Automated Traffic Light Control

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Abstract – *In the world of Innovative and automotive world everything is getting computerized. Each data is in effect effortlessly available. Yet, the movement signals checking is as yet done physically. The activity signals are observed physically from the control room by the executives or a predictable time is settled for signals evolving. Rather than this a computerized controller-based activity checking framework will be useful for controlling the movement. This plan of movement foundation will be useful in decreasing the activity clog issue in urban communities. This paper depicts a framework where IR sensors are incorporated with an Arduino to work the paths which measure the movement thickness. This incorporated arrangement of movement is Internet of Things (IoT) based which likewise empowers to clear the activity for emergency vehicle by giving a catch in rescue vehicle so the activity gets cleared on that side. It additionally empowers the vehicles tally that move over the sensors. Subsequently, movement controlling gets upgraded effectively, which in the end prompts huge change in rush hour gridlock framework.*

1. INTRODUCTION

In the emerging modern society, electronics, robots and artificial intelligence are replacing humans in many fields of endeavor one of which is traffic controlling. They are very reliable and error free. To persons who journey or adventurers, congestion means lost time, missed opportunities, and dissatisfaction. To an employer, congestion means lost workers efficiency, delivery delays and increased costs. To resume at work and to disseminate useful information to various offices within a given area during peak hours, becoming more difficult for workers and other member of the community. Due to congestion problems, traffic of four road lanes is controlled using microcontroller for 24 hrs. and this lessens waiting time for the road users. . As an added productive and incentive feature, wait times at the turning on of the red light can be effectively utilized for information dissemination since it is the time the driver and passengers are stationary and focused on the light to turn green. The information disseminated could be adverts, public information, and weather forecast and so on. The adverts can serve as a source of income generation creating a very lucrative Return on Investment (ROI)[12]. Full color or monochrome LED displays are normally employed for outdoor information dissemination. These apart from disseminating information, will add colorful aesthetic hues to the nearby surroundings beautifying the whole place. The case study of this paper is the interlocking junction between the senate building and the college of science and technology Covenant University Nigeria as shown in Figure 2. This junction is a staggered link between the two main entrance and exit roads. Due to its staggered nature, maneuvering into any of the two roads can be very daunting and dangerous. Therefore, the need Content from this work may be used under the terms of the Creative Commons Attribution 3.0 license. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI. Published under license by IOP Publishing Ltd for a traffic control system is crucial. Human traffic control at this junction is impractical as the road itself is too narrow to accommodate a human traffic officer. Also, the staggered nature of this junction makes it difficult to find a suitable place to locate a traffic officer. Therefore, an electronic traffic control system (microcontroller based)[11] is more than adequate as it defies these two limitations for a human traffic officer. The rest of this paper involves a detailed review of related studies in section 2. In section 3, the traffic light system with integrated led advertising display algorithm is presented by describing the various algorithms involved. The discussion of the findings and comparison is presented in section 4 while section 5 concludes the paper.
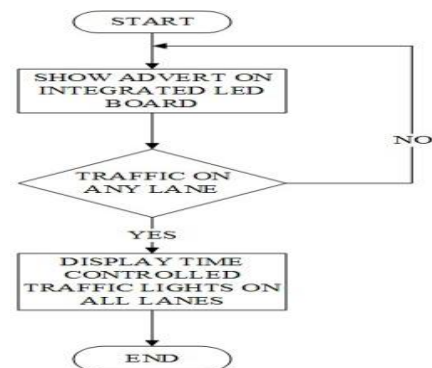

Figure 1: Flowchart for Traffic Light System

The above flow chart illustrates the step by step process of the system. This chart is an activity chart in which consists of initial user node and final destination node.

2. LITERATURE REVIEW

ASSISTANCE SYSTEM FOR TRAFFIC

Paralysis is defined as the complete loss of muscle function in any part of the body. It occurs when there is a problem with the passage of messages between the muscles and the brain[14]. Some paralyzed people cannot move even a single part of the body other than their eyes. Hence, the main aim of this paper is to design a real time interactive system that can assist the paralyzed to control appliances such as lights, fans etc. or by playing pre-recorded audio messages, through a predefined number of eye blinks. Image processing techniques have been implemented in order to detect the eye blinks. In our system, the face tracking is accomplished by using a set of trained Haar cascade classifier, and a template matching technique is employed to track the eye. Initially, the involuntary blinks of the paralyzed person are used to locate the patient's eyes by finding the number of connected components in a frame. Once the eyes are detected, an online template is created which is then used to track the patient's eye.

VOCAL-FOLD PARALYSIS PATIENTS TREATED WITH STEM-CELLGRAFTING

Vocal Fold Paralysis (VFP) is a secondary consequence of neck and throat surgery. A possible corrective treatment of VFP[17] is fat injection into the paralyzed vocal fold. Recently, this technique has been modified to enrich the injection of fat with grafts of stem cells. Questions as if the implantation of fat plus stem-cells is efficient enough compared to fat-only implantation regarding phonation restoration capability may be answered using advanced speech processing and statistical pattern matching. Results from a limited study involving eight patients (four males and four females) are presented. Voice quality analysis showed that six out of the eight patients showed remarkable improvements in phonation, and that the improvements were larger when the fat grafts were enriched with stem-cells.

METHODOLOGIES TO ASSIST TRAFFIC

The "Tongue Drive System" (TDS) is a wireless assistive technology (AT) which is operated by using tongue motion has minimum invasion & also has no obstruction to daily activities. This system can enable those people who have high spinal cord injuries such as the tetraplegia patient to move around with quite ease even giving them some ability to control their surrounding environment. The TDS transforms the movement of the tongue into user's command i.e. the intention to move in a specific direction. In our work used the TDS[13] technology to control the direction of a powered wheelchair's propulsion. The wheelchair was initially a manual one but by using two high torque gear motor in each of its wheel it's been turned into a powered one. A small permanent magnet secured in the tongue was used as a tracer for the tongue movement. These tongue movement was then detected by five magnetic sensors on an orthodontic base inside or in a headset outside the mouth. We used Hall Effect sensors as the magnetic sensors. The Five sensors carry five different commands: Forward, Reverse, Right, Left & Stop. The output of the sensors then sent wirelessly to the Motor driver connected with the DC motors[15]. The driver later controls the DC motors according to the received signal. Finally the testing of the project was done with a healthy subject who was able to maneuver the wheelchair in obstacle course with quite ease.

ASSISTIVE INTERACTIVE DEVICE USINGELECTRO-OCULOGRAPHY

Detecting eye signal with different eye movement is a difficult task. By implementing this technique as an application for the paralyzed person those who cannot make any body movement or cannot speak. Human brain mainly works on electric signals transmitting all over the body to send the information in order to operate the body parts. Even while rotating eye ball body increases or decreases the resistance near eye area. This variation in electric signals can be measured using EOG dry electrodes. A brain-computer interface (BCI)[16] in a set of hardware devices to reach an interface human brain/computer. This new communication channel only uses brain waves; consequently, it is particularly suitable for Paralyzed person. This project will help paralyzed person to overcome their problem by communicating with doctors through EOG based device.

3. EXISITING SYSTEM

The current system is the mechanical switch has to assign for the traffic lights all the time to govern Traffic for indefinite time. Hence to overcome this we have designed this project.

4. PROPOSED SYSTEM

Design and Implementation of the Proposed Algorithm In this section, focus is on the steps taken to produce the result expected. This includes the algorithm design, Hardware and Software design, then simulation with results generated and recorded. The implementation was carried out with the Arduino Uno [18]prototyping platform. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Open Source, meaning the user has the right to modify the software as he/she pleases. The Arduino is actually a microcontroller based prototyping platform and is able to: a, read inputs, such as reading a sensor, a key press on a keypad, b, turn on an output such as activating a motor, or turning on an LED as in this case. The Arduino comes in many variant flavors categorized in either 8bit or 32bit processing power. It is a very popular platform with a very active support community, a large Library repository, and lots of easy add-ons called shields to provide extra capabilities. Microcontroller based designs are easily implemented on the Arduino platform as the programs are written in C and a host of very good library functions are available reducing project development time. We refer to [20] to check the pin out diagram of the Arduino Uno Prototyping Board.

5. HARDWARE REQUIREMENTS

Arduino Nano

Arduino is open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone, or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP). Arduino received an Honory Mention in the Digital Communities section of the 2006 Ars Electronica Prix.

The Arduino Nano can be powered via the mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.
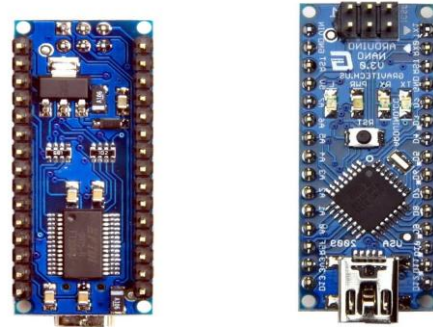
3A 3B

Figure 3: Arduino Nano

PIN DESCRIPTION

Arduino Nano is a surface mount breadboard embedded version with integrated USB. It is a smallest, complete, and breadboard friendly. It has everything that Diecimila/Duemilanove has (electrically) with more analog input pins and onboard +5V AREF jumper. Physically, it is missing power jack. The Nano is automatically sense and switch to the higher potential source of power, there is no need for the power select jumper. Nano's got the breadboard-ability of the Boarduino and the Mini+USB with smaller footprint than either, so users have more breadboard space. It's got a pin layout that works well with the Mini or the Basic Stamp (TX, RX, ATN, GND on one top, power and ground on the other). This new version 3.0 comes with ATMEGA328[19] which offer more programming and data memory space. It is two layers. That make it easier to hack and more affordable.

GSM Module

A GSM modem is a device which can be either a mobile phone or a modem device, can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily.

Compatibility that we can use the same mobile to make calls in several countries, Flexibility and increased capacity

due to equipment is smaller in size, Improved spectrum efficiency, International roaming, Compatibility with integrated services digital network (ISDN), Support for new services, SIM phonebook management, Fixed dialling number (FDN), Real time clock with alarm management, High-quality speech, Uses encryption to make phone calls more secureand Short message service (SMS).

Figure 4: GSM

Bluetooth

The HC-05 is a very cool module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which makes this process a lot easier. The module communicates with the help of USART[20] at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART. We can also configure the default values of the module by using the command mode. So if you looking for a Wireless module that could transfer data from your computer or mobile phone to microcontroller or vice versa then this module might be the right choice for you. However do not expect this module to transfer multimedia like photos or songs; you might have to look into the CSR8645 module for that.

The HC-05 has two operating modes, one is the Data mode in which it can send and receive data from other Bluetooth devices and the other is the AT Command mode where the default device settings can be changed. We can operate the device in either of these two modes by using the key pin as explained in the pin description.
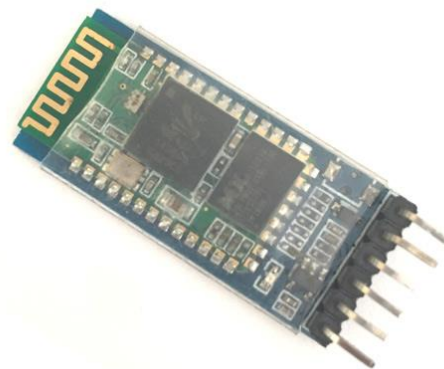

Figure 5: Bluetooth

POWER SUPPLY

12V lithium battery with 1.3Amps supply for 20 hours battery backup Used for the obstacle detection domain. Thus, this battery is weight less compared to any 12V battery. Longer battery life - will last 3-5x longer than an equivalent SLA or VRLA battery. Lightweight - 30% of the weight of an SLA 12V 4.5AH lead acid battery. Wide temperature performance.Can be safely charged with a lead acid battery charging system. Low self-discharge. Maintains higher voltage during discharge than lead acid.Can store at any state of charge without degradation.Safer than traditional lithium ion batteries, hermetically sealed.Built in over charge and over discharge protection.Built in over current protection. Product Type: Replacement for 12V 17Ah Lead Acid Battery. No memory effects. Built in short circuit protection. Applications: Perfect for motorcycle starter, 12VDC power, medical equipment, LED light power supply, solar power. 9V, triple A battery used for IrDA transceivers. This makes easy installations and easy replacements. It reduces the cost and installing complexities. The life time of the battery is more than 6 months for the designed and pre-programmed transmitters and receivers. IrDA transceivers makes the advantages over this power consumption reduction.

SOFTWARE REQUIREMENTS

- Arduino IDE
- My SQL
- JDBC

The software algorithm is based on the truth table as described in section 4.1. The LEDs representing the traffic lights are switched on and off based on the truth

table. Also, a delay is inserted in between each lighting sequence as described in the truth table. These delays provide the timing required between each light sequence. Delays used in software are achieved using the Millis () function of the Arduino programming language. This which provides delay functions without inhibiting other processor activities in the software. The delays used are user adjustable to facilitate field adjustments during actual implementation. The C programming language was employed for the coding of the Arduino program.

RESULT AND CONCLUTION
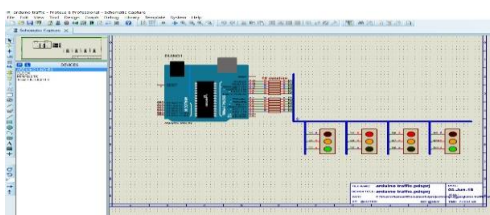
The circuit design was simulated both in software (Figure 3a and 3b) and hardware (Figure 4). For the software simulation, the Proteus VSM environment was employed. The Proteus VSM environment is an innovative software from Lab center Electronics suitable for Analog, digital and mixed mode circuit analysis. It is widely used in schools globally as the software is very intuitive and easy to use. Below are several screenshots of the Proteus VSM simulation results with the switching pattern generated as a set of waveforms. The delay values used in the simulation were made short to facilitate quick response of the design so as to be able to capture the outputs as waveforms in the shortest possible time.

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