Automated Parking Lot

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Abstract— This paper deals with the need for an automation of parking lots. Conventional parking lots use human beings to assess the current capacity of a parking lot. This project is to automate that scenario using an Arduino board. A capacity will be checked dynamically every time a car has to be parked in the parking lot if the parking lot can accommodate a car, the gate opens. In every other case the gate remains closed. A similar check is done every time a car exits the parking lot. This project mainly deals with automation using switches and a simple program which drives an Arduino based micro-controller.

Keywords— Switches, Arduino, parking lot structure and Sensors.

I.   INTRODUCTION

 The idea of the project Automated parking lot is to ensure that the passenger who intend to park their vehicles in the parking lot know if there is any slots that are available to park.

   In the proposed system, the automated parking lot, this parking lot monitoring system, indicates the number of free slots available for parking the vehicles. In the existing manual system, it is difficult to find an unoccupied parking space in a large car parking lot. The proposed automated parking lot helps in finding the empty slots available. If no slots are empty, the servo motor doesn't open the gate for the passenger vehicles to park, this helps in giving the passengers intelligent parking service to run the proposed system Arduino UNO board is being used. The Arduino is a very user friendly device which can be easily interfaced with any sensors or modules and is very compact in size.

   A brief description of the scenario is as follows, when the passenger vehicles enter the parking lot, the gate opens only if there are empty slots in the parking lot. This helps in creating an efficient way of parking that helps the passenger vehicles if there are any empty available for parking. Thus reducing the manual effort in checking if there are empty slots available in the parking lot.

II.   LITERATURE REVIEW

   The literature that was used to develop this project is from an Arduino based project blog known as "Arduining". The article talks about the need of such a project to be and how it would ease the existing parking system that is in place today. In the traditional system, several people are required to monitor a parking lot so as to assess the number of free slots and match it with the capacity of a parking lot. If this system is replaced with an automated indicator the number of People employed would reduce. The article talks about this scenario. The need for each component is also elucidated.

   The Arduino board is the heart of this project. The board is controlled using a program that is written on it. The program assessed the number of switches presses where each switch corresponds to a slot and subtracts it from the capacity or the total number of slots present. The literature also describes the common anode display used to display the number of free slots calculated using the program. LCD is used to display the number of free slots that are empty. The article also talks about the use of a servo motor. The servo motor basically is a motor where the angular velocity can be controlled and varied.

III.   MOTIVATION

   In traditional system, when the passenger vehicles wish to enter the parking lot to park the vehicle someone has to manually check the entire parking lot for any empty slots available. This system is time consuming and often the gate opens even if there are no empty slots in the parking lot.

   The idea of this automated parking lot is to ensure that the passenger vehicles who intend to park their vehicles in the parking lot know if there is any slots that are empty.

IV.   METHODOLOGY

   The Intelligence Module: This module mainly deals with the Arduino Board. The Arduino board is programmed in such a way that it is able to compute the number of free slots within a parking lot. It does this by counting the number of switches pressed. Each switch corresponds to a slot and when a switch is pressed it means that a slot is being used. The free slots is calculated by subtracting the number of switched used from the capacity. When this number becomes zero the gate ceases to open or the signal to the servo motor is not sent.

The Servo Motor: This module mainly deals with the opening and closing of the gate. If there are free slots in the parking lot then a signal is sent to power on the servo motor. If there are no free slots no signal is sent. The servo motor is used so that the angular momentum can be controlled. This need for the control of the angular momentum can be used in opening and closing the gate.

The Display Module: This module consists of a LCD. This display shows the number of free slots available.

The Switching/Sensor Module: This module is used to sense if a car is parked in a particular slot. If it is parked, then a switch is pressed. If a slot remains empty then a switch is open. The number of switched is counted and the number of switches pressed is constantly being sought out. This module will be implemented in a much customized manner. As in the switching.
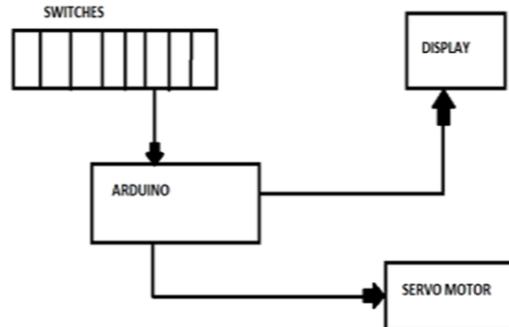

Fig. 1 Architectural Design.

V. COMPONENT DESCRIPTION

A. Arduino Board

At the centre of this project is the Arduino Board. The core of the hardware used is the Arduino Board. The Arduino Uno is a microcontroller board based on the ATmega328. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. It is programmable and can be reprogrammed using a very simple programming interface.

This Arduino board has many inputs which are connected to switches. Each switch corresponds to a parking slot. When a parking lot is used, i.e. when a car is being parked, a switch is pressed. The Arduino board keeps track of the number of switches being pressed at any given time and matched this with the capacity of a parking lot. In other words capacity minus the number of switches being pressed equals to the number of free slots used. This number of free slots used is displayed on the common anode display. Based on the number free slots a signal to open the gate is sent to the servo motor or not sent to the same.

This board is programmed in such a way that if by any chance the number of parking slots filled is equal to the capacity of the parking lot, then the gate does not open. To indicate if a parking spot is utilized, a switch is used. If a switch is pressed it indicates that a particular slot is used. The difference between the capacity of a parking slot and the number of switches is equal to the number of cars that can be parked. If this number is zero, i.e. if there are no free slots no signal is sent to power on the servo motor. So the gate remains closed. When this number of free slots is greater than one, then the servo motor is powered and the gate opens.

B. Servo motor.

Microprocessor was interfaced directly interface with Servo motor by connecting the control pin from servo, directly to the digital input/output pin on the Arduino board. Here, we use hitec- HS55 servo motor. The HS55 set the standard for affordable performance, offering precision components that have been engineered to provide long lasting trouble free service. Featured in a hundred model aircraft reviews worldwide, the HS-55 is the best choice when it comes to controlling "smaller" Electric's.

C. Seven Segment display

It is available in two configurations: common cathode and common anode. All the 8 LED terminals have their one end internally shorted and linked with the middle pins such that it serves as a common terminal (cathode or anode). 7 led are used to form the digits while the 8th one is for the dot which helps in identifying the correct orientation.

It is widely used in digital clock, calculator, electronic meters and various other applications where numerical display is required. It can be used in place of dot matrix displays which are more complex than seven segment display. Seven segment displays can also be used to display some alphabets. Seven segment displays is a group of Light emitting diode (LED) arrange in figure of 8 patterns.

D. Switches.

Here each parking lot is assigned to a switch, when the car is parked on a particular lot, the switch related to the particular lot gets on and similarly to all other lots. ie when the switch is on the parking lot is full, otherwise the lot is free.

The system is controlled by a pair of sensor in the paper which serves as the parking lot. There are three sheets of heavy stack; the top and bottom both have aluminium foil on them, with the centre layer as a separator. There are holes cut in the separator where the hash marks are seen. When you park the car on the lot, with the pressure of the car, the circuit instructs that there's a vehicle in position.
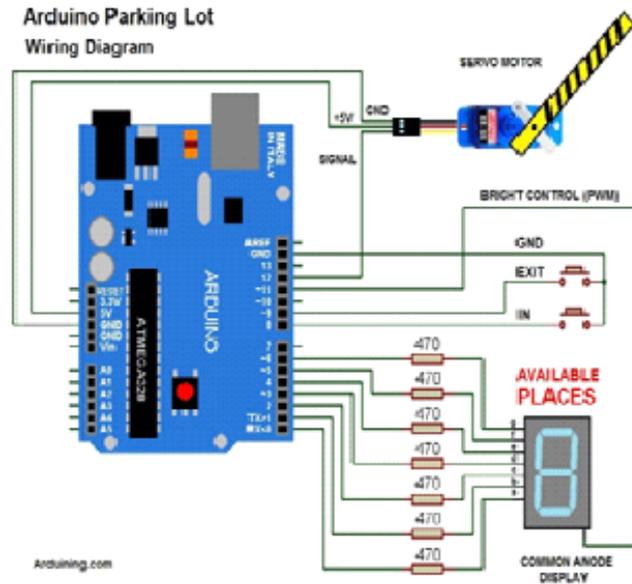
Fig 2. Circuit Diagram

VI. CONCLUSIONS

Automated Parking lot is an effective method to reduce many issues faced by the existing parking lot. The project is very efficient and reliable in comparison to the traditional methods. This method is user friendly to the passengers and the authorities in the parking lot.

Some of the future enhancement to this method is to allow priority based parking lot for the disabled.

REFERENCES
[1]   Amin Kianpisheh, Norlia Mustaffa, Pakapan Limtrairut and Pantea Keikhosrokiani., Smart Parking System (SPS)
[2]   YUN Meiping, YU Ruisong Architecture Using Ultrasonic Detector Modeling on Scale of Public Parking Lot based on Parking Choice.
[3]   Amin Kianpisheh, Norlia Mustaffa, Pakapan Limtrairut and Pantea Keikhosrokiani Parking Place Inspection System Utilizing a Mobile Robot with a Laser Range Finder.