Effective Traffic Managemet in Lagos State and Allied: An Innovative Ideology

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ABSTRACT
Today, many nations suffer from traffic congestion, which affects the transportation system in cities and cause serious upset in road use. Lagos State is not without this traffic issue, being a state in glamour, aesthetic and of "Eko for show". Due to these environment attributes, Lagos is tagged "CENTRE OF EXCELLENCE", with large population density which has led to vehicular traffic especially at junctions (Tee or Cross). Traffic Warden in this area becomes obsolete and the recent electronic/digital traffic in existence is becoming ineffective, due to the environmental attributes. Innovation added to the recent light traffic control has become effective tool for effective management of the sequential control of this vehicular traffic on the road to avert what would have being a recurrent sag of ghastly accidents and commotions at the junctions. There have been many ways of achieving this, Lagos State, with her peculiar motorists, such as tired, fatigued, dozy, on-looker and/or indiscipline motorists due to the environment attributes and the slogan "OMEKO", with uppermost among these being the employment of electronic monitoring circuits, controlled by petro clock. This work takes care of this peculiarity by developing an electronics/digital traffic system, which incorporates an innovative voice sound system (like adding salt to the soup) in the traffic light, to alert the tired, fatigued, dozy and on-looker and/or indiscipline motorists in Lagos State and allied, in order to allow for smooth running and/or management of the traffic system. This work finds application in Lagos and allied states and developing world.
Keywords: Allied; Environment; Innovative; Lagos; Management; Traffic.

I. INTRODUCTION
In the ever fast growing world of business and technology today, such as Lagos State and allied, there has become an increase in traffic at different points. In Lagos State, peculiar motorists such as the tired, fatigued, dozy on-lookers and/or indiscipline motorists have made the traffic personnel ideology obsolete and even the recently used electronics light control system ineffective in some cases. This work takes care of this inefficiency by designing and developing an electronics traffic system which incorporates an innovative sound system in the traffic light, to alert these aforementioned peculiar motorists in Lagos State and allied, in order to allow for smooth running and/or management in the traffic system.

Here, the motorists are of peculiar nature, they might have over-worked themselves, thereby becoming tired and slumbered and/or being an indiscipline on-looker motorist, due to attractive nature of the environment, at the point when the electronic light controller or traffic warden says "Stop"; "Ready to Go", and then "Go" but being indiscipline, tired or dozy on the steering and does not know when the "Go", order is made, other serious minded motorists are blocked, leading to unnecessary agitations/commotions leading to exchange of tout languages and worst accidents.

To avert this situation, this work was developed with an incorporated voice sound system, which incorporates English Language and the three major languages (Yoruba, Igbo and Hausa) in Nigeria (such as "Get Ready; Mura Sile; Ga-Esi Njikere; Shirya), embedded in the system operations, to give understanding to all and to alert and re-align the tired, dozy, on-looker and/or indiscipline motorist at the point of "Ready to Go", in order to set and ignite his/her vehicle for onward motion. It also incorporates a solar power, so as to avert "dead time" caused by mains power failure.

There are three lights in the traffic signal, having different message for the drivers. Red light (Upper One) asks the driver to pause motion at the intersection; green light (Last One) gives the driver a motion command, to drive through the

intersection, whereas the yellow light (Middle One) alerts the driver to be ready. However, improving the time of the traffic signals at intersections in the network reduce congestion and provide an immediate cost effective solution.

General Review

Traffic lights alternate the right of way accorded to road users by displaying lights of a standard color (red, yellow/amber, and green) following a universal color code. In the typical sequence of color phases.

The first traffic lights were installed in 1868 outside the British Houses of Parliament in London to control the traffic in Bridge Street, Great George Street and Parliament Street. They were promoted by the railway engineer J. P. Knight and constructed by the railway signal engineers of Saxby& Farmer. The design combined three semaphore arms with red and green gas lamps for night-time use, on a pillar, operated by a police constable. The gas lantern was turned with a lever at its base so that the appropriate light faced traffic (Greenfield, 2000).

Traffic lights are signaling devices that are conceived to control the traffic flows at road intersections, pedestrian crossings, rail trains, and other locations. Traffic lights consist of three universal colored lights: the green light allows traffic to proceed in the indicated direction, the yellow light warns vehicles to prepare for short stop, and the red signal prohibits any traffic from proceeding (Kham & Nwe, 2014).

Nowadays, many countries suffer from the traffic congestion problems that affect the transportation system in cities and cause serious dilemma. In spite of replacing traffic officers and flagmen by automatic traffic systems, the optimization of the heavy traffic jam is still a major issue to be faced, especially with multiple junction nodes (Isa, Shaari, Fayeez & Azlin, 2014). The rapid increase of the number of automobiles and the constantly rising number of road users are not accompanied with promoted infrastructures with sufficient resources. Partial solutions were offered by constructing new roads, implementing flyovers and bypass roads, creating rings, and performing roads rehabilitation.

However, the traffic problem is very complicated due to the involvement of diverse parameters. First, the traffic flow depends on the time of the day where the traffic peak hours are generally in the morning and in the afternoon; on the days of the week where weekends reveal minimum load while Mondays and Fridays generally show dense traffic oriented from cities to their outskirts and in reverse direction respectively; and time of the year as holidays and summer. Secondly, the current traffic light system is implemented with hard coded delays where the lights transition time slots are fixed regularly and do not depend on real time traffic flow (Ghazal, ElKhatib, Chahine & Kherfan, 2016).

Related Review

This work was developed mainly to avert accidents at road junctions, a controller system, which is void of fatigue, to enable continuous monitoring of traffic at road junctions was developed to remove the fatigued type of man traffic which has, for long been abandoned by developed world like UK, USA etc. Conclusively, it incorporates an innovative incorporation of sound system the case of the developing countries and elsewhere. Other level of sound could be used, such as voice tag sound according to languages. This has already been done/completed in another research work as a peculiar case of Nigeria, using the borrowed language (English) incorporated with the three major indigenous languages (Hausa, Igbo and Yoruba).

Ghazal et al, 2016 proposed a system based on PIC microcontroller that evaluates the traffic density using IR sensors and accomplishes dynamic timing slots with different levels. Moreover, a portable controller device is designed to solve the problem of emergency vehicles stuck in the overcrowded roads.

Taghizadeh et al.. (2010) presented a generalized framework for integrating simulator and a v ehicle traffic simulator for rapid prototyping and evaluation of dedicated short rang communication based on vehicular communication protocols and their applications in the context of intelligent transport system. The resulting integrated simulator is utilized to investigate the performance of the collision avoidance applications.

Turky et al. (2009) described the design of an intelligent traffic light control based on genetic algorithm. The developed algorithm is used to simulate the situation of an isolated intersection based on this technology. Then the performance of the genetic algorithm controller was compared with the conventional fixed time controller.

Al-Khateeb, et al. (2008) explained traffic congestion and tidal flow management as major problems in urban areas, which have caused much frustration and loss of man hours. An intelligent radio frequency identification traffic control system has been developed to solve the congestion problems. RFID technology with appreciate

algorithm and data base were applied to provide an efficient time management scheme.

Aye (2008) demonstrated car traffic control system using LAN networking. The obtained results showed reduction in normal recurring, significantly enhanced operational tools congestion to effectively manage traffic incident, reduced pollution, and faster response, improve public transport, reduction in emergency response time.

Hirankitti et al. (2007) proposed a Multi agent approach for intelligent traffic light control that consist of agents and their world (cars, networks, traffic lights ...etc). Each of these agents controls all traffic lights at one road junction by an observe-think-act cycle. This approach showed that a complicated problem of traffic light control on a large road network can be solved elegantly by the rule based multi agent approach.

Deng et al. (2006) improved the video surveillance and self adaptive urban traffic signal control system to achieve the development trend in intelligent transportation system. The proposed system performed the vision-based methodologies to know well the real time measurements in urban road.

This work tends to carry out an innovative effective traffic management system, meant for Lagos State and allied.

Method
Design Specs

In this design, a traffic light controller for T-junction road system was considered. The major unit system tied together to achieve the objective of this work are: The counter unit, the timer unit the logic gate unit. The pulses from the timer in the astable multivibrator modes sets the counter (being a Johnson decade counter) at which each subsequent output will get high on the negative edge of the previous output pin. In this case, the outputs (P) are ten (10) in number (i.e. 0 - 9) as per the counter. When P_0 is in "ON STATE", all other outputs ($P_1 – P_9$) remain in "OFF STATE". At the moment P_1 goes off, P_2 will start working and so until P_9 in succession. This design is such that both the timer and counter are operating from same source voltage powered by solar energy, to prevent system collapse in the phase of mains supply. The design employs the use of timer (555 mode) as the pulse generator and the counter (Decade mode) as the binary coded decimal (BCD). The timer clocks the counter, in order to achieve the successive output mode operation of the counter.

Since in any digital system or circuitry, the logics of 0 and 1 become paramount, the successive output from the counter is tied together via the logic gates to achieve the control of the light output (Red, Yellow and Green) which controls the traffic.

By calculation,

The Periodic time, T = 0.69RC

Where:

R = Resistance and C= Capacitance

While the frequency (F) of oscillation is given as:

$$F = \frac{1}{T} \, inSecs$$

Where F = Frequency of oscillation.

The counter interpretation of Figure 1 shows a T-junction of this project design which could be interpreted based on how the counter works
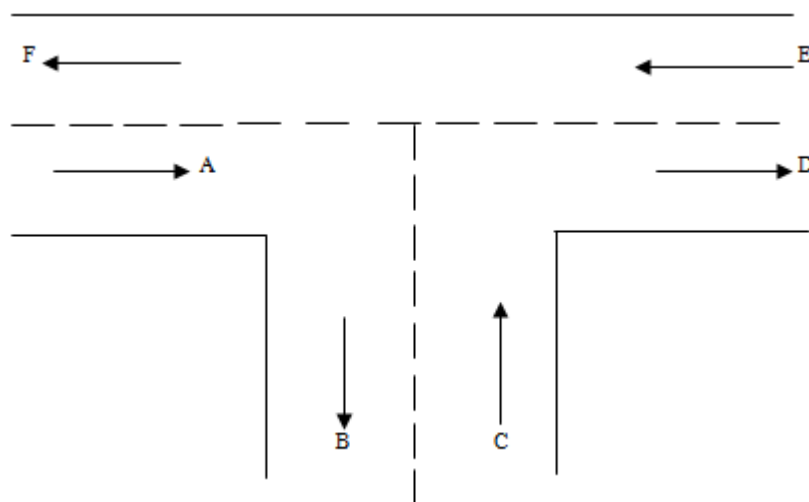

Figure 1: T layout interpretation road junction

In the T-junction of Figure 1, the arrows indicate the direction of traffic flow. The letters A – F indicate a particular direction on the road.

A motorist coming from A may either decide go straight to D or make a right turnand head towards B. likewise, a motorist coming from E may either decide to go straight to F or make a left turn to B and also a motorist coming from C may also decide to make a right to D or make a left turn to F.

If this traffic not properly controlled, a traffic jam may occur leading to chaos on the road. The traffic can be controlled thus:

For motorists coming from A and crossing to D, motorists coming from C and those that are willing to turn to B from E must stop.

For motorists coming from C and turning to F, motorists coming from E and those that are coming from A must stop.

For motorists coming from E and turning to B, motorists coming from A and those that are coming to C and willing to cross to F must stop.

3.2 Rechargeable Battery in Traffic Light Control

The power supply to this work is a solar powered system. This is suggested to maintain a steady supply to the system unit, in order to avert the system collapse during

operation, thereby averting commotion and/or accidents in traffic operation
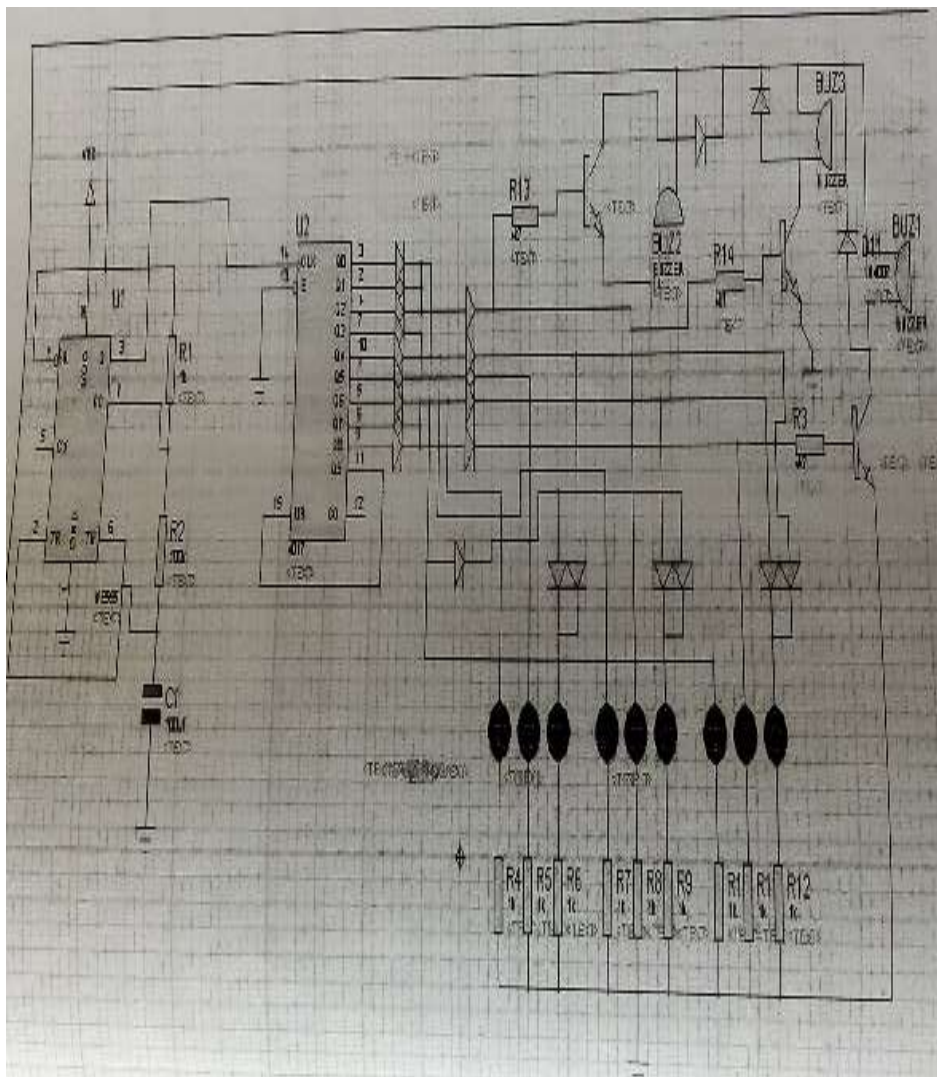

Figure 2: Comprehensive System Circuit Diagram

II.   RESULTS AND DISCUSSION

In the analysis of the results and discussion, a T-junction traffic light was considered. In this consideration, one of the three phases making up the "T" construction was analyzed as follows:

At the switch on of the traffic light system, the Green/Red light may come on, which represents "Go/Stop", depending on the setting. In the case when the Red light comes on first which represents "Stop" it lasted for some seconds (depending on the design), before change over to the next light. This time represented the setting on the generator circuit (Timer), and the successive "on" of the counter.

At the change-over, the Yellow light which represents "Ready to Go" comes on for few seconds (depending on the design), before change over to the next light. This time represented the setting on the generator circuit and the successive "ON" time of the counter. Immediately the Amber comes on, which represents "Ready to Go", a voice sound "GET READY; MURA SILE; GA-ESI NJIKERE; SHIRYA" also comes on alongside this Yellow light. This sound alerts the tired, dozy, on-looker and/or indiscipline motorist(s), who is sleeping on the steering or attracted by the "Opeke or Figure 8/handsome man" in motion or the Elephant house in the Island of Lagos or the environmental glamour/aesthetics enveloping the city and then, re-aligned back to the traffic line and get set for motion by kick-start his/her vehicular system for the period of its on time. This is the remarkable innovative aspect of this work.

At the change-over, the Green light which represents "Go" comes on and lasted for some seconds also (depending on the design), before change over to the next light. This time represented the setting on the generator circuit and the successive "ON" time of the counter.

Note: Each phase could be analyzed to give its various light change effect.

III.   CONCLUSION

Automatic traffic lighting system, with innovative sound is useful equipment for controlling traffic flow at junction in Lagos and allied. This method will out weight the recently used electronic/digital traffic system by managing the effect of traffic in many ways. It is more efficient and effective as well as it can enhance transportation system of the environment located, saving many hours and lives usually lost in traffic problem. Accident may also be perverted and lives can be saved.

Recommendation

The Lagos State Government through her traffic management authority and allied, should look into this development, devote time and resources to this project as it would be of great benefit to all and sundry.

Specific attention should be given to this method of traffic lighting system by government of this peculiar environment, as it posed to reducing or preventing unnecessary commotion and/or road accidents thereby reducing or preventing loss of lives associated with it.

An innovative ideology, with sound "PINNNNNNNNNNNNNNNNN", in tune, at "Ready to Go" has already been prototyped at the Federal Polytechnic, Ilaro, Ogun State, Nigeria.

Worth noting is that more of this is in the offing, if given the ample chance..

Contribution to Knowledge

The major contribution to knowledge of this innovative work is as summarized;

Light control system with innovative voice sound technology to alert the tired, dozed, on-looker and/or indiscipline motorists to move at the appropriate time, in order to avert unwarranted time, energy, life wasting and other unwarranted damages.

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