Implementation of Automatic Car Parking System Using Verilog HDL

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Abstract:

In the entrance of the parking system, there's a detector that is activated to find a vehicle returning. Once the detector is triggered, a secret is requested to open the gate. If the entered secret is correct, the gate would hospitable let the vehicle get in. Otherwise, the gate remains fast. If this automotive is getting into the park being detected by the exit detector and another the automotive comes, the door are going to be fast and needs the approaching cars to enter passwords.

Keywords — Parking System, VHDL.

I.   INTRODUCTION

In this realistic world every person dispensed several tasks while not being evasive. Thus, so as to hold out all the activities for the effective use of resources, wise steps ought to be taken to curb waste of your time in ineffective areas like the foremost ofttimes performed follow, that is un successful vehicle parking. Therefore, this paper offers associate choice for an efficient use of your time in parking relevant to the protection drawback that serves at its best. The key topic includes the subsequent solutions given below for the economical use of your time that doesn't take abundant time for parking functions and conjointly for providing a secure park while not involving risks of any kind. the most goal is systematic parking with protection. Protection needs the employment of secret once parking, indication of range of accessible vacancies still as their

locations wherever solely the adjacent vacancies square measure required specially, total range of vacancies out there during a specific slot and even distance calculation to obstacles. Public services want a parking network which may effectively operate and be combined with alternative public utilities. there's no effective thanks to assign parking slots associated parking management system fails to assist and organize info for an economical system. so as to avoid these issues, style is planned for secured automotive parking management system, which can be enforced on FPGA to envision vacancies and

supply automotive protection. Recently, a reconfigurable FPGA design is an efficient methodology for implementing a digital logic, as FPGA offers a rendezvous between processors for general use and ASIC. The FPGA design is strong, programmable and might be re-functioned. It will simply amendment the FPGA primarily based style by dynamical the software package element. Our planned system {is styleed|is meant|is intended} for FPGA design and also the modeling of gate levels. HE main explanation for parking issues worldwide is ever increasing population and with it the quantity of vehicles. The place out there for

parking is restricted however the quantity of vehicles increasing on road daily has no check. in keeping with the recent trends, there has been associate exponential rise within the sale of cars. the quantity of cars sold-out worldwide hyperbolic hugely from thirty-nine.2 million in 1999 to eighty one.57 million in 2018. In twenty years the sales were raised by a worth as high as around equal forty million. The statistics within the variety of a graph square measure diagrammatical in Figure one. Due to this huge increase in traffic on road, the immediate next consequence that was ascertained was a eruption in congestion issues on road. Figure two depicts the rise in congestion issues from 987 to 2003. This gave rise to associate increasing range of accidents on roads and conjointly the traveling time needed to succeed in destination hyperbolic. Even to hide atiny low distance consumed abundant. To solve and kind out these parking issues in large malls, instructional institutes and to avoid wastage of your time at parking, of individuals visiting such organizations, here is a shot created to create the parking method a great deal easier. Also, with the assistance of evolving technologies, the

system is updated more to give birth to a totally machine-controlled parking system. At places with parking issues, folks got to wait during a long queue and seek for free slots out there as there's no methodology to trace the vacant slots mechanically. notwithstanding there squ are measure slots out there, guests don't get to grasp thanks to large infrastructure and that they find yourself dawdling in sorting out slots, at that point this planned methodology would are helpful.

II. LITERATURE SURVEY

Soh Chun Khang, et.al (2010) conferred work on parking system {in that|during which|within which} the quantity of slot which is accessible for parking is send as a message to driver. Driver will resend sms hard to please for a replacement position once the sooner assigned slot gets crammed. Huachun tan, et.al (2009) planned a system that is useful to search out the park at places wherever there an outsized parking zone. this is often done by capturing pictures through camera mounted at every parking slot. info like range plate of automotive and color square measure recognized and hold

on in knowledge.

This knowledge so includes info concerning all automotives lay within the heap and thus it's attainable to search out any car simply. S.V.Srikant, et.al(2009) camp up with system to find the free parking slots. Author has used wireless communication technology to create the parking system a lot of economical. Gongjun Yan, et.al (2011), planned associate intelligent parking system that was supported secured wireless system and detector communication. economical auto mobile parking space utilization and fast search of free slot was the work concerned.

Insop Song et.al, (2006) worked upon system exploitation Field Programmable Gate Array (FPGA) exploitation symbolic logic Controller. Advantage of this technique is reduction in computation time. Several literatures are done associated with the planned work. In proves the practicability of the approach. This strategy is efficient and includes several of the aspects of sensible automotive parking management. The project's central plan is to avoid troubles we have a tendency to face within the daily routine of parking our cars. Day by day the matter of parking cars

proliferates. to the present finish a literature survey was performed so as to make sure that this is able to not be replicated as before. this is often created exploitation MATLAB, and it uses cameras to find the free parking slots. exploitation this program photos collected by a police work camera were processed in real time to check the parking zone occupancies. the knowledge is processed through a central management unit and is directed to the show panels set at strategic parking lot locations. Through the small print shown on the panels the drivers can understand the empty parking zone.

In it had been planned to introduce a secure automotive parking management framework exploitation Verilog alpha-lipoprotein. This safe system for automotive parks is split into 2 elements. Another is parking slot recognition and {lcd|liquid crystal show|LCD|digital display|alphanumeric display} display screens and another is safety warning that may give the automotive with protection if the unauthorized individual decides to vacate the vehicle. The system uses four alphanumeric display screens, specifically Total Vacancies, Adjacent Row Vacancies, and Nearest

Vacancy screens. once showing vacancies, total range of empty parking areas. Line Vacancies indicates the quantity of open empty slots during a given row. Next Vacancies reveals the quantity of vacancies within the parking zone next thereto. Nearest Vacancy shows the quantity of nearest vacancies from the given list. That automotive are going to be given a secret or

key once the automotive is lay during a bound vacant location. a private will enter a key solely thrice when the device does not work and also the management or security person desires permission. This device can embody safe vehicle parking. associate approach exploitation associate intelligent automotive parking network supported WSN

(Wireless detector Network), during which wireless sensors square measure deployed into the parking lot, with every parking zone consisting of 1 detector node that tracks the parking zone occupancy. within the framework was enforced exploitation programing language C. 1st the C code was checked on pc (PC) to envision however the filter and alternative blocks operate. The implementation created clear the conception behind the

project. constant methodology has been used for Xilinx MicroBlaze soft processor device when with success testing it on a macintosh.

Floating purpose operations square measure dearly-won thus it's been determined to not use floating purpose unit. A fixed-point system was introduced thanks to the absence of a floating-point network. the $64000 constant is 299792458 however was rounded all the way down to three * 10^(-8). This misestimation off resulted during a minor variation within the decimal element and was meant to try and do thus. 1st results square measure written exploitation Hyper-terminal, connecting Microblaze port to computer port. Later we have a tendency to inherent {lcd|liquid crystal show|LCD|digital display|alphanumeric display} to display performance. This paper deals with the implementation of FPGA and ASIC styles to live a moving remote object's distance and speed exploitation optical maser supply and echo pulses mirrored from that remote object. With FPGA implementation, the project proceeded in 3 phases: All-in-C style exploitation Xilinx Microblaze soft core processor system, accelerated style with custom co- processor and Microblaze soft

core processor system, and complete custom hardware design enforced exploitation Xilinx FPGA VHDL. the total framework was later introduced at ASIC. the look of ASIC optimized the realm and temporal arrangement modules for a method technology of one hundred thirty nm.

• Parking is dear and restricted in virtually each major town within the world. Innovative parking systems for meeting near-term parking demand square measure required. This paper proposes a unique, secure, and intelligent parking system (SmartParking) supported secured wireless network and detector communication. From the purpose of users' read, SmartParking could be a secure and intelligent parking service. The parking reservation is safe and privacy preserved. The parking navigation is convenient and economical. the entire parking method are going to be a non- stop service. From the purpose of management's read, SmartParking is associate intelligent parking system. The parking method is shapely as birth-death theoretical account and also the prediction of revenues is created. supported the prediction, new business promotion is created, as an

example, on-sale costs and new parking fees. In SmartParking, new promotions is printed through wireless network. we have a tendency to address hardware/software design, implementations, and analytical models and results. The analysis of this planned system proves its potency.

• This paper has shown the conception of associate automatic automotive parking system. Everything within the present goes automatic, we've engineered a system which may mechanically sense the entry and exit of cars through the gate then show the quantity of cars within the parking zone. This machine-controlled automotive parking system reduces the time taken to envision the house for vehicles by displaying the out there areas for parking on associate alphanumeric display displayer by exploitation infra-red (IR) sensors put in at the doorway and exit. This project is developed exploitation 89c52 microcontroller.

III. PROPOSED SYSTEM AND PROPOSED DIAGRAM

In the entrance of the parking system, there's a detector that is activated to find a vehicle returning. Once the detector is triggered, a secret is requested to open the gate. If the

entered secret is correct, the gate would hospitable let the vehicle get in. Otherwise, the gate remains fast. If this automotive is getting into the park being detected by the exit detector and another the automotive comes, the door are going to be fast and needs the approaching automotive to enter passwords. what's associate FPGA, as a number of you may already bear in mind of associate FPGA could be a kind of computer circuit (IC) that may be programmed for various algorithms when fabrication. trendy FPGA devices accommodates up to 2 million logic cells that may be designed to implement a range of software package algorithms.

Although the normal FPGA style flow is a lot of kind of like an everyday IC than a processor, associate FPGA provides important value blessings compared to associate IC development effort and offers constant level of performance in most cases. Another advantage of the FPGA when put next to the IC is its ability to be dynamically reconfigured. This method, that is that the same as loading a program during a processor, will have an

effect on half or all of the resources out there within the FPGA material. For this documentation the FPGA getting used is Zynq™-7000 All programmable SoC devicein that we have a tendency to specifically use the Zynq 7020 (ZC702) FPGA board.

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.

3.1 Proposed Diagram

Fig. 1 - Finite State Machine

- In which the output depends only on the state of the system. Hence, in state transition diagrams for Moore machines, the outputs are labeled in the circles. Recall that mealy machines are much like Moore machines, but the outputs can depend on

inputs as well as the current state. Hence, in state transition diagrams for Mealy machines, the outputs are labeled on the arcs instead of in the circles. The block of combinational logic that computes the outputs uses the current state and inputs, as was shown in Fig. 1

- A finite state machine is a mathematical model of computation usually represented as a graph, with a finite number of nodes describing the possible states of the system, and a finite number of arcs representing the transitions that do or do not change the state, respectively. Such a machine is mostly used to model computer programs and sequential logic. There are two types of FSMs: mealy machine, where the output values are determined based on the current state together with the current input, and Moore machines, where the output is determined solely based on the current state. Extended finite state machine (EFSMs) [allow for internal variables than can store more detailed internal state information. Thus, EFSMs allow for a larger number of internal states. Mapping the large number of internal states to a smaller number of visible states requires an abstraction of the system, which can influence the testing process.

3.2 Car Parking System

Fig. 2 - Parking System

The above Fig. 2 shows the demo of the proposed parking system

- It is a simple project is to implement a car parking system in verilog

- In the entrance of the parking system, there is a sensor which is activated to detect a vehicle coming

- Once the sensor is activated, a password is request to open the gate

- Till that time the car will be in the idle state. Before entering the sensor entrance the current state will be in idle

- In the sensor entrance it ask the password if it is wait password then it will be idle state

- If it is correct password then it goes into parking

- If it is wrong password then it give another chance and ask password again

- If it is correct password it goes to parking if it is wrong password then again it goes to idle state

- It give 2 chances for password

- If the entered password is correct,the gate would open to let the vechicle 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 the car comes ,the door will be locked and requires the coming car to enter the pass.

- The simulation is designed with the help of Xilinx software.

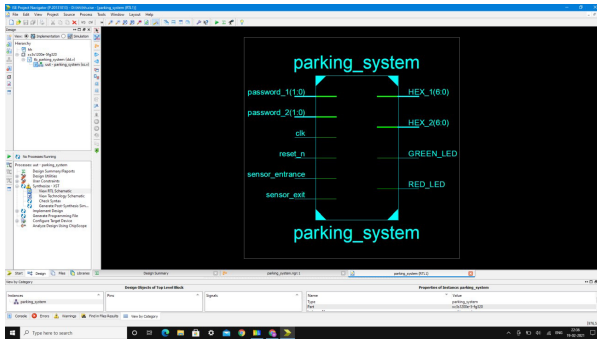The final design is shown in output section

IV.   OUTPUTS AND CONCLUSION

Fig.3 RTL Schematic

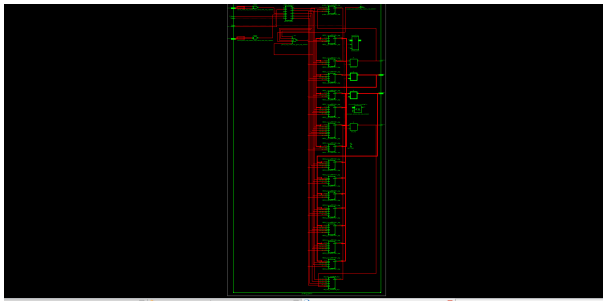- The above Fig. 3 result show about the pin diagram of the parking system of the project

Fig. 4 - RTL Schematic

- The above Fig. 4 shows the RTL Schematic of automatic car parking system in Verilog HDL.
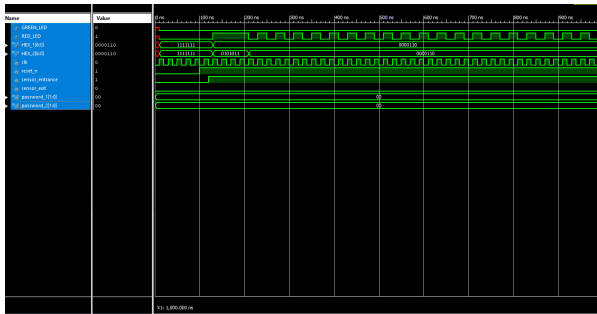
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Fig. 5 – Simulation Waveform-1

- The above Fig. 5 result show that output waveform of the parking system (when red light is 0 and green light is 1)

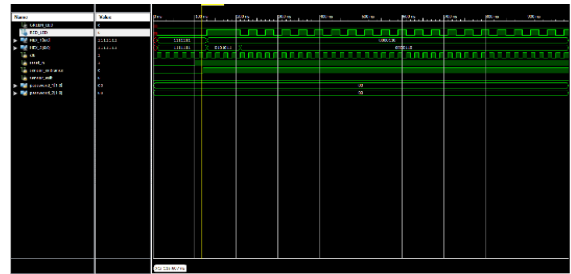- The below Fig. 6 result show that output waveform of the parking system(when red light is 0 and green light is 0)

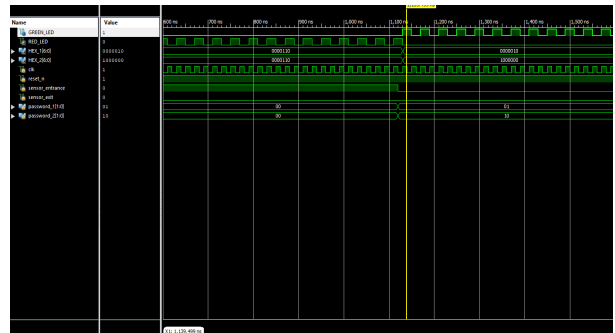**Fig. 6 – Simulation Waveform-2**

Fig. 7 – Simulation Waveform-3

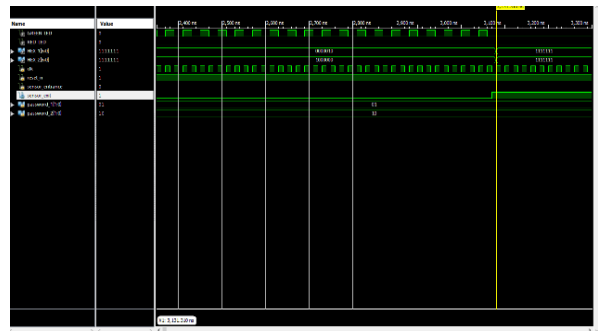- The above Fig. 7 result shows that the parking place (when green light is 1 red light is 0)

Fig. 8 – Simulation Waveform of Sensor Exit

- The above Fig. 8 result shows the sensor exit is 1

Fig. 9 – Simulation Waveform of Sensor Enter

• The above Fig. 9 result shows the sensor enter 1

4.1.CONCLUSION

• The goal of this project was to develop a most effective smart car parking system. This was the key impetus in deciding to incorporate the FPGA method. With the support of Xilinx ISE Design Suite, smart car parking system is implemented using Verilog HDL. The design is tested on FPGA kit Spartan6. The FPGA increases productivity, reduces costs and speeds up market time. The system built can be used for many applications, and can easily increase the number of slot choices and increase parking protection. Through using the above implemented program parking becomes simple. The car is correctly identified and parking safety will be stressed. Even the drivers can easily pick the slot.

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