

MECHATRONICS

BOOK SERIES

SYSTEM DESIGN AND SIGNAL PROCESSING

VOLUME 2

Editors

Md. Raisuddin Khan

Md. Mozasser Rahman

Muhammad Mahbubur Rashid

Shahrul Na'im Sidek



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

ISBN: 978-967-418-132-1

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

Printed by :
IIUM 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
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

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CHAPTER 14

DESIGN AND IMPLEMENTATION OF A SIMPLE QUEUEING SYSTEM FOR VEHICLE TRAFFIC SIMULATOR

Wahju Sediono

Department of Mechatronics Engineering, International Islamic University
Malaysia, Jalan Gombak, 53100 Kuala Lumpur, Malaysia

wsediono@iium.edu.my

14.1 Introduction

Traffic congestions and crowded situations in the streets, especially in big cities, are believed to cause negative effects on both the environment and human being. In traffic jam situation vehicles can move forward slowly so that a large amount of unhealthy gas, produced at a certain time on a certain area, can raise non-negligible air pollution. In the same time the traffic noise can also raise serious ecological damage. These discomforts can additionally increase the stress of people trapped in the jam and of them who live nearby the area. In a long term this steady traffic conditions can decrease the productivity of a nation. It was reported that the yearly losses due to traffic congestion in Bogor is estimated at USD 720 millions in 2006 [1].

One important reason for traffic congestion is the raising unbalance between the traffic flow and the street capacity. Well planned traffic rules can be used to control the traffic flow, so that the overcapacity of the streets could be avoided. In this context, a software tool to support in planning the traffic rules is very helpful. Using this software tool, a future impact of newly planned traffic rules can be simulated on a computer model before it is implemented on the road [2-3].

14.2 A Simple Model of the Queueing System

Without limiting the problems, and also because of its simplicity, the traffic condition at the toll gate is chosen as a special case for modeling the queueing system. A typical highway with a series of toll gates is shown in Fig. 14.1.



Fig. 14.1: A highway with a series of toll gates can be modeled by a simple queueing system.