Automatic Gate Control with Digital Monitored Parking Area

[*]Dipankar Haloi, [#]Pranjal Das

[*]UG Scholar, [#]Assistant Professor, Jorhat Institute of Science and Technology, Jorhat, India,

[*]dipankarhaloi91@gmail.com, [#]daspranjal97@gmail.com

Abstract: This project deals with the problem of manually opening or closing the gate and also vehicle parking in the parking lots/areas. This project is designed so as to automatically open/close the gate when a vehicle arrives and to facilitate vehicle parking without human intervention. The gate will open only if the parking area is not full, otherwise not. Gates are operated manually by gate keepers and the parking areas are controlled using human instructions. While opening or closing the gate manually, lots of energy is required in order to push or pull the gate. Due to lack of prior knowledge about the space available in the parking area, a person is always required to check the number of vehicles and the number of empty slots present. Also if the exact location for the parking is not known, a lot of chaos occurs in the parking lot. In order to avoid the above mentioned problems, the proposed paper introduces the concept of "Automatic Gate Control with Digital Monitored Parking Area". The current work tries to create a system that uses microcontrollers to automate gate (opening / closing) operation and digital parking area surveillance. The project is carried out using the microcontroller (AT8S52) series 8051. The vehicle is detected by the IR Sensors which are interfaced with the microcontrollers. Here in this project we are using five IR Sensors. Two of them are used for detecting the vehicle at both sides of the gate. The remaining sensors are used for detecting the vehicle in the parking area. When the vehicle reaches the gate, the gate is automatically opened with the help of motor that is interfaced with the microcontroller. A soon as the vehicles leaves, the gate is closed again. The project detail with information is shown in a 16 x 2 LCD which is also interfaced with the microcontroller. For parking the vehicle, the number of parking slots present is shown in the LCD indicating the vacant slot. The Gate will not open if the parking area is full.

Keywords: Microcontroller, parking area, Slot, Direct Current. Infrared.

I. INTRODUCTION

Parking is a significant problem nowadays. There is a rapid increase in the amount of government and private cars, thus increasing the amount of issues encountered while parking. The problem of car parking has some issues with how to control the amount of vehicles inside the parking area, how to monitor the motion of the car (inside / outside), how to verify whether more cars can be parked or not. Assume a car must be parked and enter a parking area without previous understanding of the availability of vacant parking space. If there is no vacancy available; If previous information can be made available about the availability of vacant parking space before entering the parking area; Time, fuel and money can be saved, making it easier for an person to park his or her car. We were therefore decisive in preparing a project in perspective of the above issue. This project's fundamental motive is to fix these issues by developing a surveillance scheme for parking area control. Gatekeepers also operate the doors manually. When the door is opened or closed manually, it takes a lot of energy to push or pull the door. With this project, when a car arrives, the door can be automatically opened / closed, thus decreasing human effort. Only if the parking area is not complete will the door open, otherwise it will not. Our project tries to create a system that uses microcontrollers to automate gate (opening / closing) operation and digital parking area surveillance. The project is carried out using the microcontroller (AT8S52) series 8051. The car is identified by the microcontrollers interfacing IR sensors. We're using five IR sensors here in this project. Two of them are used on both sides of the door to detect the car. In a 16 x 2 LCD, which is also interfaced with the microcontroller, the project detail with data is displayed. The amount of parking spaces current in the LCD is shown to park the car.

II. WORKING PRINCIPLE

When a car arrives at the door, the door sensor detects the car that, with the assistance of a microcontroller, instantly checks for empty room in the parking lot. The door will not open if all locations are filled. The status of each slot is

 DOI : 10.35291/2454-9150.2019.0413

shown on the LCD. A slot LED OFF shows it's empty. If any vacant room is accessible, the door will open and automatically close the car for a few seconds. The LCD specifies the empty room. The IR sensor will feel the presence of the car after the car is parked, which in turn changes the position in the LCD. In that slot, the LED goes ON indicating the vehicle's existence. The sensor will immediately detect that the slot is empty when a car comes out of the slot and displays the respective position in the LCD. When the car comes at the door, the exit sensor detects the car and the door opens for the car to leave for a few seconds and then automatically closes.

III. HARDWARE STRUCTURE

A. BLOCK DIAGRAM

In this project, we have used six IR sensors, motor, motor driver circuit, buzzer and LCD display.

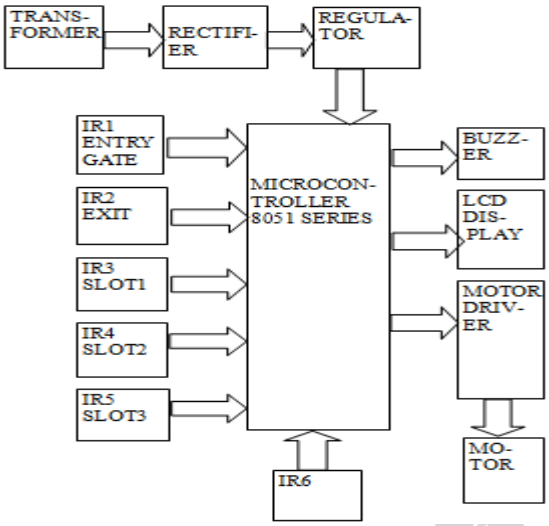

Figure 1: Block diagram of the system

B. CIRCUIT DIAGRAM

Fig 2 shows the circuit diagram of the system and a details description of the circuit diagram to implement the system is given below.

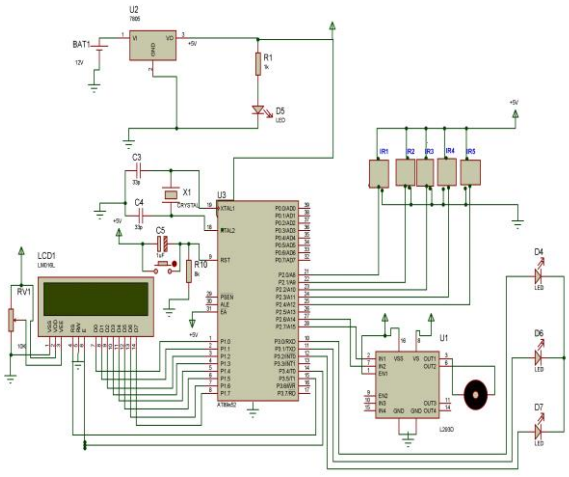

Figure 2: Circuit diagram of the system

IV. CIRCUIT EXPLANATION

A. Power Supply

Our project is running on dc power, so we used the adapter and ac to dc to energy our project. The adapter can be simply connected to an ac supply and the device receives an output of 12 volts dc. This dc voltage is used to run the microcontroller and the system's other parts. The microcontroller needs only 5 volts dc of supply, however, and so we used a voltage regulator 7805, which provides a constant voltage output of 5 volts for inputs varying from 9 volts to 25 volts.

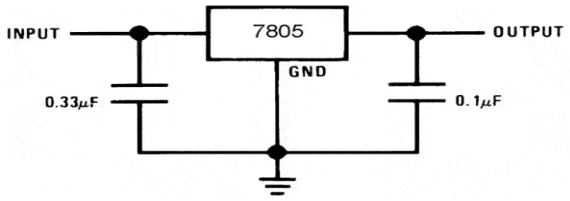

Figure 3: Power Supply

B. Microcontroller

The AT89S52 is an Flash memory programmable 8-bit high-performance low-power CMOS microcontroller with 8k bytes of memory. The device is produced using the high-density, non-volatile memory technology from Atmel and complies with the instruction set and pin-out industry standard 80C51. On-chip Flash allows programmers to reprogram the program's memory in-system or normal non-volatile memory. The AT89S52 is a strong microcontroller that provides an incredibly flexible and cost-effective solution for many embedded control apps by combining a versatile 8-bit CPU with a Flash programmable in-system on a monolithic chip. The AT89S52 offers the following normal characteristics: 8k Flash bytes, 256 RAM bytes, 32 I / O LINES, Watchdog timer, 2 information pointers, 3 16-bit timer / counter, 6-vector duplex serial port, oscillator chip and clock circuitry. The AT89S52 is also intended for operation with static logic up to zero frequency and supports two selectable power-saving modes. The idle mode protects the CPU while allowing for continued functioning of the RAM, timer / counter, serial port and interrupt system. Power-down mode saves the RAM content but freezes the oscillator and disabilities any other chip function until the next one.

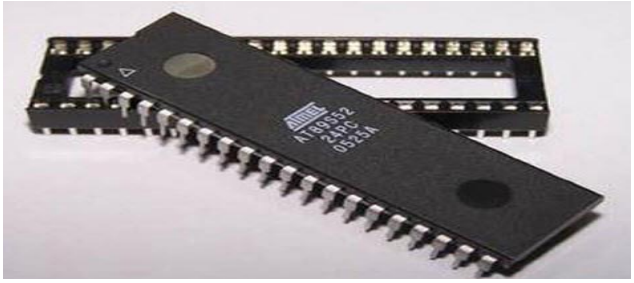

Figure 4: Microcontroller

 DOI : 10.35291/2454-9150.2019.0413

C. IR transmitter and Receiver

The project is used to identify the vehicles by the IR transmitter and receiver pair. Using a LM358 IC voltage comparator, the IR transmitter-receiver is introduced. The LM358 IC is linked to an IR LED and a photodiode that serves as the LM358 input, and the LM358 output is fed into the microcontroller providing car detection data.

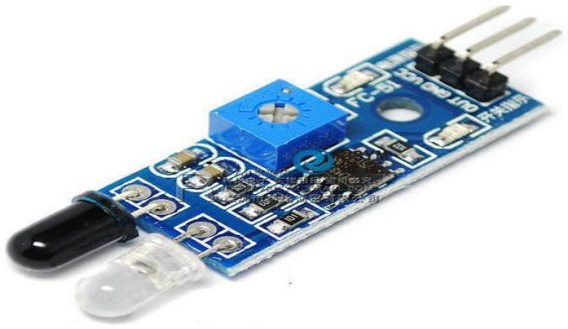

Figure 5: IR transmitter and Receiver

D. MOTOR

DC gear engine can be described as an expansion of a DC engine that has already demystified its insight information here. A geared DC motor has equipment assembly to the engine. The velocity of the engine is calculated as the shaft is rotated per minute and is called RPM. The gear assembly helps to increase the torque and lower the velocity. By using the right mix of gears, the door speed is reduced but its torque is increased known as gear reduction. The insight will investigate all the minor and important information that make the gear head and thus the gear DC motor work.

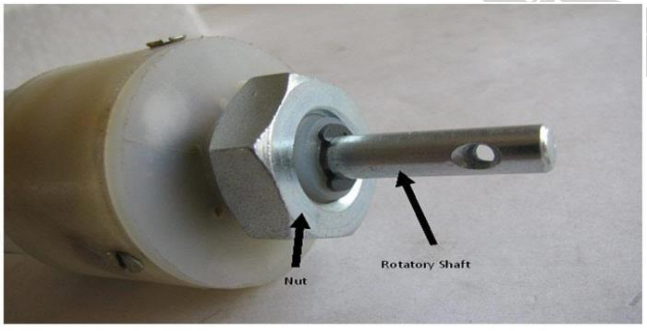

Figure 6: MOTOR

E. Liquid Crystal Display (LCD)

The output of the microcontroller is sent straight to the LCD input so that the microcontroller's slot and count status can be controlled or displayed on the LCD. Basically LCD is a display of seven segments and we used 162 alphanumeric ie capable of showing character or rather a string of characters.

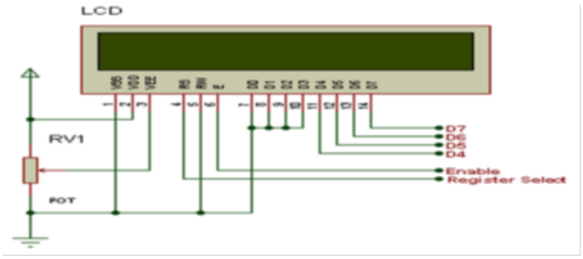

Figure 7: LCD

V. SOFTWARE SYSTEM STRUCTURE

The software system design includes two parts, the data input from hardware sensors and the data output to the LCD.

A. Software used

1. Simulator

2. PROTEUS ISIS

B. Algorithm

Our project is based on the following algorithm:

1. Initialize all parameter.

2. First when vehicle comes in front of Gate entry sensor (IR 4), it goes high.

3. Check for available space.

4. If all placed are filled then gate remain close .shows status of slot in LCD as

   1. FILLED
   2. FILLED
   3. FILLED

5. IF any places are vacant then gate opened for 10 sec and & display status of vacant slot in LCD as empty.

6. When vehicle comes near to gate exit sensor (IR5), it goes high & then gate opened for 10 sec.

7. Repeat step 2 to step 6.

8. Exit.

C. Flowchart

The flowchart of this project is given bellow:

 DOI : 10.35291/2454-9150.2019.0413

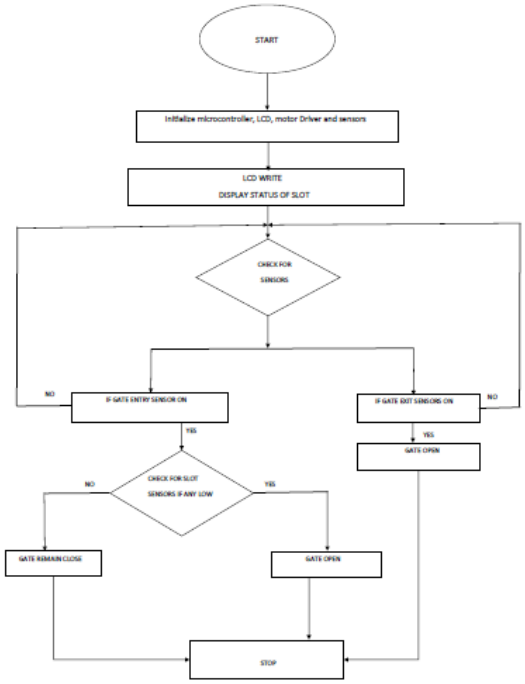

Figure 8: Flowchart of the system

VI. RESULTS AND DISCUSSION

The project report has begun with the introduction of basic functioning of microcontroller 8051 and its application via interfacing with IR sensor, L293D, LCD. The project deals with microcontroller as the central controlling unit. This project has shown the concept of an automatic gate operation (opening/closing) and digital monitoring of parking area using microcontrollers. Everything in the modern world is going automatic, thus we have built a system which can automatically sense the entry and exit of vehicles through the gate and then display the number of vacancy in the parking area indicating the vacant slot. This "Automatic Gate Control with Digital Monitored Parking Area" reduces the time taken to check the space available for vehicles by displaying the available spaces for parking on a LCD displayer by using infrared (IR) sensors installed at the entrance and exit**.**

A. LCD display

In LCD, display the status of various slot of the parking system and the screen shoot of LCD is given bellow:

Figure13: LCD display

Experimental setup

The experimental setup of our project "automatic gate control with digital monitored parking area" is shown below:

Figure 9: Experimental setup

VII. FUTURE SCOPE

This can be expanded in the sense of security. Using metal detectors and CCTV cameras, security of the parking area can be enhanced. We can add pick and place facility to park the cars automatically.

VIII. CONCLUSION

As number of vehicles is increasing rapidly, so it is very essential to monitor and control parking system. Our project basically deals with this problem. Our project focuses exclusively on opening / closing the door automatically when a car comes and monitoring the parking area digitally. It decreases the time required to verify the room available by showing the precise place where the parking space is accessible on the LCD display at the entrance via IR sensors, so the human effort is greatly reduced. We hope this project enhances the research put in this field by the people at academic/ nonacademic level. Implementing their ideas through automated programming techniques and minimizing the manual efforts and cost of production and management; thereby helping society and our nation's economy.

IX. ACKNOWLEDGMENT

I take this opportunity of thanking my dissertation guide Mr. Pranjal Das, Assistant Professor, Department of Electronics and Telecommunication Engineering, Jorhat Institute of Science and Technology, Assam for his indispensable guidance, generous help, perpetual encouragement, constant attention offered throughout in preparation of this dissertation. I am grateful for the support and guidance provided by him.

REFERENCES

[1] H. N. Y. Pwint, Z. M. Tun and H. M. Tun, "Automatic Railway Gate Control System Using

 DOI : 10.35291/2454-9150.2019.0413

Microcontroller", International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 5, May 2014.

[2] B. B. Mansingh, K. S. Selvakumar and S. R. V. Kumar, "Automation in unmanned railway level crossing", 2015 IEEE 9th International Conference on Intelligent Systems and Control (ISCO)

[3] S. Mahmud, I. R. Emon and M. M. Billah, "Automated Railway Gate Controlling System", International Journal of Computer Trends and Technology (IJCTT) Volume-27 Number-1, 2015.

[4] B. S. Dhande and U. S. Pacharaney, "Unmanned level crossing controller and rail track broken detection system using IR sensors and Internet of Things technology", 2017 International Conference on Inventive Communication and Computational Technologies (ICICCT).

[5] S. Trifun, R. Milutin, "One Approach to Weather Station Design Based on Raspberry Pi Platform", 23rd Telecommunications forum TELFOR 2015 IEEE.

[6] K. Khreasarn and K. Hantrakul, "Automatic gate using Bluetooth technology (Open the gate with the strength of the Bluetooth signal on the smartphone)" 2018 International Conference on Digital Arts, Media and Technology (ICDAMT).

[7] P. Sharma, R. Kumar and Sarika, " Automatic Railway Gate Control System Based on RFID, pressure sensor and servo motor", Journal of Network Communications and Emerging Technologies (JNCET) Volume 5, Special Issue 2, December (2015).

[8] M Mansattha and W. Benjapolakul, "Automated Railway Crossing System Using ZigBee", International Conference on Engineering Innovation 2016 (ICEI 2016).

[9] V. Kumar, and S. Kumar," Design and implementation of automatic railway gate operator", International Journal of Pure and Applied Mathematics Volume 116 No. 19 2017, 245-249.

[10] P. Bhosale, M. A. Patel, A. Shedulkar and D. Ghussar, "Automatic Railway Signalling System", International Journal on Recent and Innovation Trends in Computing and Communication Volume: 4 Issue: 4.

 DOI : 10.35291/2454-9150.2019.0413