Design of Automatic Parking System for Two-Wheeler
(with Forklift)

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Abstract — *In Metro cities, two-wheeler parking has become a major problem in all traffic areas. Also problem of two-wheeler parking becomes major in Malls, Multiplexes, and picnic places during weekends. By this project maximum space utilization of parking can be done. This study presents a simulation based feasibility study for development of fully automated parking structure with a group of plates using electromagnet. There are different types of automated parking structure available such as Rotary parking, Multi Circulation parking, Tower parking, Puzzle parking, etc. From these types present study is about Puzzle parking structure. In this structure there are number of floors and each floor can be divided horizontally and also there are number of sections vertically in each floor. In this Puzzle parking system controller software based computer can be used for controlling all the movements of parking system. In addition to these two plates mechanism are used in which one plate used for park the two-wheeler and other one is used for providing base for the electromagnet. Each top plate is used to carry two-wheeler between floors. In which electromagnet is used for holding the two-wheeler. Fork Lift will be used for moving two-wheeler horizontally and vertically in the parking system without need of driver while the engine is off. By this parking system there will be good space utilization. By the help of this parking system we can reduce the retrieving time of the vehicle to approximately 3 minutes as compared to manual.*

Keywords- *Two-wheeler parking system, Puzzle parking, Fork Lift, Electromagnet, Solenoid*

I.   INTRODUCTION

Now a day there is traffic issues due to inappropriate parking of vehicles on road. Due to this people face many difficulties during driving. Due to less parking allotted areas people park their vehicles on road.

It relates to an installation for the parking vehicles which comprises several drive in and drive out positions for vehicles, parking spaces (parking slots) arranged at some parking levels and forming a puzzle structure, and automatically controlled mechanical forklift means for the vertical and horizontal transport of the vehicles between the drive in and drive out positions and the parking spaces. [1]

Proposals are known for mechanical parking systems which don't require the vehicle to be driven to a free parking place within the parking facility, either by ramps or other means of access, but where, instead, mechanical means take over the vehicle on arrival, park it automatically, and later return it to the waiting driver.[2]

One of the important requirements of mechanical parking garages is the speedy storage and retrieval of the vehicles, i.e. the user's waiting time will be kept as short as possible. Depending on location and the kind of use make for the parking garage, it is usually necessary to provide for peak hour operation, when large numbers of vehicles have to be accepted or handed back. But known types of puzzle or silo-type facilities hardly ever meet this important requirement. Thus, for example, in the mechanical puzzle parking system, a single drive in/drive out position receives arrive vehicles on a stack of pallets; a lift then takes the vehicle with the top most pallet, transports it vertically in a central lift shaft, and transports it horizontally in order to reach a location in front of a free parking lot, where it is then stored with the pallet. [3]

II.   COMPONENT USED

A. Plates
B. Motor
C. Worm and warm gear
D. Electromagnet
E. Forklift
F. Solenoids
G. Computerized control system

A. Plates

Two plates mechanism is used in this parking system in which top plate is used for park the vehicle on it and bottom is used for providing base for the electromagnet. Each top plate is used for holding the vehicle between floors and electromagnet is used for holding the vehicle. Bottom plate is fixed with forklift.

B. Motor

There are three motors used in this system.

One is for moving forklift horizontally by the help of worm and warm gear. Second is used for moving forklift vertically. Third is used for moving lift to and fro to the parking slot.

Figure 2.1 Motor

C. Worm and warm gear

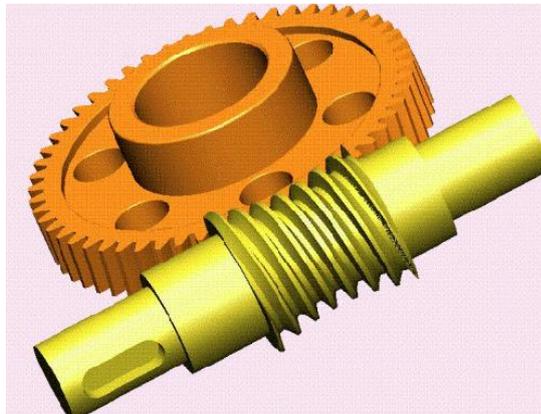It is used for moving forklift horizontally.

Figure 2.2 Worm and warm gear

D. Electromagnet

It is a device which produces magnetic field by using electric current. The magnetic field disappears when the current is turned off. Electromagnets usually consist of insulated wire wound into a coil. A current through the wire creates a magnetic field which is concentrated in the hole in the center of the coil. It is used for holding the vehicle on the plate.
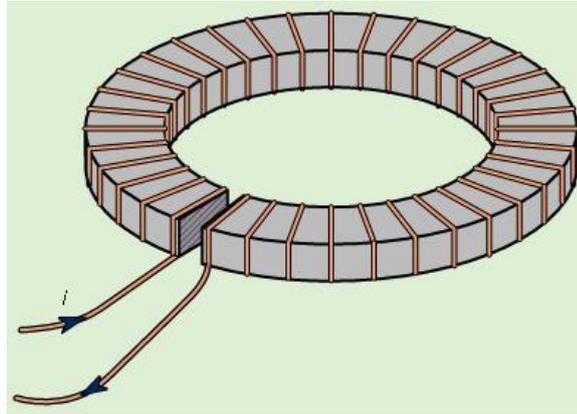
Figure 2.3 Electromagnet

E. Forklift
    It is used for moving vehicles horizontally, vertically and to and fro motion.
F. Solenoids
    It is a cylindrical coil of wire acting as a magnet when carrying electric current. It is used for engage and disengage top plate and bottom plate.
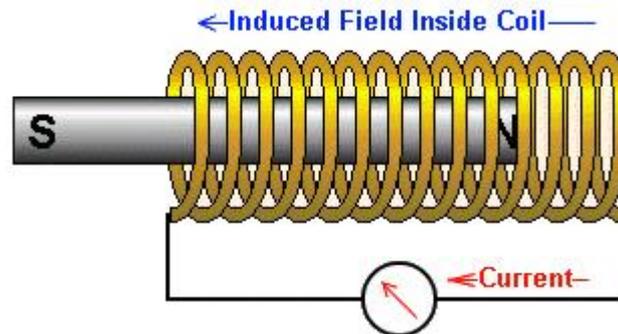

Figure 2.4 Solenoid

G. Computerized control system
    It is used for controlling all the movements of the parking system.

III. MATHODOLOGY

Vehicle enters the parking system. It stops on the top plate as per indication of the system. Driver leaves the vehicle and fills the mentioned data (driver's name, vehicle type, number plate (passing number), etc.) in the computerized system. The computerized system generates the token for the vehicle from the data given by the driver. The whole parking structure is connected to the computerized control system. Then the control system finds the parking slot for mentioned vehicle. Then it commands the Forklift to come to the platform. The forklift has base plate on which electromagnet and solenoids are provided. Then base plate of the forklift is connect to the top plate by solenoid after the electromagnet goes in the slot provided on the top plate. Then electromagnet holds the vehicle by magnetic field. Then the forklift lifts the plate and moves it to the parking slot. Then electromagnet is switched off by the computerized control system. Then solenoid is switched off and the base plate is disengaged from the top plate. Then forklift comes back to its place. At the retrieving time driver needs to insert the token into the computer system. The computer accesses the token and finds the parked vehicle from parking slot. Then computer system gives command to the forklift for bringing the vehicle at the exit point. The driver picks the vehicle and comes out from the parking.

Here is the Numerical model of Automated parking System. This was done by AUTOCAD. From the Literature survey we use most considerable data in our model. Below figure shows the Numerical Model.
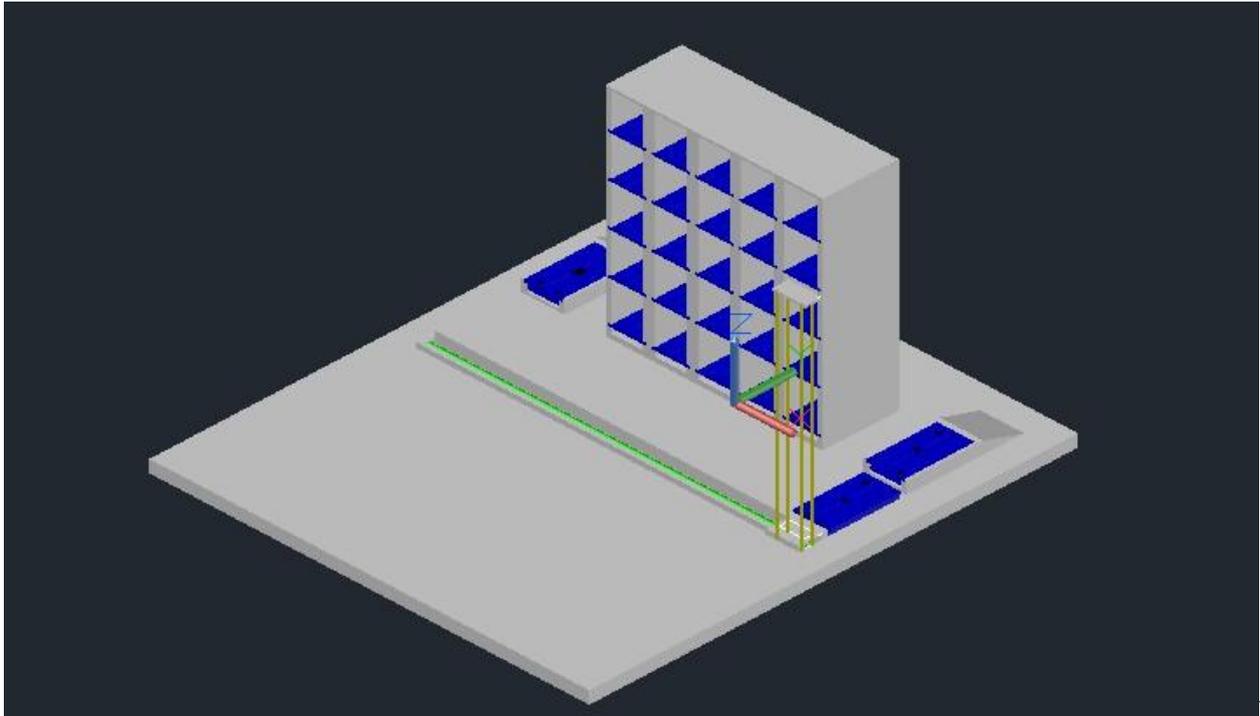
Figure3.1 Numerical model of Parking System

IV. CONCLUSION AND FUTURE SCOPE

By this work done proposal of "Smart parking system" that exploits technology for parking space have availability detection and which allocate optimal parking spots to drivers instead of only supplying and give guidance to them. We have defined the system infrastructure and basic smart parking procedure which studied the main requirement to implement such a system and provide the essential solution. By using this Parking system the retrieving time can be reduced to approximately 3 minutes.

Future enhancement
- In future solar panels can be used on the roof of the parking system to overcome the electricity issues.
- More users friendly will be made as per customer review.
- We can use Piezo-electric material on the top plate and structure slots for power generation.

Figure 4.1 Model of Parking system

Figure 4.2 Model of parking system

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