Smart Rotary Parking System (SRPS)

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Except vertical car parking system all other systems use a large ground area, vertical car parking system is developed to utilize maximum vertical area in the available minimum ground area. It is quite successful when installed in busy areas which are well established and are suffering with shortage of area for parking.

It is simple to operate with the driver parking and leaving the vehicle in the system at the ground level. Once the driver leaves the incorporated safety zone the vehicle is automatically parked by the system rotating to lift the parked car away from the bottom central position. This leaves an empty parking space available at the ground level for the next car to be parked on. The parked car is easily retrieved by pushing the button for the relevant position number the car is parked on. This causes the required car to rotate down to ground level ready for the driver to enter the safety zone and reverse the car out of the system.

Although

The construction of this system is challenging related to the best choice of the materials, chains, sprockets, bearings, and machining operations, kinematic and dynamic mechanisms.

This paper presents the design of a vertical car parking system prototype with its full design details

Keywords— Smart Parking System, Rotary Parking System, Arduino.

I. INTRODUCTION

The number of cars and other vehicles in cities keeps growing as the population continues to grow. However, this growth is combined with an increased demand for land for construction, industry, housing and agriculture. This leaves very little ground in the city for car parks and slots. As a consequence of the massive daily jams, drivers stuck in car parks looking for parking places, be they offices, schools and workplaces. These jams lead to wasted invaluable man-hours, waste of time, which could otherwise be better used. There is therefore a need for an automated parking system to use the available parking system

In this document we examine the existing automated parking systems technology and are developing a working prototype for a Rotary Parking System that is consistent with the needs of Smart City. Tickets, their smart phones or other identification methods for parking their vehicles can be used by drivers. The paper shows the mechanical design steps, the components used and the development system's programming. The system will then be assessed.

The results show that the system developed has been successfully deployed; for this work a working prototype and simulated system were developed and the data show that the Rotary parking system developed actually has the potential to reduce the number of lost man-hours wasted in car parks and to reduce their associated stress and enhance its quality of life further.

It is difficult and difficult to create more car parking areas in the vast majority of cities because cars have almost fully occupied them.

Combining this problem with the inefficient use of parking spaces results in congestion because parking seekers and regular drivers are aggregated.

Recent developments in inexpensive and low-power embedded systems have the opportunity to develop new solutions.

Smart Cities in particular are enhanced by new resource management for their sustainability

[1].The growth of cheap, low-power sensing and communication technologies creates the Internet of Things (IoT) as an overall network infrastructure allowing fine spatial and temporal detail for a wide variety of physical objects and environments.

The detailed, dynamic data gathered from these devices provides the basis for new commercial and public applications, including in public security, transport logistics and environmental management

[2].This paper presents the general concept of the use, on the Internet of Things (IoT) paradigency, of cloud-based intelligent car parking services in Smart Cities.

The IoT sub-system includes the sensor layer, the layer of communication and the application layer.

The architecture of the system is highly described

[3].With regard to the phenomenon of the failure to meet the increasing demand of the private car owners of the common parking service, an intelligent ZigBee network and geomagnetics-based parking guide system was established. Geomagnetic sensors around car parks collected and updated to severe centre via the ZigBee network in real-time vehicle position or related traffic data

[4].Creating extra parking spots for vehicles is difficult and expensive in the vast majority of cities, as they have nearly reached capacity.

When this problem is combined with improper parking space usage, traffic congestion results from the combination of parking searchers and regular drivers.

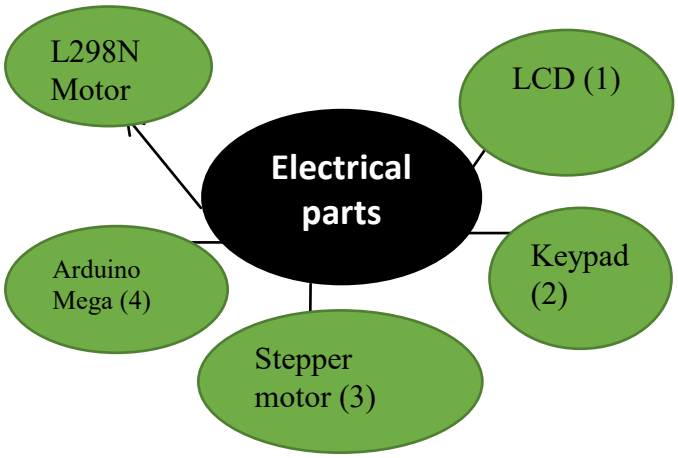
Recent advancements in low-cost, low-power embedded systems have opened the door to new applications to address these issues[5-8].

This paper is presenting the smart solve for the parking problems.

CHARACTERISTICS

- Less cost.
- Space for parking 3 cars can hold more than 4 to 24 cars.

II. ELECTRICAL PARTS



(1):-

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits and devices like mobile phones, calculators, computers, etc.

(2):-

It consists of a matrix of Rows and Columns that connects their rows to serve as a supply source and their columns as a drain for the supply current "may be the opposite", and each button in this matrix works as a switch, and if the button is pressed, it allows the current to pass through.

(3):-

An electric motor is used in small machines that need precise control of their motors, such as printers, laser cutters, etc. One of the most important features of this type of motor is that it is possible to control the number and speed of its cycles and the stopping angle accurately. This motor is also used in robotic applications, since it can be controlled to stop at a specific angle.

(4):-

is an open source platform used for building electronic projects. An Arduino consists of a physical programmable board (often referred to as a microcontroller) and a piece of software, or the Arduino IDE (Integrated Development Environment) software.

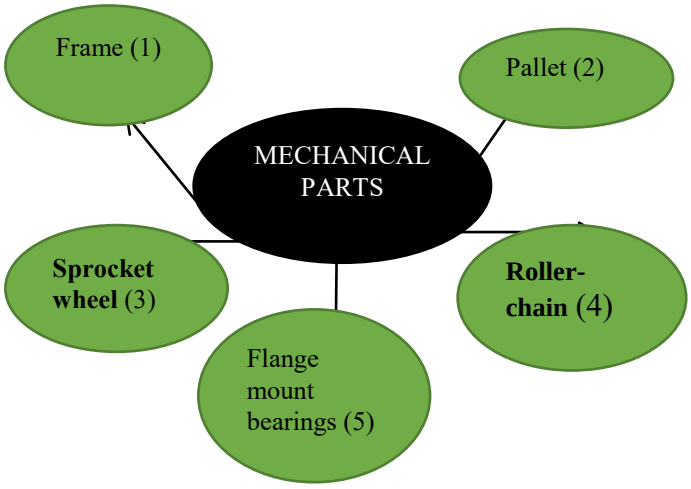
(5):-

The L298N motor unit, called the L298N motor driver, is a driver unit for controlling high-power DC motors such as the DC Motor and the Stepper Motor.

Proteus simulation-:

The parts were connected to the Arduino Mega with the help of the breadboard, and when making sure the connections were made using jumpers, and the motor was connected in a correct way based on the picture shown, the connection method. After that, some questions will appear on the screen, and through the user's answers, specifying the number of cars, the angles between each car, and the speed used. This will be programmed and dealt with through this information entered through the keypad.

III. MECHANICAL PARTS



(1): To build this project, we had to make the frame ourselves, as we determined the dimensions we want, then we used bars of metal and start welding them together to get that shape ,then we began to get all the parts together

(2): is a platform like structure on which the car will stay or lift. It is designed in such way that all car is suitable for this pallet. It is made from mild steel plate and shaped in fabrication process.

(3): is a profiled wheel with teeth, cogs, or even sprockets that mesh with a chain, track or other perforated or indented material. Sprockets are of various designs, a maximum of efficiency being claimed for each by its originator.

(4): is the type of chain drive most commonly used for transmission of mechanical power on many kinds of domestic, industrial and agricultural machinery, including conveyors, wire- and tube-drawing machines, printing presses, cars, motorcycles, and bicycles.

(5): are bearing units contained inside a housing unit. The housing provides a rigid and secure position while allowing the bearing unit to rotate within a clean, contained environment. The housing is bolted to a foundation allowing the outer ring of the bearing to remain stationary while the inner ring rotates. Housed bearings are most commonly used in light duty applications.

IV. PROGAMMING:

It is possible to configure speed, individual shift angle for each step, set steps per revolution value etc., for different motor and environment flexibility. This program gives us the ability to choose which platform we want to be at the zero position.

This system works as follows:

By pressing the button for the relevant position number, the parked car can be readily retrieved. The needed car will spin down to ground level, allowing the driver to enter the safety zone and reverse out of the system.

Features:

Adjustable motor speed (RPM).

Changeable Steps per revolution value for any bipolar stepper motor to be used. (Though 200 steps per revolution or 1.8-degree step angle motor is preferred).

Adjustable number of platforms.

Adjustable which platform we want to start with.

Individual shift angle for every stage (thus any error in manufacturing can be programmatically compensated).

Bidirectional movement for efficient operation.

Settable offset.

Storage of setting, thus adjustment required in first run only.

To program the board (or Arduino), Arduino IDE or Arduino builder is required.

V. CONCLUSION

[1] The system benefits of smart parking go well beyond avoiding the needless circling of city blocks. It also enables cities to develop fully integrated multimodal intelligent transporta-tion systems that don't rely on cars in the first place.

[2] Developing smart parking solutions within a city requires data standardization and mana-gement mobile-phone integration hardware and software innovation and coordination among various stakeholders.

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