Lecture Notes in Artificial Intelligence 2019

Subseries of Lecture Notes in Computer Science
Edited by J. G. Carbonell and J. Siekmann

Lecture Notes in Computer Science
Edited by G. Goos, J. Hartmanis and J. van Leeuwen

Springer
Berlin
Heidelberg
New York
Barcelona
Hong Kong
London
Milan
Paris
Singapore
Tokyo

Peter Stone Tucker Balch
Gerhard Kraetzschmar (Eds.)

RoboCup 2000: Robot Soccer World Cup IV

Springer

Series Editors

Jaime G. Carbonell,Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editors

Peter Stone
AT & Labs - Research
180 Park Ave., room A273, Florham Park, NJ 07932, USA
E-mail: pstone@research.att.com

Tucker Balch
Carnegie Mellon University
The Robotics Institute
5000 Forbes Avenue, Pittsburgh, PA 15213-3891, USA
E-mail: trb@ri.cmu.edu

Gerhard Kraetzschmar
University of Ulm
Neural Information Processing Department
Oberer Eselsberg, 89069 Ulm, Germany
E-mail: gkk@neuro.informatik.uni-ulm.de

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

RoboCup <4, 2000, Melbourne>:
Robot Soccer World Cup IV / RoboCup 2000. Peter Stone ... (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Singapore ; Tokyo : Springer, 2001
(Lecture notes in computer science ; Vol. 2019 : Lecture notes in artificial intelligence)
ISBN 3-540-42185-8

CR Subject Classification (1998): I.2, C.2.4, D.2,7, H.5, I.5.4, I.6, J.4

ISBN 3-540-42185-8 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York
a member of BertelsmannSpringer Science+Business Media GmbH

http://www.springer.de

© Springer-Verlag Berlin Heidelberg 2001
Printed in Germany

Typesetting: Camera-ready by author
Printed on acid-free paper SPIN 10782256 06/3142 5 4 3 2 1 0

Preface

RoboCup 2000, the Fourth Robot World Cup Soccer Games and Conferences, was held from August 27th to September 3rd, 2000, at the Melbourne Exhibition Center in Melbourne, Australia. Like the previous international RoboCup events – RoboCup 97 in Nagoya, Japan; RoboCup 98 in Paris, France; and RoboCup 99 in Stockholm, Sweden – RoboCup 2000 included a technical workshop as well as several robotic soccer competitions. RoboCup 2000 introduced the first RoboCup Jr. competition for children, as well as demonstrations of humanoid robots and of the RoboCup-Rescue disaster rescue simulator.

This book documents RoboCup 2000. It consists of (i) an overview; (ii) championship papers by the winners of the competitions; (iii) the finalist papers for the RoboCup challenge awards; (iv) the papers and posters presented at the workshop; and (v) descriptions of the teams that competed.

The book begins with an overview article introducing the competitions and demonstrations and including the scores of all of the games in the four competition leagues: the simulation league, the small-size robot (F180) league, the middle-size robot (F2000) league, and the Sony legged robot league. The following section presents the championship papers from the winners of these leagues.

The RoboCup challenge awards are distinctions that are given annually to the RoboCup-related researchers with the greatest potential to advance their respective fields. In RoboCup 2000, the challenge award finalists were selected from among the workshop papers. The four selected finalist papers appear in the next section.

The annual RoboCup workshop provides a forum for RoboCup researchers to exchange ideas that are generally applicable across the different RoboCup leagues and/or that are of general scientific interest. The RoboCup 2000 workshop received more than 60 submissions, from which 20 were selected for full presentation and an additional 20 were selected for poster presentation. These research papers form the main body of this book.

The book concludes with descriptions of most of the more than 80 teams that competed in RoboCup 2000. These team descriptions serve to catalog the full range of researchers and approaches that have been applied to the challenges put forth by RoboCup.

The next international RoboCup events will be held in Seattle, USA (2001) and in Fukuoka, Japan (2002). In addition to all existing RoboCup events, they are scheduled to introduce (i) RoboCup-Rescue disaster rescue competitions for the transfer of ideas and techniques developed in the soccer domain to a related task, and (ii) a humanoid robot competition as a step towards the long-term goal of creating a full team of humanoid robots that compete on a real soccer field. We look forward to continuing research innovations and exciting demonstrations of robotics and AI technology in these and other future RoboCup events.

March 2000 Peter Stone, Tucker Balch, and Gerhard Kraetzschmar

RoboCup Federation

The RoboCup Federation, the governing body of RoboCup, is an international organization that promotes science and technology using soccer games by robots and software agents.

President:
Hiroaki Kitano, Japan Science and Technology Corporation, Japan
Vice-Presidents:
Minoru Asada, Osaka University, Japan
Enrico Pagello, University of Padua, Italy
Manuela Veloso, Carnegie Mellon University, USA
Trustees:
Hans-Dieter Burkhard, Humboldt University, Germany
Silvia Coradeschi, Orebro University, Sweden
Dominique Duhaut, University of Southern Bretagne, France
Frans Groen, University of Amsterdam, The Netherlands
Andrew Jennings, Royal Melbourne Institute of Technology, Australia
Milind Tambe, University of Southern California, USA
Executive Committee:
Tucker Balch, Carnegie Mellon University, USA
Andreas Birk, Free University of Brussels, Belgium
Masahiro Fujita, Sony Corp., Japan
Gerhard Kraetzschmar, University of Ulm, Germany
Paul Levi, University of Stuttgart, Germany
Pedro Lima, ISR/IST, Technical University of Lisbon, Portugal
Henrik Lund, University of Southern Denmark, Denmark
Daniele Nardi, University of Rome "La Sapienza", Italy
Itsuki Noda, ETL, Japan
Daniel Polani, Lübeck University, Germany
Raúl Rojas, University of Berlin, Germany
Peter Stone, AT&T Labs – Research, USA
Satoshi Tadokoro, Kobe University, Japan
Gordon Wyeth, University of Queensland, Australia
Advisory Committee:
Luigia Carlucci Aiello, Universitá di Roma "La Sapienza", Italy
Daniel Bobrow, XEROX PARC, USA
Michael Brady, Oxford University, UK
Toshio Fukuda, Nagoya University, Japan
Michael P. Georgeff, Australian AI Institute, Australia
Alan Mackworth, University of British Columbia, Canada
David Waltz, NEC Research, USA
Wolfgang Wahlster, DFKI, Germany

RoboCup 2000 Organization and Support

General Chair:
Andrew Jennings, Royal Melbourne Institute of Technology, Australia
Deputy General Chair:
Jeremy Samuel, Australian AI Institute, Australia
Organizing Co-chairs:
Enrico Pagello, University of Padua, Italy
Manuela Veloso, Carnegie Mellon University, USA
Minoru Asada, Osaka University, Japan
Simulator League Committee:
Paul Scerri (chair), Linköping University, Sweden
Tomoichi Takahashi, Chubu University, Japan
Gal Kaminka, University of Southern California, USA
Mikhail Prokopenko, CSIRO, Australia
Ryszard Kowalczyk, CSIRO, Australia
Small-Size Robot League (F180) Committee:
Gordon Wyeth (chair), University of Queensland, Australia
Raúl Rojas, Free University of Berlin, Germany
Yuki Nakagawa, Kitano Symbiotic Systems, Japan
Andrew Howard, University of Melbourne, Australia
Middle-Size Robot League (F2000) Committee:
Steffen Gutmann (chair), University of Freiburg, Germany
Yong Fook Seng, Ngee Ann Polytechnic, Singapore
Wei-Min Shen, University of Southern California, USA
Paul Parisi, Australian AI Institute, Australia
Sony Legged Robot League Committee:
Masahiro Fujita (chair), Sony Corp., Japan
Minoru Asada, Osaka University, Japan
Manuela Veloso, Carnegie Mellon University, USA
Dominique Duhaut, University of Southern Bretagne, France
Workshop Program Committee:
Peter Stone, (co-chair), AT&T Labs – Research, USA
Tucker Balch (co-chair), Carnegie Mellon University, USA
Gerhard Kraetzschmar (co-chair), University of Ulm, Germany
Giovanni Adorni, University of Parma, Italy
David Andre, U.C. Berkeley, USA
Ron Arkin, Georgia Institute of Technology, USA
Andreas Birk, University of Brussels, Belgium
Andrea Bonarini, Politecnico di Milano, Italy
Michael Bowling, Carnegie Mellon University, USA
Ian Frank, Electrotechnical Laboratory, JAPAN
Doug Gage, Space and Naval Warfare Systems Center, USA
Wiebe van der Hoek, Utrecht University, The Netherlands

Huosheng Hu, University of Essex, UK
Kurt Konolige, SRI International, USA
Robin Murphy, University of South Florida, USA
Lynne Parker, Oak Ridge National Laboratory, USA
Jukka Riekki, University of Oulu, Finland
Wei-Min Shen, University of Southern California, USA
Sho'ji Suzuki, Osaka University, Japan
Masayuki Ohta, Tokyo Institute of Technology, Japan
Gordon Wyeth, University of Queensland, Australia

Supported by:

Fuji Xerox
Australon
RMIT University

RoboCup World Wide Sponsors:

Sony Corporation
SGI

Table of Contents

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

Champion Teams

FC Portugal Team Description: RoboCup 2000 Simulation League Champion 29
Luís Paulo Reis and Nuno Lau

The Cornell RoboCup Team 41
Raffaello D'Andrea, Tamás Kalmár-Nagy, Pritam Ganguly, and Michael Babish

CS Freiburg: Doing the Right Thing in a Group 52
Thilo Weigel, Willi Auerbach, Markus Dietl, Burkhard Dümler, Jens-Steffen Gutmann, Kornel Marko, Klaus Müller, Bernhard Nebel, Boris Szerbakowski, and Maximilian Thiel

The UNSW RoboCup 2000 Sony Legged League Team 64
Bernhard Hengst, Darren Ibbotson, Son Bao Pham, John Dalgliesh, Mike Lawther, Phil Preston, and Claude Sammut

Challenge Award Finalists

Adaptive Path Planner for Highly Dynamic Environments 76
Jacky Baltes and Nicholas Hildreth

Communication and Coordination Among Heterogeneous Mid-Size Players: ART99 86
Claudio Castelpietra, Luca Iocchi, Daniele Nardi, Maurizio Piaggio, Alessandro Scalzo, and Antonio Sgorbissa

A Localization Method for a Soccer Robot Using a Vision-Based Omni-Directional Sensor 96
Carlos F. Marques and Pedro U. Lima

Behavior Classification with Self-Organizing Maps 108
Michael Wünstel, Daniel Polani, Thomas Uthmann, and Jürgen Perl

Technical Papers

Full Papers

Flexible Synchronisation within RoboCup Environment: A Comparative Analysis 119
Marc Butler, Mikhail Prokopenko, and Thomas Howard

Extended Q-Learning: Reinforcement Learning Using Self-Organized State Space 129
Shuichi Enokida, Takeshi Ohasi, Takaichi Yoshida, and Toshiaki Ejima

And the Fans Are Going Wild! SIG plus MIKE 139
Ian Frank, Kumiko Tanaka-Ishii, Hiroshi G. Okuno, Junichi Akita, Yukiko Nakagawa, K. Maeda, Kazuhiro Nakadai, and Hiroaki Kitano

Fast and Accurate Robot Vision for Vision Based Motion 149
Pieter Jonker, Jurjen Caarls, and Wouter Bokhove

Design of RoboCup-Rescue Viewers – Towards a Real World Emergency System – 159
Yoshitaka Kuwata and Atsushi Shinjoh

From Multiple Images to a Consistent View 169
R. Hanek, T. Schmitt, M. Klupsch, and S. Buck

Omni-Directional Vision with a Multi-part Mirror 179
Fabio M. Marchese and Domenico G. Sorrenti

Observation Strategy for Decision Making Based on Information Criterion 189
Noriaki Mitsunaga and Minoru Asada

Towards a Logical Approach for Soccer Agents Engineering 199
Jan Murray, Oliver Obst, and Frieder Stolzenburg

Bridging Gap between the Simulation and Robotics with a Global Vision System 209
Yukiko Nakagawa, Hiroshi G. Okuno, and Hiroaki Kitano

Real-Time Estimating Spatial Configuration between Multiple Robots by Triangle and Enumeration Constraints 219
T. Nakamura, M. Oohara, A. Ebina, M. Imai, T. Ogasawara, and H. Ishiguro

Framework of Distributed Simulation System for Multi-agent Environment 229
Itsuki Noda

Robust Real Time Color Tracking 239
Mark Simon, Sven Behnke, and Raúl Rojas

Reinforcement Learning for 3 vs. 2 Keepaway 249
Peter Stone, Richard S. Sutton, and Satinder Singh

Fault-Tolerant Self Localization by Case-Based Reasoning 259
Jan Wendler, Steffen Brüggert, Hans-Dieter Burkhard, and Helmut Myritz

PINO The Humanoid: A Basic Architecture 269
Fuminori Yamasaki, Tatsuya Matsui, Takahiro Miyashita, and Hiroaki Kitano

Poster Descriptions

Team/Goal-Keeper Coordination in the RoboCup Mid-Size League 279
Giovanni Adorni, Stefano Cagnoni, Monica Mordonini, and Maurizio Piaggio

RescueModel: A Multi-Agent Simulation of Bushfire Disaster Management 285
Gary Au, Simon Goss, Clint Heinze, and Adrian R. Pearce

Vision-Based Localization in RoboCup Environments 291
Stefan Enderle, Marcus Ritter, Dieter Fox, Stefan Sablatnög, Gerhard Kraetzschmar, and Günther Palm

Collaborative Emergent Actions between Real Soccer Robots 297
M. Ferraresso, C. Ferrari, E. Pagello, R. Polesel, R. Rosati, A. Speranzon, and W. Zanette

The Statistics Proxy Server 303
Ian Frank, Kumiko Tanaka-Ishii, Katsuto Arai, and Hitoshi Matsubara

Using Simulated RoboCup in Undergraduate Education 309
Fredrik Heintz, Johan Kummeneje, and Paul Scerri

Path Planning of a Mobile Robot as a Discrete Optimization Problem and Adjustment of Weight Parameters in the Objective Function by Reinforcement Learning 315
Harukazu Igarashi

Simulator Complex for RoboCup Rescue Simulation Project — As Test-Bed for Multi-Agent Organizational Behavior in Emergency Case of Large-Scale Disaster 321
Toshiyuki Kaneda, Fumitoshi Matsuno, Hironao Takahashi, Takeshi Matsui, Masayasu Atsumi, Michinori Hatayama, Kenji Tayama, Ryousuke Chiba, and Kazunori Takeuchi

A Quadratic Programming Formulation of a Moving Ball Interception and Shooting Behaviour, and Its Application to Neural Network Control 327
Frederic Maire and Doug Taylor

Keeping the Ball from CMUnited-99 333
David McAllester and Peter Stone

Potential Tasks and Research Issues for Mobile Robots in RoboCup Rescue 339
Robin R. Murphy, Jenn Casper, and Mark Micire

Potential Field Approach to Short Term Action Planning in RoboCup F180 League 345
Yasunori Nagasaka, Kazuhito Murakami, Tadashi Naruse, Tomoichi Takahashi, and Yasuo Mori

RoboCup-Rescue Simulation: In Case of Fire Fighting Planning 351
Masayuki Ohta, Tomoichi Takahashi, and Hiroaki Kitano

On Emergence of Scalable Tactical and Strategic Behavior 357
Mikhail Prokopenko, Marc Butler, and Thomas Howard

Karlsruhe Brainstormers — A Reinforcement Learning Approach to Robotic Soccer 367
M. Riedmiller, A. Merke, D. Meier, A. Hoffman, A. Sinner, O. Thate, and R. Ehrmann

Preliminary Studies of Dynamics of Physical Agent Ecosystems 373
Josep Lluís de la Rosa, Israel Muñoz, Bianca Innocenti, Albert Figueras, Miquel Montaner, and Josep Antoni Ramon

RoboCup Rescue Disaster Simulator Architecture 379
Tomoichi Takahashi, Ikuo Takeuchi, Tetsuhiko Koto, Satoshi Tadokoro, and Itsuki Noda

Improvement Continuous Valued Q-learning and Its Application to Vision Guided Behavior Acquisition 385
Yasutake Takahashi, Masanori Takeda, and Minoru Asada

Recognizing Formations in Opponent Teams 391
Ubbo Visser, Christian Drücker, Sebastian Hübner, Esko Schmidt, and Hans-Georg Weland

Team Descriptions

Simulation League

SBC++ Simulator Team 397
Amin Abbaspour, Mahmood Rahmani, Bahman Radjabalipour, and Eslam Nazemi

A Team 401
Hidehisa Akiyama

AT Humboldt 2000 (Team Description) 405
Hans-Dieter Burkhard, Joscha Bach, Kay Schröter, Jan Wendler, Michael Gollin, Thomas Meinert, and Gerd Sander

AIRG Sibiu 409
Ciprian Candea and Marius Staicu

The NOAI Team Description 413
Anneli Dahlström, Fredrik Heintz, Martin Jacobsson, Johan Thapper, and Martin Öberg

Improved Agents of the magmaFreiburg2000 Team 417
Klaus Dorer

Virtual Werder 421
Christian Drücker, Sebastian Hübner, Esko Schmidt, Ubbo Visser, and Hans-Georg Weland

Kakitsubata Team Description 425
Tetsuya Esaki, Taku Sakushima, Shinji Futamase, Nobuhiro Ito, Tomoichi Takahashi, Wei Chen, and Koichi Wada

PaSo-Team 2000 429
Carlo Ferrari, Francesco Garelli, and Enrico Pagello

Sharif-Arvand Simulation Team 433
Jafar Habibi, Ehsan Chiniforooshan, Majid Khabbazian, Mahdi Mirzazade, MohammadAli Safari, and HamidReza Younesi

SharifII Soccer Simulation Team 437
Jafar Habibi, Ehsan Foroughi, Mehran Motamed, Pooya Karimian, Hamed Hatami, and Hossein Fardad

Essex Wizards 2000 Team Description 441
H. Hu, K. Kostiadis, M. Hunter, and N. Kalyviotis

RoboCup-2000 Simulation League: Team KU-Yam2000 445
Harukazu Igarashi, Yusuke Yamauchi, and Shuichi Iidoi

Harmony Team 449
Hiroyuki Iizuka, Masatoshi Hiramoto, Hidenori Kawamura, Masahito Yamamoto, and Azuma Ohuchi

TakAI 453
Tetsuhiko Koto

PSI Team. 457
Alexander N. Kozhushkin

Gnez: Adapting Knowledge to the Environment with GA 461
Takenori Kubo

Zeng00: The Realization of Mixed Strategy in Simulation Soccer Game . . . 465
Takuya Morishita, T. Kawarabayashi, J. Nishino, H. Shimora, and H. Ogura

RoboLog Koblenz 2000 469
Jan Murray, Oliver Obst, and Frieder Stolzenburg

Open Zeng: An Open Style Distributed Semi-cooperative Team Development Project from Japan 473
Junji Nishino, Takuya Morishita, and Takenori Kubo

Gemini in RoboCup-2000 477
Masayuki Ohta

Team Description for Lucky Lübeck — Evidence-Based World State Estimation 481
Daniel Polani and Thomas Martinetz

Karlsruhe Brainstormers 2000 Team Description 485
Martin Riedmiller, Artur Merke, David Meier, Andreas Hoffmann, Alex Sinner, and Ortwin Thate

ATT-CMUnited-2000: Third Place Finisher in the RoboCup-2000 Simulator League 489
Patrick Riley, Peter Stone, David McAllester, and Manuela Veloso

Headless Chickens IV 493
Paul Scerri, Nancy Reed, Tobias Wiren, Mikael Lönneberg, and Pelle Nilsson

Mainz Rolling Brains 2000 497
Birgit Schappel and Frank Schulz

Team Description of Spatial-Timer 501
Kosuke Shinoda and Susumu Kunifuji

Polytech100 505
L. Stankevitch and S. Akhapkin

Team YowAI-2000 Description 509
Takashi Suzuki, Sinnosuke Asahara, Hideaki Kurita, and Ikuo Takeuchi

11MonkeysII 513
Naotaka Tanaka and Mio Yamamoto

Small-Size Robot (F180) League

All Botz 515
Jacky Baltes

4 Stooges 519
Jacky Baltes

CIIPS Glory Small Soccer Robots with Local Image Processing 523
Thomas Bräunl, Petter Reinholdtsen, and Stephen Humble

ViperRoos 2000 527
Mark M. Chang, Brett Browning, and Gordon F. Wyeth

RoboCup 2000 (F180) Team Description: UPMC-CFA Team (France) 531
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

MuCows 535
Andrew Howard

Role-Based Strategy in TPOTs RoboCup Team 539
Nadir Ould Khessal

LuckyStar II — Team Description Paper 543
Ng Beng Kiat, Quek Yee Ming, Tay Boon Hock, Yuen Suen Yee, and Simon Koh

FU-Fighters 2000 547
Raúl Rojas, Sven Behnke, Lars Knipping, and Bernhard Frötschl

RoGi Team Description 551
Josep Lluís de la Rosa, Bianca Innocenti, Miquel Montaner, Albert Figueras, Israel Muñoz, and Josep Antoni Ramon

UQ RoboRoos: Kicking on to 2000 555
Gordon Wyeth, Ashley Tews, and Brett Browning

Middle-Size Robot (F2000) League

ART'00 - Azzurra Robot Team for the Year 2000 559
Giovanni Adorni, Andrea Bonarini, Giorgio Clemente, Daniele Nardi, Enrico Pagello, and Maurizio Piaggio

RMIT United 563
James Brusey, Mark Makies, Lin Padgham, Brad Woodvine, and Karl Fantone

Agilo RoboCuppers: RoboCup Team Description 567
Sebastian Buck, Robert Hanek, Michael Klupsch, and Thorsten Schmitt

WinKIT 571
Kosei Demura, Nobuhiro Tachi, Noriharu Kubo, and Kenji Miwa

CMU Hammerheads Team Discription 575
Rosemary Emery, Tucker Balch, Rande Shern, Kevin Sikorski, and Ashley Stroupe

GMD-Robots 579
Ansgar Bredenfeld, Thomas Cristaller, Horst Guenther, Jörg Hermes, Giovanni Indiveri, Herbert Jaeger, Hans-Ulrich Kobialka, Paul-Gerhard Plöger, Peter Schoell, and Andrea Siegberg

A Goal Keeper for Middle Size RoboCup 583
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

The Dutch Team 587
Pieter Jonker, Will van Geest, and Frans Groen

The RoboCup-NAIST 591
T. Nakamura, H. Takeda, T. Terada, M. Oohara, T. Yamamoto, and M. Takeda

KIRC: Kyutech Intelligent Robot Club 595
Takeshi Ohashi, Shuichi Enokida, Junich Minatodani, Kazuhiko Kawamoto, Youji Shigeoka, Takaichi Yoshida, and Toshiaki Ejima

CoPS-Team Description 599
N. Oswald, M. Becht, T. Buchheim, P. Burger, G. Hetzel, G. Kindermann, R. Lafrenz, M. Schanz, M. Schulé, and P. Levi

Golem Team in Middle-Sized Robots League 603
Paolo de Pascalis, Massimo Ferraresso, Mattia Lorenzetti, Alessandro Modolo, Matteo Peluso, Roberto Polesel, Robert Rosati, Nikita Scattolin, Alberto Speranzon, and Walter Zanette

Osaka University "Trackies 2000" 607
Yasutake Takahashi, Eiji Uchibe, Takahashi Tamura, Masakazu Yanase, Shoichi Ikenoue, Shujiro Inui, and Minoru Asada

Sony Legged Robot League

Essex Rovers Team Description 611
Huosheng Hu, Donbing Gu, and Bo Li

French LRP Team's Description 615
Vincent Hugel, Patrick Bonnin, and Pierre Blazevic

Team ARAIBO 619
Yuichi Kobayashi

CMPack '00 623
Scott Lenser, James Bruce, and Manuela Veloso

The McGill's RedDogs Legged League System 627
Guillaume Marceau

BabyTigers: Osaka Legged Robot Team 631
Noriaki Mitsunaga, Yukie Nagai, and Minoru Asada

S.P.Q.R. 635
D. Nardi, C. Castelpietra, A. Guidotti, M. Salerno, and C. Sanitati

The University of Pennsylvania RoboCup Legged Soccer Team 639
James P. Ostrowski, Kenneth A. McIsaac, Aveek K. Das, Sachin Chitta, and Julie Neiling

Team Sweden 643
A. Saffiotti, M. Boman, P. Buschka, P. Davidsson, S. Johansson, and Z. Wasik

RoboMutts 647
Robert Sim, Paul Russo, Andrew Grahm, Andrew Blair, Nick Barnes, and Alan Blair

Humboldt Heroes 651
Matthias Werner, Helmut Myritz, Uwe Düffert, Martin Lötzsch, and Hans-Dieter Burkhard

Author Index 655