



GLOBAL JOURNAL OF RESEARCHES IN ENGINEERING  
ELECTRICAL AND ELECTRONICS ENGINEERING  
Volume 13 Issue 16 Version 1.0 Year 2013  
Type: Double Blind Peer Reviewed International Research Journal  
Publisher: Global Journals Inc. (USA)  
Online ISSN: 2249-4596 & Print ISSN: 0975-5861

# Design of an Automated Car Parking System by using Microcontroller

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**Abstract-** Now a days, with the growing number of vehicles and consequent shortage of parking space there is a haphazard and totally unregulated parking of vehicles all over, the station calls out for an automated parking system that not only regulates parking in a given area but also keeps the manual control to a bare minimum.

To cater to need here we present a minimum model of an automated car parking system that regulated the number of cars that can be parked in an area at any given time based on the parking space available. The entry and exit of vehicle are vacillated using to using to tally automated gate status signal indicates whether space is currently available in the parking lot and whether a car currently in the process of entering or leaving the parking space.

To avoid the manual dependent system a Microcontroller-Based system has been developed. The microcontroller has been interfaced with a simple hardware to a PC so that the program can be easily changed as our needs. So, no special arrangement is required to reprogram the microcontroller. The project is less expensive and works satisfactory.

**Keywords:** *micro-controller, avr, stepper motor etc.*

**GJRE-F Classification :** *FOR Code: 290903p*



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## I. INTRODUCTION

A gate has been provided at the entry of the parking space which opens on the arrival or departure of a car. A display section has been provided which consist of status signal and a display showing the number of the number of the cars space available in the parking space at any point of time .after the maximum number cars have entered the parking space the gate is automatically disabled or closed for vehicles seeking entry into the parking lot. In this project Microcontroller ATtiny26 is used. The software for the microcontroller is written in BASCOM-AVR (a powerful basic complier) which is capable of creating a hex file. The hex file code can be burnt into the microcontroller using any commonly available programmer or kit or burner. The line LCD display, stepper motor, power supply also the key parameters of this project.

## II. DESCRIPTION OF A ATTINY26(L) MICROCONTROLLER & IRFZ44

The ATtiny26(L) is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC

architecture. By executing powerful instructions in a single clock cycle, the ATtiny26(L) achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATtiny26(L) has a high precision ADC with up to 11 single ended channels and 8 differential channels. Seven differential channels have an optional gain of 20x. Four out of the seven differential channels, which have the optional gain, can be used at the same time. The ATtiny26(L) also has a high frequency 8-bit PWM module with two independent outputs. Two of the PWM outputs have inverted non-overlapping output pins ideal for synchronous rectification. The Universal Serial Interface of the ATtiny26(L) allows efficient software implementation of TWI (Two-wire Serial Interface) or SM-bus interface. These features allow for highly integrated battery charger and lighting ballast applications, low-end thermostats, and fire detectors, among other applications. The ATtiny26(L) provides 2K bytes of Flash, 128 bytes EEPROM, 128 bytes SRAM, upto 16 general purpose I/O lines, 32 general purpose working registers, two 8-bit Timer/Counters, one with PWM outputs, internal and external Oscillators, internal and external interrupts, programmable Watchdog Timer, 11-channel, 10-bit Analog to Digital Converter with two differential voltage input gain stages, and four software selectable power saving modes. The Idle mode stops the CPU while allowing the Timer/Counters and interrupt system to continue functioning. The ATtiny26(L) also has a dedicated ADC Noise Reduction mode for reducing the noise in ADC conversion.

High-performance, Low-power AVR® 8-bit Microcontroller

RISC Architecture:

Powerful Instructions – Most Single Clock Cycle Execution

32 x 8 General Purpose Working Registers

Fully Static Operation

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Up to 16 MIPS Throughput at 16 MHz

Data and Non-volatile Program Memory:  
 2K Bytes of In-System Programmable Program Memory Flash  
 Endurance: 10,000 Write/Erase Cycles  
 128 Bytes of In-System Programmable EEPROM  
 Endurance: 100,000 Write/Erase Cycles  
 128 Bytes Internal SRAM  
 Programming Lock for Flash Program and EEPROM  
 Data Security

Peripheral Features:

- 8-bit Timer/Counter with Separate Pre scaler
- 8-bit High-speed Timer with Separate Pre scaler
- 2 High Frequency PWM Outputs with Separate Output Compare Registers
- Non-overlapping Inverted PWM Output Pins
- Universal Serial Interface with Start Condition Detector
- 10-bit ADC
- 11 Single Ended Channels
- 8 Differential ADC Channels
- 7 Differential ADC Channel Pairs with Programmable Gain (1x, 20x)
- On-chip Analog Comparator
- External Interrupt
- Pin Change Interrupt on 11 Pins
- Programmable Watchdog Timer with Separate On-chip Oscillator

Special Microcontroller Features:

- Low Power Idle, Noise Reduction, and Power-down Modes
- Power-on Reset and Programmable Brown-out Detection
- External and Internal Interrupt Sources
- In-System Programmable via SPI Port
- Internal Calibrated RC Oscillator

I/O and Packages:

- 20-lead PDIP/SOIC: 16 Programmable I/O Lines
- 32-lead QFN/MLF: 16 programmable I/O Lines

Operating Voltages:

- 2.7V - 5.5V for ATtiny26L
- 4.5V - 5.5V for ATtiny26

Speed Grades:

- 0 - 8 MHz for ATtiny26L
- 0 - 16 MHz for ATtiny26

Power Consumption at 1 MHz, 3V and 25°C for ATtiny26L

Active 16 MHz, 5V and 25°C: Typ 15 mA  
 Active 1 MHz, 3V and 25°C: 0.70 mA  
 Idle Mode 1 MHz, 3V and 25°C: 0.18 mA  
 Power-down Mode: < 1  $\mu$ A

IRFZ44: N channel power MOSFET. Continuous Drain current 36A with  $V_{GS}=10V$

### III. PIN DESCRIPTIONS

VCC Digital supply voltage pin.  
 GND Digital ground pin.  
 AVCC AVCC is the supply voltage pin for Port A and the A/D Converter (ADC). It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter.

Port A (PA7..PA0) Port A is an 8-bit general purpose I/O port. PA7..PA0 are all I/O pins that can provide internal pull-ups (selected for each bit). Port A has alternate functions as analog inputs for the ADC and analog comparator and pin change interrupt as described in "AlternatePort B (PB7..PB0) Port B is an 8-bit general purpose I/O port. PB6..0 are all I/O pins that can provide internal pull-ups (selected for each bit). PB7 is an I/O pin if not used as the reset. To use pin PB7 as an I/O pin, instead of RESET pin, program ("0") RSTDISBL Fuse. Port B has alternate functions for the ADC, clocking, timer counters, USI, SPI programming, and pin change interrupt. An External Reset is generated by a low level on the PB7/RESET pin. Reset pulses longer than 50 ns will generate a reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a reset.

XTAL1 Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

XTAL2 Output from the inverting oscillator amplifier.

### IV. 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.

## V. ATtiny26(L) BLOCK DIAGRAM

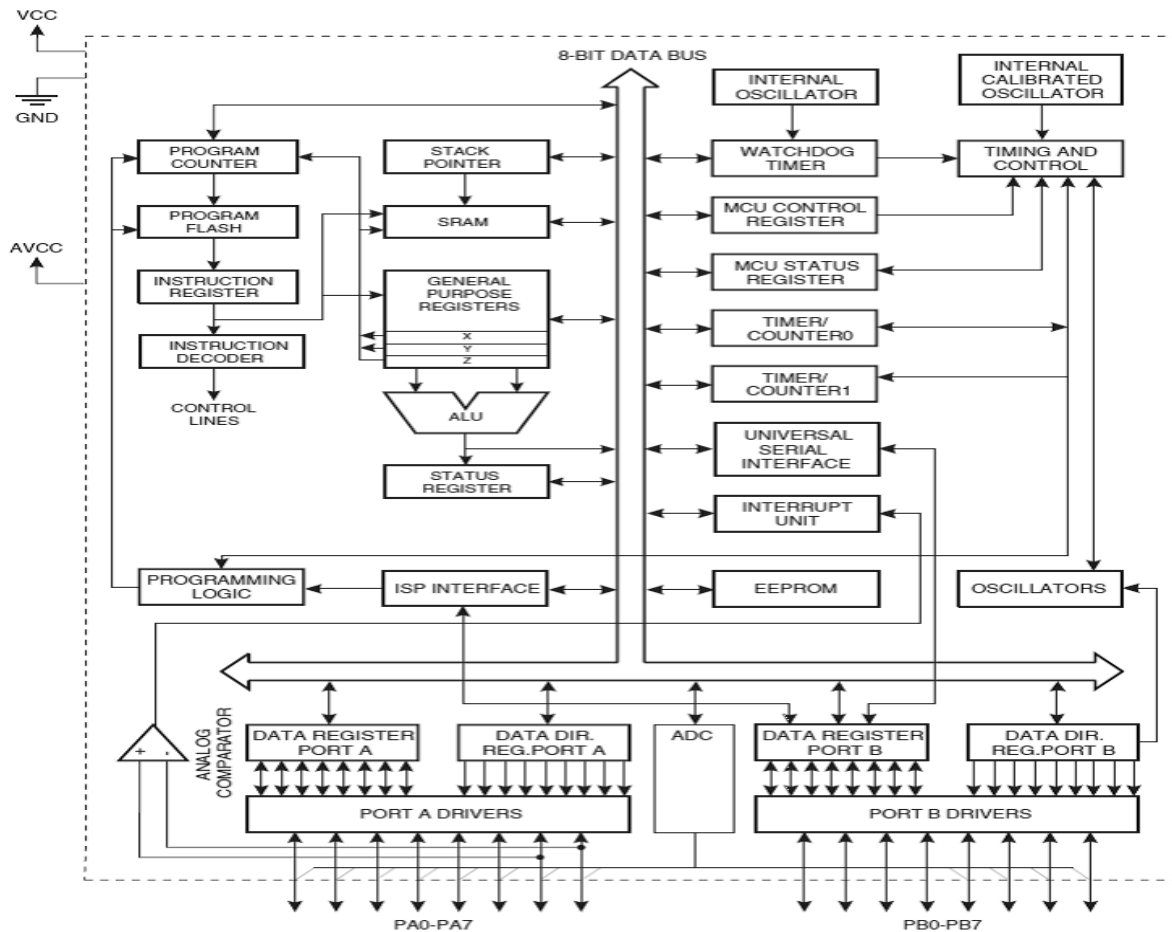


Figure 1 : ATtiny26 (L) Block Diagram

## VI. REASON OF USING MOSFET

Discrete power MOSFETs employ semiconductor processing techniques that are similar to those of today's VLSI circuits, although the device. The metal oxide semiconductor field effect transistor (MOSFET) is based on the original field-effect transistor introduced in the invention of the power MOSFET was partly driven by the limitations of bipolar power junction transistors (BJTs) which, until recently, was the device of choice in power electronics applications. Although it is not possible to define absolutely the operating boundaries of a power device, we will loosely refer to the power device as any device that can switch at least 1A. The bipolar power transistor is a current controlled device. A large base drive current as high as one-fifth of the collector current is required to keep the device in the ON state. Also, higher reverse base drive currents are required to obtain fast turn-off. Despite the very advanced state of manufacturability and lower costs of BJTs, these limitations have made the base drive circuit

design more complicated and hence more expensive than the MOSFET.

### VII. BLOCK DIAGRAM OF LIQUID CRYSTAL DISPLAY

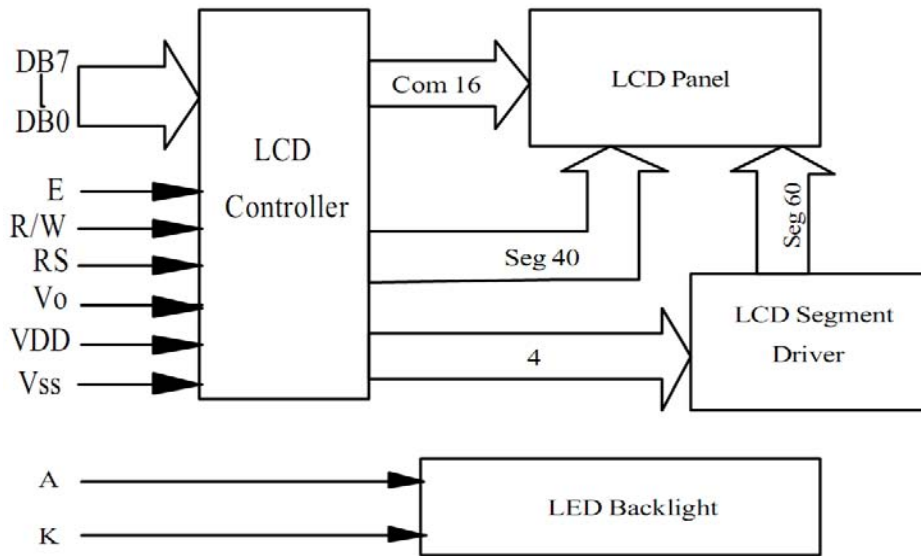


Figure 2 : Block diagram of LCD

Several types of LCD is available such as 16\*2, 20\*2, 20\*4 etc. 16\*2 represents that this LCD contains 16 character per line and total line is 2. LCD has 16 pin. From them 8 pins are data pin. For LED backlight 2 pins are reserved one is anode and other is cathode.

Vdd: Positive Supply.

Vss: Substrate Voltage (Reference level or Ground potential)

VO: Contrast selecting voltage. The contrast of the LCD is inversely proportional to the voltage at VO pin. If it set to ground potential the contrast will be maximum.

RS: Resister Select pin.

R/W: Read / Write select pin. Setting this pin to one state will configured LCD to read data from LCD and zero state will configured LCD to write data to LCD. As we will write data to LCD this pin will be connected to Vss.

E: Enable Pin.

D0-D7: Data pin. LCD operates in two mode – Pin mode and Bus mode. Pin mode uses only higher 4 bit and bus mode uses all the data bit.

LED+: LED Backlight anode pin.

LED-: LED Backlight cathode pin.

### VIII. CIRCUIT DIAGRAM OF 12V & 5VDC SUPPLY

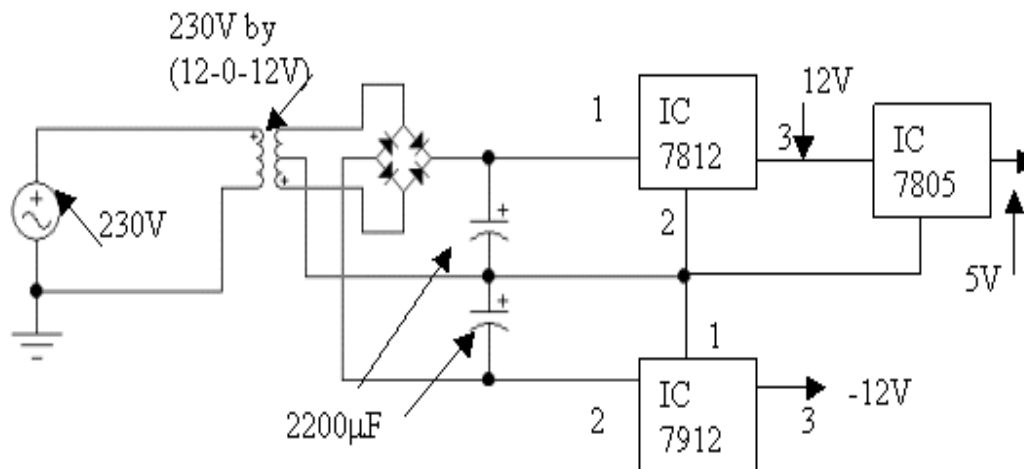


Figure 3 : Circuit Diagram of 12V & 5V DC Supply

## IX. PHOTOOF THE PROJECT



Figure 4 : Project work

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