International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 04 | April - 2021 ISSN: 2582-3930

Automatic Parking System in E-Vehicle

B.NoorulHamitha[1] ,
M.AbdulRaheem[2], S.ShangarGhanesh[2], N.Surya[2]

[1]Assistant Professor/EEE, Kamaraj college of Engineering & Technology,
[2]Student/EEE, Kamaraj College of Engineering & Technology

Abstract -

The industrialization of the world, increase in population, slow paced city development and mismanagement of the available parking space has resulted in parking related problems. There is a dire need for a secure, intelligent, efficient and reliable system which can be used for searching the unoccupied parking facility and guidance towards the parking facility.This project describes a control system which automatically parks a scaled automobile inside a rectangular reduced space given certain conditions and making decisions based on some sensors. We have studied some of the existing systems and it gives that most of the existing systems aren't completely automated and require a certain level of human interference with the system. The difference between our system and the other existing systems is that to make our system as less human dependent as possible by automating the car to park the car themselves in parking lot.

Key Words: Parking management system, Ultrasonic Sensor Unit, E-Vehicle

1.INTRODUCTION

The rapidly increasing urban population and improvements in living standards, the number of vehicles has increased dramatically. The rapid increase in urban car ownership not only increases the burden of urban traffic but also exacerbates the problem of insufficient parking spaces. The increased driving distance in the parking process increases energy consumption and exacerbates parking difficulties, which increasing the number of minor accidents, such as scuffing and collisions.

At present, intelligent vehicles are the main development trend of the automotive industry and is the research focus of major domestic and foreign automobile manufacturers and research institutions. As a key component of intelligent vehicle technology, automatic parking technology has become a popular research topic. Automatic parking technology completes parking operations safely and quickly without a driver and can effectively improve driving comfort while greatly reducing the probability of accidents during parking. In addition, the popularization of automatic parking technology can promote the development of automatic and intelligent vehicles.

In the development of traffic management systems, an intelligent parking system was created to reduce the cost of hiring people and for optimal use of resources for car-park owners. Currently, the common method of finding a parking space is manual where the driver usually finds a space in the street through luck and
experience. This process takes time and effort and may lead to the worst case of failing to find any parking space if the driver is driving in a city with high vehicle density. The alternative is to find a predefined car park with high capacity. However, this is not an optimal solution because the car park could usually be far away from the user destination

In recent years, research has used vehicle-to-vehicle and vehicle-to infrastructure interaction with the support of various wireless network technologies such as radio frequency identification (RFID), wireless mess network, and the Internet. This study aimed to provide information about nearby parking spaces for the driver and to make a reservation minutes earlier using supported devices such as smartphones or tablet PCs.

It can help drivers automatically drive the car in constrained environments where much attention and experience is required. The parking strategy is completed by means of coordinated control of the steering angle and taking into account the actual situation in the environment to ensure collision-free motion within the available space. Several automobile research institutes and manufacturers are developing automatic parking systems. The group in INRIA has built up complete sensor based control architecture for an autonomous vehicle. Their planning method is a model-based approach that decomposes the motion into a number of "parallel parking" series. By use of the ultrasonic sensors, the size of the free parking space is determined.

As a key component of intelligent vehicle technology, automatic parking technology has become a popular research topic. Automatic parking technology completes parking operations safely and quickly without a driver and can effectively improve driving comfort while greatly reducing the probability of accidents during parking. In addition, the popularization of automatic parking technology can promote the development of automatic and intelligent vehicles.

This research proposes an automatic parking system (APS) with a good performance for vehicle. The proposed configuration of the APS includes sensors information fusion, position estimation, path planning, and tracking algorithm. Parking space, in particular, is scarce in most metropolitan areas and intelligent systems are required to coordinate parking. This paper presents a wireless system for locating parking spots remotely via a wireless sensor node which determines if parking spots are vacant or not. If it is found that the system is highly efficient and has high accuracy, even at long ranges. We have studied some of the existing systems and it shows that most of the existing systems aren't completely automated and require a certain level of human interference or interaction in or with the system. The difference between our system and the other existing systems is that we aim to make our system as less human dependent as possible by automating the cars as well as the entire parking lot, on the other hand most existing systems require human personnel to park the car themselves.

2. PROPOSED WORK

2.1 BLOCK DIAGRAM EXPLANATION

In this paper, we present the proposed architecture of our system. The Parking control system is solely responsible for ensuring proper parking of the vehicle to the destined position. The system installed in the car is responsible for movement of the car as per the commands received from the Parking system.

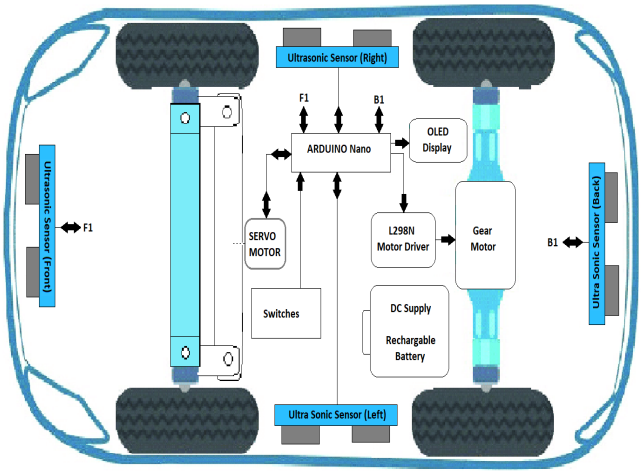

Fig 1- Block diagram

The proposed system is divided into following 4 modules:-
1) Interfacing Ultrasonic with Microcontroller.
2) Interfacing Gear Motor with Microcontroller.
3) Interfacing Servo Motor with Microcontroller.
4) Interfacing OLED with Microcontroller.

2.2 MODULAR DESCRIPTION

Interfacing Ultrasonic sensor with Microcontroller

Ultrasonic sensor is an electronic device that measures distance of a target or object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound. This sensor interfaced with microcontroller for measuring the place to park the car and further parking operation.

Interfacing Gear motor with Microcontroller

Gear motor uses gearbox to increase output torque and reduce RPM. The Gear motor is used for forward and Reverse action of the car which gets encoded message from the microcontroller. Gear motor controlled by motor driver which is also interfaced with Microcontroller. The Gear motor transmitted further action in serially and synchronized form for the further operation of back wheel.

Interfacing Servo motor with Microcontroller

Servo motors are controlled by sending an electrical pules of variable width modulation, through the control wire. It can usually only rotate 90 degree in either for a total movement of 180 degree movement. The Servo motor control right and left turning action of the car which gets encoded message from the microcontroller. Servomotor controlled by motor driver which is also interfaced with Microcontroller. It fully control action of front wheel for park the car in correct place.

Interfacing OLED with Microcontroller

Interfacing of microcontroller with OLED Unit is mainly used for displaying the parking slot status data to the system user. The OLED module can represent data in alpha-numeric data along with some pre-defined characters. The OLED module communicates with the micro-controller and displays the condition of the car.

3. WORKING

A proposed system on Automatic Parking System in E-Vehicle has been worked as following. It stars from press the switch when car reach the parking lot. When we (owner) Press the park button in system, the command turn on the parking process which is controlled by microcontroller. The process of parking needs some information which is taken from ultrasonic sensor. Information from Ultrasonic sensor used to find the space to park car in accurate place. The front and back sensors are trace the information about obstacles which across to the car. And then left and right side sensors are measure the place to park the car and all the information processed by the microcontroller. The front and back wheels are under the control of microcontroller. DC Gear motors are used as back wheels and control of front wheel taken by Servo motor.

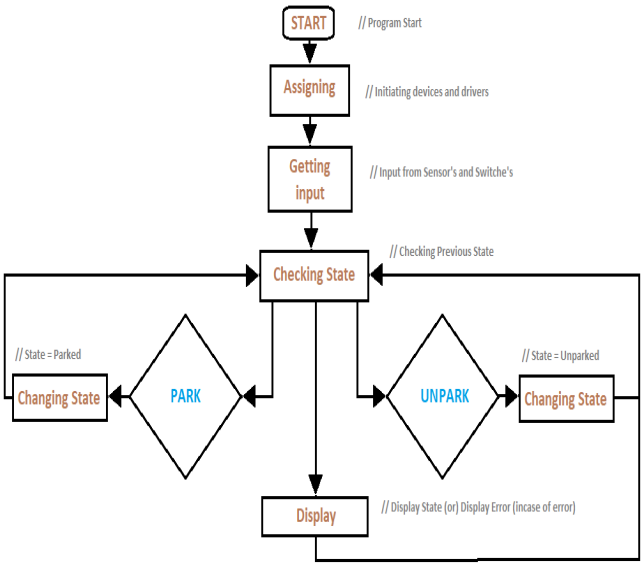

Fig 2-Flowchart

The collected information from the sensors are used to park the car by controlling the motors which can controlled by microcontroller. Information from ultrasonic sensor is enough to park the car then the microcontroller drive the car by controlling the front and back wheels. When the process of parking once finished the massage displayed by OLED Display. If we (owner)want to un-park the car, the operation done by turn on the un-park switch. As same way the car automatically un-park itself by doing the same operation in inversely and OLED will display un-park state on it. In other case if the ultrasonic sensor cannot find the further place to park car, this information displayed also by OLED display.

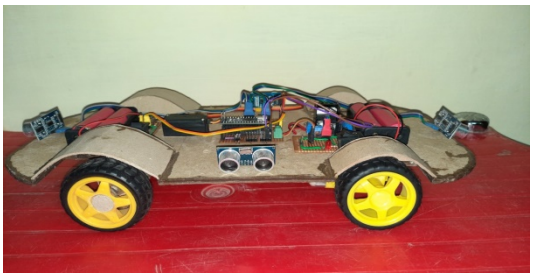

Fig 3- Side view of Automatic Parking System

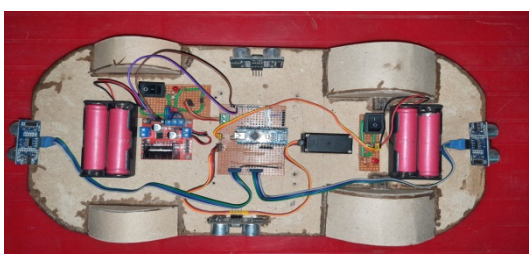

Fig 4- Top view of Automatic Parking System

3.1OBJECTIVE

- To improvement of e-vehicle as automatic vehicle.
- To park the car without any human interaction.
- To development of traffic Management in city or developed area.
- To find the free parking space in crowd area.
- To reduce the wastage of time when parking the car.

4. CONCLUSIONS

- This project reviews Intelligent Parking Services used for parking guidance, parking facility management and gives an insight into the economic analysis of such projects.
- The objective of such technology is the reduction of the burden on driver, improvement of the traffic capacity, and provision of reliable and secure car functions.
- Smart parking system is able recognize free parking spaces and guidance to park the car.
- The discussed systems will be able to reduce the problems which are arising due to unavailability of a reliable, efficient and modern parking system.

5. REFERENCES

1. Bobin Wang, Chunfu Shao, Juan Li, et al. “Investigating the interaction between the parking choice and holiday travel behavior, ” Advances in Mechanical Engineering, vol. 7, no. 6, pp. 1-11, Jun. 2015.
2. Mireia Roca-Riu, Elena Fernández, and Miquel Estrada. “Parking slot assignment for urban distribution: Models and formulations,” Omega, vol. 57, pp.157-175, Dec. 2015.
3. Xinxin Du and Kok Kiong Tan. “Autonomous reverse parking system based on robust path generation and improved sliding mode control,” IEEE Transactions on Intelligent Transportation Systems, vol. 16, no. 3, pp. 1225-1237, Sep. 2014.
4. Aneesh Chand, Michihiro Kawanishi and Tatsuo Narikiyo. “Application of sigmoidal Gompertz curves in reverse parallel parking for autonomous vehicles,” International Journal of Advanced Robotic Systems, vol. 12, no. 9, pp. 127, Jan. 2015.
5. Yiding Hua, Haobin Jiang, Yingfeng Cai, et al. “Path Tracking Control of Automatic Parking Cloud Model considering the Influence of Time Delay,” Mathematical Problems in Engineering, vol. 2017, Feb. 2017.
6. M.Ataur Rehman, M.M. Rashid, A.Musa, AFarhana and N.Farhana,“Automatic parking management and parking fee collection based On Number Plate Recognition”, International Journal of Machine Learning and Computing, vol. 2, no. 2, pp. 93 98, 2012.

7. G. Horng, C. Wang and S. Cheng, “Using cellular automata on recommendation mechanism for smart parking in vehicular environments,” in Proc. of 2nd Int. Conf. on Consumer Electronics, Communications and Networks (CECNet), pp.3683 - 3686, April 2012.
8. S. Banerjee, “An overview of common parking issues, parking management options and creative solutions, ”Department of Transportation, August 2003.
9. E. Polycarpou, L. Lambrinos and E. Protopapadakis, “Smart parking solutions for urban areas," in Proc. of 14th IEEE Int. Symp. And Workshops on Wireless, Mobile and Multimedia Networks (WoWMoM), pp.1-6, June 2013.
10. Y. Shah, W. Tan and K. Durai, “Design and development of a IPv6- based Smart Parking System,” in Proc. of Int. Conf. on Information,Communications and Signal Processing (ICICS), pp.1- 5, Dec. 2013.