LB/DON/34/04

21

CCTV BASED SENSING TECHNIQUES FOR ADAPTIVE CONTROL OF TRAFFIC SIGNALS IN MULTIPROCESSOR ARCHITECTURES

LIBRARY
UNIVERSITY OF MORATUWA, SRI LANKA
MORATUWA

G.G. D. NISHANTHA

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

SUBMITTED FOR THE DEGREE OF MASTER OF PHILOSOPHY
IN ELECTRONIC AND TELECOMMUNICATION ENGINEERING

621.38"02"
621.397.3

UNIVERSITY OF MORATUWA
SRI LANKA

UM Thesis coll.

APRIL 2002

79891

University of Moratuwa
79891
79891

Declaration

The work presented in this thesis has not been submitted for the fulfillment of any other degree.

UOM Verified Signature

.....

G.G.D.Nishantha

(Candidate)

UOM Verified Signature

Prof. J.A.K.S.Jayasinghe

(Supervisor)

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Abstract

As the problem of urban traffic congestion spreads, there is a pressing need for the introduction of advanced technology and equipment to improve the state of the art of traffic control. In this context, the techniques used for sensing traffic flow information plays a vital role, ensuring accurate real time controllability.

Closed Circuit Television (CCTV) has gained popularity because of its ability to provide diverse information on relatively large regions leading to opportunities for performing substantially more complex tasks than conventional detection schemes. By processing these video images, traffic parameters such as speed, traffic composition, queue length etc. can be extracted. In addition CCTV images can be further processed for other useful information such as detection of vehicle shapes, vehicle types, occurrence of traffic violations and vehicle identification numbers etc.

To introduce CCTV based vehicle detection for automation of road traffic control in Sri Lanka involves an unaffordable investment cost to purchase foreign technology and equipment unless some locally developed system is introduced.

This thesis presents complete design of a CCTV system, which involves multitude of design and implementational aspects. It involves development of an image grabber, a remote communication interface and detection algorithms. In addition to visual monitoring of remote road traffic scenes, the designed system is capable of assessing many different traffic parameters, which can be used for adaptive control of road traffic.

The underlined project is an attempt to seek the possibility of introducing image-based traffic sensing technology to Sri Lanka. Significant attention has given to reduce the cost of development throughout the project to ensure that the concept of CCTV can be realized in practice in Sri Lanka for road traffic control.

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

To

Every body

Who helped me

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Acknowledgements

First I thank with deep gratitude to my project supervisor, Dr. JAKS Jayasinghe, for the excellent guidance and inspiration he has provided me through out this work. He provided a lot of encouragement and help for which I will be forever grateful.

I also thank Dr. (Mrs.) Deleeka Dias, Head/Electronics and Prof. (Mrs.) I. J. Dayawansa for their kind attention and valuable suggestions offered. The work carried out by them at official levels, towards the continuation of this project is deeply appreciated.

My thanks also go to Dr. Amal S. Kumarage and Dr. J.M.S.J. Bandera for their valuable advises.

I specially thank the administration of road development Authority (RDA) and Road Construction and development company (RCDC) for allocating funds for this research project. I would like to personally thank Mr. GAM Sumanasekara (DGM/Mecanical, RCDC) for his kind cooperation offered for the upliftment of this project. I also thank Mr. Santha Kumara Gamege and Mr. Wasantha Ranjewwa for their sincere cooperation offered throughout the project.

I am extremely grateful to my colleague Hemantha Kodikara Arachchi, without whose valuable support and inspirations I could have never achieved this goal.

Thanks are due to all my good friends in the research lab Ranaweera, Chandana, and Nuwan for helping me in many ways to make this project a success. I also thank the two final year students Dewasurendra and Warawita for spending their valuable time to participate on field visits and helping me in many other ways.

I also thank Mr. Jayantha Perera and Mr. Senadeera for their help offerd to me throughout this project. Mr. Thushara and Mr. DD Sumanapala are also remembered for spending their time after working hours to keep the research lab open.

Finally my thank goes to all who helped me to make this venture a success.

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Contents

University of Moratuwa, Sri Lanka.
Theses & Dissertations
www.lib.mrt.ac.lk

University of Moratuwa, Sri Lanka.
www.lib.mrt.ac.lk

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Abbreviations

ATCS	Advanced Traffic Control Systems
CCD	Charge Coupled Device
CCTV	Closed Circuit Television
IVHS	Intelligent Vehicles and Highway Systems
MPEG	Motion Picture Expert Group
PATH	Partners for Advanced transit and highways
TSC	Traffic Control System
USB	Universal Serial Bus
VIP	Video Image Processing

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

List of figures

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

List of tables


University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk