

**Smart Four Wheeler Parking Management System Using Ultrasonic Sensor**Ashwini Kulkarni¹, Amrapali Ladkat², Pooja Bhelake³, Harshal Deshmukh⁴, Prof. Sandip U. Kadam⁵¹B.E Student of Information Technology, Zeal College of Engineering & Research²B.E. Student of Information Technology, Zeal College of Engineering & Research³B.E. Student of Information Technology, Zeal College of Engineering & Research⁴B.E. Student of Information Technology, Zeal College of Engineering & Research⁵H.O.D. of Information Technology, Zeal College of Engineering & Research

Abstract — Tremendous growth in world population, giant industrialization, high four wheeler utilization, slow paced city development and mismanagement of available parking space leads towards necessity of smart four wheeler parking management system. There is a dire need for intelligent, efficient and reliable system which can be useful in searching the unoccupied parking facility, guidance towards parking along with proper management of the parking facility. The traditional parking system is used more often which has its own disadvantages like maintainability, training cost, system is dependent on human resources, time consuming, congested. This proposed system makes use of Ultrasonic sensors and to create android application for smart parking system to overcome the disadvantages of traditional system. It minimizes the human involvement and efficiently manages the empty parking slots. It provides direct user access through android application.

Keywords- Ultrasonic Sensor, Android Application, Arduino Board, Microcontroller, Wi-Fi Module.

I. INTRODUCTION

India is a developing country. People tend to migrate from villages to towns and from towns to metropolitan cities. This has resulted into tremendous pressure on civic body to provide basic amenities to the growing population. Increase in population is directly proportional to increase in the number of vehicles. As cities are getting more and more populated open space is reducing, finding parking space has become one of the hardest tasks for city dwellers. The difficulty in finding a parking space introduces stress in driver and wastes both – time and fuel.

In traditional parking system there is no guarantee of finding available parking space. There is more human involvement which leads to maintenance cost, training cost and least efficiently occupying of free parking spaces and so on. Smart Parking using ultrasonic sensors and android application leads us to answer of these challenging tasks.

The existing system uses traditional approach. The human resource is used sometimes along with surveillance cameras. But there are various drawbacks of existing parking management system. It is costly to maintain. Temper flare between two visitors. If cameras are used, constant monitoring is required.

The purpose of this survey paper is to compare traditional parking system and to stress the advantages of latter over the former. The proposed system consists of Arduino board, Ultrasonic Sensors, Wi-Fi module and an Android Application. The ultrasonic sensors detect whether the parking space is empty or not by sending out a high-frequency sound pulse and the time taken by echo of sound to reflect back. The IDE of Arduino consists of sketches (programs), it is result for data provided by ultrasonic sensors at developer machine. Wi-Fi module is used connect the developer machine to android application. An Android Application helps the end user to find the available parking space and take shortest path for that parking space without involving management personnel. This system gives advantage over the traditional system.

II. LITERATURE SURVEY

This paper has compared the following implemented papers with our system.

2.1 A Smart Parking System Using Wi-Fi and Wireless Sensor Network

This approach uses wireless sensor network to create communication methodology applied for Smart Parking System in three parts:

1] Parking Space Detection Algorithm: In this algorithm, the parking space detection uses a sensor node that estimates on which side is the car parked - in or out and the result will be send to a node name sink node and then will be forwarded to the server. ^[1]

2] Wi-Fi Positioning and Navigation: The Wi-Fi will send a result when a vehicle will be passing by sensor node, a peak will be detected to the data.

3] System: All the information will be processed in the server and the information will also be provided to the user with help of smart mobile device.

2.2 Smart Parking System Based on Embedded System and Sensor Network

The system is designed and implemented using Reservation based Smart Parking System (RSPS) approach.^[2] This Smart Parking System is implemented for multilevel parking using WSN. The modules used in the system are:

A] Space Detection: The space is detected using IR LED which keeps on transmitting infrared rays up to a certain range and when these rays hit any object, the waves reflect back which are then captured by photodiode.

B] Communication: Following two communication techniques are used:

I] V2I: It involves the driver sending request for parking status information and confirmation of reservation.

II] I2V: It involves the functionality of reserving the space for the user and guidance to the driver with help of a map, map contains the images of the path allocated to the reserved parking space.

C] Allocation: The system helps to locate the nearest parking space which is empty to the user by performing linear search. This helps in optimal allocation of the parking space.

2.3 Smart Campus Phase One: Smart Parking Sensor Network

The implemented system presents Sensor Network/IOT-based Smart Parking facility. The system contains sensing devices, network and a server application. It presents a low cost solution for the issues such as huge cost for parking, importing components from foreign vendors and so on.^[3]

The wireless sensor node is used to check whether the space is empty or full. It contains two sensor, first is distance sensor to measure the distance and magnetic sensor to detect the object nearby. These both sensors are connected with a microcontroller.

The Relay node acts as a hop between a pair of distantly located nodes which results in prolonged lifetime of the sensor network and can overcome challenges such as scalability, limited power and connectivity.

The mobile application provides bi-directional communication between client and server and also shows the available parking spaces.

2.4 Parking Space Detection Using Ultrasonic Sensor in Parking Assistance System

The main purpose of this proposed system is to make use of the ultrasonic sensor for detecting the empty space in the parking areas. Multiple echo function is considered as a best option for real time environment parking detection. Various types of sensors are discussed here, such as Vision sensor, Laser range finder and Short range radar.

In earlier research ultrasound was transmitted and only a single echo was received. But here ultrasound is transmitted once and multiple echoes (more than 2 times) is received. The errors can be observed in edge detection because in reality edges of automobiles are very much rounded due to which it becomes difficult to get accurate results. So to manage these errors adjustments in radial resolution of MEF, amplitude gain and ultrasonic sensors rotation.^[4]

The edge having more than 20cm errors are examined and amplitude gain is effectively reduced with increase in the width of sensor. The comparison is done between Satonaka's method and proposed method by various models of vehicles (SUV, Sedan). This system can be implemented easily and it is very simple which can correctly predict the edge detection

III. ARCHITECTURE DESIGN

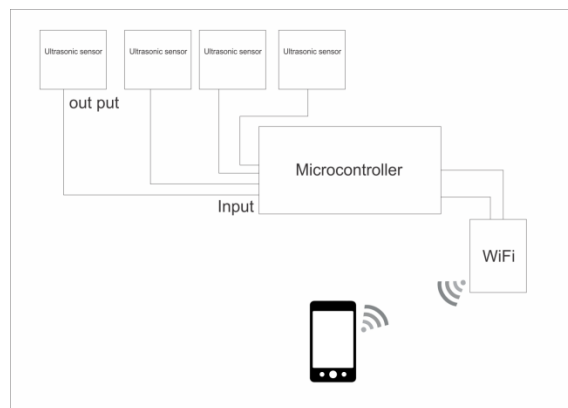


Fig: Block diagram of proposed system

Ultrasonic sensor detects the vehicle – send yes signal to microcontroller – controller initiate vehicle presence command in data base. If ultrasonic sensor detect no vehicle – send no signal to (0) controller- controller initiate parking

empty command in data base. When digital signal initiate WI-FI. It connect with android platform and WI-FI send real time data string to application. System can detect status of parking. When system detects parking space from stored data base the user can easily access the easiest path for that position .

IV. CONCLUSION

In this paper, we compare existing parking management system with the proposed system. The proposed system Smart Parking Using Ultrasonic Sensor includes Microcontroller (Arduino), WI-Fi module, Ultrasonic Sensors and Android Application.

Ultrasonic sensor senses whether the parking lot is empty or not. Data captured by ultrasonic sensor and is send to Arduino board IDE of Arduino board on developer's machine which connects to a application through Wi-Fi module. Shortest path to the parking lot is displayed on the android application at end user. The low management cost, reduce human involvement, accuracy and probability are the advantages of the proposed system over the traditional system.

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