

# SMART PARKING GUIDANCE SYSTEM USING WSN

Rao Bahadur Y Mahabaleshwarappa Engineering Collage, Ballari, INDIA

**Mrs Suvarna.S.Patil Assistant professor**

Dept of Electronics & communication  
Engineering, RYMEC Ballari.

**Ms Farah Naaz UG Student**

Dept of Electronics & communication  
Engineering, RYMEC Ballari.

**Ms Sahana Yadav UG Student**

Dept of Electronics & communication  
Engineering, RYMEC Ballari.

**Ms Sushma M UG Student**

Dept of Electronics & communication  
Engineering, RYMEC Ballari.

**ABSTRACT:** *Wireless sensor network (WSN) has received intense attention in recent years and has been applied in industrial areas. Based on the Open WSN platform, we design an intelligent parking system to help avoid the crowd jam of parking lot in city. Both theoretical analysis and practical simulation are presented in this paper. Due to energy limitations of wireless sensor networks and the objective circumstances of the parking lot, novel network protocols (MAC and NET layers) are proposed to handle the above situations. Detailed experimental design and simulation are evaluated in the experiment section to show the effectiveness and efficiency of the new scheme.*

**KEYWORDS:** Wireless sensor networks; Parking guidance.

## 1. INTRODUCTION

Finding a free parking slot in a congested city like big cities is very hard. Here, if anyone wants to go outside from home with personal car first thing comes in his mind is about parking, where he will park his car. Most of the cases, people go to a parking station and find that all parking slots are full and then he has to search for another parking slot. So, it is a big hassle and many people keep in fear about parking of his car when he gets out with his car. So, I was thinking, how the problem can be solved and finally I succeeded to make a smart parking system and I hope implementing the system can remove the parking problem of the city. Using this system a user will be able to find an available parking slot easily using web app from anywhere and can book the slot of car based on the duration. The system updates parking data. The prices of the car will be based on the duration what the people choose and even timings. Wireless sensor networks are ad-hoc in nature employing a large number of sensor nodes communicating in a co-operative fashion with a Central Supervisory Station (CSS). The sensor node being a battery operated device has limited computation and communication capabilities. Several environmental parameters can be monitored by interfacing the node with different sensors. The wireless sensor network has many advantages over its wired counterpart like flexibility, inherent intelligence, low cost, rapid development and more sensing points, especially in areas that cannot be wired. Owing to these advantages, the WSNs have found their way in diverse application domains such as facility management like traffic and parking management, health care, environment monitoring, intelligent building, disaster relief applications etc.

According to the International Organization of Motor Vehicle Manufacturers (OICA), the number of cars produced in 2011 alone stands at 59.9 million [2]. Ward's research [3]. States that, the number of vehicles in operation worldwide surpassed 1 billion in the year 2010. In 2012 alone it was estimated that around 60 million cars would be produced (that is 165,000 cars produced every day) [4]. In urban areas, one-third of cars have reached their destination and are circling around looking for a parking space, leading to problems like pollution and traffic congestion [5]. With the explosive growth in automobiles, on-street parking will soon disappear,

Given the constraints on road space. Looking at the statistics provided so far we can conclude that better intelligent parking management systems like the one we are proposing will be required to handle the volume of cars/vehicles. A number of WSN systems have been developed to address the car parking management. Typical car parking management systems monitor the number of cars passing the entry and exit points for estimating the free slots available. This result is then displayed

at strategic locations for assisting the user. In [6], the system is developed using the DSYS25z [7], node with magnetic sensors. The system described in [6] concentrates on issues such as connectivity, sensing and network performance. In [8, 9] and [10], WSN based car parking systems are proposed, where each of these papers explore the possibility of using different kinds of sensors. They also routing mechanisms for transferring the data from the source to the sink.

## 2. OBJECTIVE:

- With the change of the global economy and modern life. The information and communication technologies (ICT) sector has experienced a vital acceleration its process to adapt at such change. This certainly causes additional carbon di- oxide emissions and damages the environment of the city's ecosystem .On the other hand, it increase driver's frustration and traffic congestion in the city which will certainly cause traffic accidents.
- Smart parking systems are system that manages the difficulty of parking in the city in public, using WSN. These systems obtain information on the available parking spaces in a parking area using real-time data collection by the sensor nodes scattered in the parking area.
- This project is designed with ARM7Lpc2148.This project present a smart parking system using WSN. The system consists of transmitting unit and receiving unit.

## 3. PROBLEM STATEMENT

In modern society, there is an ever increasing number of vehicles. This leads to problems such as large urban parking slots becoming inefficient.

The three main problems that are increasing number of vehicles and the decreasing efficiency of modern busy parking slots are:

- Valuable time wasted from inconvenient and inefficient parking slots.
- More fuel consumed while idling or driving around parking slots, leading to more carbon di-oxide emission being produced.
- Potential accidents caused by abundance of moving vehicles in disorganized parking slots.

## 4. PROBLEM SOLUTION:

This is the system which is proposed for the purpose of smart parking using WSN. An intelligent car parking system using WSN is proposed where each parking space is equipped with one sensor to detect its occupancy. The WSN system using sensors are presented which can track available parking spaces in real time and communicate the information.

## 5. METHODOLOGY:

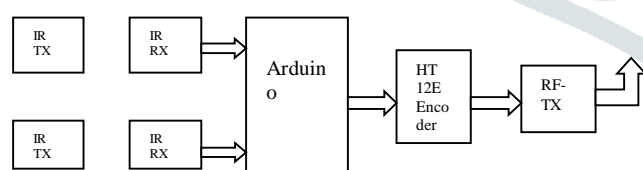


Fig a. Transmitter Unit

Enter Exit

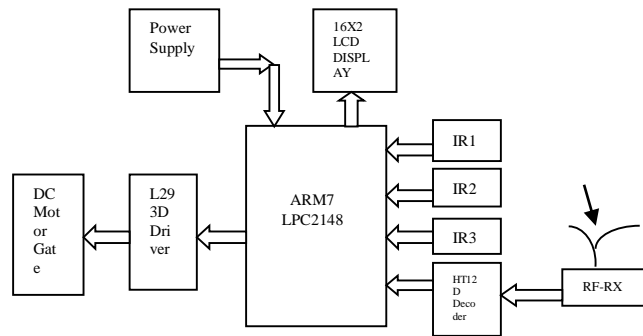
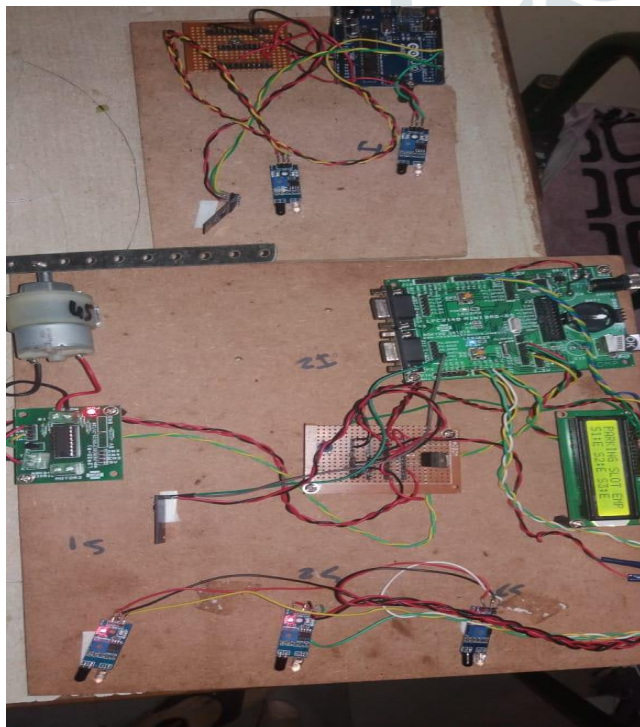


Fig b. Receiving Unit

## WORKING:

The block diagram of transmitter unit is shown in fig (a). The transmitting unit has entry and exit. Entry should note down the number of vehicles. If any vehicle should enter the driver IC's gives the information to HT12D decoder. This decoder should pass the signal to the receiver unit.

The block diagram of receiver unit is shown in fig (b). The receiving unit will receive the some vehicle is coming the gate should be opened. L293 D driver will open the gate it can occupy the any of the slot. The 16x2 LCD will display whatever the process is going on that should be displayed on the LCD.



## 6. LIST OF HARDWARE:

- **ARM7 LPC2148:** ARM7 based LPC2148 Microcontroller. The full form of an ARM is an advanced reduced instruction set computer (RISC) machine, and it is holdings. The architecture of an ARM processor was licensed by many corporations for designing ARM processor-based SoC products and CPUs.
- **BRIDGE RECTIFIER:** A bridge rectifier is a type of full wave rectifier which uses four or more diodes in bridge circuit configuration to efficiently convert the Alternating Current (AC) in to direct current (dc).
- **FILTER CAPACITOR:** A filter capacitor is a capacitor which filters out a certain frequency or range of frequencies from a circuit. Usually capacitors filter out very low frequency signals. These are also referred to as DC signals

- **IC 7805 VOLTAGE REGULATOR:** IC 7805 is a 5 volt voltage regulator that restricts the output voltage to 5 volt output for various ranges of input voltage. The maximum value for input to the voltage regulator is 35v.
- **LIGHT EMITTING DIODE (LED):** LED is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.
- **MAX232:** MAX232 is an integrated circuit first created in 1987 by Maxim integrated products that convert signals from a TIA-232 (RS-232) serial port to signals suitable for use in TTL-compatible digital logic circuit.
- **ARDUINO:** Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs- light on a sensor, a finger on a button, or a twitter message- and turn it into an output- activating a motor, turning on an LED.
- **IR SENSORS:** Infrared Sensor is an electronic device that emits in order to sense some aspects of the surroundings.

## 7. ADVANTAGES:

- There is a greater sense of security due to the fact that patrons do not actually walk to and from their own space.
- It is highly feasible for extremely small sites that are unable to accommodate a conventional ramped parking structure.
- There is no need for driving while looking for an available space.
- Emissions are greatly brought down and reduced.

## 8. DISADVANTAGES:

- Use of redundant systems will result in a greater cost.
- It may be a bit confusing for unfamiliar users.
- There may be a fear of breakdown (How do I get my car out?).
- It requires a maintenance contract with the supplier.

## 9. APPLICATIONS:

- Parking information is stored in a database using cloud architecture through the sensors in the parking entrances.
- Customers can obtain parking information stored in database with an improved application.
- With smart parking system, it is possible to find suitable parking place to prevent loss of customer's time and to reduce costs.

## 10. FUTURE SCOPE:

The system can be extended to operate in outdoor environments by the use of additional sensors, which can validate the decision of the existing sensor. The use of additional sensors also helps in improving the reliability of the system. The system can be extended to incorporate the IMS network so that SIP enabled devices can also get the same service. Mobile apps can be employed to provide location based services which give a better user experience by providing real time information.



Fig 10. Deployment

## 11. CONCLUSION:

A smart parking guidance system based on wireless sensor networks is built in this paper. The wireless communications-based applications, smart parking system with a more complete experimental design and simulation. We use light sensors to simulate and to detect the parking area.

Whenever the transmitting unit sends the signal to the receiving unit the signal should be passed and the gate should be opened. It can occupy the any of the parking slot. The LCD will display which slot is empty.

We mainly introduce the system design, software design and system detailed work process. Test to prove that our system is successful, and has broad application prospects, the system will be used popular in the future.

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