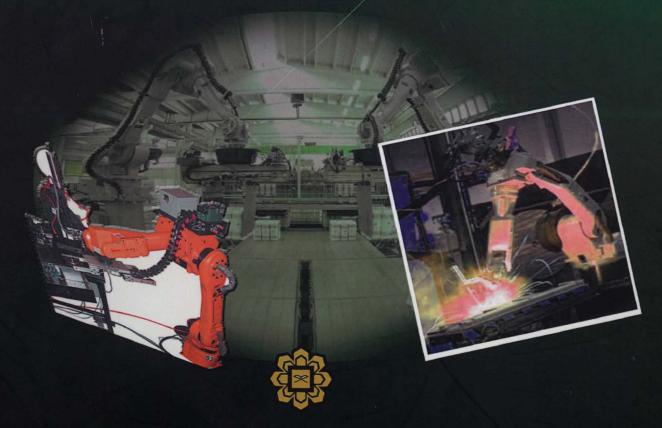
MECHATRONICS BOOK SERIES

ROBOTICS AND AUTOMATION

Rini Akmeliawati Wahju Sediono Nahrul Khair Alang Md. Rashid



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

MECHATRONICS BOOK SERIES: ROBOTICS AND AUTOMATION

Editors

Rini Akmeliawati Wahju Sediono Nahrul Khair Alang Md. Rashid



Published by: IIUM Press International Islamic University Malaysia

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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Rini Akmeliawati, Wahju Sediono & Nahrul Khair Alang Md. Rashid: Mechatronics Book Series Robotics and Automation

ISBN: 978-967-418-152-9

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM (Malaysian Scholarly Publishing Council)

Printed by:

HUM PRINTING SDN.BHD.

No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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CHAPTER 4

Development of Cooperative Mini Robots

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4.1 Introduction

Many teams of intelligent robots have been developed at different labs for mainly for research issues in specific areas of collaborative and cooperative work. The teams of intelligent robots can also be classified according to the robotic system either homogeneous or non-homogeneous.

Cooperative actions can be defined as to associate with another for mutual, often economic benefit. It also can be defined as joint collaborative behaviour that is directed toward some goal in which there is a common interest or reward, the form of interaction usually based on communication.

Cooperative behaviors enable a team of mobile robots to accomplish missions that cannot be achieved with individual mobile robot. Since each of robots is only responsible for partial fulfillment of the task, the robots can be less complex. Multiple robots can be used for numerous tasks such as foraging and coverage, box pushing and object transportation, exploration and flocking, multi-target observation as well as entertainment purposes such robotic soccer or coordinated dancing robot.

In this paper, a description of the design and structure of a pair of mini robot to be used in cooperative work is presented. The immediate aim of the development is to design and develop a pair of mini robot which has the ability of moving and balancing the long beam at the same time. Each of the robots can be programmed to be a leader or follower, whereby the leader will be instruction to other robots whilst the follower will receive instructions from the leader robot. The robots as presented here are homogeneous multi-robot system as both of the robots are similar with each other (sensor, microcontroller and mechanical components). Implicit communication where the robots communicate through physical interaction is implemented.

4.2 Literature Review

Farinelli et al. [1] classified the works on multi-robot system (MRS) as two group of dimensions; Coordination dimensions and System dimension. Coordination dimension is divided into four level; Cooperation, Knowledge, Coordination and Organization.

The first level, Cooperation level is focused on the ability of the system to cooperate in order to accomplish a specific task. The second level, Knowledge level is concerned with the knowledge the teach robot in the team has about its team mates. In this level, there is aware and unaware robot which the former robot has knowledge of their team mates while the latter robot is in the other way round. The Coordination level is concerned with the mechanism used for cooperation. The final level, Organization level introduces the distinction in the form of coordination, distinguishing centralized approach from distributed ones.