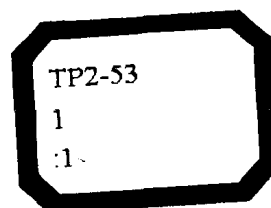


# **Proceedings of the 4th World Congress on Intelligent Control and Automation**

**June 10—14, 2002  
Shanghai, China**



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# FOREWORD

On behalf of the Steering Committee I would like to welcome you to the Fourth World Congress on Intelligent Control and Automation. After the successful Congresses held in Beijing, Xi'an, and Hefei, WCICA has become an important event in the system and control community especially for the Chinese from all over the world. This is witnessed by the number and distribution of papers submitted to WCICA 2002. As a matter of fact, there are 1124 papers coming from 15 different countries and regions, and these papers are distributed over almost all important directions in control and automation. I hope that you will enjoy and benefit from the paper presentations and from discussion with colleagues from all around the world.

By this opportunity, I would like to express much gratitude to the Ministry of Education of China, the National Natural Science Foundation of China, the Administration of Foreign Experts Affairs of China, China International Center for Economic & Technical Exchanges, the United Nations Development Program (UNDP), the IEEE Robotics & Automation Society and the K.C.Wong Education Foundation, Hong Kong, for their generous support. I would also like to thank colleagues from the sponsored universities of WCICA 2002: Shanghai Jiaotong University, Tongji University, and East China University of Science & Technology for their great effort devoted to the success of the Congress.

Shanghai is the biggest metropolitan in China, serving as its financial, cultural, commercial, and industrial center. However, it is also a famous sightseeing destination: not only Shanghai is attractive by itself, but also it is surrounded by the most beautiful part of China, including the well-known sightseeing cities Hangzhou, Suzhou, and Wusi.

I hope your trip will be colorful and enjoyable! Wish WCICA 2002 a great success !



Han-Fu Chen  
Chairman of the Steering Committee, WCICA 2002

# Preface

The 4th World Congress on Intelligent Control and Automation (WCICA2002) will be held in Shanghai, June 10 – 14. It is a great event in the control society especially for the Chinese all over the world who are working in the area of control and automation. As the chairmen of the International Program Committee, we are pleased to organize this conference in Shanghai.

Although there are a series of important events in control society this year, such as the 15th IFAC World Congress in Barcelona this July and the 4th Asian Control Conference in Singapore this September, we are pleased to notice that WCICA 2002 still received enthusiastic responses from the community. More than 1100 papers from 15 countries and regions were submitted. The topics almost cover all the fields of control and automation, including neural networks, fuzzy system and fuzzy control, GA and evolutionary computing, modeling, identification and estimation, information processing systems, intelligent robot, control applications in various fields, etc. With a rigorous reviewing process, about 800 papers have been selected to be presented at the conference. Among them, 705 are published in this proceedings. Due to the large number of the accepted papers, poster presentations are first introduced to WCICA this year. Both oral and poster papers have the same values in academic sense. We hope that this measure would make presentations more flexible.

Five world's leading scholars will deliver plenary speeches at this conference. Their talks would provide the participants a broad view on the control and automation in modern IT era. Some special sessions as well as panel discussions in areas such as intelligent control, robot soccer, etc. are also arranged, with which the participants could express their ideas and opinions in their interested fields. Awards for the best theoretical paper, the best application paper, and the best poster paper will be given to the outstanding papers presented at the conference. The proceedings will be published in both hard copies and CD-ROM.

We would like to thank the chairmen of the Steering Committee, Prof. Han-Fu Chen, Prof. T.J. Tarn and Prof. Steve T.C.Hsia, and the committee members for their most valuable guidance. We appreciate the effort of all the IPC members. We thank the Organization Committee chaired by Prof. Qidi Wu and Prof. Xingyu Wang for their great assistance. In particular, we thank the WCICA2002 Secretariat and Prof. Shaoyuan Li, Prof. Junwei Yan, Prof. Hao Zhang, Prof. Jian Wang and Prof. Xingsheng Gu for their consistent support and outstanding contributions to the organization of the conference. We also thank Dr. Max Meng for his help to publish the proceedings CD-ROM. It is a joint effort of these people and many others that makes the conference an enjoyable and successful event.



Yugeng Xi  
Shanghai, China



Xiren Cao  
Hong Kong, China



Lei Guo  
Beijing, China



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