

# Table of Contents

Overview of RoboCup-2000 .....	1
<i>Edited by Peter Stone with Minoru Asada, Tucker Balch, Masahiro Fujita, Gerhard Kraetzschmar, Henrik Lund, Paul Scerri, Satoshi Tadokoro, and Gordon Wyeth</i>	

## Champion Teams

FC Portugal Team Description: RoboCup 2000 Simulation League Champion .....	29
<i>Luís Paulo Reis and Nuno Lau</i>	
The Cornell RoboCup Team .....	41
<i>Raffaello D'Andrea, Tamás Kalmár-Nagy, Pritam Ganguly, and Michael Babish</i>	
CS Freiburg: Doing the Right Thing in a Group .....	52
<i>Thilo Weigel, Willi Auerbach, Markus Dietl, Burkhard Dümmler, Jens-Steffen Gutmann, Kornel Marko, Klaus Müller, Bernhard Nebel, Boris Szerbakowski, and Maximilian Thiel</i>	
The UNSW RoboCup 2000 Sony Legged League Team .....	64
<i>Bernhard Hengst, Darren Ibbotson, Son Bao Pham, John Dalglish, Mike Lawther, Phil Preston, and Claude Sammut</i>	

## Challenge Award Finalists

Adaptive Path Planner for Highly Dynamic Environments .....	76
<i>Jacky Baltes and Nicholas Hildreth</i>	
Communication and Coordination Among Heterogeneous Mid-Size Players: ART99 .....	86
<i>Claudio Castelpietra, Luca Iocchi, Daniele Nardi, Maurizio Piaggio, Alessandro Scalzo, and Antonio Sgorbissa</i>	
A Localization Method for a Soccer Robot Using a Vision-Based Omni-Directional Sensor .....	96
<i>Carlos F. Marques and Pedro U. Lima</i>	
Behavior Classification with Self-Organizing Maps .....	108
<i>Michael Wünnstel, Daniel Polani, Thomas Uthmann, and Jürgen Perl</i>	

## Technical Papers

### Full Papers

Flexible Synchronisation within RoboCup Environment: A Comparative Analysis .....	119
<i>Marc Butler, Mikhail Prokopenko, and Thomas Howard</i>	
Extended Q-Learning: Reinforcement Learning Using Self-Organized State Space .....	129
<i>Shuichi Enokida, Takeshi Ohasi, Takaichi Yoshida, and Toshiaki Ejima</i>	
And the Fans Are Going Wild! SIG plus MIKE .....	139
<i>Ian Frank, Kumiko Tanaka-Ishii, Hiroshi G. Okuno, Junichi Akita, Yukiko Nakagawa, K. Maeda, Kazuhiro Nakadai, and Hiroaki Kitano</i>	
Fast and Accurate Robot Vision for Vision Based Motion .....	149
<i>Pieter Jonker, Jurjen Caarls, and Wouter Bokhove</i>	
Design of RoboCup-Rescue Viewers – Towards a Real World Emergency System – .....	159
<i>Yoshitaka Kuwata and Atsushi Shinjoh</i>	
From Multiple Images to a Consistent View .....	169
<i>R. Hanek, T. Schmitt, M. Klupsch, and S. Buck</i>	
Omni-Directional Vision with a Multi-part Mirror .....	179
<i>Fabio M. Marchese and Domenico G. Sorrenti</i>	
Observation Strategy for Decision Making Based on Information Criterion .....	189
<i>Noriaki Mitsunaga and Minoru Asada</i>	
Towards a Logical Approach for Soccer Agents Engineering .....	199
<i>Jan Murray, Oliver Obst, and Frieder Stolzenburg</i>	
Bridging Gap between the Simulation and Robotics with a Global Vision System .....	209
<i>Yukiko Nakagawa, Hiroshi G. Okuno, and Hiroaki Kitano</i>	
Real-Time Estimating Spatial Configuration between Multiple Robots by Triangle and Enumeration Constraints .....	219
<i>T. Nakamura, M. Oohara, A. Ebina, M. Imai, T. Ogasawara, and H. Ishiguro</i>	
Framework of Distributed Simulation System for Multi-agent Environment .....	229
<i>Itsuki Noda</i>	

Robust Real Time Color Tracking . . . . .	239
<i>Mark Simon, Sven Behnke, and Raúl Rojas</i>	
Reinforcement Learning for 3 vs. 2 Keepaway . . . . .	249
<i>Peter Stone, Richard S. Sutton, and Satinder Singh</i>	
Fault-Tolerant Self Localization by Case-Based Reasoning . . . . .	259
<i>Jan Wendler, Steffen Brügger, Hans-Dieter Burkhard, and Helmut Myritz</i>	
PINO The Humanoid: A Basic Architecture . . . . .	269
<i>Fuminori Yamasaki, Tatsuya Matsui, Takahiro Miyashita, and Hiroaki Kitano</i>	
<b>Poster Descriptions</b>	
Team/Goal-Keeper Coordination in the RoboCup Mid-Size League . . . . .	279
<i>Giovanni Adorni, Stefano Cagnoni, Monica Mordonini, and Maurizio Piaggio</i>	
RescueModel: A Multi-Agent Simulation of Bushfire Disaster Management	285
<i>Gary Au, Simon Goss, Clint Heinze, and Adrian R. Pearce</i>	
Vision-Based Localization in RoboCup Environments . . . . .	291
<i>Stefan Enderle, Marcus Ritter, Dieter Fox, Stefan Sablatnög, Gerhard Kraetzschmar, and Günther Palm</i>	
Collaborative Emergent Actions between Real Soccer Robots . . . . .	297
<i>M. Ferrarezzo, C. Ferrari, E. Pagello, R. Polesel, R. Rosati, A. Speranzon, and W. Zhanette</i>	
The Statistics Proxy Server . . . . .	303
<i>Ian Frank, Kumiko Tanaka-Ishii, Katsuto Arai, and Hitoshi Matsubara</i>	
Using Simulated RoboCup in Undergraduate Education . . . . .	309
<i>Fredrik Heintz, Johan Kummeneje, and Paul Scerri</i>	
Path Planning of a Mobile Robot as a Discrete Optimization Problem and Adjustment of Weight Parameters in the Objective Function by Reinforcement Learning . . . . .	315
<i>Harukazu Igarashi</i>	
Simulator Complex for RoboCup Rescue Simulation Project — As Test-Bed for Multi-Agent Organizational Behavior in Emergency Case of Large-Scale Disaster . . . . .	321
<i>Toshiyuki Kaneda, Fumitoshi Matsuno, Hironao Takahashi, Takeshi Matsui, Masayasu Atsumi, Michinori Hatayama, Kenji Tayama, Ryousuke Chiba, and Kazunori Takeuchi</i>	

A Quadratic Programming Formulation of a Moving Ball Interception and Shooting Behaviour, and Its Application to Neural Network Control . . . . .	327
<i>Frederic Maire and Doug Taylor</i>	
Keeping the Ball from CMUnited-99 . . . . .	333
<i>David McAllester and Peter Stone</i>	
Potential Tasks and Research Issues for Mobile Robots in RoboCup Rescue	339
<i>Robin R. Murphy, Jenn Casper, and Mark Micire</i>	
Potential Field Approach to Short Term Action Planning in RoboCup F180 League . . . . .	345
<i>Yasunori Nagasaka, Kazuhito Murakami, Tadashi Naruse, Tomoichi Takahashi, and Yasuo Mori</i>	
RoboCup-Rescue Simulation: In Case of Fire Fighting Planning . . . . .	351
<i>Masayuki Ohta, Tomoichi Takahashi, and Hiroaki Kitano</i>	
On Emergence of Scalable Tactical and Strategic Behavior . . . . .	357
<i>Mikhail Prokopenko, Marc Butler, and Thomas Howard</i>	
Karlsruhe Brainstormers — A Reinforcement Learning Approach to Robotic Soccer . . . . .	367
<i>M. Riedmiller, A. Merke, D. Meier, A. Hoffman, A. Sinner, O. Thate, and R. Ehrmann</i>	
Preliminary Studies of Dynamics of Physical Agent Ecosystems . . . . .	373
<i>Josep Lluís de la Rosa, Israel Muñoz, Bianca Innocenti, Albert Figueras, Miquel Montaner, and Josep Antoni Ramon</i>	
RoboCup Rescue Disaster Simulator Architecture . . . . .	379
<i>Tomoichi Takahashi, Ikuo Takeuchi, Tetsuhiko Koto, Satoshi Tadokoro, and Itsuki Noda</i>	
Improvement Continuous Valued Q-learning and Its Application to Vision Guided Behavior Acquisition . . . . .	385
<i>Yasutake Takahashi, Masanori Takeda, and Minoru Asada</i>	
Recognizing Formations in Opponent Teams . . . . .	391
<i>Ubbo Visser, Christian Drücker, Sebastian Hübner, Esko Schmidt, and Hans-Georg Weland</i>	
<b>Team Descriptions</b>	
<b>Simulation League</b>	
SBC++ Simulator Team . . . . .	397
<i>Amin Abbaspour, Mahmood Rahmani, Bahman Radjabipour, and Eslam Nazemi</i>	

A Team .....	401
<i>Hidehisa Akiyama</i>	
AT Humboldt 2000 (Team Description) .....	405
<i>Hans-Dieter Burkhard, Joscha Bach, Kay Schröter, Jan Wendler, Michael Gollin, Thomas Meinert, and Gerd Sander</i>	
AIRG Sibiu .....	409
<i>Ciprian Candea and Marius Staicu</i>	
The NOAI Team Description .....	413
<i>Anneli Dahlström, Fredrik Heintz, Martin Jacobsson, Johan Thapper, and Martin Öberg</i>	
Improved Agents of the magmaFreiburg2000 Team .....	417
<i>Klaus Dorer</i>	
Virtual Werder .....	421
<i>Christian Drücker, Sebastian Hübner, Esko Schmidt, Ubbo Visser, and Hans-Georg Weland</i>	
Kakitsubata Team Description .....	425
<i>Tetsuya Esaki, Taku Sakushima, Shinji Futamase, Nobuhiro Ito, Tomoichi Takahashi, Wei Chen, and Koichi Wada</i>	
PaSo-Team 2000 .....	429
<i>Carlo Ferrari, Francesco Garelli, and Enrico Pagello</i>	
Sharif-Arvand Simulation Team .....	433
<i>Jafar Habibi, Ehsan Chiniforooshan, Majid Khabbazzian, Mahdi Mirzazade, MohammadAli Safari, and HamidReza Younesi</i>	
SharifII Soccer Simulation Team .....	437
<i>Jafar Habibi, Ehsan Foroughi, Mehran Motamed, Pooya Karimian, Hamed Hatami, and Hossein Fardad</i>	
Essex Wizards 2000 Team Description .....	441
<i>H. Hu, K. Kostiadis, M. Hunter, and N. Kalyviotis</i>	
RoboCup-2000 Simulation League: Team KU-Yam2000 .....	445
<i>Harukazu Igarashi, Yusuke Yamauchi, and Shuichi Idoi</i>	
Harmony Team .....	449
<i>Hiroyuki Iizuka, Masatoshi Hiramoto, Hidenori Kawamura, Masahito Yamamoto, and Azuma Ohuchi</i>	
TakAI .....	453
<i>Tetsuhiko Koto</i>	

PSI Team. ....	457
<i>Alexander N. Kozhushkin</i>	
Gnez: Adapting Knowledge to the Environment with GA .....	461
<i>Takenori Kubo</i>	
Zeng00: The Realization of Mixed Strategy in Simulation Soccer Game ...	465
<i>Takuya Morishita, T. Kawarabayashi, J. Nishino, H. Shimora,</i> <i>and H. Ogura</i>	
RoboLog Koblenz 2000 .....	469
<i>Jan Murray, Oliver Obst, and Frieder Stolzenburg</i>	
Open Zeng: An Open Style Distributed Semi-cooperative Team Development Project from Japan .....	473
<i>Junji Nishino, Takuya Morishita, and Takenori Kubo</i>	
Gemini in RoboCup-2000 .....	477
<i>Masayuki Ohta</i>	
Team Description for Lucky Lübeck — Evidence-Based World State Estimation .....	481
<i>Daniel Polani and Thomas Martinetz</i>	
Karlsruhe Brainstormers 2000 Team Description .....	485
<i>Martin Riedmiller, Artur Merke, David Meier, Andreas Hoffmann,</i> <i>Alex Sinner, and Ortwin Thate</i>	
ATT-CMUnited-2000: Third Place Finisher in the RoboCup-2000 Simulator League .....	489
<i>Patrick Riley, Peter Stone, David McAllester, and Manuela Veloso</i>	
Headless Chickens IV .....	493
<i>Paul Scerri, Nancy Reed, Tobias Wren, Mikael Lönneberg,</i> <i>and Pelle Nilsson</i>	
Mainz Rolling Brains 2000 .....	497
<i>Birgit Schappel and Frank Schulz</i>	
Team Description of Spatial-Timer .....	501
<i>Kosuke Shinoda and Susumu Kunifuji</i>	
Polytech100 .....	505
<i>L. Stankevitch and S. Akhapiin</i>	
Team YowAI-2000 Description .....	509
<i>Takashi Suzuki, Sinnosuke Asahara, Hideaki Kurita, and Ikuo Takeuchi</i>	
11MonkeysII .....	513
<i>Naotaka Tanaka and Mio Yamamoto</i>	

## Small-Size Robot (F180) League

All Botz .....	515
<i>Jacky Baltes</i>	
4 Stooges .....	519
<i>Jacky Baltes</i>	
CIIPS Glory Small Soccer Robots with Local Image Processing .....	523
<i>Thomas Bräunl, Petter Reinholdtsen, and Stephen Humble</i>	
ViperRoos 2000 .....	527
<i>Mark M. Chang, Brett Browning, and Gordon F. Wyeth</i>	
RoboCup 2000 (F180) Team Description: UPMC-CFA Team (France) ....	531
<i>Jerome Douret, Thierry Dorval, Ryad Benosman, Francis Bras, Gael Surtet, Thomas Petit, Nadege Quedec, Denis Philip, Gilles Cordurié, Mario Rebello, Didier Abraham, Nicolas Couder, and Marco Marcon</i>	
MuCows .....	535
<i>Andrew Howard</i>	
Role-Based Strategy in TPOTs RoboCup Team .....	539
<i>Nadir Ould Khessal</i>	
LuckyStar II — Team Description Paper .....	543
<i>Ng Beng Kiat, Quek Yee Ming, Tay Boon Hock, Yuen Suen Yee, and Simon Koh</i>	
FU-Fighters 2000 .....	547
<i>Raúl Rojas, Sven Behnke, Lars Knipping, and Bernhard Frötschl</i>	
RoGi Team Description .....	551
<i>Josep Lluís de la Rosa, Bianca Innocenti, Miquel Montaner, Albert Figueras, Israel Muñoz, and Josep Antoni Ramon</i>	
UQ RoboRoos: Kicking on to 2000 .....	555
<i>Gordon Wyeth, Ashley Tews, and Brett Browning</i>	

## Middle-Size Robot (F2000) League

ART'00 - Azzurra Robot Team for the Year 2000 .....	559
<i>Giovanni Adorni, Andrea Bonarini, Giorgio Clemente, Daniele Nardi, Enrico Pagello, and Maurizio Piaggio</i>	
RMIT United .....	563
<i>James Brusey, Mark Makies, Lin Padgham, Brad Woodvine, and Karl Fantone</i>	

Agilo RoboCuppers: RoboCup Team Description . . . . .	567
<i>Sebastian Buck, Robert Hanek, Michael Klupsch, and Thorsten Schmitt</i>	
WinKIT . . . . .	571
<i>Kosei Demura, Nobuhiro Tachi, Noriharu Kubo, and Kenji Miwa</i>	
CMU Hammerheads Team Discription . . . . .	575
<i>Rosemary Emery, Tucker Balch, Rande Shern, Kevin Sikorski, and Ashley Stroupe</i>	
GMD-Robots . . . . .	579
<i>Ansgar Bredenfeld, Thomas Cristaller, Horst Guenther, Jörg Hermes, Giovanni Indiveri, Herbert Jaeger, Hans-Ulrich Kobialka, Paul-Gerhard Plöger, Peter Schoell, and Andrea Siegborg</i>	
A Goal Keeper for Middle Size RoboCup . . . . .	583
<i>M. Jamzad, A. Foroughnassiraei, T. Hadji Aaghai, V.S. Mirrokni, R. Ghorbani, A. Heydar Noori, M. Kazemi, H. Chitsaz, F. Mobasser, M. Ebraahimi Moghaddam, M. Gudarzi, and N. Ghaffarzadegan</i>	
The Dutch Team . . . . .	587
<i>Pieter Jonker, Will van Geest, and Frans Groen</i>	
The RoboCup-NAIST . . . . .	591
<i>T. Nakamura, H. Takeda, T. Terada, M. Oohara, T. Yamamoto, and M. Takeda</i>	
KIRC: Kyutech Intelligent Robot Club . . . . .	595
<i>Takeshi Ohashi, Shuichi Enokida, Junich Minatodani, Kazuhiko Kawamoto, Youji Shigeoka, Takaichi Yoshida, and Toshiaki Ejima</i>	
CoPS-Team Description . . . . .	599
<i>N. Oswald, M. Becht, T. Buchheim, P. Burger, G. Hetzel, G. Kindermann, R. Lafrenz, M. Schanz, M. Schulé, and P. Levi</i>	
Golem Team in Middle-Sized Robots League . . . . .	603
<i>Paolo de Pascalis, Massimo Ferraresso, Mattia Lorenzetti, Alessandro Modolo, Matteo Peluso, Roberto Polesel, Robert Rosati, Nikita Scattolin, Alberto Speranzon, and Walter Zanette</i>	
Osaka University “Trackies 2000” . . . . .	607
<i>Yasutake Takahashi, Eiji Uchibe, Takahashi Tamura, Masakazu Yanase, Shoichi Ikenoue, Shujiro Inui, and Minoru Asada</i>	
<b>Sony Legged Robot League</b>	
Essex Rovers Team Description . . . . .	611
<i>Huosheng Hu, Donbing Gu, and Bo Li</i>	



French LRP Team's Description .....	615
<i>Vincent Hugel, Patrick Bonnin, and Pierre Blazevic</i>	
Team ARAIBO .....	619
<i>Yuichi Kobayashi</i>	
CMPack '00 .....	623
<i>Scott Lenser, James Bruce, and Manuela Veloso</i>	
The McGill's RedDogs Legged League System .....	627
<i>Guillaume Marceau</i>	
BabyTigers: Osaka Legged Robot Team.....	631
<i>Noriaki Mitsunaga, Yukie Nagai, and Minoru Asada</i>	
S.P.Q.R. ....	635
<i>D. Nardi, C. Castelpietra, A. Guidotti, M. Salerno, and C. Sanitati</i>	
The University of Pennsylvania RoboCup Legged Soccer Team .....	639
<i>James P. Ostrowski, Kenneth A. McIsaac, Aveek K. Das, Sachin Chitta, and Julie Neiling</i>	
Team Sweden .....	643
<i>A. Saffiotti, M. Boman, P. Buschka, P. Davidsson, S. Johansson, and Z. Wasik</i>	
RoboMutts.....	647
<i>Robert Sim, Paul Russo, Andrew Graham, Andrew Blair, Nick Barnes, and Alan Blair</i>	
Humboldt Heroes .....	651
<i>Matthias Werner, Helmut Myritz, Uwe Döffert, Martin Löttsch, and Hans-Dieter Burkhard</i>	
<b>Author Index .....</b>	<b>655</b>

RoboCup 2000: Robot Soccer World Cup IV  
Stone, P.; Balch, T.; Kraetzschmar, G. (Eds.)  
2001, XVII, 662 p., Softcover  
ISBN: 978-3-540-42185-6