COMPUTERIZED ROAD TRAFFIC DATA ACQUISITION SYSTEM
USING TINI

CYRIL AGAS ANAK JIRAM

This report submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Computer Science

Faculty of Computer Science and Information System
Universiti Teknologi Malaysia

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Date of birth: 11TH SEPTEMBER 1987
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Name of Supervisor: ENCIK FIROZ BIN YUSUF PATEL DAWOODI
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To my beloved family and friends
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ABSTRACT

Road traffic data has many applications in the field of road planning and design. The current manual system for collecting road traffic data has flaws and is not efficient because it is done using human labor. Data is recorded through observation from booths set along the road. The data is written on paper forms and tables which is time consuming. Humans are bound to make mistakes and get tired easily with a few hours of repetitive work which affects the accuracy of the road traffic data. A new system that is more efficient and accurate is needed to replace the current system that is less efficient. Tiny InterNet Interface (TINI) is a network capable microcontroller that can be interfaced with many compatible devices and sensors. By taking advantage of the capabilities of TINI, the Computerized Road Traffic Data Acquisition System Using TINI is developed. A sensor is attached to the TINI board to sense the presence of vehicles on the road which is more accurate and efficient to acquire road traffic data. The computerized system can store the road traffic data analyze it automatically by generating analysis charts. The Computerized Road Traffic Data Acquisition System Using TINI saves time, money and effort.
ABSTRAK

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Computerized Road Traffic Data Acquisition System using TINI (Tiny Internet Network Interface) system consists of three general parts which are the data collection, data acquisition and data analysis and display. Sensors on the road will sense the presence of vehicles then the TINI board will acquire the data from the sensors. Finally, the data from TINI board will be sent to the client application to be analyzed and displayed. The current system for collecting road census data in Malaysia is by manual human workforce using few booths set up along the selected road which is time consuming and is sometimes inaccurate. This system can reduce the usage of valuable resources and man-power used in the current system. Furthermore, this system is also convenient as the end users can view the road census data from the comfort of their personal computers (PC) with the client application installed.
1.2 Problem Background

The current system used to collect road census data is by manual labor where booths will be set along the road. Data such as number and type of vehicles that passed through that point is recorded by the observers.

One significant problem is the accuracy of the data collected is not guaranteed. The observer might miss a car because it is too fast or simply because there are too many of them to count at a time. Humans are bound to make errors and this compromises the data being collected. It is a known fact that humans will get tired doing repetitive tasks for long periods of time because we still need to eat and rest. This produces the need to work in shifts if the data is to be collected continuously for days. Time is wasted when they rest, eat or change shifts and some vehicles might already pass that point on the road without being recorded. Again, this will cause inaccuracy issues to the data collected.

Other than that, the data collected in the manual system will be written on paper forms and tables. Those data will be keyed in manually into the computer to generate the needed charts or tables. This again is very time consuming and not very accurate. In the Computerized Road Traffic Data Acquisition System using TINI, the data is collected and stored into a database. Then the analysis charts are generated by the client application based on the data in the database. This system saves time, effort and man power.

1.3 Importance of System

Road traffic data is important for road planning especially around busy metropolitan cities where traffic jams are frequent. Data collected from road traffic is essential in optimizing the traffic flow in busy areas with heavy traffic.
There are two main applications of the data that is collected. One of them is to plan or to alter road systems. For example, if the traffic is very heavy along a certain stretch of road and the road could not support the traffic that pass through it every day, that road can be expanded to another lane to ease the traffic. The data can also be used to evaluate the designs of new roads, to determine if it will cause traffic congestions or not. Another application is to control traffic light durations. If at a certain time or during certain peak hours there are more vehicles using that road, then the duration of the green light can be lengthened for that road or multiple traffic lights at busy intersections can be controlled accordingly based on the data that has been collected and analyzed.

The Computerized Road Traffic Data Acquisition System using TINI uses sensors instead of humans to collect the data. Sensors are more accurate and can be used for a long period of time continuously compared to the current manual system and provide more raw data to be analyzed by the system which is then collected by the TINI board. Because it is computerized, the analysis of the data is done rapidly and more extensively for many applications by different organizations like road development companies and traffic control companies. It is possible to extract data that is needed only and do more calculations and analysis. Besides that, less human labor is needed and costs for erecting booths can be reduced. Precious time can also be saved as the user only needs to access the system through the network on the client application.

1.4 System Aim

The aim of this system is to develop a Computerized Road Traffic Data Acquisition System using TINI that can be accessed on a client PC to display analysis and is more accurate and efficient than the current manual system.
1.5 System Objective

i. To ease the acquisition of traffic data using remote sensors.

ii. To automate the traffic data acquisition process as much as possible using TINI board.

iii. To analyze all acquired data on the client application by producing different types of charts.

1.6 System Scope

i. This system is limited to collecting and analyzing the raw data which is stored into a Microsoft Access database.

ii. Programming will be done in JAVA on TINI board and also the client application.

iii. The system will be done on a model scale and not in a full size scale due to budget and permission restrictions.

iv. In the actual system, the sensors will be placed on the side of the road to scan passing vehicles. We assume in this system that the road only has one lane and only one vehicle will pass the sensor at a time and would not overlap with another vehicle.

v. In the model, the sensors can only collect the number of vehicles. Other data such as type, axle count, length and weight will be simulated because of sensor technology restrictions.
The Computerized Road Traffic Data Acquisition System using TINI is developed to replace the current manual system. This system is more accurate and cost-effective. The data that are collected and stored in the database can be used in many other applications especially road planning and traffic control. Although this system has some restrictions due to budget and technology restrictions it can be further expanded to a fully functional system in real world conditions in the future.