A Project Report on Automatic Car Parking System

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Abstract- **The industrialization of the world, rise in population enormously, almost ceased paced city development and mismanagement of available parking spaces has resulted in a number of parking related problem. In this paper, we develop and experimentally demonstrates a parking method using a puzzling logic and a single chip microcontroller.**

Keywords—**automatic, car parking, puzzling, single chip microcontroller**

I. INTRODUCTION

In communication, mobile technology and information technology are the examples. In electronic industry, a single motor is driving the total plant. In biomedical electronics, X-ray machine, a scanning machine, ECG, EMG and Hemodialysis machine are the main gifts. Also, PLC's and embedded system have lions share in industrial automation.

We are developing a system "Automatic Car parking system" which will be controlled by a single chip microcontroller. The system is developed using the puzzle logic.

In the big cities and multistory building, there is not enough space for parking the cars in multi-floor fashion. Let's consider the case study of "Taj Hotel" in Mumbai where a number of floors and number of rooms and flats are available in same building. It is highly impossible to park the cars on the ground floor alone.

We are utilizing a lift system for each column. The cars can be moved in vertical and horizontal fashion. The incoming and outgoing cars are first coming in the entrance, and then the user will press his allotted button and leave his car. The car will be automatically located at its pallet place. Similarly, when the user has to go outside, he will come in the entrance. On each floor, one pallet has to be kept free so that the puzzling can be made possible. The cars are parked automatically with belt and pulley system.

Thus, plenty of cars is parked in this fashion. The limit switches will be fitted in mechanical assembly. These switches will sense whether the car is on the pallet is present or not. The logic high and low signals will be given to microcontroller as the input.

The keyboard connection will go directly to the CPT AT89C51 as the input. The microcontroller is provided with train receivers and up resistor in order to avoid the tri-state logic situation.

The relay board is driven by the microcontroller with its output port. These relays are made ON and OFF as per the commands received by the user from the keyboard and limit switched.

Objective

By this automatic car parking system, the following objectives will be achieved.

1. Reduces the human effort and time for parking.
2. Creating a cost-effective parking system.
3. Multi-level car parking system can be achieved.

II. WORKING

Automated car parking is a method of automatically parking and retrieving cars that typically uses a system of pallets, lifts, and carries. By parking cars in this way, the floor area and the volume of the garage can be used much more efficiently. The intention is to compact more cars in the same space, reduce the space needed to park the same no of cars or allow car parking where previously there would have been no room. Automated car parking can be site above or below ground or a combination of both, and designed to accommodate any no of cars.

Automated car parking will make a huge difference In urban planning and in designing development of the future. The process of parking is simple for the driver. The car is parked in a module at an entrance to the car park. It is then automatically moved to the garage and stored in parking space depending upon the type of automated system, this is done by a computerized system of plates, lifts, carriers and in the case of sky car park robotic parking system, robots.

The car is returned to the driver, in the same way, using a sliding device in private parking or a ticket and payment system in a public car park. Retrieval time for a vehicle is rapid and average of 2.5 min depending upon the type automatic car park and it's size
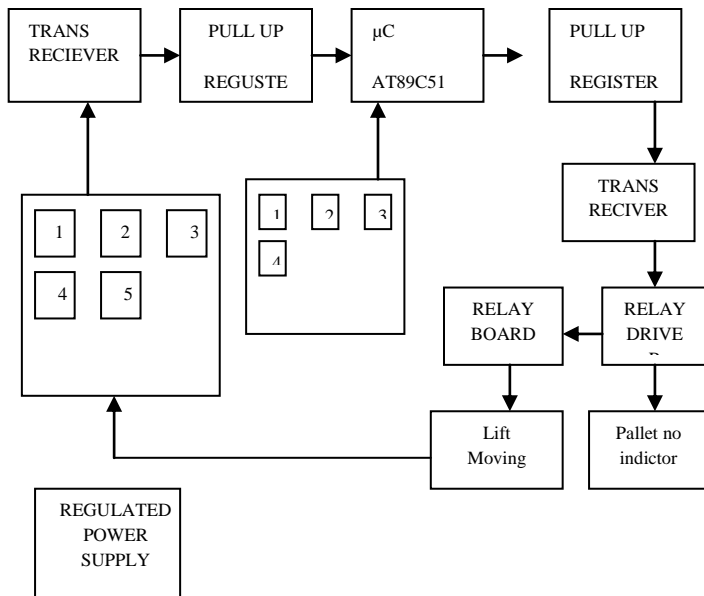
III. LITERATURE REVIEW

Jong-Ho Shin & Hong-bae Jun [1] has introduced the concept of smart parking guidance system and incubated the smart parking guidance algorithm which considers dynamic circumstances of parking a car in a city. To do this, a futuristic parking guidance algorithm based on dispatching rules is proposed. This helps in assigning the car to a vacant place in the parking system. There is two Parking utility function which is used in implementing the dispatching rules and parking choice is done by these parking utility function. A various factor considered in the decision of the parking choice is done by parking utility function. Driving time and distance, the distance on foot, the cost of parking, traffic congestion by guidance itself and possibility to find vacant parking lot when a car enters. To analyze the effect of considering a factor, six different importance according to the total weight of factor are proposed and evaluated the validation of proposed algorithm is performed by the simulation test. For the multi-level car parking system having the different maximum number of concurrent parking requests, six kinds of preferences putting different weight on various decision factor have been evaluated and compared with the base. Using the proposed algorithm, it has been proven a lot, utilization of parking resources in the city, and traffic congestion can be improved. The proposed system and algorithm enables car drivers to find the most appropriate parking lot and redundant time and energy.

Eventually, the redundant time and energy consumption caused by cruising for parking space in city can be improved with the help of the smart parking guidance system

Patrick Zips, Martin Bock, Andreas kungi[2] By this paper a rapid optimization, direction, planning, algorithm for parking in a narrow environment is proposed. It's feasible for different scenarios without any further modification. Angle parking, garage parking, and parallel parking can be handled in a simple way. It takes a millisecond for a path planner to decide the path. This paper normally talks about the path planning and its algorithm.

Yanan Zhao, Emmanuel G. Collins Jr. [3] This paper produced and underwork a test in a narrow space around car parking algorithm. The algorithm is designed to detail and casual test result shows the efficiency and effectiveness of the sensors. This paper algorithm was also used for fine tuning logic controllers. The developed system not only exclude human's car parking designer from the time-consuming process but also provide a medium to develop a system to the different vehicle platform.

K.Demirli, M.Khoshnejad[4] This paper provides a solution for an automatic backward parking of vehicle under the use of sensor proposed. The main focus of the paper is that the undertook the case where dimensions of the parking space can not find out by navigating the vehicle towards the start position. In this project, the control system combines the technology of fuzzy logic and sensor navigation to design a system to automatically calculate the reference path. The given sensor-based parking system for planning the motion is effective for automatic car parking in the case when the parking space dimension can not be found. This system would be feasible for approximation the reference path on the computer by processing the information given by sensor at each interval and by taking into consideration the non-holonomic constraints. The system is computationally efficient because the direction is generated by the online system based on sensor measurement and there is no use of any offline path planner.

Faheem, S.A Mahmud, G.M khan, M.Rahman and H.Zafar[5] In this paper, the system by which intelligent parking services provide is discussed and details. The system can face the parking problem caused by unavailability of reliable, more efficient and modern car park system. The use of a various modern technique such as wireless sensor expert board fuzzy logic GPS based and vision based can decrease the parking-related issues.

It can help the economic, social and safety based consideration of the society the preservation of the fuel and time can be done by same. It helps us to do the economic analysis and can help to find the feasible project to find the better parking system without making an economic loss. Future work also is done for taking into account different technology an order to develop the system which can be more efficient reliable secure and inexpensive. The analysis should be done economically for both quantitatively and qualitatively result. After the economic analysis is done the given project can finalize.

Our project is basically into the following main points:-

1. *Electrical Section*
2. *Mechanical section*

These two major parts can be further subdivided into subparts.

Electrical section consists of

1. Power supply- we have to develop two power supplies +5v regulated and +12v regulated power supply
2. CPU-(89c51) i.e. Mother Board: - the microcontroller is provided with trans-receivers and pull up resistors in order to avoid the tri- state logic situation. The input to the CPU AT89C51 is from limit switches that will be fitted in mechanical assembly and from the keyboard.
3. Relay Board: - The relay board is driven by the microcontroller its output port. These relays are made ON and OFF as per the commands received by the user from the keyboard and the limit switches.

Mechanical Sections consists of: -

1. Pallet system: - The pallet system consists of 5 pallets. The cars can be moved in the vertical and horizontal direction with the help of the pallet. The pallet will move up and down with the help of motors.
2. Lift moving motors: - The microcontroller takes input from the keyboard and the output from the microcontroller block drives the relays on the relay board that ultimately drives the motor of mechanically assembly to move pallets up and down.
3. 3. DC Motor Principle: - an electric motor is a machine which converts electric energy into mechanical energy. Its action is based on the principle that when a current carrying is placed in a magnetic field. It experiences a mechanical force whose direction is given by Fleming's left-hand rule and whose magnetic field is given by $F=Bil$.newton

4. Limit Switches: - It will be fitted in mechanical assembly. These switches will sense whether the car is on the pallet is present or not.

IV. OPERATIONS

The mechanical assembly is consisting of 3 pallets up and 2 pallets down leaving one place empty for puzzling. The cars are parked automatically with belt pulleys system. The plenty cars can be parked in this fashion.

When a particular pallet key number is pressed by the car holder, the signal goes to the microcontroller via the transceiver. Before taking the decision, it checks whether a route for the car which is accepted to come down is free or not. And if not obstructing pallets are too cleared first. It searches for the output to go high and thus energizing the particular relay. The relay drives the motor in forward and reverse direction and also in up and down motion.

Mechanical assembly: -

Mechanical assembly is nothing but a model of automatic car parking system that decides actually in a well-defined way after taking a look at model one can easily get a clear picture of the actual system.

Since we made this project to the demonstration of the actual placement of component, an overview of its upper edge over the usual face system. Huge building type system when come person clip the TAC and get the car parked so the lines and 5 pallet system.

The three pallets on the 1st-floor limits check the vertical motion of the pallet of the 2nd floor has a horizontal position. The pallet adjusts the position using the software and the pallet on which component is to be placed come on the ground floor accordingly.

We have used 3DC shunt motors (12V) for the vertical motion of the pallet and 2 for the horizontal motion of the pallets through the gear and regarding the pallets arrangements on the ground floor gets their horizontal motion through the rack and pinion arrangement.

The pallets have been supported with the help of extensive string which is capable of lifting up to 0.1KG of the load. Each pallet has been supported with help of way guided around iron boards by placing them through the pallets at the 4 corner this help in avoiding the damaging movement of pallet while moving vertically.

The main frame of mechanical assembly is made up square iron pipes. There is a total of 3 columns that adjust the 1st-floor level and two on the ground floor. To control the motion of the pallets and for their accurate positioning, we have used limits switch at the pallets platforms.

They also provide the feedback to the microcontroller unit by signaling it by presence or absence of cars in pallets and accordingly software works and the relay get the approximate signal from the microcontroller.

V. CONCLUSION

The multi-level car parking system has been designed and developed successfully. Single chip microcontroller is used to control the traffic flow of cars in the multi-level car parking system. Availability of vacant places on each floor is checked by the microcontroller with the help of some sensors. It can be observed that control system for multi-level car parking system has achieved the non-doubtable performance to regulate the entry and exit of the car to several floors accurately. The movement of the car carrier or the car elevator between the floor was continuous and smooth as requested number of entering and exiting the car from all 2 doors was controlled as per this signals from this sensor on each floor at entry and exit point. The entry and exit phases of the car depend upon the availability of the elevator ad time required for exit. The preference for the entry will be for the car that is present at stopping in front of an elevator at the ground floor. Meanwhile, the preference for the exit from another floor will depend firstly on the space and secondly on the time dependent for the exit.

VI. FUTURE SCOPE

There are basically two points we are considering in the future scope of our project. Firstly, we want to replace it by conventional 2 floor or 3-floor parking systems in the residential and corporate building with our automatic car parking system. And secondly, we see our project can be built in collaboration with the construction of 5 and 7-star hotels to accommodate our parking system in the building itself so as the luxury cars can be fitted with the suite of the executive lounges. We are working to develop the project and research on the same. Also, the available parking system is based on the PLC system and we have developed it by using the single chip microcontroller.

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