

Rotational Car Parking System with Bluetooth

Bharti Garhewal¹, Hemlata Shandilya², Neha Gupta³, N.V.S.Swati⁴, Rashmi Nayak⁵, Swapnil Sinha⁶

Department of of Electronics and Telecommunication Engineering

^{1, 2, 3, 4, 5}UG Students,GDR CET,Bhilai, Chhattisgarh,India.

⁶Assistant Professor,GDR CET,Bhilai, Chhattisgarh,India.

Abstract-Rotational car parking using microcontroller, the main aim of this parking system has been developed to decrease the parking area which is reduced due to increase in population. Car parking system enables the parking of vehicles, floor after floor and thus reducing the space used. Such a system proposed and designed in this project. In places where more than 100 cars need to be parked, this system proves to be useful in reducing wastage of space. Here any number of cars can be parked according to the requirement. These makes the system modernized and thus space-saving one.

This idea is developed using microcontroller. Car parking issue has some problems with how to control the number of the car inside it, how to monitor the movement in/out side of the parking lot, how to check whether there is a place inside for more cars or not in the safety to park.

This project work includes a literature survey about some of the existing method for car parking system. The developed algorithm is simulated using KEIL software for car parking accessing; which show that proposed method is accurate, faster and robust in nature.

Keywords-Microcontroller, Keil software.

I. INTRODUCTION

In today’s world the vehicle parking is becoming a big problem. As population is increasing the number of vehicles is also increasing but the area of Vehicle Park is not increasing. And this creates a big problem to vehicles like car and mini vans for parking. People with cars in roads which further leads to traffic jam. Multi stored car parking system will help in parking large number of cars in smaller parking land. Automatic car parking system enables the parking of vehicles, floor after floor and thus reducing the space used. Such a system proposed and designed in this project. In places where more than 100 cars need to be parked, this system proves to be useful in reducing wastage of space. Here any number of cars can be parked according to the requirement. These makes the system modernized and thus space-saving one.

The aim of this project is to solve this problem by designing a system to control the parking area using a microcontroller. The microcontroller serves as a programming to run the whole operation, to reduce the cost in terms of requirement such as job opportunity and to increase security. Moreover, this system is faster, flexible and can meet market needs.

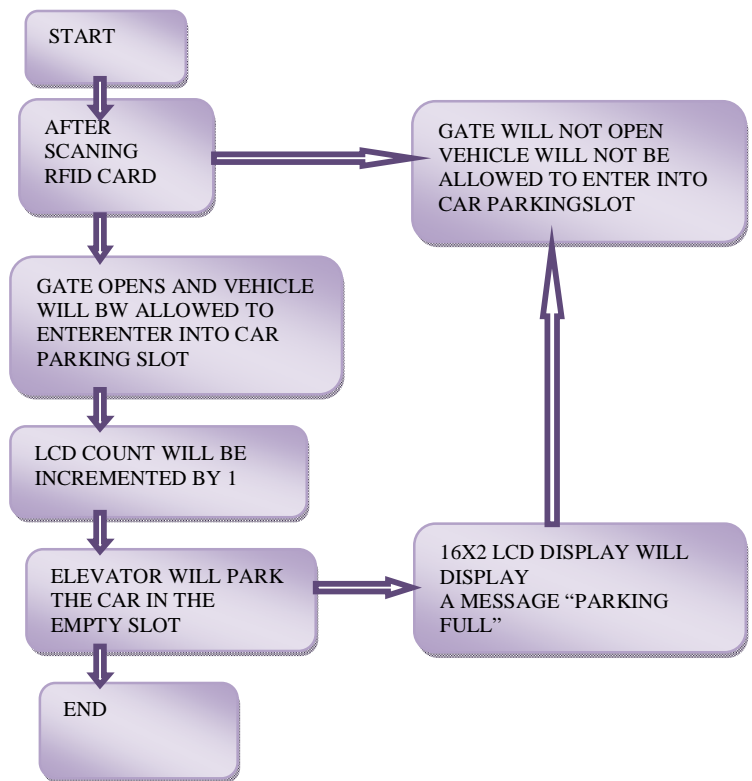


Fig.1: Flowchart for retrieving the vehicle

Human errors are the major source of traffic accidents, therefore building tools in- car X technologies for checking the parking lot, avoiding accidents and guidance to the parking facility is turning out to be an integral area for research. The objective of such technologies is the reduction of the burden on the driver, improvement of the traffic capacity and provision of reliable and secure car functions.

II. DESIGN AND IMPLEMENTATION

The automated parking system was actually first developed in 1925 by Max Miller in New York City. The

designs original purpose was simple to lift a vehicle off the ground, such as in the case of a stalled or broken down car on a street. It was never used. It is used for optimum utilization of parking space by utilizing vertical space rather than horizontal space. The growing population and the increase in vehicles have made the plots expensive and hence the conventional parking has become non-feasible. Car ramps consume a lot of space therefore mechanized car parking to be feasible. Multi-level car parking system (MLCPS) has a number of advantages over the conventional parking system.



Fig.2: Block Diagram of rotating car parking using microcontroller

We can built various types of design according to the way we want to adjust the area of parking lot. All the preference is about to the structural view and space allotted to per car.

It uses a vertical structure to occupy less space because horizontal area covers more space.

Criteria for the quality multi store car parks are:

- Safety in use
- Clear visibility
- Clear views to the outside.
- Good natural lighting and ventilation.



Fig.3: Parking Problems

III. METHODOLOGY

ATMEGA 328

The Atmel core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to Arithmetic Logic Unit(ALU), allowing two independent registers to be assessed in a 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 device is manufactured using Atmel’s high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated providing true Read-While- Write operation. By combining the 8-bit RISC CPU within-System.

1. Internal ROM and RAM
2. I/O ports with programmable pins
3. Timers and counters
4. Serial data communication



Fig.4: ATmega 328 IC

The ATmega 328/P provides the following features. 32 kbytes of In-System Programmable Flash with Read-While-Write capabilities 1kbytes EEPROM, 2kb SRAM, 23 general purpose I/O Lines, 32 general purpose working registers, Real Time Counter(RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTS, 1 Bytes oriented 2-wire Serial Interface(I2C), a 6 channel 10-bit ADC(8 channels TQFP and

QFN/MLF packages) a programmable, Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counter, SPI port, and interrupts system to continue functioning.

The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer and continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping.

The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator oscillator is running while the rest of device is sleeping. This allows very fast start-up combined with low power consumption. In Extended Standby mode, both the main oscillator and the asynchronous timer continue to run

RFID Reader Module

An RFID (Radio-frequency identification and detection) reader is a device which is used to communicate RFID tags by receiving and transmitting signals. These signals use radio waves for wireless communication. RFID tag is applied to products, individuals or animals to identify and track them. The identification is done through a unique serial number. This topic covers the interfacing of a passive RFID system with ATmega328.

This is low frequency (125 KHz) RFID reader with serial output with at range of 8-12cm. It is a compact unit with built in antenna and can be directly connected to the PC using RS232 protocol. RFID or Radio Frequency Identification is a method in which electromagnetic waves are used for transmitting data for the purpose of identifying tags attached to objects. An RFID system consists of a transmitter (tag) and a reader. The tag is encrypted with a unique code and the reader scans this code for the identification purpose.

The tags are generally of two types: active and passive. Active tags have a battery fitted to it and it transmits the unique code periodically or in the proximity of the reader. Passive tags are powered using the electromagnetic induction from the signal transmitted by the reader. Typical applications of RFID are access control system, ID cards, human identification, animal identification, payment system, tagging books, replacing bar codes, tagging merchandise in stores etc. RFID tags are available in the market in the form of a module with all the supporting hardware. This article is about

interfacing RFID to 8051 microcontroller. The images of a typical RFID card and reader are shown below.

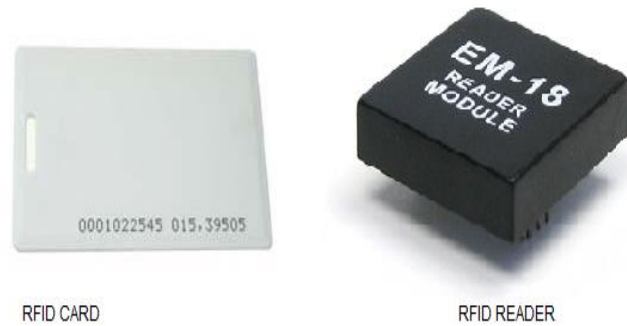


Fig.5: RFID card and reader

HC 05 BLUETOOTH MODULE

HC serial Bluetooth product consist of Bluetooth module and bluetooth adapter,Such as:

1 Bluetooth serial interface module:

Industrial level : HC-03 ,HC-04 (HC-04-M,HC-04-S)

Civil level : HC-05,HC-06(HC-06-M,HC-06-S)

HC-05-D,HC-06-D(with baseboard ,for test and evaluation)

2 Bluetooth adapter:

HC-M4

HC-M6

This document mainly introduces BT serial module is used for converting serial port to BT. this module have two modes: master and slaver device. The device named after even number is define to be master and slaver when out of factory and can't be to the other mode. But for the device named after odd numbers, user can set the the work mode (master or slaver) of the device via AT commands.

HC-04 specially includes:

Master device: HC-04-M, M=master

Slave device : HC-04-S,S=slaver

The default situation of HC-04 is slave mode. If you need master mode, please state it clearly orplace an order for HC-O4-M directly. The naming rule of HC-06 is same. When HC-03 and HC-05 are out of factory, one part of parameters are set for activating the device. The work mode is not set, since user can set the mode of HC-03, HC-05 as they want.

The main function of Bluetooth serial module is replacing the serial port line, such as:

1. There are two MCUs want to communicate with each other. One connects to Bluetooth master device while the other one connects to slave device. Their connection can be built once the pair is made. This Bluetooth connection is equivalently liked to a serial port line connection including RXD, TXD signals. And they can use the Bluetooth serial module to communicate with each other.
2. When MCU has Bluetooth slave module, it can communicate with Bluetooth adapter of computers and smart phones. Then there is a virtual communicable serial port line between MCU and computer or smart phone.
3. The Bluetooth devices in the market mostly are slave devices, such as Bluetooth printer, Bluetooth GPS. So, we can use master module to make pair and communicate with them.
4. Bluetooth Serial module's operation doesn't need drive, and can communicate with the other Bluetooth device who has the serial. But communication between two Bluetooth modules requires at least two conditions:

- (1) The communication must be between master and slave.
- (2) The password must be correct.

However, the two conditions are not sufficient conditions. There are also some other conditions basing on different device model. Detailed information is provided in the following chapters.

In the following chapters, we will repeatedly refer to Linvor's (Formerly known as Guangzhou HC information Technology Co., Ltd.) material and photos.

2. Selection of the Module

The Bluetooth serial module named even number is compatible with each other; The slave module is also compatible with each other. In other word, the function of HC-04 and HC-06, HC-03 and HC-05 are mutually compatible with each other. HC-04 and HC-06 are former version that user can't reset the work mode (master or slave). And only a few AT commands and functions can be used, like reset the name of Bluetooth (only the slaver), reset the password, reset the baud rate and check the version number. The command set of HC-03 and HC-05 are more flexible than HC-04 and HC-06's. Generally, the Bluetooth of HC-03/HC-05 is recommended for the user.

HC-05

Master and slave mode can be switched

Bluetooth name: HC-05

Password: 1234

Master role: have no function to remember the last paired slave device. It can be made paired to any slave device. In other words, just set AT+CMODE=1 when out of factory. If you want HC-05 to remember the last paired slave device address like HC-06, you can set AT+CMODE=0 after paired with the other device. Please refer the command set of HC-05 for the details. Pairing: The master device can not only make pair with the specified Bluetooth address, like cell-phone, computer adapter, slave device, but also can search and make pair with the slave device automatically. Typical method: On some specific conditions, master device and slave device can make pair with each other automatically. (This is the default method.) Multi-device communication: There is only point to point communication for modules, but the adapter can communicate with multi-modules. AT Mode 1: After power on, it can enter the AT mode by triggering PIN34 with high level. Then the baud rate for setting AT command is equal to the baud rate in communication.

3. Information of Package The PIN definitions of HC-03, HC-04, HC-05 and HC-06 are kind of different, but the package size is the same: 28mm * 15mm * 2.35mm. The following figure 1 is a picture of HC-06 and its main PINs. Figure 2 is a picture of HC-05 and its main PINs. Figure 3 is a comparative picture with one coin. Figure 4 is their package size information. When user designs the circuit, you can visit the website of Guangzhou HC Information Technology Co., Ltd. (www.wavesen.com) to download the package library of portal version.



Fig.6: HC-05 BT module.

IV. RESULT

After completion of manufacturing all the parts were gathered to assemble the whole prototype. Accordingly it has assembled but after assembling it was observed that there were misalignments in the chain.

So it was checked for misalignment thoroughly and the output came was a bit loosening of one of the chain. The

corrective actions were taken and the prototype ran without misalignment.

After eliminating this misalignment it was found that 3 buckets were not in the proper motions due to presence of taper in the acrylic sheet .To eliminate this taper once again drilling of sheets are carried out. After drilling it worked properly.

Even though corrective actions were taken there were little bit vibrations in buckets and founded that it was vibrating only when the buckets were with negligible weight and at designed load conditions they were not vibrating at all.

In this way the prototype ran successfully.

Advantages

❖ LESS REQUIREMENT OF SPACE

Since it is a multilevel parking structure it requires less space and it can accommodate more no of cars as compared to the car parking system.

❖ NO HUMAN ERROR

As this is purely a automated multilevel car parking human error is not involved so many problems like accidents can be avoided by using this car parking system.

❖ MORE ACCOMODATION

As it is a multilevel car parking system more no of cars can be easily accommodate in a small area

❖ ENVIRONMENT FRIENDLY

It requires less space and some amount of pollution is reduced as the user need not find the parking area and park there instead it is done it is done by elevator automatically.

Disadvantages:

❖ COSTLY

As it is a multilevel car parking the cost required to construct it would be more than the normal car parking system.

❖ POWER SUPPLY:

As to drive the entire multilevel car parking system more amount of power supply required is more fails then the entire system stops working.

❖ COMPLEX:

It is more to design the infrastructure of multilevel car parking system as compared to the normal parking system.

❖ MAINTENANCE:

Multilevel car parking system facilitates support for hundreds and thousands of vehicles that enter the parking slot so the structure deteriorates much faster so the maintenance required is much more in this case.

Applications:

The multilevel car parking system finds many applications in:

- At industrial areas
- At malls
- At residential area.

V. CONCLUSION

The Proposed designed in this paper has been successfully completed and tested with integration of the features of every hardware component for its development. The main purpose of our project is to build up a automatic car parking system demo. To face the challenge of automation 3333in practical, we need a vast knowledge. In this project, we worked with Microcontroller based control system. We also tried to differentiate among different types of automation and control systems. In here we also tried to give proper security of the vehicle. To increase the knowledge about automation, this project will obviously be very helpful. Nonetheless, this project can further be modified or developed any time to offer more flexibilities and facilities. It reduces traffic and pollution problem to great extent. We can park more cars in small space. We also reduce time and cost required for conventional parking system with high degree of security. So we conclude by saying

“DEMAND FOR ENERGY EFFICIENT, SUSTAINABLE AND GREEN SOLUTN”.

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