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# AUTOMATED UNDERGROUND VEHICLE PARKING SYSTEM

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***Abstract— In metropolitan cities vehicle parking has become a major concern in all busy areas and a good traffic system needs a good parking system.***

***A multilevel vehicle parking is essentially a building with number of underground floors or layers for the vehicle to be parked. It consists of mechanized lifts which transport the vehicle to the different levels. Therefore, these vehicles need less building volume and less space.***

***The purpose of this project is to eliminate inconvenience of vehicles being parked on pavements, which make life harder for everyone walking around the city. There is no more clutter upon the streets and owners have peace of mind knowing that their vehicle is in a safe place, out of the way of thieves, bad weather and need not worry about incorrect parking.***

***Keywords— mechanized lifts, underground floors, eliminate inconvenience.***

## I. INTRODUCTION

Since the 1960s, vehicle parking has become a major user of developable land. Underground multi-storey vehicle parks, underground or basement vehicle parks, and vehicle parks in a multi-function building are common. Often, visitors gain their first impressions of a town from its vehicle park, as this may be the first building with which they come into contact.

Although multi-storey vehicle parks are mainly found in city and town centers, they also feature in airports, retail centers, conference centers, hotels, housing developments, places of employment (both offices and factories), places of entertainment, railway stations, and sports facilities. Certain features are common to all of these and essential if the vehicle park is to fulfill its function. Potential users should be able readily to identify a vehicle parking facility and its entrance. In urban areas, it helps if a public multi-storey vehicle park can be easily recognized for what it is. Such vehicle parks are usually open structures to permit natural ventilation and no higher than about 15m. Their main structural lines are typically near horizontal and, to meet circulation requirements, they may have external ramps.

## II. PROJECT DISCREPTION

The developed underground parking system is multi-layer parking system, where the vehicles are parked in several stairs. The vehicles are carried to various layers using a lift. The lift is having vertical and horizontal rotation. These movements are obtained by using two stepper motors. The stepper motors are interfaced to PC through motor driver ICs. The PC has a GUI application where the vacant and filled locations are displayed.

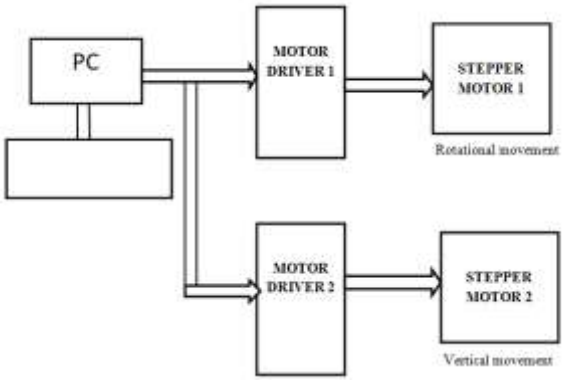



Fig 1: Block Diagram

**STEPPER MOTOR**

A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied.

**MOTOR DRIVER IC**

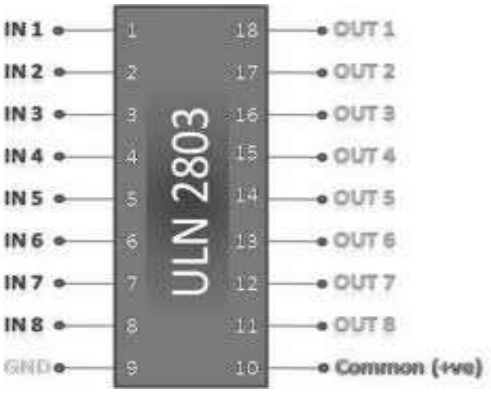
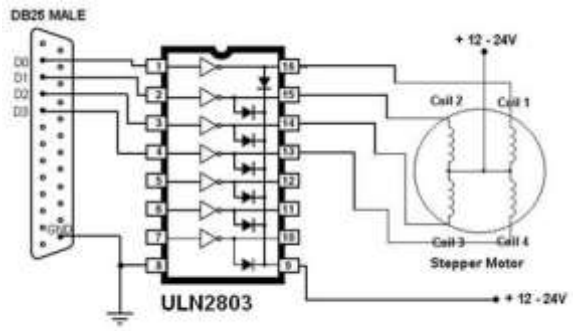



Fig2: Pin diagram of ULN2803

The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL,

CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications. All devices feature open–collector outputs and free wheeling clamp diodes for transient suppression.

Fig3: Interfacing of stepper motor and PC




The ULN2803 is designed to be compatible with standard TTL families while the ULN2804 is optimized for 6 to 15 volt high level CMOS or PMOS. Resistors cannot draw more than a few milliamps of current. Needed a device that could withstand fast current switching

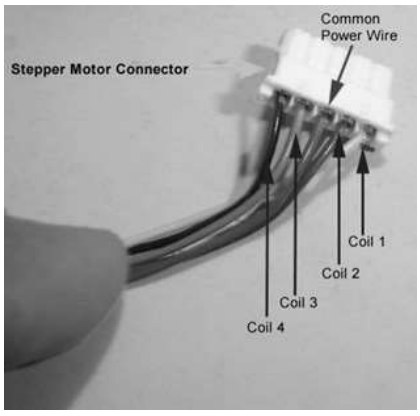
The ULN2803APG / AFWG Series are high−voltage, high−current darling ton drivers comprised of eight NPN darling ton pairs. All units feature integral clamp diodes for switching inductive loads.

Applications include relay, hammer, lamp and display (LED) drivers.

**Features**

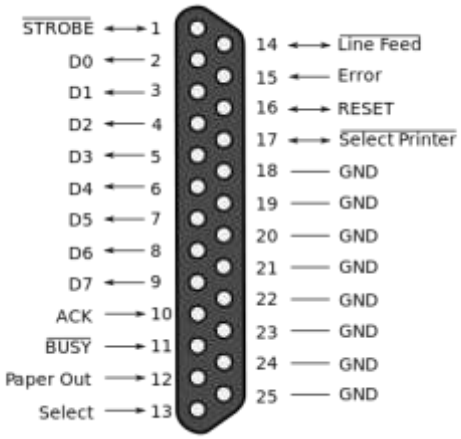
- Output current (single output) 500 mA (max)
- High sustaining voltage output 50 V (min)
- Output clamp diodes
- Inputs compatible with various types of logic.
- Package Type− APG: DIP−18pin
- Package Type− AFWG: SOP−18pin

Fig4: Stepper motor connector




Yellow wire - Coil 1
Brown wire - Coil 2
Red wire - Common power wire
Orange wire - Coil 3
Black wire - Coil 4

Fig5: Parallel Port Pin Diagram




**Parallel Port Basics**

A parallel port is a socket found in personal computers for interfacing with various peripherals such as printers, scanners and even some webcams. On many computers, particularly laptops, the parallel port is omitted for cost savings, and is considered to be a legacy port. However, in laptops, access to the parallel port is still commonly available through docking stations. Here's a picture of DB-25 parallel printer port on the back of a laptop.

Table1: Pin description of parallel port

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | Strobe | Usually remains high but is pulled low whenever the computer sends a byte of data. This drop in voltage tells the printer that data is being sent. |
| 2 - 9 | D0 - D7 | The eight data ports. We will be using these in our project |

| | | |
|---|---|---|
| 10 | Ack | Sends the acknowledge signal from the printer to the computer. |
| 11 | Busy | If the printer is busy, it will set this pin to high. Then, it will pull to let the computer know it is ready to receive more data. |
| 12 | Paper Out | The printer lets the computer know if it is out of paper with this pin. |
| 13 | Select | Device indicates it is ready by pulling high. |
| 14 | Autofeed | The computer sends an auto feed signal to the printer through Pin 14. |
| 15 | Error | If the printer has any problems, it drops the voltage to less than 0.5 volts on Pin 15 to let the computer know that there is an error. |
| 16 | Initialize | This pin is pulled low by the computer whenever a a new print job is ready for the printer. |
| 17 | Select-In | Pin 17 is used by the computer to remotely take the printer offline. |
| 18-25 | Ground | These are mostly used for competing circuits |

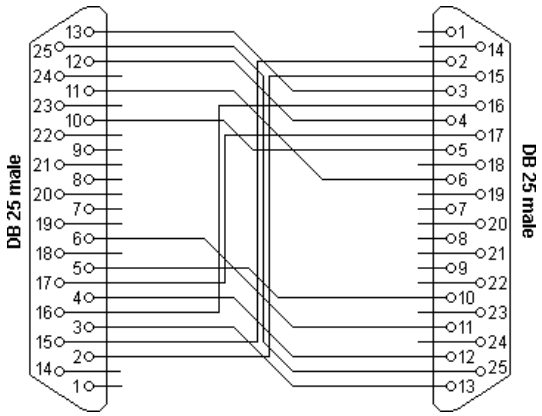



Fig6: Interlink and Windows 95/98/ME DCC parallel cable

**POWER SUPPLY**

In this project, we use 12 volts regulated power supply.

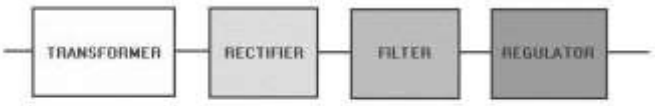



Fig7: Block diagram of power supply

**AC SUPPLY AND TRANSFORMER**

A power supply is used to provide the required amount of power at specific voltage from a primary source which can be ac mains or a battery. A transformer changes the ac mains (line) voltage to a required value. It is used to step the voltage up or down. In a transistor radio it may be a and in a CRT it may be a step-up transformer. Transformer provides isolation from the power line .It should be used even when any change in voltage is not necessary.

**RECTIFIER**

A rectifier converts ac into dc. It may be a half wave rectifier, a full-wave rectifier using a transformer with center-tapped secondary winding or a bridge rectifier. But the output of a rectifier may be fluctuating.

**FILTER**

A filter circuit is used for smoothing out the ac variations from the rectified voltage. There are four types of filters: 1) Capacitor filter, 2) Inductor filter, 3) L-C filter and 4) R-C filter.

**VOLTAGE REGULATOR**

A voltage regulator is necessary to maintain a constant output dc voltage by providing line regulation and load regulation. A zener regulator, transistorized regulator or three terminal IC regulator can be used for this purpose. A switched mode power supply (SMPS) is used to provide large load current with negligible power dissipation in the series pass transistor.

**OPERATION**

We had considered a semi-automatic system, in this a single operator is present always and he moves in the lift.

When there is a vehicle to be parked it is placed in position, the operator takes the vehicle into the lift. Then the lift takes the vehicle and operator to the floor where there is a vacancy. And the lift stops in the direction of the sector which has a vacancy. Then the operator keeps the vehicle in the required place. And the owner is given a code of the place where the vehicle is placed.

When the owner wants the vehicle back, he/she has to give the code to the operator then the operator types the code and enters into the lift and goes to the position of the vehicle. And he places the vehicle in the lift and takes up. Then the time of parking along with bill is generated.

In this two stepper motors are used one is used for the rotational movement whereas the other is used for the vertical movement. The two steppers motors are controlled by the personal computer and driven by the two motor drivers.

The mechanism involved in this plays a crucial role.

Our model looks as

FIG8:VIEW OF OUR MODEL

## III. RESULT

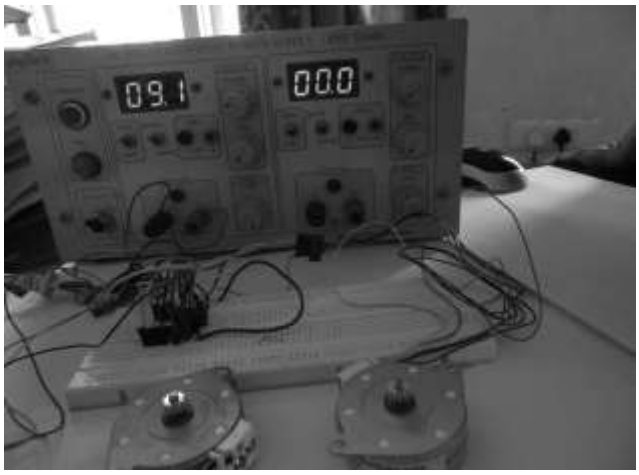



Fig8: Interfacing of two stepper motors

## IV. CONCLUSION

This system parks the vehicle in a safe place with minimum number of workers in less time and in less space. And it also provides environmental safety along with safety from thieves.

## V. REFERENCES

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