A PROJECT PHASE-I REPORT ON

AUTONOMOUS VEHICLE PARKING USING NUERO FUZZY

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE IN
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CERTIFICATE

This is to certify that the project phase-I report entitled

"Autonomous Vehicle Parking Using Nuero Fuzzy"

Submitted by

is a bonafide work carried out by them under the supervision of Prof. S. V. Moholkar and it is approved for the partial fulfillment of the requirement of Savitribai Phule Pune University for the award of the Degree of Bachelor of Engineering (Electronics and Telecommunication Engineering)

This project phase-I report has not been earlier submitted to any other Institute or University for the award of any degree or diploma.

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CONTENTS

ABSTRACT

The first aim of project is design an advanced vehicle parking system this system will automatically park the car without using the driver. This system has shown the concept of an automatic car parking system. Everything in the modern world is going automatic, we have built a system which can automatically sense the empty parking slot and the car is parked automatically. This automated car parking system reduces the time taken to check the space for vehicles.

These systems can also works as retrieving the car from parking space. A neuro-fuzzy model has been developed for autonomous parallel parking of a car-like mobile robot. In our approach we have focused on the most difficult case of parallel parking which is the case when the parking space dimensions cannot be identified. Stepper motor or (DC) motor is used to provide the movements of transporting the car in the parking system. The Ultrasonic Sensor is used to detect the empty slot which is achieved by measuring the distances. This project is developed using 16f/18f microcontroller.

CHAPTER 1
INTRODUCTION

1. INTRODUCTION

1.1 BACKGROUND

In this modern world, parking of vehicles has major issue in the world. Because population is growing drastically which indirectly reduces the space available for parking.Due to this high population, traffic congestion problems have become a major issue in today’s world. So it is a need to solve the parking problems and provide an efficient solution for parking of the vehicles.

Car parking is a major problem in urban areas in both developed and developing countries. Following the rapid incense of car ownership, many cities are suffering from lacking of car parking areas with imbalance between parking supply and demand which can be considered the initial reason for metropolis parking problems. This imbalance is partially due to ineffective land use planning and miscalculations of space requirements during first stages of planning. Shortage of parking space, high parking tariffs, and traffic congestion due to visitors in search for a parking place are only a few examples of everyday parking problems. Advanced Car Parking is an efficient solution for traffic congestion. The design of this system in which the parking has no intervention of human at all.

This system has not only reduces the human efforts, but also reduces the consumption of space. The advanced car parking assures full safety of vehicle and its owner.

- **Problem of parking**

Saturated parking spaces

One of the most common problems today is a saturation of parking spaces. Incidences of violence over occupancy, deformed cars due to a space crunch, and overcharging for parking are some problems that result. Most cities propose increasing parking spaces to combat the problem.

1.2 OBJECTIVES

- To scan the Parking space and verify the distance.
- To adjust the position of vehicle for parking.
- To start the parking algorithm and get the vehicle parked.
- To un-park the vehicle.

1.3 PROJECTUNDERTAKEN

The project undertaken is “autonomous vehicle parking using neuron fuzzy”. The main purpose of this project is to provide automatic self-parking system with maximizing efficiency.

CHAPTER 2
LITERATURE SURVEY

Sr. No	Title	Authors	Publishing Year	Data Seeds
1	Privacy-Aware Autonomous Valet Parking: Towards Experience Driven Approach	Shiva Raj Pokhrel; Youyang Qu; Surya Nepal; Surjit Singh	2020	Driverless parking, an influential application of Mobility as a Service (MaaS) model, is one of the clear early benefits for autonomous vehicles, given often narrow spaces and multiple potential hazards (such as pedestrians stepping out from in between other vehicles).
2	Sensor Technology in Autonomous Vehicles : A review	sean Campbell Institute of Technology, Tralee Niall O' Mahony Institute of Technology, Tralee LenkaKrpalkova Institute of Technology, Tralee Daniel Riordan Institute of Technology, Tralee	2018	This paper review the main sensor technologies used to create an autonomous vehicle. Sensors are key components for all types of autonomous vehicles because they can provide the data required to perceive the surrounding environment and therefore aid the decision-making process .

3	Autonomous Parking Using Optimization-Based Collision Avoidance	Xiaojing Zhang; Alexander Liniger; Atsushi Sakai; Francesco Borrelli	2019	The main idea was to first use a generic path planner, such as Hybrid A*, to compute a coarse trajectory using a simplified vehicle model and by discretizing the state-input space. This path is subsequently used to warm-start the OBCA algorithm, which optimizes and smoothens the coarse path using a full vehicle model and continuous optimization.

4	Automatic Parking Vehicle System	George Tzanetakis, Perry Cook Ms. Honghong Liu Dr. Gene Yeau-Jian Liao, Wayne State University ..	2016	)The project is focused on achieving a single task (automatic parking) by integration of sensors and actuators controlled by microcontroller and strategy planning/coding, therefore the vehicle platform is not built from the parts but from modifying a RC toy car instead for saving the time. There are generally three kinds of parking patterns: parallel, front/back-in perpendicular, and with an angle (usually 45 degrees), and this project is just focused on the parallel parking

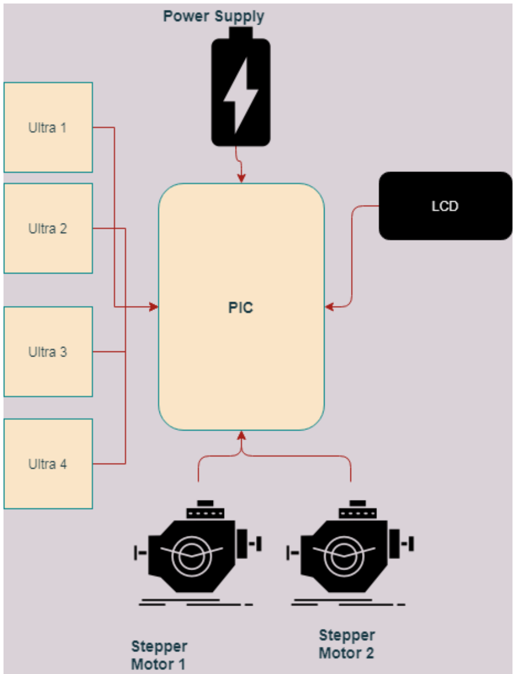
5	New approach for self-parking management system	HichamLahdili Zine El AbidineAlaouiIsmaili	2018	)This proposal is a combination of two subsystems that will be collaborating to achieve a fully automated system; the first part is composed of an indoor navigation system, based on the adaptation of the available surveillance camera network in the parking area.

6	Self Parking car prototype	Anukriti Singh Aditi Chandra DivyaPriyadarshni Nisheeth Joshi	2018	)we present a simple yet effective method for implementing lowcost self-parking car. Hardware like raspberry pi 3, infraredsensors and webcam are used. We experimented other methodsof parking the car with our prototype like parallel and per-pendicular parking

CHAPTER 3
DESIGN AND DRAWING

3. DESIGN AND DRAWING

3.1 BLOCK DIAGRAM



3.1 BLOCK DIAGRAMDESCRIPTION

We have proposed a developing the autonomous parking car project. In autonomous parking, we need to create the algorithm and position the sensors according to certain assumptions.

Our assumptions will be as follows in this project. In the scenario, the left part of the road will consist of a wall and parking areas. As you can see in the video, it detects the surroundings with a total of 6 sensors, 2 on the left side and right side of the car and one on the rear and front.

When the car starts to move, the sensors on the left side constantly measure the distance and search for the appropriate width in the parking area. If both sensors detect a suitable distance for parking, the parking procedure algorithm is activated.

In Parallel Parking the car passes the parking area and the car stops when the two sensors on the edge see the wall again. It comes back a little. And it turns 45 degrees to the right. While moving backwards, the rear sensor measures and enters the parking area and starts to turn left.

While moving to the left, the sensors on the edges continuously measure and continue to turn left until the value measured by the two sensors is equal to each other. It stops when it's equal. The front sensor measures and moves forward until it is less than 10 cm. and stops if it is less than 10 cm. and the parking process ends

3.2 ADVANTAGES, DISADVANTAGES AND APPLICATIONS

- **Advantage**
- Save Space and Money. A typical parking garage is constructed to allow cars enough room to safely circulate in both directions and back out of parking spaces.
- Lower Operational, Construction and Finishing Costs.
- Decrease Environmental Impact.
- Increase Customer Satisfaction.

- **Disadvantage**
- There is a greater construction cost per space (but this may be offset by the chance for lesser land costs per space and the system manufacturers say that the operating and maintenance cost will be lower as compared to a conventional ramped parking structure).
- Use of redundant systems will result in a greater cost.
- It may be a bit confusing for unfamiliar users.
- It is not recommended for high peak hour volume facilities.
- There may be a fear of breakdown (How do I get my car out?).
- There is an uncertain building department review and approval process.
- It requires a maintenance contract with thesupplier.

- **Application**

- Parking system
- Shopping Mall
- Automatic cars

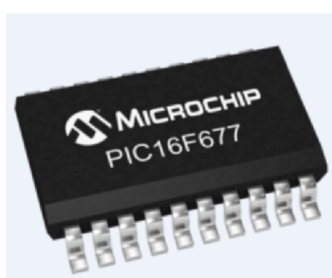
CHAPTER 4
IMPLEMENTATION

4.1 IMPLEMENTATION-:

1. Pic microcontroller -:

PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology, derived from the PIC1650[1][2][3] originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller,[4] and is currently expanded as Programmable Intelligent Computer.[5] The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems.

Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types.



Pic microcontrolle

Ultrasonic sensor-:

Ultrasonic transducers and ultrasonic sensors are devices that generate or sense ultrasound energy. They can be divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound. In a similar way to radar and sonar, ultrasonic transducers are used in systems which evaluate targets by interpreting the reflected signals. For example, by measuring the time between sending a signal and receiving an echo the distance of an object can be calculated. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions. The design of transducer can vary greatly depending on its use: those used for medical diagnostic purposes, for example the range-finding applications listed above, are generally lower power than those used for the purpose of changing the properties of the liquid medium, or targets immersed in the liquid medium, through chemical, biological or physical (e.g. erosive) effects. The latter class include ultrasonic probes and ultrasonic baths, which apply ultrasonic energy to agitate particles, clean, erode, or disrupt biological cells, in a wide range of materials

Ultrasonic

LCD Display-:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly,[1] instead using a backlight or reflector to produce images in color or monochrome.[2] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.

LCDs are used in a wide range of applications, including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in LCD projectors and portable consumer devices such as digital cameras, watches, digital clocks, calculators, and mobile telephones, including smartphones. LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to very large television receivers. LCDs are slowly being replaced by OLEDs, which can be easily made into different shapes, and have a lower response time, wider color gamut, virtually infinite color contrast and viewing angles, lower weight for a given display size and a slimmer profile (because OLEDs use a single glass or plastic panel whereas LCDs use two glass panels; the thickness of the panels increases with size but the increase is more noticeable on LCDs) and potentially lower power consumption (as the display is only "on" where needed and there is no backlight). OLEDs, however, are more expensive for a given display size due to the very expensive electroluminescent materials or phosphors that they use. Also due to the use of phosphors, OLEDs suffer from screen burn-in and there is currently no way to recycle OLED displays, whereas LCD panels can be recycled, although the technology required to recycle LCDs is not yet widespread. Attempts to maintain the competiviveness of LCDs are quantum dot displays, marketed as SUHD, QLED or Triluminos, which offer similar performance to an OLED display, but the quantum dot layer that gives these displays their characteristics can not yet be recycled.

Since LCD screens do not use phosphors, they rarely suffer image burn-in when a static image is displayed on a screen for a long time, e.g., the table frame for an airline flight schedule on an indoor sign. LCDs are, however, susceptible to image persistence.[3] The LCD screen is more energy-efficient and can be disposed of more safely than a CRT can. Its low electrical power consumption enables it to be used in battery-powered electronic equipment more efficiently than a CRT can be. By 2008, annual sales of televisions with LCD screens exceeded sales of CRT units worldwide, and the CRT became obsolete for most purposes.

LCD Display

DC Gear Motor-:

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances.

Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

DC Gear

Working Of system -:

- First we press switch to start car
- We are using ultrasonic sensor to calculate side distance of car
- As per distance system will control motor speed and gear while direction
- We are using DC gear for left , right, forward, backward moving direction
- After successful parking we will show notification LCD display.

CHAPTER 5
CONCLUSIONS

CONCLUSION

Thus we have focused on the most difficult case of parallel parking which is the case when the parking space dimensions cannot be identified. We are reducing the time to park the Car and save the fuel. This type of technology could be implemented in Self Driving car in which most of the functionalities would be Autonomous. The proposed automatic-driving car is successfully created, implemented and tested.

CHAPTER 6
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[1]