International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622
NATIONAL CONFERENCE on Developments, Advances & Trends in Engineering Sciences
(NCDATES- 09th & 10th January 2015)

RESEARCH ARTICLE OPEN ACCESS

Sensor Based Automated Parking System for Slot Tracking and Auto Parking Of Vehciles

Pothana.Siva Naga Mani[1], Vaseem Ahmed Quershi [2,] R.Venkatesh [3]
[1], Prime ki software solutions Associative QA engineer,Hyderabad, Telangana.
[2], Associate professor, CMR Engineering college,Hyderabad, Telangana.
[3], Assistant Professor, CMR Engineering college,Hyderabad, Telangana.

Abstract:
This paper proposes vacant parking slot detection and tracking system that fuses sensors. The proposed system consists of three stages: parking slot marking detection, parking slot occupancy classification, and parking slot marking tracking. The parking slot marking detection stage recognizes various types of parking slot markings. The parking slot occupancy classification stage identifies vacancies of detected parking slots using ultrasonic sensor data. Parking slot occupancy is probabilistically calculated by treating each parking slot region as a single cell of the occupancy grid. The parking slot marking tracking stage continuously estimates the position of the selected parking slot while the ego-vehicle is moving into it. During tracking, In the experiments, it is shown that the proposed method can recognize the positions and occupancies of various types of parking slot markings and stably track them under practical situations in a real-time manner. The proposed system is expected to help drivers conveniently select one of the available parking lots and support the parking control system by continuously updating the designated target positions.

Keywords: ARM Micro Controller (LPC2148), Ultrasonic sensor, Motor Drive (L293D)**,** IR reflective sensor, ZIGBEE, LCD**.**

I. Introduction

There are many advantages with the existing system because it maintains a particular order for parking all the vehicles, but also have some disadvantages that with this system we can't know where exactly the car has been parked. We also cannot able to identify which slot is empty and which slot is filled. So through this project we want to create a system that gives information about slots and there occupancy. We use IR reflective Sensors for detecting which slots are filled and which are not filled. We use the ZIGBEE module for sending this information to the monitoring section where the LCD will display the information of the slots. If user selects any required slot, then automatically car gets parked and whenever the user wants his car then using Ultrasonic sensors the car can be tracked easily.

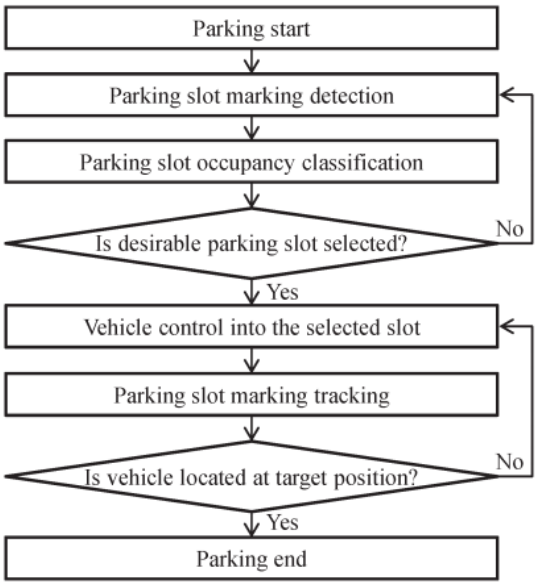

Fig.1.Flow chart of The Parking System

II. The Hardware System

Micro controller:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the

devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI:

ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements

I. Design of Proposed Hardware System

ENTRY SECTION

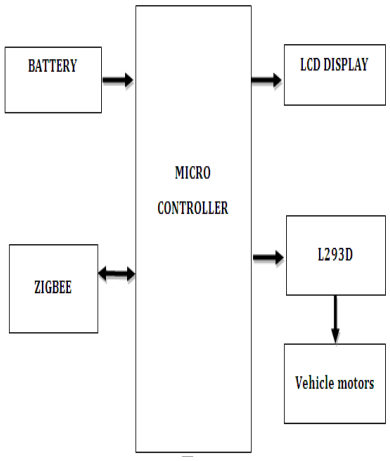

Fig.2.block diagram

PARKING SLOT SECTION

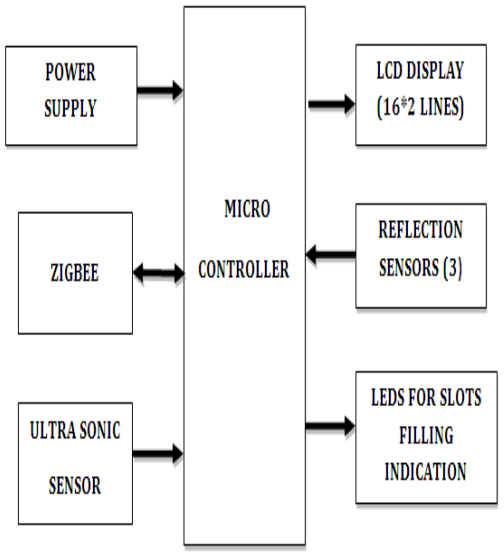

Fig.3.block diagram

The proposed system consists of three stages:

(1) Parking slot marking detection

(2) Parking slot occupancy classification

(3) Parking slot marking tracking.

The parking slot marking detection stage recognizes various types of parking slot markings using AVM image sequences means It detects parking slots. The parking slot occupancy classification stage identifies vacancies of detected parking slots using ultrasonic sensor data. Parking slot occupancy is probabilistically calculated by treating each parking slot region as a single cell of the occupancy grid. The parking slot marking tracking stage continuously estimates the position of the selected parking slot while the ego-vehicle is moving into it.. After analyzing and processing the data, the information and Management center would distribute the parking information by LCD screen and displays for the drivers. And the results of the experiment show that the performance of the system can satisfy the requirements of parking guidance.

III. Board Hardware Resources Features

Ultrasonic sensor:

Ultrasonic sensing techniques have become mature and are widely used in the various fields of engineering and basic science. Actually, many types of conventional ultrasonic instruments, devices and sophisticated software are commercialized and used for both industrial and medical applications. One of advantages of ultrasonic sensing is its outstanding

capability to probe inside objectives nondestructively because ultrasound can propagate through any kinds of media including solids, liquids and gases except vacua. In typical ultrasonic sensing the ultrasonic waves are travelling in a medium and often focused on evaluating objects so that a useful information on the interaction of ultrasonic energy with the objects are acquired as 2ultrasonic signals that are the wave forms variations with transit time. Such ultrasonic data provides the fundamental basis for describing the outputs of ultrasonic sensing and evaluating systems.

Fig.4.Ultrasonic Sensor

IR Reflective Sensor:

The reflectivity of infrared light varies with the color and distance of the reflecting surface. According to this principle, Grove - Infrared Reflective Sensor utilizes a RPR220 reflective photo sensor module to detect color and distance. When a light-colored object approaches, the signal intensity received by infrared reflective sensor increases and the indicator LED on board turns red. When a dark-colored object approaches, the intensity decreases and the LED turns off. This sensor is a basic and widely used part in applications such as line-following cars, rotary speed detection, auto data logging on utility meters or other situations where color or distance contrast is sharp.

Fig.5.IR Reflective Sensor

ZIGBEE:

ZIGBEE is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for Low-Rate Wireless Personal Area Networks (LR-WPANs), such as wireless light switches with lamps, electrical meters with in-home-displays, consumer electronics equipment via short-range radio needing low rates of data transfer. The technology defined by the ZIGBEE specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZIGBEE is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking.

ZIGBEE is a low-cost, low-power, wireless mesh networking standard. First, the low cost allows the technology to be widely deployed in wireless control and monitoring applications. Second, the low power-usage allows longer life with smaller batteries. Third, the mesh networking provides high reliability and more extensive range.

Fig.6.ZIGBEE Module

Motor Drive:

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

Fig.7.Gear Motor

In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

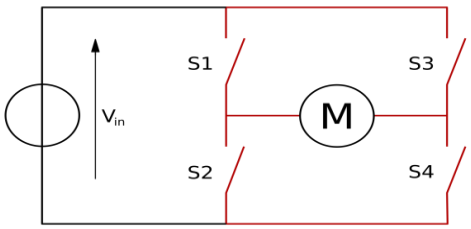

Fig.8.Motor Drive

IV. CONCLUSION

This paper has proposed a vacant parking slot detection and tracking system that fuses the sensors This paper has presented that 1) parking slot markings can be successfully detected and tracked by fusing two off-the-shelf parking aid systems, 2) parking slot markings can be reliably detected by combining sequential detection results, 3) occupancy of parking slot can be efficiently classified by treating each parking slot region as a cell of an occupancy grid, and 4) parking slot markings can be tracked robust against severe occlusions. As a result of quantitative evaluation using practical databases, the proposed system achieves 97.8% recall and 95.8% precision for parking slot marking detection, 98.1% classification rate for parking slot occupancy classification, and accuracy of 3.1 cm and 0.9 ◦ for parking slot marking tracking.

Furthermore, it is revealed that the proposed system can operate in real time, i.e., 47.1 ms for parking slot marking detection and occupancy classification and 32.0 ms for parking slot marking tracking.

REFERENCES

[1] S. Hiramatsu, A. Hibi, Y. Tanaka, T. akinami, Y. Iwata, and M. Nakamura, "Rearview camera based parking assist system with voice guidance," presented at the Proc. SAE World Congr. Exhib., Detroit, MI, USA, Apr. 2002, Paper 2002-01-0759.

[2] M. Furutani, "Obstacle detection systems for vehicle safety," presented at the Proc. SAE Converg. Int. Congr. Expo. Transp. Electron., Detroit, MI, USA, Oct. 2004, Paper 2004-21-0057.

[3] Y. Kageyama, Look, No Hand! New Toyota Parks Itself, Jan. 14, 2004. [Online]. Available: http://www.cnn.com/

[4] H. G. Jung, C. G. Choi, P. J. Yoon, and J. Kim, "Novel user interface for semi-automatic parking assistance system," inProc. 31st FISITA World Autom. Congr., Oct. 2006, pp. 1–10.

[5] H. Satonaka, M. Okuda, S. Hayasaka, T. Endo, Y. Tanaka, and T. Yoshida, "Development of parking space detection using an ultrasonic ensor," in Proc. 13th World Congr. Intell. Transp. Syst. Serv., Oct. 2006, pp. 1–10.

[6] P. Degerman, J. Pohl, and M. Sethson, "Hough transform for parking space estimation using long range ultrasonic sensors," presented at the Proc. SAE World Congr. Exhib., Detroit, MI, USA, pr. 2006, Paper 2006-01-0810.

[7] W. J. Park, B. S. Kim, D. E. Seo, D. S. Kim, and K. H. Lee, "Parking space detection using ultrasonic sensor in parking assistance system," in Proc. IEEE Intell. Veh. Symp., Jun. 2008, pp. 1039–1044.

[8] S. H. Jeong, C. G. Choi, J. N. Oh, P. J. Yoon, B. S. Kim, M. Kim, and K. H. Lee, "Low cost design of parallel parking assist system based on an ultrasonic sensor,"Int. J. Autom. Technol., vol. 11, no. 3, pp. 409–416, Jun. 2010.

[9] Ford 2013 TAURUS. [Accessed: Mar. 2013]. [Online]. Available: http:// www.ford.com/cars/taurus/features/#page=Feature18

[10] BMW 7 Series Sedan. [Accessed: Mar. 2013]. [Online]. Available: http:// www.bmw.com/com/en/newvehicles/7series/sedan/2012/showroom/ convenience/park-assistant.html

[11] Lexus 2013 LS. [Accessed: Mar. 2013]. [Online].Available: http://www.lexus.com/models/LS/features/

[12] Hyundai 2013 AZERA (GRANDEUR). [Accessed: Mar. 2013]. [Online].Available: http://www.hyundai.com/kr/showroom.do?carCd1=RD014

[13] A. Hashizume, S. Ozawa, and H. Yanagawa, "An approach to detect vacant parking space in a parallel parking area," inProc. 5th Eur. Congr. Exhib. Intell. Transp. Syst. Serv., Jun. 2005, pp. 1–5.

[14] C. Vestri, S. Bougnoux, R. Bendahan, K. Fintzel, S. Wybo, F. Abad, and T. Kakinami, "Evaluation of a vision-based parking assistance system," in Proc. 8th Int. IEEE Conf. Intell. Transp. Syst., Sep. 2005,pp. 131–135.

[15] J. K. Suhr, H. G. Jung, K. Bae, and J. Kim, "Automatic free parking space detection by using motion stereo-based 3D reconstruction,"Mach. is. Appl., vol. 21, no. 2, pp. 163–176, Feb. 2010.