

Preface

Frequent outbreaks of natural disasters is a serious problem on a global scale. In 2008, when the author was editing this book, Sichuan earthquake attacked China and struck the lives of more than 70,000 residents. Recently, significant damage has been caused in Asian countries by a number of disasters such as the huge cyclone in Myanmar and the tsunami in Sumatra. The United States has suffered damage from hurricanes, floods, tornados, and forest fires almost every year. It is reported in ancient documents that several catastrophes shattered urban cities. The human race has experienced a number of natural disasters in its history.

In Japan, the Great Hanshin-Awaji earthquake claimed more than 6,400 human lives in the center of the urban city of Kobe in the early morning of January 17, 1995. Japan is located in the area where huge earthquakes frequently occur. The Headquarters for Earthquake Research Promotion of Japan Ministry of Education, Culture, Sports, Science and Technology (MEXT) estimated that the probability that in the next 30 years, a Nankai-Tonankai earthquake of magnitude 8.5 will occur is 50–60% and that a Miyagi-offshore earthquake of magnitude 7.5 will occur is 99%. It has estimated that the Nankai-Tonankai earthquake will claim 17,800 human lives, and large areas of Tokai, Kinki, and Shikoku districts will be absolutely devastated by the tremor and tsunami up to 15 m high [1]. Disasters such as in Sumatra, which was widely broadcast on TV, might strike us anytime and anywhere. Earthquake disaster is not a past fact nor a distant occurrence, but an existing serious risk that might strike today.

It is important and essential to be prepared for such disasters in order to minimize the number of casualties. All possible measures must be applied to raise the survival rate, and the contribution of advanced technologies such as robotics is expected in the future.

An investigation research committee in the Robotics and Mechatronics Division of Japan Society of Mechanical Engineers, which was formed just after the Hanshin-Awaji Earthquake, showed that robotics would be highly effective for urban search and rescue [3]. The committee also reported that only a few researchers had been developing robots for urban search and rescue. Such rescue robots had appeared only in science fiction and played an active role only in children's cartoon movies. This

fact meant that effective robots would never be invented even in the 22nd century if new initiative did not start. Human lives would never be saved by rescue robots although robotic systems are potentially the best solutions when secondary damage is possible.

The ability of first responders would be drastically improved by long-term research and development. In front of the rubble piles on a city-wide scale in Kobe, the members of the committee determined that they should initiate an effort to resolve the situation and should try to develop applicable technologies step by step. That was the genesis of rescue robotics in Japan. Many researchers began to apply their robotics and related technologies to urban search and rescue problems.

This book introduces the main results of *DDT Project* launched by MEXT, of which official name is “Special Project for Earthquake Disaster Mitigation in Urban Areas, III. Advanced Disaster Management System, 4. Development of Advanced Robots and Information Systems for Disaster Response.” This project was managed by a nonprofit organization, International Rescue System Institute (IRS), and more than one hundred robotics researchers and students across the nation have contributed for five years from August 2002 to March 2007 [2].

I thank all the people and organizations that contributed to this project.

Sendai, Japan
December 2008

Satoshi Tadokoro
Tohoku University
International Rescue System Institute
Project Manager of DDT Project

References

1. Central Disaster Prevention Council, Cabinet Office of Japan (2003) <http://www.bousai.go.jp/> (in Japanese)
2. Tadokoro S et al. (2003–2007) Reports of Special Project for Earthquake Disaster Mitigation in Urban Areas, III-4 Development of Advanced Robots and Information Systems for Disaster Response. Ministry of Education, Sports, Culture, Science and Technology, National Research Institute of Earth Science and Disaster Prevention, International Rescue System Institute (in Japanese)
3. Tadokoro S, Takamori T, Tsurutani S, Osuka K (1997) On robotic rescue facilities for disastrous earthquakes – from the Great Hanshin-Awaji (Kobe) Earthquake –. *J Robotics and Mechatronics* 9-1:46–56



<http://www.springer.com/978-1-84882-473-7>

Rescue Robotics

DDT Project on Robots and Systems for Urban Search
and Rescue

Tadokoro, S. (Ed.)

2009, XXII, 192 p., Hardcover

ISBN: 978-1-84882-473-7