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Implementation of Secured Car Parking Management System Using Verilog HDL

Bhavana CHENDIKA*, Alapati Manideepu **, Fazal NOORBASHA***
Department of ECE, K L University, Vaddeswaram, Guntur, AP, India-522502

ABSTRACT
Present days usage of motor vehicles are increased day by day, it causes the pollution, traffic congestion and parking place problems. In this paper we proposed a secured car parking management system using Verilog HDL. This system has two main modules Module-1: Slot identification for parking and LCD display screens, Module-2: Security indicator will provide security to the car, if unauthorized person want to vacant the car. These modules are modeled in Verilog HDL and implemented on FPGA.
Keywords – Parking system, Spartan 3A, Verilog HDL, LCD screen, Security.

I. INTRODUCTION

In this pragmatic world, several tasks were performed by every individual without being evasive. So, in order to sort out all the tasks for the efficient usage of time, wise steps should be taken to curb the wastage of time at unproductive areas such as at the most frequently performed action, which is the parking of vehicles. So, our paper provides a better alternative to have an efficient usage of time at parking correlated with the security issue which serves at its best. The major discussion involves the following solutions given below for the efficient usage of time which doesn't spare much time for parking purpose and also in order to have a safe park without involving any sort of crashes. Systematic parking with security is the main motto. Security includes the usage of password at the time of park; Indication of number of available adjacent vacancies as well as their positions where only the adjacent vacancies are needed in particular; Indication of the total number of vacancies available in a particular slot; Indication of the nearest vacancy of a particular row or slot among all the rows of a parking area. Parking systems can also take advantage of innovative technologies in order to improve the ease and convenience of paying for parking. Now a days, smart cards minimize transaction time by allowing user to simply wave their card in front of a reader. Mobile devices can also be used in payment transactions Public utilities need a parking system that can function efficiently and be integrated with the other urban city utilities. For the allotment of parking slots there is no proper way, thus parking management system fails in coordination and centralizing the information for an effective system. To avoid these problems, design of secured car parking management system is proposed, which will be implemented on FPGA to check vacancies and give security to car . Recently, a reconfigurable FPGA design is efficient method to implement a digital logic, because FPGA provides a compromise between general-purpose processors and ASIC. The FPGA based design is also more flexible, programmable and can be re-programmed. FPGA based design can be easily modified by modifying design's software part. Our proposed system is designed in FPGA design style and gate level modeling.

II. PARKING SYSTEM MODEL AND SECURITY OPERATION

This secured car parking management system has two modules. Module-1: Slot identification for parking and LCD display screens, Module-2: Security indicator will provide security to the car, if unauthorized person want to vacant the car. Figure 1 shows the block diagram of car parking and slot identification. For this we have taken a 4x4 car parking slots. In this design total parking vacancies are 16, it consists four rows and each row has four car parking vacancies.

In this system we arranged four LCD displays, namely Total Vacancies, Row Vacancies Adjacent Vacancies, and Nearest Vacancy. Total Vacancies displays the total number of parking slots available. Row Vacancies displays number of vacancies available in a particular row (R1/R2/R3/R4). Adjacent Vacancies displays the number of adjacent spaces available in the parking lot (i.e. more than two vacancies beside each other). Nearest Vacancy displays the number of nearest vacant place from the particular row.

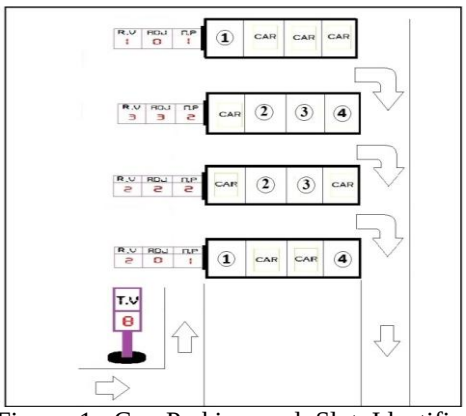

Figure 1: Car Parking and Slot Identification Block Diagram

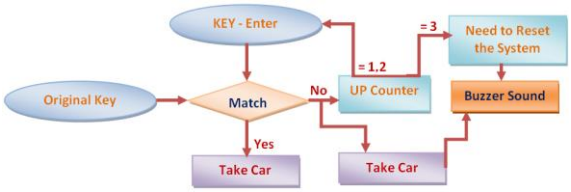

Figure 2: Security Indicator Block Diagram

Figure 2 and Figure 3 shows the security Indicator block diagram and car parking and security control system. Everyone will get a password or key when they park the car in a particular vacant place. When they want to take the car must enter the key which they get at the time of parking the car when it matches with original then gate will open otherwise gate will close. A person can enter a key only three times after that the system will not work, so, need to get permission from the control or security person. If any person want to take even wrong password or key then a buzzer will give loud sound. Thus this system will provide good security for parking vehicles.

Figure 3: Car Parking and Security Control System

III. SYSTEM IMPLEMENTATION

To design and implement this proposed secured car parking management system first we have designed the Security Indicator Logic Diagram in gatel level modeling which is shown in figure 4. The Security Indicator Logic Diagram chip units are fabricated in 0.12µm, 6-metal, 90nm CMOS process technology, with power supply 1.2V it is shown in figure 5. Security Indicator Logic Diagram CMOS layout has the following parameters: Width: 40.9µm (818 lambda), Height: 7.8µm (156 lambda), Surf: 319.0µm2 (0.0 mm2), 38: Electrical Nodes, 37: nMOS, 31: pMOS. Figure 8 shows the Security Indicator Simulation Waveforms.

We have used Field Programmable Gate Array (FPGA) design methodology to implement this proposed Car Parking and Slot Identification. To design and test system functions we have used Verilog HDL language. Figure 6 shows the FPGA RTL view and Figure 7 show the simulation results of the FPGA. These FPGA blocks functionality is tested on Spartan 3A FPGA kit.

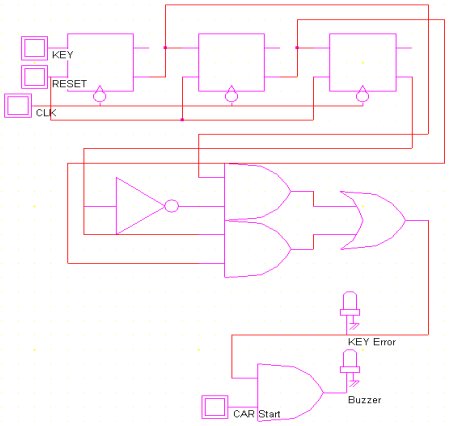

Figure 4: Security Indicator Logic Diagram

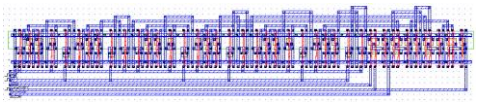

Figure 5: Security Indicator CMOS Layout

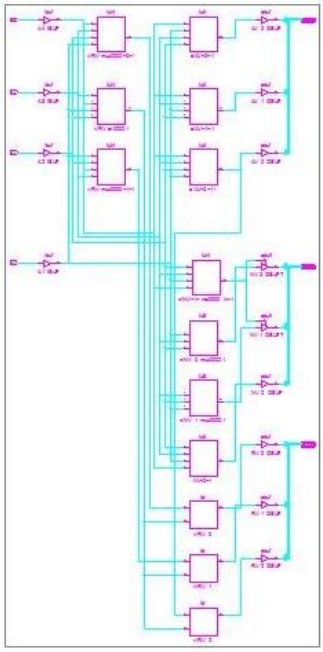

Figure 6: FPGA RTL View of Car Parking and Slot Identification

IV. RESULTS

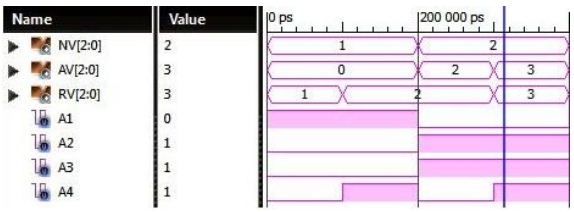

Figure 7: Car Parking and Slot Identification Simulation Waveforms (FPGA)

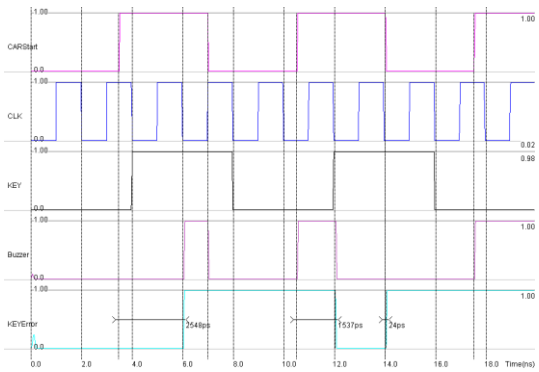

Figure 8: Security Indicator Simulation Waveforms (CMOS Layout)

V. CONCLUSION

The present secured car parking management system is implemented using Verilog HDL with the help of Xilinx ISE Design Suite. The design is verified on Spartan 3A FPGA kit. FPGA increase productivity, reduces cost, and accelerates time to market. The designed system can be used for many applications and can easily enhance the number of slot selections. Parking becomes easy by the use of the proposed designed system. And also security will be high.

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