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MANAGEMENT OF CAR PARKING SYSTEM USING WIRELESS SENSOR NETWORKS

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Abstract— **To cope with the ever growing problem of traffic management and parking management this paper proposes an advance solution for managing and monitoring free parking space and automated guidance for user to park the car. It aims at implementing smarter and better parking guidance mechanism which reduces significantly vehicle travel time and parking time. In this system all the Infrared sensor nodes (IR sensor) sense the status of the car space and accordingly transfer the information to the AVR controller. Accordingly AVR sensor sense the status of car parking space and displays the information on the LED screen for the user, thereby reducing the time for the driver to find vacant empty space and almost reduce the chances of entering into the unusual space which might lead into the traffic jam.**

I. INTRODUCTION

A. Hardware cum Software Implementation:-

Our project is a complete model for Car Parking (MCPS/WSN) Management System based on wireless sensor network technology which provides advanced features like remote parking monitoring**,** automated guidance. It describes the overall system architecture of MCPS from hardware to software implementation in the view point of sensor networks. Here we have proposed a software implementation using wireless sensor network for management of car parking system without entering into the parking lot. Parking status can be known by the driver at the entrance of the parking lot only. That means a car driver can know whether the car parking space is available in the parking lot or not without entering into the parking lot by observing the parking space. This system will save most of the time of the driver for seeing the parking space and also headache of drive the car inside the parking lot and see the parking space.

Fig 1:Proposed Multilevel Parking system

B. Problem Design :

Recent advancement in the automobile industry has opted many people to use their own vehicle for travelling. This has increased effect on car ownership. But to park all these cars in the major metro cities is quite tedious and difficult. Parking problems are becoming ubiquitous and ever growing at an alarming rate in every major city. Lot of research and development is being done all over the world to implement better and smarter parking management mechanisms. Widespread use of wireless technologies paired with the recent advances in wireless applications for parking, manifests that digital data dissemination could be the key to solve emerging parking problems. Wireless Sensor Network (WSN) technologies has attracted & increased attention and are rapidly emerging due to their enormous application potential in diverse fields. This buoyant field is expected to provide an efficient and cost-effective solution to the efficient car parking problems have taken a lot of the guesswork out of driving

II. HARDWARE CSYSTEM DESIGN

A. .Block Diagram :

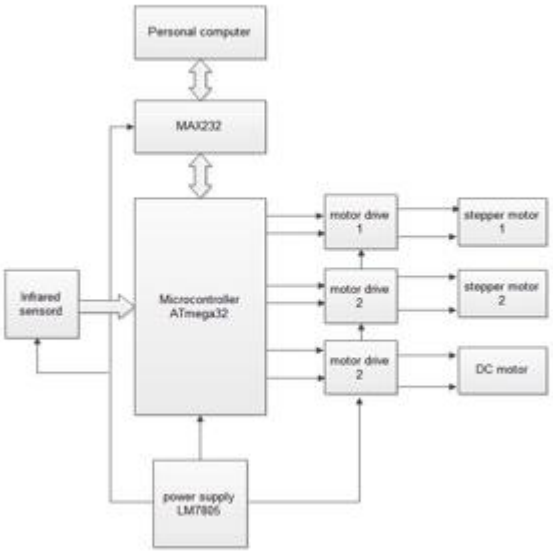


Fig 2: Block Diagram

B. Microcontroller (Atmega 32)

It is the brain of the system. It is used to process different signals, commands received from different section of the system, for example: when it receives scan command from the computer, it starts scanning the logic level of the sensor and depending upon that it sends the parking number to the computer. It is also used to control the movement of the lift by sending the appropriate logic signal to the motor driver.

A digital microcontroller typically consists of three major components: Central Processing Unit (CPU), program and data memory, and an Input Output (I/O) system. The CPU controls the flow of the information among the components of the computer. It also processes the data by performing digital operation. Most of the processing is done in the Arithmetic and Logic Unit (ALU) within the CPU.

C. Features of Atmega 32

High performance, low power 8 bit microcontroller Advanced RISC architecture
131 powerful instructions

32*8 general purpose registers Speed upto 16 MIPS at 16 MHz

32 kbytes of in-system self programmable flash program memory
1024 Bytes of EEPROM
32 programable IO lines
Operating voltage : 2.7 to 5.5 Volts
Two 8 bit timer/counter with separate prescalars

D. Infrared sensor

Infrared sensors are used to check whether the parking slot is vacant or not. Each parking slot consists of a pair of transmitter and receiver. When the parking is a vacant, sensor send logic 1 signal to microcontroller, or else it send logic 0 signal

E. Computer

The status of all the signals received by the microcontroller from the sensor can be seen on the computer, on a special Graphic User Interface (GUI) developed using Matlab. It is also used to send or receive the parking no while un-parking and parking respectively.

F. MAX232:

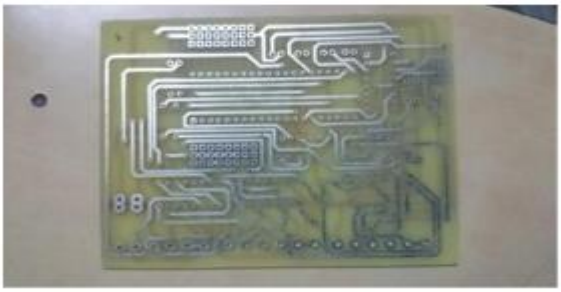
It is used to make communication between microcontroller and computer. On serial port of computer the logic 0 signal range from +3V to 15V and logic 1 signal range from -3V to -15 v, where as in microcontroller the logic 0 range for 0 to 0.5V and logic 1 range from 4.5V to 5V. So to convert the voltage level that can be understood by each of them, we use MAX232.

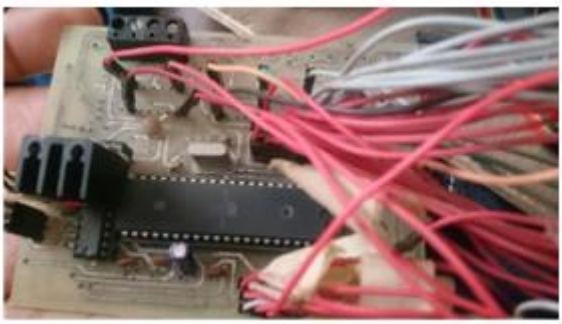
G. Motor drive (1 to 3)

It is used to operate the motor. The output voltage of the microcontroller is of 4.5V to 5V, which is insufficient to run a stepper motor. So with the help of motor drive the voltage requirement of the stepper motor can be fulfilled.

H. Power supply

It is used to supply required power by each component for smooth operation.





III. WORKING

The working of our project is divided into two parts:

1.Scanning and Parking. 2.Un-parking.

A. Scanning and Parking :

The scanning process is mainly to find out the nearest vacant parking slot. The parking number is displayed on the computer, in the GUI. When the

'SCAN' button is clicked in the GUI, the control signal is sent from the computer to microcontroller via serial port of the computer. This control signal is received by the microcontroller and it performs the scan operation of parking. In each parking slot, there is a pair of infrared transmitter and receiver. When car is not in the parking, infrared light from the transmitter falls on the receiver and a logic 0 signal is produced on the output of the sensor. If there is a car in the parking slot, the car obstruct the light from falling on the receiver, as a result the receiver detects no infrared light, so it generates logic 1 signal.
When the microcontroller receives logic signals from each sensor of different slots, it decides which parking number is to be sent to the computer. For this a priority is set, on basis of that priority the microcontroller will send the parking number.
The computer receives the parking number, via serial port. This number is displayed in display box of GUI. For parking the car, in the slot of which we received the number, we have to click the 'PARK' button.

B. Un-parking:

When we have to un-park the car, we have to enter the parking slot number from which we have to un-park it. When the parking number is entered in text box, and clicked un-park the parking number is sent from computer to microcontroller. When the microcontroller receives the parking number it start un-parking operation. First the microcontroller checks the logic signal received from the sensor of the parking slot. If the parking is vacant, it gives us the error signal notifying that there is no car in the slot. It there is a car in the slot; the microcontroller sends a drive pulse to first drive

circuit connected the stepper motor, which controls the vertical movement of the lift. First the lift moves the desired level. Then the microcontroller checks whether the lift is facing towards the parking slot selected. If the lift is not facing towards the desired parking slot, a drive pulse given to driver circuit to second driver circuit use to rotate the lift. When lift reaches the desired slot the, third drive circuit is turned on to activate the DC gear motor, this move out the plank and transfer the car in the lift. After that the lift come back to it initial position, and the car is un-parked

IV. BENEFITS OF THIS MODEL

Automated parking Saves Space and Additional Economic Benefits to Developer .

Automated parking is Safer ,Secure , and Convenient .

With this the parking buildings become compact as no ramps and drive spaces are required inside the parking building.

Also it removes the need for a valet or self-parking, saving time and making the operation completely safe.

V. APPLICATIONS & LIMITATIONS

A. APPLICATIONS

Commercial Areas&Malls

Shopping centers&Industrial Regions Sport Stadiums

Residential Buildings&Offices

B. LIMITATIONS

Lack of sufficint parking at event sites.

Difficulties with parking regulation and pricing.

VI. RESULT

Every emptied and occupied slots will be displayed on this box of GUI according to the parking and Unparking needs.

VII. CONCLUSION

Hence we can conclude that we feel secured that the system will do our job perfectly without needing us to remind about its job every now and then as in the case of human beings. Automatic multi-storey car parks provides lower building cost per parking slot, as they typically require less building volume and less ground area than a conventional facility with the same capacity.A multi-storey car parks offer greatest possible flexibility for the realization of optimum parking solution. A fast parking process in which the driver does not have to maneuver his car or drive backwards, guarantees highest comfort and security.

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