

Implementation of Car Parking System Using Xilinx

K.Lavanya, K.Geetha, T.Pavan Kishore, E.Deepesh

Student, Department Of ECE, Brilliant Group of Technical Institutions

Abstract - Now-a-days car parking system plays key role and day to day we are facing problems in the car parking. IR sensors are used when the car arrives for entry and exit. By entering the password gate will open and by the help of cameras the empty slots are detected and the car park respective empty slots and gate will close before entering of the next vehicle. The same process can be done while exit by entering the password. It discusses a project which presents a miniature model of an automated car parking system that can regulate and manage the number of cars that can be parked in a given space at any given time based on the availability of parking spot.

The distance can be evaluated and the respective slot numbers are identified on the screen by using hardware description language using Xilinx 14.1 software.

The paper central idea is to avoid troubles in the car parking system.

Keywords: Car Parking System, IR Sensors, Password, Xilinx 14.1 software.

I. INTRODUCTION

In the 21st century finding a free car parking slot has become a mind-numbing process, especially for people who travel in the morning to work are following their daily routine, they find it highly difficult and challenging to get a parking slot for their cars. Moreover, the parking slots are never user-friendly and provide no logical data about the availability of the spot unless the user visits it manually.

The main cause of parking problems worldwide is ever increasing population and with it the number of vehicles. The place available for parking is limited but the number of vehicles increasing on road daily has no check. According to the recent trends, there has been an exponential rise in the sale of cars.

A car parking system is a mechanical system designed to minimize the area and/or volume required for parking cars. Like a multi-story parking garage, an APS provides parking for cars on multiple levels stacked vertically to maximize the number of parking spaces while minimizing land usage. Our system continuously monitors the available parking slots at such places and displays the available free slots at the entrance. This saves the time of visitors which would have been wasted in standing long queue and hunting for the available free slots manually.

The key topic includes the following solutions given below for the efficient use of time that does not take much time for parking purposes and also for providing a safe park without involving risks of any kind. The main goal is systematic parking with protection. Protection requires the use of password when parking, indication of number of available vacancies as well as their locations where only the adjacent vacancies are needed in particular, total number of vacancies available in a specific

slot and even distance calculation to obstacles. Public services need a parking network which can effectively operate and combined with other public utilities.

II. LITERATURE SURVEY

Several literature have been done related to the proposed work. This strategy is cost-effective and includes many of the aspects of smart car parking management. The projects central idea is to avoid troubles we face in the daily routine of parking our cars. day by day the problem of parking cars proliferates. To this end a literature survey was performed in order to ensure that this would not be replicated as before. This is created using MATLAB, and it uses camera to locate the free parking slots. Using this program photos collected by a surveillance camera were processed in real time to test the parking lot occupancies. The information is processed through a central control unit and is directed to the display panels located at strategic parking area locations. Through the details shown on the panels the drivers will know the empty parking lot.

It was proposed to introduce a safe car parking management frame work using verilog HDL. This safe control system for car parks is split into two parts. Another is parking slot recognition and LCD display screens and another is safety warning that will provide the car with protection if the unauthorized individual decides to vacate the vehicle. The system uses three LCD screens, namely Total Vacancies, Adjacent Row Vacancies, and Nearest Vacancy screens. When showing vacancies, total number of empty parking spaces. Line vacancies indicates the number of vacancies reveals the number of vacancies in the parking lot next to it. Nearest Vacancy shows the number of nearest vacancies from the given list. That car will be given a

password or key when the car is parked in a certain vacant location. A individual can enter a key only three times after the device doesn't work and the control or security person needs permission. This device will includes safe vehicle parking. An approach using an intelligent car network based on WSN(Wireless sensor network),in which wireless sensors are deployed into the parking area, with each parking lot consisting of one sensor node that tracks the parking lot occupancy.

The frame work was implemented using program language C. First the C code was checked on personal computer(pc) to see how the filter and other blocks operates. The implementation made clear the concept behind the project. The same method has been used for Xilinx Micro Blaze soft processor device after successfully testing it on a Mac. Floating point operations are expensive so it has been determined not to use floating point unit.

A fixed point system was introduced due to the absence of a floating point network. The real light speed is 299792458 but was rounded down to 3×10^8 . This rounding of resulted in a minor variation in the decimal component and was intended to do so. First results are prontedising Hyper-terminal, connecting Micro blaze serial port to PC serial port. Later we built-in LCD to display performance.

Parking is costly and limited in almost every major city in the world. Innovative parking systems for meeting near-term parking demand are needed. This proposes novel, secure, and intelligent parking system(smart parking)based on secured wireless network and sensor communication. from the point of users view, smart parking is a secure and intelligent parking service. The parking reservation is safe and privacy preserved. The parking navigation is convenient and efficient. The whole parking process will be a non-stop service. From the point of managements view, smart parking is an intelligent parking system. The parking process can be molded as birth-death stochastic process and the prediction of revenues can be made. Based on the prediction, new business promotion can be made, for example, on-sale prices and new parking fees. In smart parking, new promotions can be published through wireless network. We address hardware/software architecture, implementations, analytic models and results. The evaluation of this proposed system proves its efficiency.

This has shown the concept of an automatic car parking system. Everything in the modern world is going automatic, we have built a system which can automatically sense the entry and exit of cars through the gate and then display the number of cars in parking lot. This automated car parking system reduces the time taken to check the space for vehicles by displaying the available spaces for

parking on an LCD displayer by using infra-red(IR)sensors installed at the entrance and exit.

PROPOSED ARCHITECTURE

In the entrance of parking system,there is a sensor which is activated to detect a vehicle coming.Once the sensor is triggered,a password is requested to open the gate.If the entered password is correct,the gate will open to let the vehicle get in.Otherwise,the gate is still locked.If the current car is getting in the car park being detected by the exit sensor and the another comes,the door will be locked and requires the coming car to enter passwords.

To solve and sort out the problems in parking system,here is a solution.A sensor is at the entrance of the parking system which is activated to detect a vehicle coming.When a car enters in, a password is needed.If the password entered is correct the gate will open or else it will be locked.This is also the same for the exit process.And with the help of ultrasonic sensor the distance is measured in which the next car is available,the number of vacant slots and the number of cars parked already will be given in the form of a message.

III. WORKING PRINCIPLE

The proposed smart car parking system into two modules:

- Car entering and exiting module.
- Distance measurement to find the obstacles.

3.1.1 Car Entering and Exiting Module

Entering Module:

In Entering Module it is sensed by the IR sensors when the car enters the lot. The IR sensors give the FPGA the pulse which considers an input to be detected .The vehicle is allowed into the parking lot only if the password is entered. If the entered password is correct then the vehicle is preceded to park or else gate will remain closed.

Exiting Module:

In Exiting Module it is detected by the IR sensors as the vehicle moves out of lot. The IR sensors provide the pulse to the FPGA which assumes that an input is detected and that the car is only exiting from the parking lot after the password has been entered correctly. And the gate is closed when the next car tries to exit the lot.

3.1.2 Distance measurement to find the obstacles:

Distance and speed monitoring devices are used in many applications such as vehicles protection etc. The system can calculate the time interval between two laser pulses, a machine-sent reference pulse and an echo pulse reflected back to the device. The machine determines the distance to

the object on which the echo-pulse is reflected with the time information.

3.2 Types of parking:

There are three types of parking:

1. Perpendicular parking: Perpendicular parking is similar to angle parking, but requires greater care in turning.
2. Angled parking: Angle parking is especially widespread in parking lots, where vehicles are designated to go one way.
3. Parallel parking: Parallel parking is a method of parking a vehicle parallel to the road, in line with other parked vehicles.

3.3 ADVANTAGES:

- Enhanced Parking. This enables drivers to quickly find the best spot available which will save time, resource and effort.
- Reduced Congestion.
- Reduced Pollution.
- Enhanced User Experience.
- Driver's Experience.
- Improved Safety.

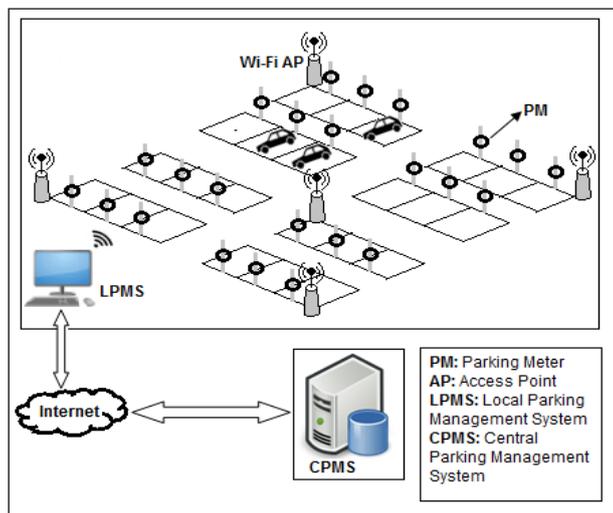


Figure 3.1: Network architecture of proposed E-parking system

The E-parking system proposed consisting of following components. These are parking meter, a WLAN or Wi-Fi integrated laptop/workstation called local parking management server along with some Wi-Fi access point deployed within each parking facility and a central server

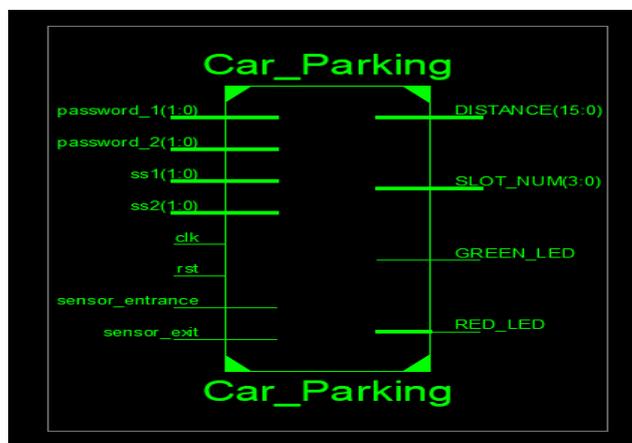
for providing parking availability information throughout the city and receiving parking lot reservation request from the driver of a vehicle. The network architecture of the proposed e-parking.

According to the proposed PM-EP system, each parking lot is equipped with a PM which is positioned at the middle of the back end of the parking lot. The proposed PM-EP presented consists of four different modules. These are parking lot monitoring system (PLMS), local parking management system (LPMS), central parking management system (CPMS) and lastly parking availability information and reservation GUI.

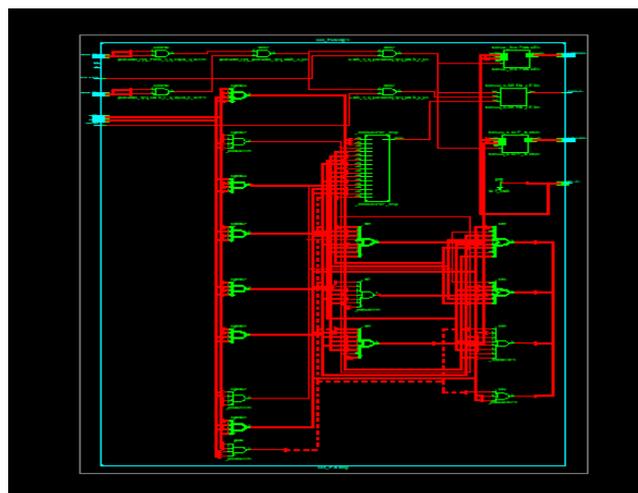
IV. SIMULATION & SYNTHESIS RESULTS

4.1 SYNTHESIS RESULTS

4.1.1 RTL SCHEMATIC (SYNTHESIS)



4.1.2 RTL SCHEMATIC



4.2 SIMULATION RESULT

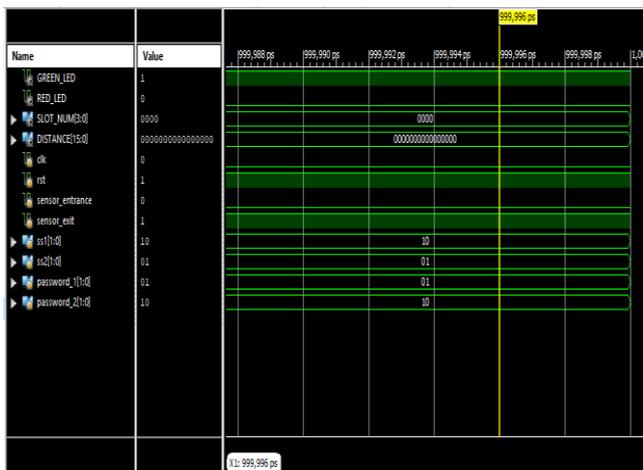


Fig 4.2.1:Simulation Waveform1



Fig 4.2.2:Simulation Waveform for Car entry

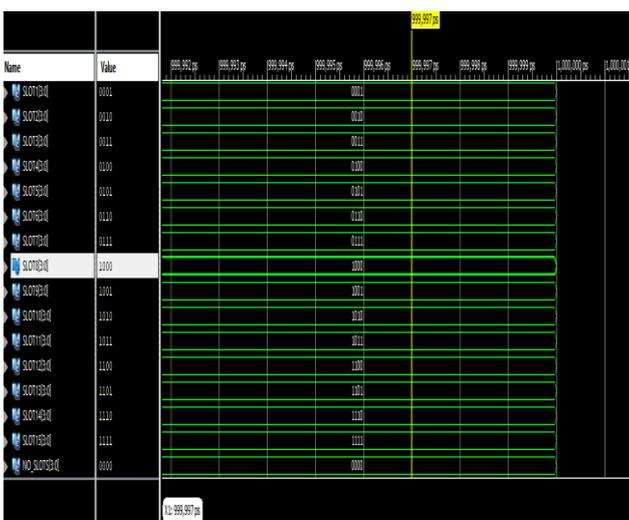


Fig 4.2.3:Simulation Waveform2

V. CONCLUSION & FUTURE SCOPE

5.1 CONCLUSION

This type of system is very useful as it avoids wastage of time of people in an unproductive work. Also it eliminates the tedious work of finding a vacant parking at crowded places such Malls, Huge Organizations by loitering here and there and wasting our time doing so. With the help of this system, one can get a complete view of parking slots, out of which, the number of filled and empty slots just at entrance on a display. Then one directly go to that slot to park his/her vehicle. As soon as vehicle is parked, the empty slot on screen changes to filled slot. So, if implemented, this will save a lot of time of people and also will help in technological advancement of society.

8.2 FUTURE SCOPE

The car parking system continues to evolve as an increasing number of cities struggle with traffic congestion and inadequate parking availability. While the deployment of sensor technologies continues to be core to the development of smart parking, a wide variety of other technology innovations are also enabling more adaptable systems— including cameras, wireless communications, data analytics, induction loops, smart parking meters, and advanced algorithms.

The arrival of autonomous vehicles (AV's) threatens to exploit the future of the smart parking program. Urban cities around the world have already started experimenting with self –parking cars, advanced AV parking lots. But it is easy to use this device that is not only unique to a private car park like malls, business parking etc., But multiple sites, such as public parking, can also be built and the functionality can be added by giving parking information. By purging the need for human labor, this will make parking space management more efficient.

REFERENCES

[1] Hua-Chun Tan; Jie Zhang; Xin-Chen Ye; Hui-Ze Li; Pei Zhu; Qing-Hua Zhao;(2009) , "Intelligent car-searching system for large park," *Machine Learning and Cybernetics, 2009 International Conference on* , vol.6, no., pp.3134-3138.

[2] Hua-Chun Tan; Jie Zhang; Xin-Chen Ye; Hui-Ze Li; Pei Zhu; Qing-Hua Zhao;(2009) , "Intelligent car-searching system for large park," *Machine Learning and Cybernetics, 2009 International Conference on* , vol.6, no., pp.3134-3138.

[3] Srikanth , S.V.; Pramod, P.J.; Dileep, K.P.; Tapas, S.; Patil, M.U.; Sarat, C.B.N.:(2009), "Design and Implementation of a Prototype Smart PARKing (SPARK) System Using Wireless Sensor Networks," *Advanced Information Networking and Applications Workshops, 2009. WAINA '09. International Conference on* , pp.401- 406.

[4] Bhavana Chendika et al. *Int. Journal of Engineering Research and Applications* ISSN: 2248-9622, Vol. 5, Issue 7, (Part - 3) July 2015, pp.01-03.

[5] V. hans , P.S sethi, J,kinra , "an approach to IOT based car parking and reservation system on cloud", 2015 international conference on green computing and internet of things(ICGCIOT).2015.

[6] E. Soni, K. Kaur and A. Kumar, "Design and development of RF ID based automated car parking system" the international general of mathematics, science, technology and management, vol.2,no.2,pe.3,2016.