Research Group Introduction

研究グループ紹介

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Abstract—Chowarit Mitsantisuk (CMIT) haptics and robotics laboratory focuses on basic and applied research in motion control and mechatronics. The aim of our lab is to develop a novel and efficient human-robot interaction systems to support human activity and to perform task in many application areas, for example medical devices, industrial process and agricultural systems.

1. Laboratory Introduction

Kasetsart University's Department of Electrical Engineering was established 46 years ago and is firmly established as a leading center for electrical engineering research in Thailand. The mission of our department is to produce professional engineers, who are recognized for their competence and technical knowledge as well as their ethical, moral and social responsibilities; and to provide extensive and socially recognized academic and research services, which contribute towards the self-sustainable development of the country. Our department has signed MoU with Ohishi laboratory, Nagaoka University of Technology, Japan to jointly develop a research and academic collaboration. CMIT lab was formed in 2012 under the guidance of Dr. Chowarit Mitsantisuk. Our laboratory consists of 2 bachelor degree students and 7 master degree students from diverse areas of engineering such as electrical, telecommunications and computer engineering.

Fig. 1. Rehabilitation Robot

Fig. 2. Automatic control of arc gap using robotic TIG welding

2. Research Topics

Currently, our current research focuses on three main themes:

〈2·1〉 **Advanced medical devices** Recently, the robot systems are extending their capability to work in medical application. Appropriate medical devices or robot systems have an important role for the rehabilitation process to support the exercise tasks which require close interaction between patient and doctor. Our lab develops a robotics-assisted rehabilitation therapy for a wrist as shown in Fig. 1 that has high motion performance, accurate force feedback and sufficiently safe to human and/or disabled. In order to achieve this, we utilize disturbance observer and Kalman filtering in order to estimate external force.

〈2·2〉 **Motion control for industrial process** The automatic welding control system based on arc voltage control as shown in Fig. 2 is proposed in order to estimate the optimum arc length and to improve the quality of the welding process. The proposed automatic welding control system can be applied to perform task with greater accuracy and reliability than humans and they are also operated for jobs which are too dangerous or dull to be suitable for human.

〈2·3〉 **Intelligent system for agriculture** Quadcopter is a new gadget that is widely used because of many advantages such as lightweight, portable and easy to build with many open source algorithms. In our research work, we use disturbance observer technique to compensate wind disturbance and apply this robot system for agriculture.

3. Collaborations

CMIT lab is collaborating with governmental organizations and university such as National Electronics and Computer Technology Center (NECTEC), National Metal and Materials Technology Center (MTEC) and Thailand Research Fund (TRF) in order to develop commercializing prototypes. Many of our research members have won both prestigious research awards from national research council of Thailand and awards for their research contributions in the academic conference.

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