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Anti-personnel Landmine Detection for Humanitarian Demining: *The Current Situation and Future Direction for Japanese Research and Development*

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Edited by Katsuhisa Furuta and Jun Ishikawa
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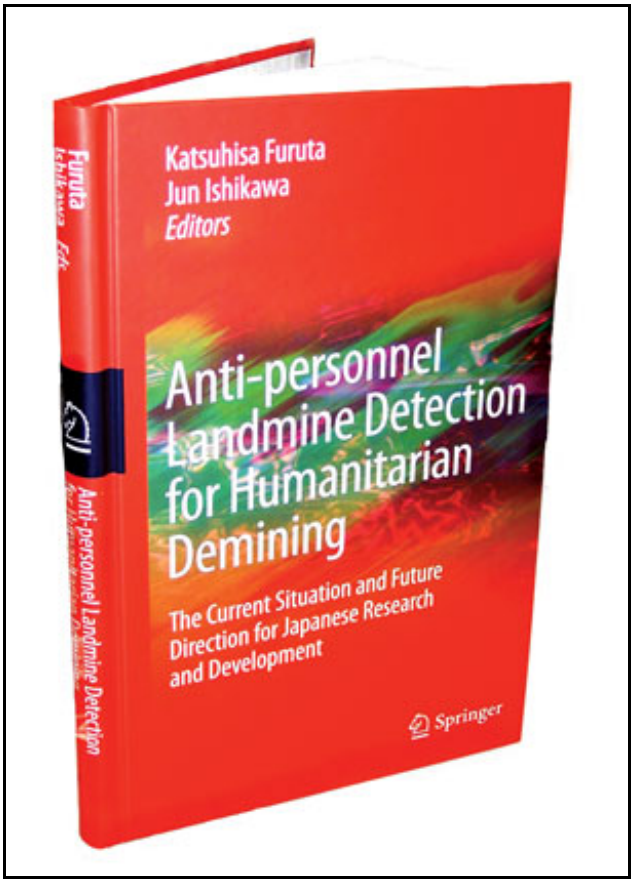
The interest in developing technology for humanitarian demining has grown in Japan ever since the country became a signatory to the Ottawa Convention on 3 December 1997. In fact, from October 2002 to March 2008, the Japan Science and Technology Agency, which is under Japan's Ministry of Education, Culture, Sports, Science and Technology, funded a comprehensive program to jump-start research and technology development in the field of humanitarian demining. This program, titled "Research and Development of Sensing Technology, Access and Control Technology to Support Humanitarian Demining of Anti-personnel Mines," consisted of 12 projects that were chosen out of 82 different proposals from various universities and private companies.



*Anti-personnel Landmine Detection for Humanitarian Demining*is a compilation of articles edited by Katsuhisa Furuta and Jun Ishikawa, reporting on the state-of-the-art technologies developed during the Japanese National Research Project in 2002–2008. The reports focus on three aspects of anti-personnel mine detection and removal: the use of ground penetrating radar to scan areas and differentiate between landmines and metal shards in the soil; the use of robotics and remote-controlled robot vehicles to maneuver around hard-to-reach areas for deminers; and the discovery of new ways to sense the explosive elements within AP mines.

Along with an introduction, the book is divided into four parts focusing on the results and evaluation data from field trials carried out in mine-action centers in Afghanistan, Cambodia and Croatia. The project itself was split into a three-year, short-term research-and-development schedule and a five-year mid-term R&D schedule. The short-term R&D project focused on the development of sensing technology that could distinguish between actual landmines and scraps of metal, as well as detect landmines in various kinds of soils. In manual demining, discriminating between metal parts of landmines from metal fragments scattered over the surrounding area is nearly impossible. According to the authors, it is common for more than 1,000 false alarms to occur for every landmine detected because of these metal fragments. Another factor that makes the use of mine detectors so difficult is that some areas have mineralized soils that cause the detector to give faulty readings; instead of having readings because of the presence of a mine, the detector receives readings from the soil

itself. This problem is very common in countries such as Afghanistan, Cambodia and Croatia. Locating minimum-metal landmines can be difficult, as well, because the small amount of metal used in them does not set off most metal detectors. The high demand and need for multipurpose mine-detection technology is the reason the short-term R&D project was expected to produce prototypes for field-testing in a span of three years. Parts II and III of the book discuss the details of this research and the results produced.

In contrast, developing sensing technologies to detect the actual explosives rather than their metal casings was the R&D projectâ€™s mid-term goal. Because AP mines only contain around 30 to 100 grams of explosive material, this endeavor was indeed an intense task that required a minimum of five years of research.

In the book, some of Part III and all of Part IV focused on this kind of research. For example, Part III examines the use of robotic vehicles in demining, such as Japan's Gryphon, a four-wheel teleoperated (operated from a distance using a remote-control) buggy equipped with a weight-balanced mine sensor arm. Part IV highlights the use of new technologies in sensing explosive material, which includes the development of an "electronic dog nose" for the highly sensitive detection of explosives.

Anti-personnel Landmine Detection for Humanitarian Demining is a useful read for any person involved in the development of mine-detection equipment. The technical and scientific material regarding the 12 projects in the book and the supplemental charts and graphs that complement the text provide an excellent source of information for professionals working in the field of mine action.

Biographies

Matthew Voegel worked as an Editorial Assistant for *The Journal of ERW and Mine Action* from October 2006 through May 2009. He graduated from James Madison University in May 2009 with a Bachelor of Arts in print journalism and minors in Spanish and Middle Eastern communities and migrations.

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