STUDY AND ANALYSIS TO MODIFY THE AUTOMATED PARKING SYSTEM IN TUMAKURU CITY

Dr. K.V. Manjunath, Navyashree P, Pramod Desai, Ravikumara D, Vishal S.R.

Department of Industrial Engineering and Management

Siddaganga Institute of Technology, Tumakuru – 572103

ABSTRACT: Electro-mechanical system is used in Automated parking system [APS] multiplies the parking capacity inside a parking lot. When driver enters the parking area the Liquid Crystal Display (LCD) shows slots to park the car. This LCD shows available slots as 'A' and Not available as 'NA'. Electro-mechanical devices like, DC motor / Hydraulic pump is used to move up and down of the pallet when car is parked. These electro-mechanical devices are operated through Programmable logic control [PLC] to give commands including, Radio frequency identification [RFID], limit switch and proximity sensor which detects the physical movement of the object and responds to it. Microcontroller checks the signals from sensors and stores the entry and exit data of cars.

Keywords: Automated parking system (APS), Programmable Logic Controller (PLC), Microcontroller, RFID.

1. INTRODUCTION

Tumakuru situated 70 KM from Bengaluru with a total of 1800 crore investment under industries. It has seen high investment and growth in this area due to the rapid growth of the industries. With the way Bengaluru is facing challenges in terms of over population, and increasing cost of living, Tumakuru will prove the ideal satellite city to decongest Bengaluru over the next few years, parallelly the Tumakuru is also growing in terms of population and vehicles. During peak time like fares, festival and weekends people tends to visit commercial centres like shopping mall, shopping streets, bazar etc., due to this parking of vehicles will become a major issue. Considering the parking problem that may arise in future due to increase in vehicles, by adapting automated parking system (APS) this issue can be resolved.

Automated parking system is an electro-mechanically operated system designed to minimize the area or volume required for parking cars with less human efforts thus saves time. As soon as the car is parked on the pallet car gets lifted by the mechanical system.

Types of automated parking system

- Based on automation level
  1. Semi-Automated
  2. Fully-Automated
- Based on system type
  1. Hardware
  2. Software
- Based on End User
  1. Commercial
  2. Residential
  3. Mixed Use
- Based on Design Model
  1. Hydraulic
  2. Electro-Mechanical
- Based on Platform
  1. Palleted
  2. Non-Palleted
- Based on Parking Level
  1. Less than level 5
  2. Level 5 – Level
  3. More than Level 15

2. PROBLEM IDENTIFICATION

- Takes time to find empty slots.
- Require high floor space.
- Long wait times to collect tickets.

3. OBEJECTIVES

- To study the automated parking system.
- To analyse the automated parking system.
- To fabricate prototype of automated parking system.
- Preliminary evaluation.

4. LITERATURE REVIEW

I. Design and fabrication system use sensors to detect the availability of vacant slots and based on the condition, if space is available or not it glows the LED bulbs used for the indication whether the slots are vacant or not. So, the green LED indicates the vacant slot and red LED indicates that no space is available. Not only is the system accurate but less complex. Drawbacks of these system are that is requires a greater number of sensors. Two sensors on elevator and two sensors on the floors are required which increases its cost. The system power consumption is also high. Because of this the parking charges also increases. So, it is not viable to all the apartments and commercial areas.

II. Multilevel parking system paper is dedicated to the use of control systems in car parks. The control system will be instrumental in coordinating the entry and exit from the parking lots. It also introduces the concept of multi-level parking lots that take up less need on the ground and accommodate the large number of vehicles. Hence the need to use technology is unavoidable. In the modern world, where parking space has become a very big issue, it has become very important to avoid wasting space in modern large Automatic multi-level parking system helps to reduce car parking space companies and apartments etc., has been accomplished the multi-level car parking system deals with three floors fitted with two sensors for each floor and two elevator sensors. After hitting the signal from the sensors, the elevator carries the car to each floor under control of programmable logic controller (PLC), and stops automatically.

5. WORKING PRINCIPLE

- According to requirements to Tumakuru, we chose Semi-Automated, Electro-Mechanically based level 2 pallet parking system.

- Vehicle arrives to the ticket counter; driver will collect the ticket. Immediately the empty slot will be displayed on LCD screen.
- LCD screen displays available slot as 'A' and not available slot as 'NA'.
- If LCD screen displays as 'A', then driver should park the car on the specific pallet, If the screen displays as 'NA' the drivers should wait or exit.
- Once the car is parked inside the slot, the proximity sensor will sense and responds signal to the microcontroller indicating that slot is occupied and when car is retrieved back sensor updates to the microcontroller indicating that slot is not occupied.
- When the driver parks the car, the pallet moves upwards with the help of hydraulic lift mechanism which consists of hydraulic piston as pillar's powered by hydraulic pump.
- The panel stop moving upwards, once the limit switch comes in contact with pallet.

6. CONCLUSION

Existing parking system has no slot detection and guiding path. The problem has been resolved by providing LCD screen for vacant and occupied slots near the ticket counter and provide guiding path. This work helps save time and manpower when combined with smart city principles, maximum number of cars can be parked in minimum area. Parking and retrieval of cars is easy and user friendly thus advantageous for commercial purpose.

7. REFERENCE

- V. Padiachy, P. Prasad, A. Chandra
  "Development of an Automated Multi-level Car Parking System"
  Conference Paper · 2019 vol-3
- Uma Maheshwari, Aswini.D,
- Dr. Gururaj murutugudde.
  "Automatic car parking system"
  International journal of pure and applied mathematics 2018 vol-120
- Y. Abujeel, K. Alsharef, M. Saad, A. Albagul
  "Design and Fabrication of an Automated Multi-level Car Parking System"
  Manufacturing Engineering, Automatic Control and Robotics 2017
- Commercial centres - Mantri mall, ETA mall, G.T. World mall, V.R. mall, Phoenix market city, Bangalore.