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Design and Implementation of Smart CarParking System using LabView

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Abstract: ***Due to rapid proliferation in the number of vehicles on the road, finding a vacant car parking space is becoming challenging and ubiquitous in every major city, resulting traffic problems are bound to exist. Increase in traffic causes the number of accidents thatcause serious bodily harm to the road users, the pollution caused by the large amount of CO2 released by the vehicles, and the continuous stress of drivers who must drive in often narrow and very busy roads and who must look for a long time to find a space to park. Thus, tosolve the parking problem, lot of research is being done on smart parking management system mechanisms. The existing system gives us the information about the empty slots availability but does not give information about the exact location of parking slot available in such a big area. This paper proposes an efficient, cost effective smart car Parking System on wireless Sensor Networks (WSN) technology using LabView that can easily locate and secure a vacant parking space at any car park deemed convenient to them. The parking slots are continuously monitored, and data is continuously updated in the display board.***

Index Terms: parking system, smart parking, IR sensor.

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 or 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 [1-3].The problem that always occurs at the car park is time being wasted in searching for the available parking spaces. Users will keep on circling the parking area until they found an empty parking spot. This problem usually occurs in urban areas, where numberof vehicles is higher as compared to the availability of parking spaces. These ineffective conditions happenedbecause of the lack of implementation in technologies. Various systems have been done to ensure smoothness of traffic in car park areas [4-5]. From manual implementationsused in the old systems, they have evolved into fully automated, computerized systems.

Car park entrances are controlled by barrier gates wherebyparking tickets are used extensively for access purpose. Withthe growth of technology, these systems have been simplifiedin many ways [6-8].

Table 1: Literature review

Paper Title	Method	**Drawbacks**
A Design ofAutomated Parking Systemfor ShoppingCenters inMetro Manila	Using the statistical data obtained the average waiting time, space required and other crucial information were gathered. Finally a multi-level spiral ramp was proposedand entry and exit willbe monitored by sensors.	The whole pointof the parkingsystem was tosave time as wellas space but thismethodology solves only one of the two at mostcases.
Smart Car Parking SystemSolution for the Internet of Things in Smart Cities	This has three parts- The parking slot,cloud and the user endpart. Sensors are putin parking slots in thearea and throughmobile app we can seewhich parking slot isfree using IoT and we can park in that area.	No tickets so slot gets occupied before the person goes tothat spot.
IntelligentSmart Parking Algorithm	It uses intelligentsmart-parking algorithm techniquewith the help of arotary-parking systemwith electronicadd-ons which facilitates easyaccess, safety, power efficiency and optimal space usage.	The vehicles donot usually stop ata rotary. Therefore, they are not suitable when there is high pedestrian movements.
An IoT-basedEParking System for Smart Cities	This E parking system uses smartparking system, parking meter and IoT. Sensors are present in the in every parking slot and it haslocal and central parking management system.	Since all the parking slots can be reserved there is no chancefor prioritizing.
Automated Vehicle Parking System And Unauthorized Parking Detector	It uses RFID, GSM module and Infrared sensor to set up the parking mechanism.	Can't recognize difference between a car and other objects.

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II. ARCHITECTURE OF SMART PARKING SYSTEM

The high level diagram of the proposed system is shown in figure 1 which can performs the following functions.

A. To allocate and de-allocate the available parking slots, IR sensors attached to each of the parking slot at the entrance and exit gates.

B. To monitor the temperature, fire and alarm, respective sensors are used and designed using front panel of NI LabView. IR sensor detects the car and sends the data toLabVIEW.

C. Arduino Uno board attached to capture the information from the sensors and to detect the amount of lightreflected from the wall of parking slot.

D. To display the total slots occupied and unoccupied and to alert the user before entering the parking area LCD display placed at the entrance gate.

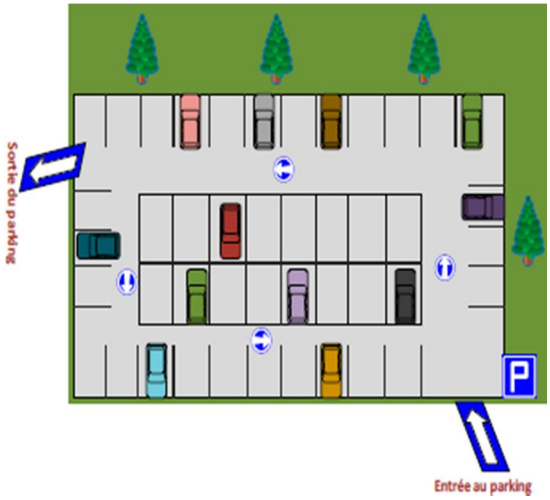


Figure 1: High level diagram of the proposed system

III. SIMULATION RESULTS

The case loops in LabVIEW are verified and checks whether the slots are empty or not. If the slot is empty text message with empty slots are available and red led will glow.If some slots are filled, then the filled slots are indicated withgreen colour. If the entire slots are full a text message with noempty slots available will be displayed and green LEDs will glow which is shown in Figure2.



Figure 2: NI LabView front panel design

The figure 3 shows that LabVIEW will manipulate the data on display board which was received from IR sensor and thusindicate the status of the slot using LED. IR sensor detects theobject, even the object is present or not it is continuously monitored by Aduino board and the data is sent to LabVIEW.

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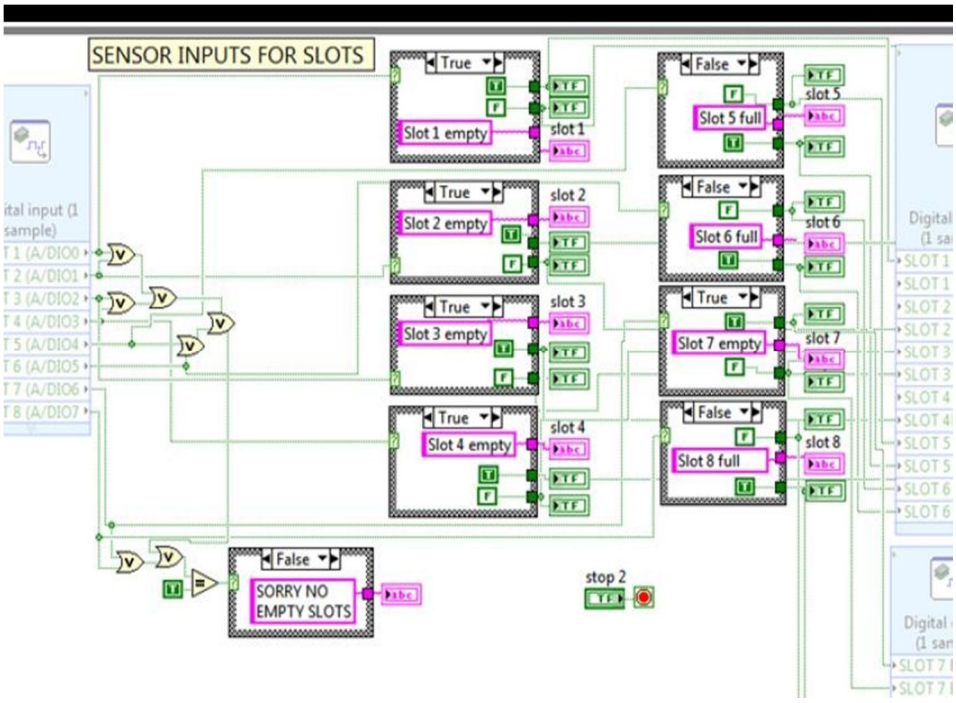


Figure 3: Implementation using LabView

Several advantages of the proposed system are listed below. Drivers are directed straight to an available parking spot. Therefore, they waste fewer kilometres driving around in circles looking for vacant parking space. Resulting in spending less money on petrol. Additionally, by driving fewer kilometres when in search of parking space, you will save valuable time which can be spent on work, fun or hobbies in spending less money on petrol. Lowering individual environmental footprint. Increase in safety.

IV. CONCLUSION

The system benefits of smart parking go beyond avoiding the needless searching of empty slots in the parking area. It also enables cities to develop fully advanced and intelligent transportation system for easy access to the parking.

Developing smart car parking system within a city requires LabVIEW for data processing, Arduino Board for acting as an interface between parking slots and display, IR sensors are used in order to know the status of the parking slots, display board is used to display the total available and occupied slots along with a message and led indications at the entrance itself. This system is fully automated and does not need any supervision at the parking area, which results in the reduction of the human efforts and does not need any man power

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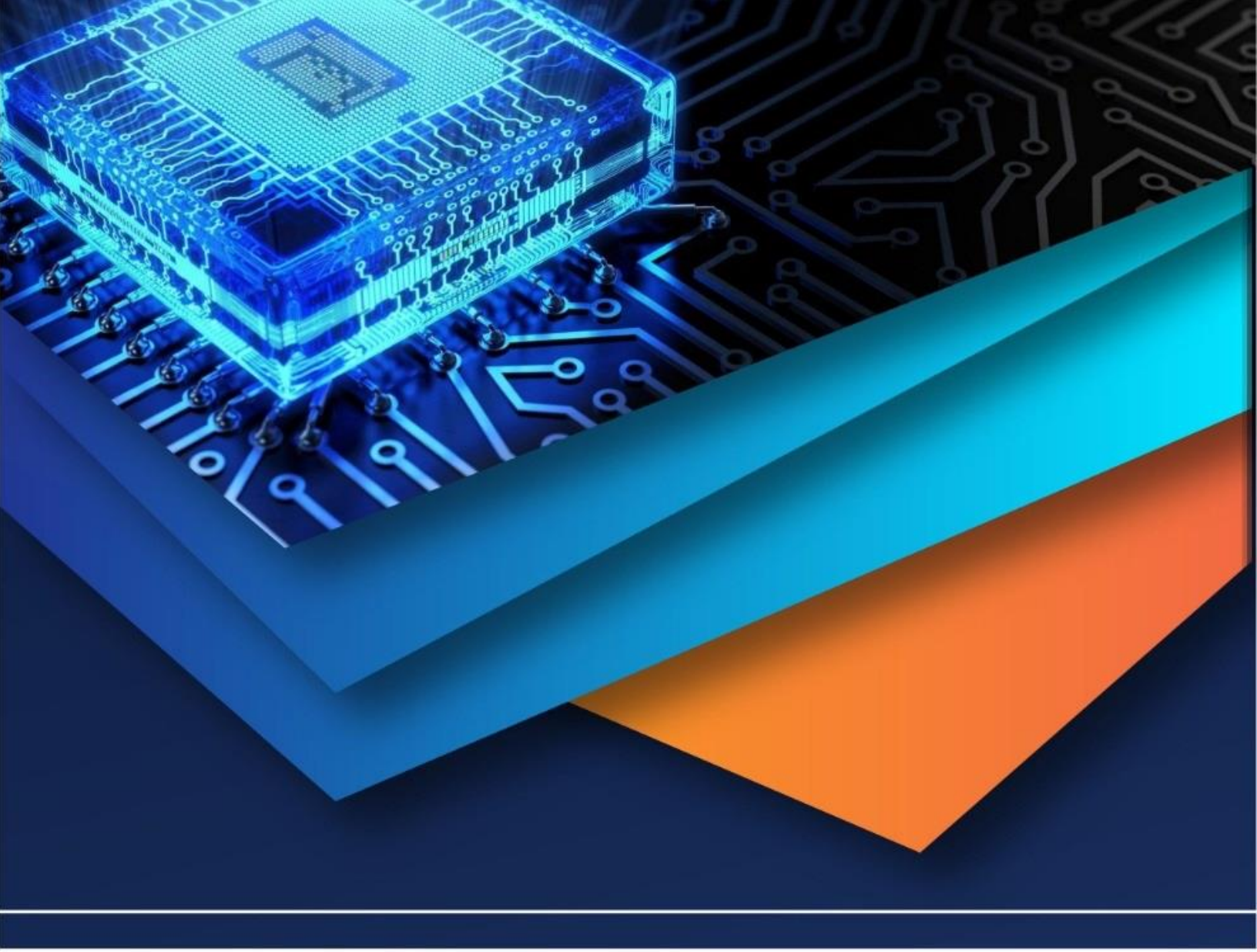


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