Rotary RFID Parking Management Solution Controlled By Microcontroller

Pradeep Rajput[1] Dr. Namit Gupta[2]
[1]P.G. Scholar [2]Assistant Professor and Head
[1,2]Department of Electronics and Instrumentation
[1,2]Shri Vaishnav Institute of Technology and Science, Indore (Madhya Pradesh), India.

Abstract— This paper led emphasis over the automatic parking system. The reason behind this research work is to eradicate the traffic problem arise during the rush hours in day time. Implementation of intelligent parking also helpful in security purpose this research paper is based on RFID based technology along with IR communication. The main governing body is microcontroller. RFID means radio frequency identification, this technology has been used for since last two decades, reason behind this technology is quite straight as it is capable of providing new services and convenience in retail environment. This technology is very reliable as well as very user friendly. This also ease the security purpose, this also reduced time consumption of user. This research involved following components (a) IR based communication, (b) RFID Module, (c) Microcontroller ATmega328.

Key words: RFID, ATmega328 microcontroller, IR Communication system, EM-18 RF Reader, LED screen 16x2, L293D Motor driver, DC gear motor, Drive chain and wheel

I. INTRODUCTION

The requirements of technologies are increasing day by day. Technology pay an important role in our daily life for every field, that's why expectations for technology are also extend. Innovation in technology is very useful to making our life easier, faster and advanced. Due to high rise of globalization traffic problem is increasing day by day. Our project is a smart idea to handling traffic situation and Parking problem. Rotary RFID Parking Management Solution Controlled by Microcontroller is the best solution for this. This project is flexible in structure i.e. mobile by nature. Along with the add of RFID technology this project serve is the perfect solution for Malls and Offices which are located in the crowd areas.

This is an innovative parking system, where we can park many number of cars in a small space. Its a very fast, flexible and efficient parking system. The advantages of this project are fast in working, easy to operate, least trouble, least noise & vibration, cheap running cost, secured with RFID cards, easy to assembly, etc.

The structure of this system can be design as per requirements. This project may be use as a portable parking station, its depend on the structure of system. This research is a some kind of intelligent idea which can provide many features i.e. time saving, using small space for parking, security, also provide safety to car because vehicles remain safe in station. Fig.1 depict the subroutine of the interconnection of the project.

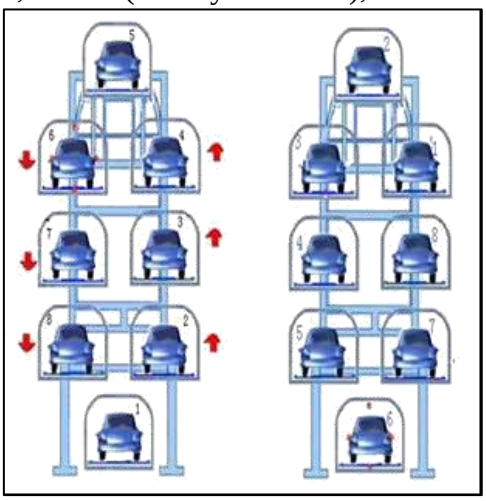

Fig. 1: Mechanical structure

Fig. 2: Main working model

Fig.2 is the main working model of the project. It is designed for the 8 cars. This prototype is suitable for the parking of 8 car. It is enough to understand the idea of research. We can minimize or maximize the number of station while works structure.

II. HARDWARE USED

A. Mechanical Structure

In this section overall physical structure has been completed successfully. For structure we use drive wheels, drive chain and frames. Setup the Station (A space where we park the car) according to the planned structure. Wheels are connected to each other by a drive chain. And this system is connected to the stations. The whole rotary structure is drive by the motor. In this project we used 8 station, which are

suitable for parking of 8 cars. Signal system is also used for safety and indication of red and green light.

B. Power Supply

The supply for ignition of the structure is given by 5 Volts DC power supply and 12 Volts DC power supply to the DC gear motor.

C. LCD Display

For showing the information and indication about status a electronic display is used. The electronic display module LCD 16x2 is a seven segment or multi segment LED display. It has two lines and per line can display 16 characters. 16x2 LCD display has two registers, command and data. The data register is store the data to be displayed on the LCD. And another register store the command instruction.

D. RFID Reader

The working principle of RFID reader is based on transformation. RFID reader transfer energy to transponder (RFID Card) by emitting electro-magnetic waves through air. RFID Tags use Radio Frequency energy for charge up. RFID Tags (Transponders) receives RF signal and responds sequently. The reader receive response of tags and process accordingly means of that data sent to be external device (Host). Control line and computer read the action arises.

E. RFID Tags

These are small devices which store and send data to reader. They are two types: Active tags and Passive tags. Active tags contain internal battery, they are not required power from reader. Passive tags are required power from reader because then don't have in built battery. They are small in size and light in weight.

F. RF Module

A RF module is a small electronic circuit which is used to receive, transmit or transceiver radio waves on one of a number of carrier frequencies. Range between 30KHz to 300 GHz. RF module is used for low power wireless communication purposes. In this project we are using EM-18 RFID Reader Module. This is a low cost 2.4 GHz transceiver designed. The circuit is designed for 2400-2483.5 MHz frequency device

Fig. 3: RFID Reader and Tags

RFID technology is quite good for security purposes. It can provide safely and comfortable system for the users. In future we can make it more intelligent and advance with the help of innovative technologies.

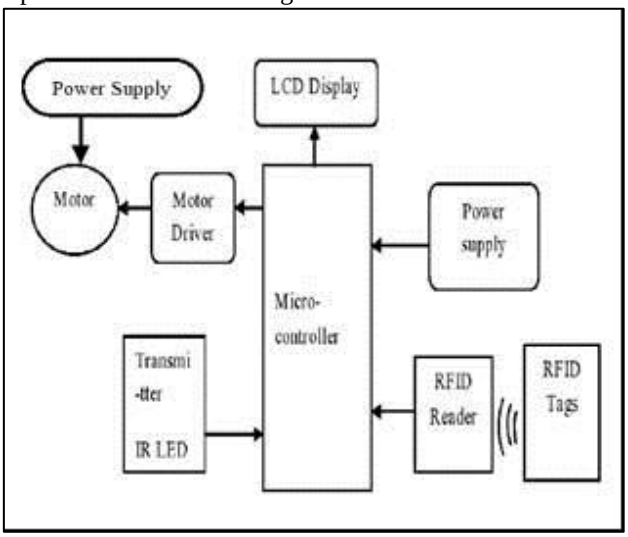

Fig. 4: Block diagram of system

G. Communication System

Infrared LED communication is a common technology. It is easy to wireless comm. Technology. IR light is very similar to visible light, but IR is undetectable of human eyes. IR comm. Is a simply light that we cannot see by our eye, which make IR great for communication. One common modulation scheme of an IR comm. Is something called 30 KHz modulation. There are few natural sources that have the regularity of 38 KHz signal, so an IR transmitter sending data at that frequency would stand out among the ambient IR.

When we press key on remote the transmitting IR LED will blink very quickly for a data second, transmitting encoded data to your appliance. We cannot see IR LED by our eyes while radiation is outside of the visible spectrum. Most cell phone cameras can detect glow of IR LED. Its required low power, its has least and simple circuitry, high speed of data communication up to 1 gbps, no effect on human body, and security with all this advantages it is a useful communication System.

H. Microcontroller

For controlling of whole system microcontroller ATmega328 is used. ATmega328 is the brain of this project. One of very high performance Atmel 8 bit AVR, RISC base controller with 32 kb flash memory. ATmega328P is a 8 bit microcontroller having 28 pins with 32 kb memory. The operation read-while-write is true for this microcontroller. Parameters of this processor are- 32 Kbytes flash memory, 8 bit AVR CPU, 28 Pins, 23 I/Os, maximum operating frequency is 20 MHz, etc.

ATmega328 microcontroller has many features i.e. High performance, low power consumption, advance RISC structure, programming lock for software security, etc. Operating voltage of this device is 1.8 to 5.5 Volts.

III. SOFTWARE USED

A. Arduino

For the programming of this project Arduino software is used. Arduino software is quite simple to use for initiator and also advanced for intelligent users. It can be run with different operating system like Window, Linux and Mac. Arduino software is useful for many applications and projects. Arduino is based on simple to use software and hardware. It is an open source prototype platform. It works around on an input devices like sensors, switches and output device like lights, motors, displays.

We can perform any action or operation what we want by transmitting the set of instruction to the microcontroller on the board. We can tell to our Arduino whatever we want to do by typing the code in Arduino programming language and using the Arduino development environment. Arduino use 8 bit Atmel AVR microcontrollers or 32 bit Atmel ARM processors. The controller is uses universal serial bus (USB) serial port for interfacing.

Arduino software provide an integrated development environment (IDE) for the programming of microcontroller based on the project. Most of Arduino PCB fabricated n LED and load resister connected between pin number 13 and ground. This system required 5 Volts power to starts.

There are many advantages of Arduino i.e. Arduino platforms are cheap in compare to other microcontroller platforms. The software IDE can run on Linux, Window and Mac operating system, while mostly controller systems are limited to window. It provide flexibility and clear programming atmosphere. It is an open source and brief software. Arduino software is friendly for users and easy to installation.

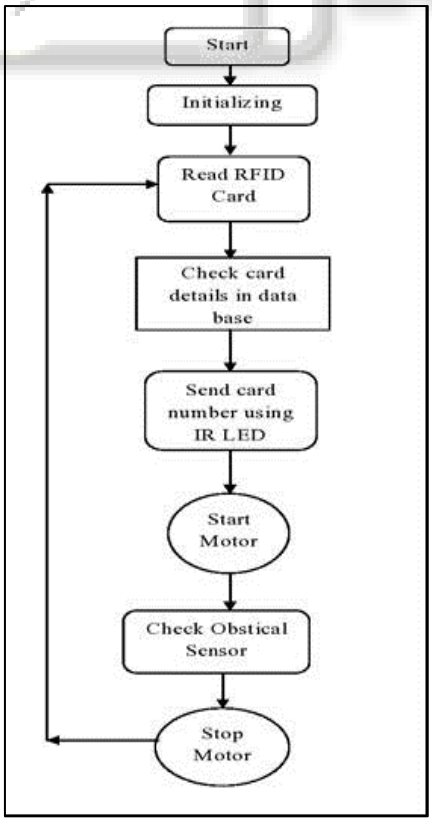

Fig. 5: Flow chart of the work [1]

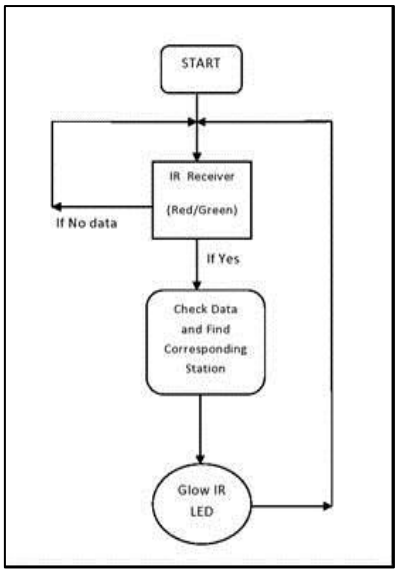

Fig. 6: Flow chart of the work [2]

IV. RESULT AND CONCLUSION

The idea of Rotary Parking System is quite friendly and reliable for today's traffic system. It is totally based on advance technology of RFID, Microcontroller and IR Communication system. In today's world number of vehicles increasing day by day while spaces and lands are converting in malls, home, shops, and roads. That's why traffic and parking problems are exponentially increasing continuously. This research can be play an important role to overcome the problems of traffic and parking. It is a flexible and portable system. We can design it as per requirements. This system is fast in working and easy to assemble. This research would be use on a large scale in future, so its future implementation will be useful.

REFERENCES

[1] Chandni Patel, Monalisa Swami, Priya Saxena, Sejal Shah, "Rotary Automated Car Parking System", International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 4, Issue 2, March 2015, ISSN: 2319-5967, ISO 9001:2008 Certified.

[2] Sawankumar G. Narone, Swapnil S. Chabukswar, Shriharh A. Valyal, Ravikant B. Hirapure, Prof. V.R. Solapure, "Vertical Car Parking –A Prototype", International Journal of Emerging Technology and Advanced Engineering (IJETAE) Volume 5, Issue 4, April 2015, ISSN: 2250-2459, ISO 9001:2008 Certified Journal.

[3] Poorva Parkhi, Snehal Thakur, Sonakshi Chauhan, "RFID Based Parking Management System", International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE) Volume 3, Issue 2, February 2014, ISSN (Online): 2278-1021, ISSN (Print): 2319-5940.

[4] M.O. Reza, M.F. Ismail, A.A. Rokoni, M.A.R. Sarkar, "Smart Parking System with Image Processing Facility", International Journal of Intelligent Systems and Applications (IJISA) Volume 3, Issue 6, March 2012, 41-47.

[5] www.lagunabeachcity.net

[6] www.parkingimages.com
[7] microcontrollers htpp://www.nxp.com
[8] www.pacontrol.com
[9] www.digi.com
[10] www.arduino.cc
[11] www.atmel.com
[12] www.pantechproED.com
[13] www.unitronics.com

