AUTOMATED VEHICLE QUEUING MANAGEMENT SYSTEM.

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Abstract— Vehicle Queuing System is a daily predictable routine with a lot of complication of ensuring prompt delivery of service and also immediate notification of delay in service when no idle server is available to avoid long queue. In this research paper, we presented the solution to the problem by using of counter to keep the record of number of active servers at an instance. We simulated this system using Arduino UNO microcontroller that was programmed with C Language. The system shows good reliability, efficiency and robustness.

Keywords : Automation, Embedded System, Packing Station, Arduino.

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1 INTRODUCTION

Vehicle traffic is a global problem [2]. This problem was most pronounced in the Packing Station where vehicles request for parking slot. However, it is commonly usual for the administrators of this parking station to ensure proper utilization of their packing spaces and avoid unnecessary conflict that might arise as a result of delaying clients when all slots available are being occupied. This has been traditionally done by hiring of more workers to be carrying out the counting of available slots. This is not only time consuming but proved to be inefficient in a packing systems of multiple entries and exits.

In this paper, we presented a way of automating this routine

Embedded system can be defined as the system that automates the functioning of working components of electronic machines in a predictive manner. An embedded system features an electronic components and system software in forms of chip or program module to make the component behaved intelligently.

2. METHODOLOGY

Our tasks are broken down further to integration of a motor sensitive environment, smart overcrowding control gate, vehicle owners' notification platform, and a user friendly interface. We used an Arduino board based system to keep track of the number of cars present with respect to available service

point in that particular filling station. This board automatically control the the gate arm to allow cars into the station or leave the station. It is able to prevent cars from further entry once the available fuel pumps have been occupied at the instance. Also, it differentiates between vehicles and other element or even humans by the use of induction sensor. It has a LCD Display screen that gives feedback to the users and administrator about the state of the parking slot in the system which gives information about the number of available service point on a monitor.

The system detects the presence car through inductive sensor.After which it checks if there is an idle parking slot waiting for a vehicle which the system can know by comparing the number of available vehicle in the system to the number of available parking slot. If there is, then the gate opens, else the gate is held closed. After a client enter or exits the system, it calculates the number of available pump left in idle state and give the display on an LCD monitor erected just by the entrance.

3. SYSTEM ANALYSIS AND DESIGN

This section explains the various connections made to archive the aim of this project, it consist the inter-connection of the various components discussed below.
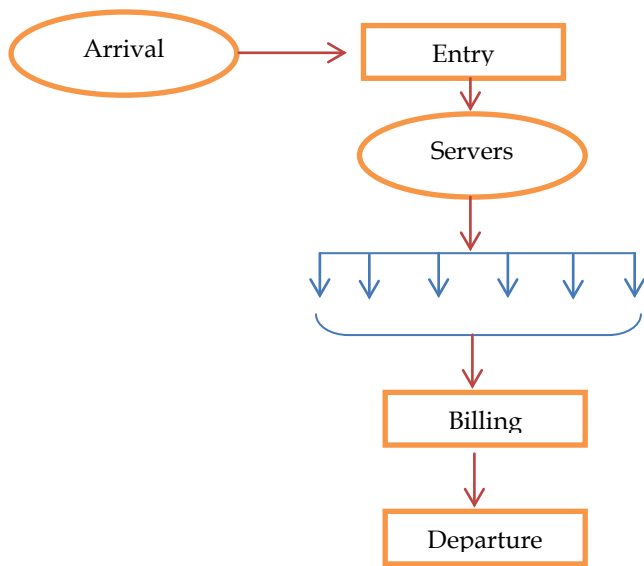
FIG 1: THE SYSTEM ARCHITECTURE

distance of the sensor depends on the actuator's shape and size and is strictly linked to the nature of the material.For the simulation, an aluminum foil will be used to replace the induction sensors since the cars to be used are non-metallic.
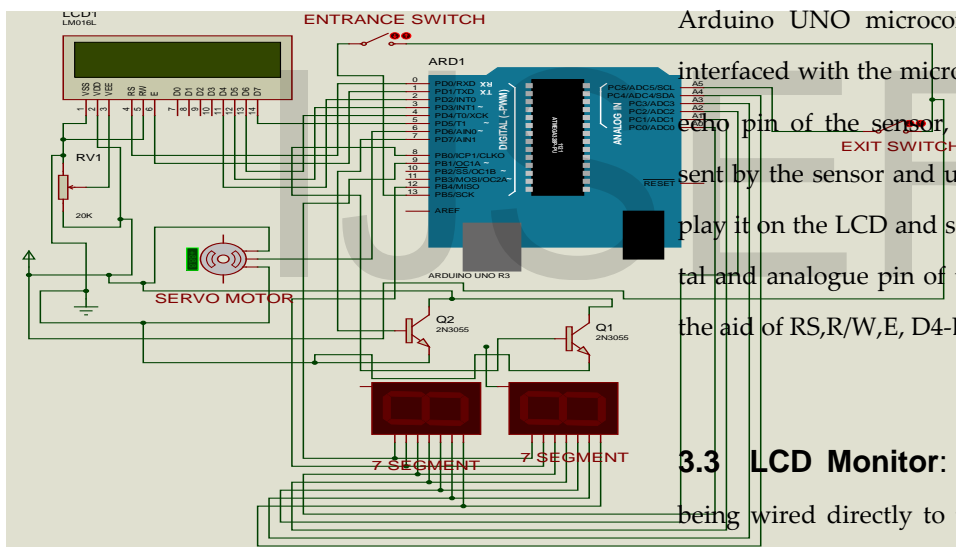

FIG 3: AN INDUCTION SENSOR

Fig 2: The circuit diagram

3.2 Arduino UNO: The process stage begins when the Arduino UNO microcontroller detect the inductive sensor interfaced with the microcontroller with the aid of trigger and echo pin of the sensor, the microcontroller relate the signal sent by the sensor and use it to execute the program and display it on the LCD and segment display connected to the digital and analogue pin of the microcontroller respectively, with the aid of RS,R/W,E, D4-D7 pin of the LCD.

3.3 LCD Monitor: The signal, after being generated is being wired directly to the LCD display monitor just by the entrance of the park, displaying information to the incoming vehicle about the available space in the park. A 16 X 2 inches display monitor will be used to covey the information on 7 segment display.

3.1 Induction sensor: Inductive proximity sensors are used for non-contact detection of metallic objects. Their operating principle is based on a coil and oscillator that creates an electromagnetic field in the close surroundings of the sensing surface. The presence of a metallic object (actuator) in the operating area causes a dampening of the oscillation amplitude. The rise or fall of such oscillation is identified by a threshold circuit that changes the output of the sensor. The operating

3.4 Seven Segments Display: The number of slot available in the park will be shown on seven segment displays; a seven segment display is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot matrix displays. It will be used as the counting agent, the countdown of the spaces as cars enters and

the counting up as a car leaves the service point will be implemented by the 7 segments display.

```
int SW1=SDA;// RED wire is the sda
int SW2=SCL // blue
int CA1=2;
int CA2=3;
int pina=5;
int pinb=6;
int pinc=7;
int pind=8;
int pine=9;
int pinf=10;
int ping=12;

void setup() {
  // put your setup code here, to run once:
pinMode(2,OUTPUT);
pinMode(3,OUTPUT);
pinMode(5,OUTPUT);
pinMode(6,OUTPUT);
pinMode(7,OUTPUT);
pinMode(8,OUTPUT);
pinMode(9,OUTPUT);
pinMode(10,OUTPUT);
pinMode(12,OUTPUT);
//digitalWrite(2,HIGH);
//digitalWrite(3,HIGH);
}
```

The code above shows the allocation of the seven segments to the Arduino pins as a digital output

3.5 Servo Motor: Servo motor is used to control the opening and closing of the gate, A servo motor is a dc, ac, or brushless dc motor combined with a position sensing device, servo motor controller is used to perform the function of opening and closing of the gate.
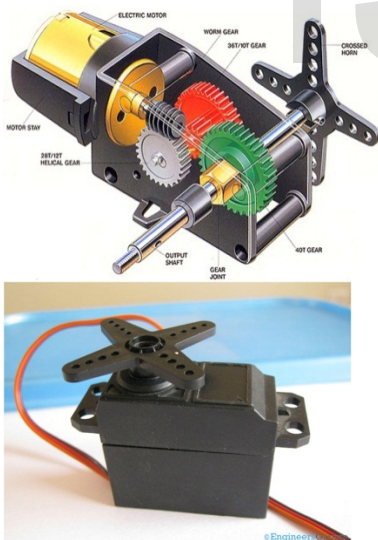

FIG 4: SERVO MOTOR

A control room or building should be created at a remote location to the gate where the main body of the system can reside to avoid any form of interruption either by the workers or the customers. Also, the power supply must be available throughout the working hour of the system, any interruption in the system will force the system to restart and with this, there might be a change in the reading of the system with respect to the available cars at the pump. There by leading to incorrect functionality in the system data base.

4. RESULTS

After the implementation, the system was subjected to testing. All components were tested with toy cars, and they all responded significantly to the original physical system they represent. The gate arm opens on noticing the presence of a vehicle, the counter responded to the movement of vehicles in and out of the station, and the display was functioning well.

The images of the system as it respond to the movement of vehicles on over time,

Fig 5a: System testing when3 cars are theparking station

Fig 5b: System testingwhen
the parking station is filled

The Automated vehicle queuing management system has been designed to be an off-line one time purchasable system with a very little mandatory requirements, but we shall discuss the major requirement that must be met for the functionality of this system.

5. CONCLUSION

All the desired design features in previous chapter have been implemented and tested, Testing revealed that the system developed matches the queuing management and control for a case study of PMS station, and this system could be the basis for further research.

At the end all the features and requirements that were outlined in the design was implemented. Various tests were car-

ried out by capturing data into the system.

In application, this developed system will is useful for project managers and business associates in the area of oil and gas. This system can also be used as a basis for development in car parking automation system, for restaurants, super markets and all other larger business enterprises.

6. FUTURE WORKS

In a view to make subsequent development on this project, We will like to make this project to be more versatile by its ability to detect and classify vehicles according to their predefined category. This will enhance it work in an heterogeneous parking station which is by far the most available type of parking stations.

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