of Mobile Robot</b>	
Adaptive Dynamic Path Following Control of an Unicycle-Like Mobile Robot .....	563
<i>Victor H. Andaluz, Flavio Roberti, Juan Marcos Toibero, Ricardo Carelli, and Bernardo Wagner</i>	
A Study on Localization of the Mobile Robot Using Inertial Sensors and Wheel Revolutions .....	575
<i>Bong-Su Cho, Woosung Moon, Woo-Jin Seo, and Kwang-Ryul Baek</i>	
Robust and Accurate Genetic Scan Matching Algorithm for Robotic Navigation .....	584
<i>Kristijan Lenac, Enzo Mumolo, and Massimiliano Nolich</i>	
Beacon Scheduling Algorithm for Localization of a Mobile Robot .....	594
<i>Jaehyun Park, Sunghee Choi, and Jangmyung Lee</i>	
Position Estimation Using Time Difference of Flight of the Multi-coded Ultrasonic .....	604
<i>Woo-Jin Seo, Bong-Su Cho, Woo-Sung Moon, and Kwang-Ryul Baek</i>	
Detecting Free Space and Obstacles in Omnidirectional Images .....	610
<i>Luis Felipe Posada, Krishna Kumar Narayanan, Frank Hoffmann, and Torsten Bertram</i>	
A Composite Random Walk for Facing Environmental Uncertainty and Reduced Perceptual Capabilities .....	620
<i>C.A. Pina-Garcia, Dongbing Gu, and Huosheng Hu</i>	
Motion Design for Service Robots .....	630
<i>Elias Xidias, Nikos A. Aspragathos, and Philip Azariadis</i>	
<b>Author Index .....</b>	<b>639</b>