DESIGN AND IMPLEMENTATION OF AN INTELLIGENT TRAFFIC CONTROL SYSTEM

ABSTRACT

Due to the ever-increasing traffic demand, modern societies with well-planned road management systems, and sufficient infrastructures for transportation still face the problem of traffic congestion. This results in loss of travel time, and huge societal and economic costs. Traffic congestion in highway networks is one of the main issues to be addressed by today's traffic management schemes. Automation combined with the increasing market penetration of on-line communication, navigation, and advanced driver assistance systems will ultimately result in intelligent vehicle highway systems (IVHS) that distribute intelligence between roadside infrastructure and vehicles and that — in particular on the longer term — are one of the most promising solutions to the traffic congestion problem. In this paper, we present an intelligent traffic control system which is capable of efficiently managing traffic to ensure steady flow and prevent congestion. The system is designed using Java programming language for front-end development and MySQL database for data storage.

CHAPTER ONE

1.0 INTRODUCTION

This project is about integration of intelligent traffic control system, for the types of collisions, congestions and traffics rules. The examples and perceptive in this project deal primarily with World computerized traffic control system and some civilized countries. Traffic light, also known as traffic signal, stop light, traffic lamp, stop and go light, robots or semaphore, are signaling devices positioned at road inspections, pedestrian crossing, and other locations to control competing flows of traffic.

1.1 BACKGROUND TO THE STUDY

The increase in urbanization and traffic congestion create an urgent need to operate our transportation systems with maximum efficiency. Real-time traffic signal control is an integral part of modern Urban Traffic Control Systems aimed at achieving optimal Utilization of the road network. Providing effective real time traffic signal control for a large complex traffic network is an extremely challenging distributed control problem. Signal system operation is further complicated by the recent trend that views traffic signal system as a small component of an integrated multimodal transportation System. Optimization of traffic signals and other control devices for the efficient movement of traffic on streets and highways constitutes a challenging part of the advanced traffic management system of intelligent transportation system.

Simply defined, **Intelligent Transport Systems and Services is the integration of information and communications technology with transport infrastructure, vehicles and users.**

For a large-scale traffic management system, it may be difficult or impossible to tell whether the traffic network is flowing smoothly and assess its current state. Over the past few years, multi-agent systems have become a crucial technology for effectively exploiting the increasing availability of diverse, heterogeneous and distributed information sources. Researchers over the Years have adopted numerous techniques and used various tools to implement multi-agent systems for their problem domains. As researchers gain a better understanding of these autonomous multi-agent systems, more features are incorporated into them to enhance their performance and the enhanced systems can then be used for more complex application domains.

Intelligent software agent is an autonomous computer program, which interacts with and assists an end user in certain computer related tasks. In any agent, there is always a certain level of intelligence. The level of the Intelligence could vary from pre-determined roles and responsibilities to a learning entity. Multi-Agent System is the aggregate of agents, whose object is to decompose the large system to several small systems which communicate and coordinate with each other and can he extended easily. Agent-based simulations are models where multiple entities sense and stochastically respond to conditions in their local environments, mimicking complex large scale system behavior. The urban

traffic system is a much complex system, which involved many entities and the relationship among them are Complicated.

Therefore, the most important issues for a learner agent is the assessment of the behavior and the intelligence level of the other agents. By sharing vital information, Intelligent Traffic System allows people to get more from transport networks, with greater safety and with less impact on the environment. Intelligent Traffic System helps the whole transport system to work most effectively and efficiently. Intelligent Traffic System integrates users, transport systems, and vehicles through state-of-the-art information and communications technologies. Intelligent Traffic System can dramatically improve travelers' safety, efficiency and comfort. Intelligent Traffic System helps shippers and carriers move freight to its destination reliably and efficiently. Intelligent Traffic System helps the people who run transport systems provide better service to their customers. Intelligent Traffic System helps get the best value from the road and rail systems we already have. Intelligent Traffic System helps traffic flow more smoothly, reducing delays, fuel consumption, and air and noise pollution. Intelligent Traffic System helps make public transport more convenient and affordable.

Intelligent Traffic System often works behind the scenes. When emergency vehicles get to a crash site more rapidly than before, Intelligent Traffic System is detecting the crash, notifying emergency services, and getting the nearest response unit rapidly to the site. Technology in a vehicle prevents

skidding and helps the vehicle to stop safely; the driver may not even realize that assistance was provided, but Intelligent Traffic System is at work.

1.2 STATEMENT OF THE PROBLEM

Traffic congestion is an increasing problem in cities and sub urban spend more of their time commuting to work, school, shopping, and social event as well as dealing with traffic light jambs and accidents. Traffic became heavy in all directions, more to and from cities as well as between sub urban locations. Sub urban business locations required huge parking lots because employees have to drive; there were few buses trains, or trolleys to carry scatter workers to their work place. The hope of reduced congestion in the sub urban had not been realized; long commutes and traffic jams could be found everywhere.

1.3 AIMS AND OBJECTIVES

Intelligent Traffic System provides travel opportunities and additional travel choices for more people in more ways, wherever they live, work and play, regardless of age or disability.

The aims of this research work are:

- To design and implement an intelligent traffic control system.
- To develop a suitable algorithm to implement the design.
- To simulate the intelligent traffic control using Java programming language.

The first objective is to make each of the traffic lights or semaphores smart. That is, aware of the time of day, basic turn red, green or yellow rules, and perhaps what traffic looks like in all directions based upon locally mounted signals. In achieving these aims, the following objectives will also be followed:

- To design a simple system that is easily adaptable to the existing traffic conditions at the junction, involving a minimum of physical changes in the intersection.
- To provide the quickest possible clearance to vehicular and pedestrian traffic in all directions at a junction.
- To a design flexible artificial intelligence traffic light system that will take care of changes in the traffic density and character.
- To reduce the stress of the traffic warder.
- To reduce the occurrence of possible accident.
- To verify the efficacy of the program.

1.4 SIGNIFICANCE OF THE STUDY

The important of this research work are:

- It will help in reducing the occurrence of possible collision or accident and thereby improve the confidence of the driver and the pedestrian plighting through the highways.
- The project to allay the fear of time wastage at the junctions because of unevenly directions of traffic system.

- Since the system is capable of working for 24hours uninterrupted thereby assured constant availability of traffic control service hence reduce human effort and energy.

1.5 SCOPE OF THE STUDY

The scope is the design of an intelligent traffic control system. The modern method of traffic control system is indicating each light at a particular time interval to pass a vehicle at one lane and stop vehicle on the other lane. The light is broken into three (3) categories (Red, Yellow, and Green) to signal to lane on what to do at a particular time where the red signify STOP, yellow signify READY, and green signify MOVE.

Each light is designed to turn itself on whenever it is necessary and turn off the time elapse.

1.6 LIMITATION OF THE STUDY

Traffic congestion is a serious problem despite costly effort to create an integrated method of traffic control system. The number of private automobiles used mainly by people with middle and income, has increased faster than any form of transportation in Lagos (Nigeria) and this has increased a demand of expansion of roads, parking space and improved computerized traffic control system.

1.7 METHODOLOGY

The designed method employed for the intelligent traffic control system for this case study was the use of Split Cycle and Offset Optimization Technique. This technique used was use for the signal timing optimization and also to make a series of frequent adjustment for signal timing to minimize the modeled vehicle delays of the case study. The method is developed to meet the need of today`s traffic management. Java was the programming language used for designing the intelligent control system of the case study and its design analysis as a functional designed method for the specification that identifies whether a new replacement system is required. This is done so as to ensure proper accuracy, efficiency and effectiveness which is the basic of a traffic control system

1.8 DEFINITION OF TERMS

Traffic Light: A road signal for directing vehicular traffic by means of colour lights, typically red for stop, green for go, and yellow for proceed with caution.

Intelligent Traffic System: refers to information and communication technology that improve transport outcomes such as transport safety, transport productivity, travel reliability, informed travel choices, social equity, environmental performance and network operation resilience.

- Intelligent Traffic System will help all travelers get where they need to go regardless of age or disability and regardless of where they live. Intelligent Traffic System will provide better information on available services to

travelers who cannot or choose not to drive including those who are mobility or sight-impaired.

- Intelligent Traffic System will also help make it easier to pay for transport services. The future will include a single electronic payment mechanism to pay for fuel, tolls, public transport fares, parking, and a variety of other charges that busy travelers encounter every day. Intelligent Traffic System will help convey the needs and interests of transport system customers to the people who manage the system, helping to ensure a transport system that is responsive to those needs and interests. Intelligent Traffic System will help managers of the transport system to make services safer and simultaneously available for motorists, cyclists, pedestrians, and users of public transport.
- Intelligent Traffic System will help focus the transport system on meeting the needs of all its customers. Better meeting customer needs means a renewed focus on customer service and effective operations.

CHAPTER TWO

2.0 LITERATURE REVIEW

Transportation research has the goal to optimize transportation flow of people and Goods. As the number of road users constantly increases, and resources provided by current infrastructures are limited, intelligent control of traffic will become a very important issue in the future. However, some limitations to the usage of intelligent traffic control exist. Avoiding traffic jams for example is thought to be beneficial to both environment and economy, but improved traffic-flow may also lead to an increase in demand [Levinson, 2003].

There are several models for traffic simulation. In our research we focus on microscopic models that model the behavior of individual vehicles, and thereby can simulate dynamics of groups of vehicles. Research has shown that such models yield realistic behavior [Nagel and Schreckenberg, 1992, Wahle and Schreckenberg, 2001].

Cars in urban traffic can experience long travel times due to inefficient traffic light control. Optimal control of traffic lights using sophisticated sensors and intelligent optimization algorithms might therefore be very beneficial. Optimization of traffic light switching increases road capacity and traffic flow, and can prevent traffic congestions. Traffic light control is a complex optimization problem and several intelligent algorithms, such as fuzzy logic, evolutionary algorithms, and reinforcement learning (RL) have already been

used in attempts to solve it. In this paper we describe a model-based, multi-agent reinforcement learning algorithm for controlling traffic lights.

2.1 INFORMATION SHARING AMONG AGENCIES AND MANAGEMENT CENTERS

Information is commonly shared among agencies by means of voice communications and data communications. The Regional Intelligent Traffic System Architecture establishes the general data flow requirements between agencies and from each agency's management center to the field equipment or other equipment that it communicates with or controls. To perform data communication between management centers, a common language and frame of reference is required. *Protocols* for the sharing of transportation related information are being established at the time of this writing by the National Transportation Communications for Intelligent Traffic System Protocol (NTCIP) and are available on its **website (http://www.ntcip.org).**

In essence, the information may be put into the proper high level language by the use of the Traffic Management Data Dictionary (TMDD). The TMDD provides the definition and format for the data and the Message Sets for External Traffic Management Communications (MS / ETMCC) which organizes the TMDD elements into relevant messages. Different protocols are

included in the NTCIP standards for transmitting these messages between management centers.

2.2 TRANSPORTATION SYSTEMS MANAGEMENT (TSM) RELATIONSHIP

Since first introduced in the mid-1970s, *transportation systems management* (TSM) has evolved from a list of about 150 low-cost actions to the productive use of existing transportation resources through their coordinated operations and improved management. TSM implies "a philosophy about planning, programming, implementation, and operations that calls for improving the efficiency and effectiveness of the transportation system by improving the operations and / or services provided". TSM, then, provides an umbrella philosophy that aims to:

- Analyze the total system, and
- Improve operation and safety before capital-intensive projects add significant capacity.

Roark classifies TSM actions within 9 different urban operating environments, including:

- Freeway corridor,
- Arterial corridor,
- Central business district (CBD),
- Regional operating environment,

- Neighborhood,
- Major employment site (non-CBD),
- Outlying commercial center,
- Major activity center, and
- Modal transfer point.

In contrast, Wagner uses two primary strategies - *supply* and *demand* (6). *Supply* strategies focus on changing the *quality* of vehicular flow, whereas *demand*-oriented strategies target decreasing the *quantity* of vehicular travel. Supply actions include:

- Arterial signal coordination,
- Signal removal or flashing operation,
- Freeway monitoring and control,
- Incident management,
- Parking prohibition,
- Turn controls, and
- Bottleneck-removal programs.

Demand actions include:

- Carpools,
- Vanpools,
- High occupancy vehicle (HOV) priority treatments, and
- Variable work hours.

In both classification schemes, traffic control systems and their effective operation predominantly affect TSM and prove vital to the full realization of several other TSM actions. For example, it does little good to entice drivers to ride the bus or join a vanpool if inefficiently operating traffic signals stop or delay *all* vehicles (including buses and vans).

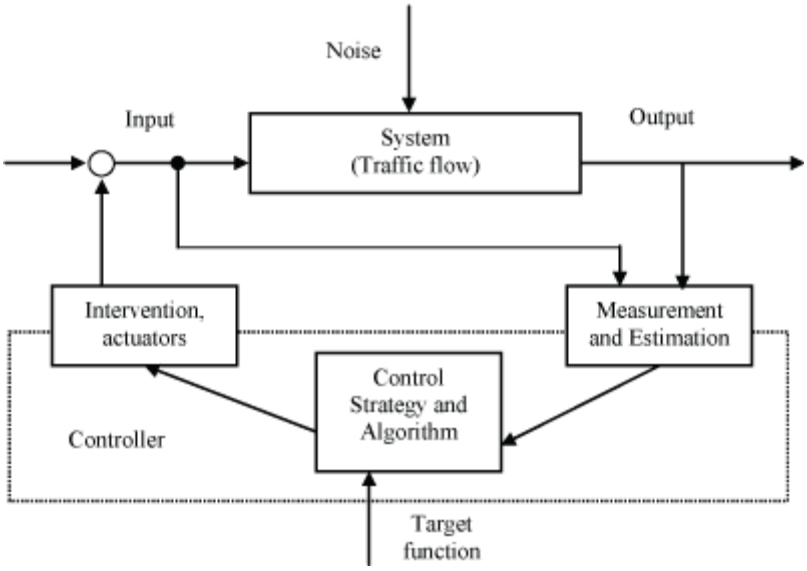

Figure 1: General traffic management and control structure.

2.3 CONTROL SYSTEM OPTIONS

Operational objectives of traffic control systems include making the best use of existing roadway and freeway network capacity and reducing trip times, without creating adverse environmental impacts.

Controlling the movement of vehicles through signalized intersections provides the major effect on traffic flow in urban areas. The control strategies shown in Table 2-2 can achieve signalized intersection control. Table 2-2

provides a summary of the features of different categories of traffic control systems.

2.4 IMPLICATIONS OF INTELLIGENT TRAFFIC SYSTEM

- **Intelligent Traffic System for safety**

More than 40,000 people die on Europe's roads each year. Road accidents cost the European economy around €200 billion each year.

While in-car safety systems have greatly improved the chances of surviving an accident, more attention now needs to be given to systems that can actually prevent accidents from happening.

Intelligent Traffic System can help reduce injuries and save lives, time and money by making transport safer:

- Intelligent Traffic System will help the drivers of cars, trucks and buses avoid getting into crashes and help keep them from running off the road. Intelligent Traffic System will help maintain safe distances between vehicles and safe speeds approaching danger spots. Intelligent Traffic System will help improve visibility for drivers, especially at night and in bad weather.
- Intelligent Traffic System will provide information about work zones, traffic congestion, road conditions, pedestrian crossings and other potential hazards.

- Intelligent Traffic System will help detect the crashes that do occur, determine the severity of the crash and likely injuries, and help emergency management services provide assistance. Intelligent Traffic System will help select the closest and most appropriate rescue unit to respond. Intelligent Traffic System will adjust traffic signals to clear the way for emergency vehicles.
- Intelligent Traffic System will connect responding units to medical care facilities to help provide initial care for the injured and help medical care facilities prepare to deliver more complete treatment when injured people arrive.
- **Intelligent Traffic System for efficiency and economy**

Congestion costs the EU 1% of its GDP – around €100 billion – each year3. There are around 300 million drivers in the EU today, while in the past 30 years the distance travelled by road has tripled4 and is set to increase further.

With funding and space for large-scale road building becoming increasingly scarce, governments, infrastructure operators and pubic authorities are turning to Intelligent Traffic System solutions to ease congestion.

Ramp metering, traffic and incident detection and variable message sign systems are already being used across Europe. Intelligent Traffic System can save time and money for travelers and the freight industry:

- Intelligent Traffic System will deliver fast, accurate and complete travel information to help travelers decide whether to make a trip, when to start,

and what travel modes to use. Intelligent Traffic System will provide his information both prior to a trip and as the trip proceeds.

- Intelligent Traffic System will help drivers select and follow safe, efficient routes to their destination. Intelligent Traffic System will let drivers pay tolls without having to stop.
- Intelligent Traffic System will help freight move swiftly and reliably using the right combination of ship, truck, train and plane.
- Intelligent Traffic System will help track freight, enabling its owners to know where it is at all times and when it is due to arrive at its destination, and allowing for better planning and scheduling of critical processes.
- Intelligent Traffic System will enable more reliable and timely commercial vehicle management. Intelligent Traffic System will automatically keep track of safety-related information about the vehicle, its driver and its cargo. Intelligent Traffic System will help communicate this information to the authorities so that, as appropriate, vehicles can be cleared through checkpoints without stopping.
- Intelligent Traffic System will help the people who build, manage and maintain the transport system. Intelligent Traffic System will help the transport system carry more traffic safely and efficiently by keeping traffic flowing, clearing incidents quickly, and managing construction and maintenance to minimize disruptions. Intelligent Traffic System will help

schedule road management vehicles and help them work more precisely and efficiently.

The next generation of Intelligent Traffic System solutions will:

- Give public transport users real-time service information, as well as smart and seamless ticketing solutions.
- Enable freight operators and customs authorities to share information about consignments and keep track of their position and status, as well as provide information on the most efficient, economical and secure routes for freight.
- Allow vehicles to communicate directly with the infrastructure around them and with one another – enabling drivers to make better decisions about their route and respond to warnings of congestion and accidents.
- **Intelligent Traffic System for environment**

Despite increasing air travel, the vast majority of this energy is still consumed by road transport.

Since Intelligent Traffic System systems can improve the efficiency of passenger and goods transport and reduce the time caught in traffic congestion, they will obviously have secondary benefits for the environment and in terms of use of space:

- Intelligent Traffic System will keep traffic flowing on urban freeways, on toll roads, at commercial vehicle checkpoints and elsewhere. Reducing delays due to congestion and incidents means that energy waste, wear–

and–tear, and the pollution caused by stop–and–go driving are also reduced.

- Intelligent Traffic System will help vehicles operate more efficiently. Intelligent Traffic System will provide location–specific information about weather and road conditions.
- Intelligent Traffic System will help to plan efficient routes and guide drivers along these routes.
- Intelligent Traffic System will help make public transport more reliable, effective and attractive, thereby accelerating its use. Intelligent Traffic System will provide better information on schedules and connections. Intelligent Traffic System will help public transport users stay in touch with their employers and their families while in transit.

❖ **Intelligent Traffic System for security**

Recent events have shown that the transport system is under threat from terrorism, whether as a target in itself or a means of attacking other targets. The need to protect travelers, transport facilities and transport workers against security risks has never been greater.

However, this must be balanced with the need to make sure transport continues to operate effectively and efficiently. Intelligent Traffic System systems are key to striking this balance. In fact, Intelligent Traffic System will help prepare for, prevent and respond to disaster situations, whether from natural causes, human error, or attacks:

- Intelligent Traffic System will help keep watch over transport facilities.
- Intelligent Traffic System will help provide personal security for people using the public transport system.
- Intelligent Traffic System will monitor freight, especially hazardous materials, through the entire supply chain.
- Intelligent Traffic System will help transport and safety/security agencies coordinate their activities and their information so they can respond more effectively to incidents of all kinds.
- Intelligent Traffic System will help identify the best routes for evacuating people at risk and for directing emergency services to incidents and disaster sites.
- Intelligent Traffic System will help the transport system, and all the other parts of the economy that depend on transport, to return to normal as rapidly as possible following a crisis, through better management of the transport system, more efficient interagency communications, and better and more timely information to the public.
- Intelligent Vision Systems can automatically spot suspicious behavior at transport hubs, while automatic tracking and alarm systems can speed the response to threats.

❖ **Intelligent Traffic System in urban public transport system**

Intelligent transport systems in urban public transport might be described as a combination of information and communication technologies integrated

into urban public transport system. These technologies might be integrated into the infrastructure of transportation system and/or in urban public transport vehicles themselves.

At present, public sector infrastructure, including electronic toll collection and road use charging, still represents the largest Intelligent Traffic System market segment.

In the future, private sector purchases of Intelligent Traffic System products and services (either from commercial and consumers) are expected rapidly to overtake the public sector market, with emphasis on communications-enabled in-vehicle products and services, reflecting rapid growth in the wireless internet. Japan is furthest advanced in this market, followed by Europe, and then North America, but this effect is accelerating in all world regions.

2.5 BENEFITS OF INTELLIGENT TRAFFIC SYSTEM IN URBAN PUBLIC TRANSPORT SYSTEMS

Application of Intelligent Traffic System in urban transport can lead to an improvement of urban transport performance through:

- Reductions in transport time, cost, and congestion
- Reductions in pollution
- More effective monitoring and management of traffic flows
- Greater safety and security in stations, streets, roads and vehicles
- Facilitation of multimodal journey planning

- Provision of real time traffic information, alternate routes, etc.
- Creation of appropriate travel conditions for disabled people.

2.6 RULES OF INTELLIGENT TRAFFIC CONTROL

Here are a few samples of the types of rules that might be employed at a couple levels of an intelligent system.

Individual traffic light:

1. If the time of day is between A and B then red on time is X, yellow on time is Y and green on time is Z.
2. If direction A is green and direction A number of cars visible is very low and direction B is red and direction B number of cars visible is very high then trigger direction A to red and trigger direction B to green.
3. If direction A weighted average wait time is greater than direction B weighted average wait time then incrementally increase within limits the direction A green on time and decrease, within limits, direction B green on time.

2.7 VEHICLE CONTROL

It is a well-known fact that traffic flow would increase drastically if all drivers would drive at the same (maximum) speed. Another fact is that this will never happen if you let drivers decide. In this section we first show how

vehicles could learn to cooperate. We then describe an ambitious research program that aims to control all vehicles by on-board computers.

Moriarty and Langley (1998) have used reinforcement learning for distributed traffic control.

Their approach enabled cars to learn lane selection strategies from experience with a traffic simulator. Experimental studies showed that learned strategies let drivers more closely match their desired speeds than hand-crafted controllers and reduce the number of lane changes. Their approach, like ours, focuses on distributed car-based controllers, which makes it easy to take specific desires/goals of drivers into account such as desired speed or destination.

In the California Partners for Advanced Transit and Highways (PATH) program, the Automated Highway System (PATH-AHS) project aims to completely automate traffic [Horowitz and Varaiya, 2000]. Cars on special roads would travel in so-called platoons. A platoon is a number of cars that travel at high speed, with little distance in between. Each car controls its own speed and lateral movement, and makes sure it follows the leader. The leader navigates the platoon, and makes sure that there is enough space between platoons. In order to optimize flow, a platoon leader receives information about the optimal speed from a roadside coordinating system. Because of this, and the fact that there is little distance in between cars in a platoon, an AHS is said to be able to increase road capacity by a factor of about four.

Another aspect of traffic control is controlling traffic lights in a way that minimizes the time drivers have to wait. We will describe previous research in this area and our car-based, multi-agent reinforcement learning algorithm in section 4. First we will discuss reinforcement learning.

Fig 2.7 Traffic control light

2.8 EXPERT SYSTEMS

An expert system uses a set of given rules to decide upon the next action. In traffic light control, such an action can change some of the control parameters. Findler and Stapp (1992) describe a network of roads connected by traffic light-based expert systems. The expert systems can communicate to allow for synchronization. Performance on the network depends on the rules

that are used. For each traffic light controller, the set of rules can be optimized by analyzing how often each rule fires, and the success it has. The system could even learn new rules. Findler and Stapp showed that their system could improve performance, but they had to make some simplifying assumptions to avoid too much computation.

2.9 PREDICTION-BASED OPTIMIZATION.

Tavladakis and Voulgaris (1999) describe a traffic light controller using a simple predictor.

Measurements taken during the current cycle are used to test several possible settings for the next cycle, and the setting resulting in the least amount of queued vehicles is executed. The system seems highly adaptive, and maybe even too much so. Since it only uses data of one cycle, it could not handle strong fluctuations in traffic flow well. In this case, the system would adapt too quickly, resulting in poor performance.

Liu et al. (2002) introduce a way to overcome problems with fluctuations. Traffic detectors at both sides of a junction and vehicle identification are used to measure delay of vehicles at a junction. This is projected to an estimated average delay time using a filter function to smooth out random fluctuations. The control system tries to minimize not only the total delay, but the summed deviations from the average delay as well. Since it is no longer beneficial to let a vehicle wait for a long time, even if letting it pass would increase the total

waiting time, this introduces a kind of fairness. Data of about 15 minutes is used to determine the optimal settings for the next cycle, and even using a simple optimization algorithm, the system performs well compared to preset and actuated controllers.

CHAPTER THREE

3.1 SYSTEM ANALYSIS AND DESIGN

System analysis /investigation and design of the proposed system are necessary in order to produce the required system needed for effective running of the organization. Imperatively the boundary of the new system and its limitation are also produced to see its measure of effectiveness and ineffectiveness as regulate its relationship either with its domain or other department of the organization.

3.2 ANALYSIS OF EXISTING SYSTEM

System investigation means the fact-finding strategy analysis phase or synthesis phase of creatively establishing the configuration of system components which is necessary to accomplish effectively the objective of an existing system with the technical modification necessary to convert the manual way into effective operation was carried out at the initial stage to ascertain whether or not the manual way of processing is accurate and efficient to take

change of the Intelligence Traffic Control System. So as to improve and enhance the existing system.

A system can be defined as working together harmoniously of different part, units sections or element towards achieving a common goals and objectives **.While** Analysis is defined as the collection, organization and evaluation of fact a system or a problem and the environment in which it operates.

Therefore, system analysis is a way of diagnosis an existing system and finds the solution to the problems arises. So as to make the system meets the goals and objectives of the people. The existing system is observed to have been associated with the following problems:-

- Irregularity:- this time control program of the existing system in allowing(passing), delay of vehicle at Olaiya junction Oshogbo is not regular.
- Time wastage: - the timing control in delaying of vehicle is too much while passing (allow) is too small.
- Inaccuracy: - the irregularity in timing makes time spent to be much while leads inaccuracy of the system.

3.3 DESCRIPTION OF NEW SYSTEM

Since the existing system lack merit, the new system is going to be replace by another one which take care of all the shortcoming of an existing system. The new system will process the Traffic time control efficiently and will ensure

its effectiveness justify the aim of that necessitate the design .therefore, the timing schedule will be programmed in a manner that will eliminate waste of time, irregularity in delay or pass that make vehicles to be delayed so much.

3.4 MERIT OF THE PROPOSED SYSTEM

For the proposed system and people convenience there is need to employ few number of Traffic Warden officers who will monitors and presume offenders are prosecuted as speculated by law.

3.5 FEASIBILITY STUDY

There are several methods involve/ adopted in this process in order to meet requirement for the set objective. Meanwhile this project work aimed also to provide mechanism and avenue to re-programming the system to improve the traffic activities. In the course of fact finding or feasibility study a number of techniques are used to determine exactly how the existing will be upgraded, the programmed and redirected to suit the designer needed specification. Also the traffic code, road sign and caution were considered errantly

3.6 SOURCE OF DATA

For the successful completion of this project materials used include information inside federal road safety commission offences, city dweller consulted traffic policeman.

3.7 METHOD OF COLLECTION

In the analysis of information system many methods are used in collecting fact, this method includes Interview, record inspector, and questionnaire e.t.c. Because the system is still in it planning stage we improve interviewing and record inspector.

3.8 SYSTEM SPECIFICATION

This section presents the entire task that this system performs through the program and procedures. It has the logical design of Intelligence Traffic Control System which describes the system function with precise function.

3.9 SYSTEM DESIGN AND IMPLEMENTATION

System design is a stage in a system development that determines what a new system will do and how it will be done. It is concern with the co-ordination of the procedures and the effective utilization of the equipment provided in order to make sure that the aims and objectives are achieved. System design brings a proposed system much closer by describing the nature of input files and output as well as the process by which they are connected. System implementation can also be described as a phase in a system development cycle where the new system designed becomes fully operational system. Implementation phase is one of important stage in system development cycle

because if it is not properly planned and carried out. It could result in time wastage.

CHAPTER FOUR

4.0 SYSTEM DESIGN AND IMPLEMENTATION

This chapter deals with input and output design specification with its implementation, testing and evaluating. It is the task of structuring specification of requirement of the computerized system.

4.1 SYSTEM DESIGN

The system design specification describes the features of the Intelligence Traffic Control System. It is first step in implementing the analysis of the new system.

The primary objectives of system design is to implement a Traffic Automated system which will remove problems inherent in the old system (Traffic Warden)and deliver function required to support the objectives of the usher.

The program is design using the bottom up design approach each program was design separately and later linked together to form a coherent system.

4.3 SYSTEM REQUIREMENT

Hardware Requirement

Hardware refers to the physical part of a computer. This hardware help in keying key program (device: keyboard) so what is being typed showed on a device called monitor which stored information and produce the hard copy of the system.

- A Pentium iv system (80gb) or higher version
- A hard disk capacity of at least 80GB
- A RAM sizes of at least 512MB
- USP uninterruptible power supply
- A printer. Laser jet

4.4 SOFTWARE REQUIREMENT

Software means set of instruction given to computer to perform a specific task. A system that will be used for this program must be multi-user operating system. Which are:

- A window operating system preferably window XP or higher version
- Antivirus
- Xampp server
- Java runtime environment version 8

4.5 SYSTEM REQUIREMENT FOR INSTALLATION

This program was written with Java and has been made for executable file. It can be install in any personal computer (P C) which is window based

(window XP and above) the total disk space must be up to 80 gigabyte. This will allow at least successful execution of Intelligence Traffic Control System.

4.6 SYSTEM INSTALLATION PROCEDURE

First switch on the system (PC) after booting, insert the CD ROM, then go to my computer double click on file menu then navigate to select open, this will display a dialogue box which will direct you to the environment then click on courage it will take you to another environment, then double-click on the jar package to tun.

4.7 HOW TO RUN THE SYSTEM

On installation you click start menu from the program select project by clicking on it which will display Intelligence Traffic Control System by clicking on it to open. Then click continue running then click proceed to display the running environment of Intelligence Traffic Control System on the monitor (VDU).

4.8 CHOICE OF PROGRAMMING LANGUAGE

The system platform used is windows 7 and above. Also, the IDE (integrated development environment) used is NetBeans 8.2 and the programming language used is Java created by James Gosling in 1994 and publicly released in June 8, 1995. Java is a robust programming language that effectively work with databases. Several reasons ride the choice of using Java for this system, one of which is its extensive portability and use over several

web host servers on the internet. Also, Java possesses several inbuilt functions which allow it to integrate well with the widely used and accepted database storage management system for the MySQL. Due to its wide use, several documentations are available online which will guarantee that materials about any aspect of its use will be easily found.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

The Intelligence Traffic Control System has been developed through a systematic use of software development methodology. Each phase in the development stage was a proportionate amount of time to ensure reasonable measure of reliability

There are three major benefit of the system which includes:-

Firstly, it provides mechanism for the generation of accurate statistic on the Intelligence Traffic Control System.

Secondly, it provides a monitoring mechanism for the detection of committed offences.

Thirdly, it provides a monitoring mechanism for the prevention of road accidents.

The implementation of the system will provide an improvement of this services being rendered by the road traffic division of the Nigeria police and federal road safety commission.

5.2 CONCLUSION

The manual method of operation in most organization has proved to be highly ineffective organization that deals with the transfer of document from one department to another do not have to rely solely on the manual operation

which will be very disastrous should any accident occur. It is to maintain fast, effective, reliable and accurate result with this method. All these shortcoming of the manual system are completely eradicated by the Intelligence Traffic Control System. From the above analysis, you can rightly say that the Intelligence Traffic Control System with the aids of Traffic Light which is much more better than the manual method i.e. Traffic Warden.

5.3 RECOMMENDATION

The new system and the existing system has been detected that the advantages of new system are more than the existing system. It is therefore recommended to the every user of road that the new system should be adopted so that they can have all the benefit of Traffic Light that controls traffic jam.

However, from the point mention above the new system is there by recommend by the Federal Road Safety Commission.

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