Car Parking Space Detector

Using MSP430

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***Abstract*— In our day-to-day life, we do suffer a lot regarding parking our vehicles in parking lots. From this point of view, we came up with an idea to build something that will reduce these sufferings and will make this "Car parking" system easier and comfortable. To make it real, we tried to made our very own device named "Car Parking Space Detector" that will detect the vacant space available for cars, will display the possible number of car parking space and will control the entrance and the exit of cars. We used to MSP430 mainly to made this device.**

Index terms— Intelligent car parking, vehicles, parking detection, MSP430.

I. INTRODUCTION

Currently, most of the parking lots do not have a useful and systematic system. Most of them are manually monitored and handled as well. The problem that always or most of the time occurs is time being wasted in search of for the available parking spaces. Even people keep searching areas round and round for a vacant parking space. These kinds of problems can be seen usually in the busy urban areas where the number of vehicles is more than the available parking space. If we take a close look at this problem, we can see that these occurrences are happening because of lack of the usage of modern technology, though we are living in an era of modern science. Various systems have been developed to make car parking smoother and easier. To take this smoothness more effectively and easily, we are introducing our this device. According to our this automated system, this device calculates the vacant space of a parking lot, will display the number of the possible car parking area and will control the entrance and the exit of cars.

II. SYSTEM MODULE

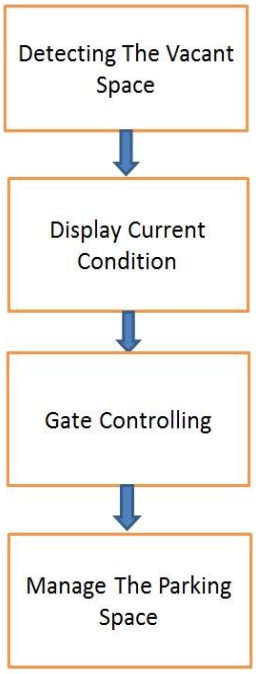
Our project includes four essential modules. The very first module of our project is detecting the vacant space as a procedure to automatically identify the vacant possible space for car parking. The second one is displaying the current condition of the parking lot which refers displaying the number of the possible car parking as if there is a person who is waiting on the road to find a place to park his/her car can get the message of whether there is any vacant space to park a car or not instead of getting in the parking lot and find that out in person. The third of our module is controlling the gate. The gate will basically be open only when there is at least one vacant space, otherwise it will not be opened. When the gate gets opened, it displays a light and sounds a buzzer that symbolizes that the gate is opened for a car. The fourth and the most important module of our project is managing the parking space. In this module, there will be a green LED that symbolizes that the space is free, and will turn into red when the car takes that place. At the time of taking that space by a car, a counter will be started that will count the time and a bill will be generated when the car is leaving. The details and technical parts of each module are described below:

A. Detect vacant space

To begin with, all the process of our project starts from this module. The main work of this module is to detect the vacant space of a parking lot. We used four IR sensors placed in the ground of the parking lot spaces. Each of the IR sensors are being used separately in every single space. These IR sensors keep sending signals continuously. If the signals are blocked, it means that there is a car onto that space, and then automatically the counter of the space taken cars will get reduced, and, if the signal is freed, then that counter will be increased, automatically.

B. Display the current condition

To display the current condition of the parking lot, we used LED display. Basically the counter that is used to find whether there is any car onto the parking space or not, will send directly that number to that LED display. By that, a passerby who might be waiting for a free parking space will know the current status of the parking lot instead of getting entered into that parking lot.



C. *Gate controlling*

About controlling the gate, well, we used an IR sensor and a servo motor. The IR sensor is used here for detecting whether any car is standing in front of the gate or not, and the servo motor is used to open or block the gate. A buzzer is used as well here to be alert that the gate is opened.

D. *Managing the parking space*

This is the main module of our project. The four IR sensors placed in the ground of the positions of the car parking space. The IR sensors are sending signals continuously, and counting time at the same time. Whenever the sensors are blocked, that means a car is standing on it, it will turn the green LED off and will start a counter that will measure the time duration that how long the car has stayed. At the same time it will reduce the car number counter and will send that to the display, and vise versa for the opposite situation. Moreover, depending on the duration, it will generate a bill that has to be paid by the car's person.

(iii) EXPERIMENTAL RESULT

After a lot of errors and so many tries, we became successful to develop our very own device that works perfectly, senses the cars, shows the free spaces and controls the gate perfectly. The percentage of error is barely 10% as it works so perfectly, measuring all the information so accurately.

(iv) CONCLUSION AND FUTURE WORK

The "Car Parking Space detector" device is perfectly designed, developed and well tested. By getting the signals blocked it starts its work and ends up by getting freed. Unlike any other automated system developed in other countries, our this device is so cheaper, simple and portable, yet, so effective and accurate. And, about our future plans, well, we do have some future plans regarding this device. Those are: making a lifted smart car parking lot, using some other sensors to make the measurements more accurate and useful, making the entrance, exit and the gate more secured and making the billing system online.

(v) ACKNOWLEDGMENT

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REFERENCES

[1] G.L.Foresti, C.Micheloni, and L.Snidaro, "Event Classification for Automatic Visualbased surveillance of Parking Lots" Proceeding of the 17th International Confrence on Pattern Recognition, pp. 1051-1081.

[2] Q. Tao, G.W. Wu, F.Y Wang, and J. Wang, "Posterior probability support vector Machines for unbalanced data" IEEE transactions on Neural Networks, Vol.16, Issue 6, P.1561-1573 Nov. 2005

[3] Y.Boykov, O. Veksler, and R.Zabih, "Efficient Approximate Energy Minimization via Graph Cuts" IEEE transactions on PAMI,Vol.20,no.12,p.1222-1239,Nov.2001