

IOT BASED SMART PARKING SYSTEM

¹N. AJAYSAIRAM, ²T. JEEVAN KUMAR, ³S. RAVI TEJA, ⁴N. CHANDRA SEKHAR

^{1,2,3,4} UG Scholar, Department of Electrical and Electronics Engineering, PVPSIT, Vijayawada, A.P, India.

Abstract: Parking of vehicles is a major issue in modern cities. There are too many vehicles on the road and not enough parking spaces are available. This led to the need for efficient parking management system. In this design Internet of Things based parking management system is designed for efficient parking space utilization. IR sensors and servomotors are used in the design. This process utilizes Wi-Fi modem and an Arduino for operation. The user can know the parking space availability through lcd display and web browser. By this process the user can park the vehicle in smart mode.

Keywords: Arduino, IR sensor, Wi-Fi-modem, IoT.

INTRODUCTION

The design entitled smart parking system is to manage all the parking establishments to an stoner. The recent growth in economy and due to the availableness of low price buses in the request, an every average middle- class existent can go a auto, which is good thing, still the consequences of heavy traffic jams, pollution, lower vacancy of roads and spot to drive the motor motor vehicle. One of the important firms, which is to be taken in account, is the problem of parking those vehicles. Though, if there's space for parking the vehicle but so important time is wasted in finding that exact parking place resulting in further energy intake and not also environment friendly. It'll be a great deal if in some way we find out that the parking itself can give the precise vacant position of a parking slot also it will be helpful not limited to the drivers also for the environment. Originally when the user is about to enter the position the LCD displays the number of empty and filled spots and when the user is with its vehicle near to the parking detect sensor, he/ she would be able to see the information about number of parking places available on mobile application and through browser also.

PROPOSED METHODOLOGY

Nowadays people are facing lot of problems because of low parking spaces all around the country and also there's no proper security because of the salary incrementation for the security persons and there's lot of consumption of fuel, which is also being a big problem as there's lower amount of fuel available there's more amount price increment and by applying this design, people can have these effects in control to make our country better and safer place to live and indeed the air pollution could be controlled at most 10 of the being air pollution especially in metropolises.

India is one of the countries with lots of population of people and it's also one of the countries of lots of cars available each over the country. Though India is poor at its marketing and the Sensex but India is the country with lots of imported cars & even the middle- class people has cars. And that is the main reason why there's lot of problem with the parking in India, that's why smart system is needed to make this parking system to be more secured and flexible and to make the clients to spend less amount of capitalist for the sake of parking their vehicles in the parking places. So, that's why this smart parking system would help them to give the smart parking with lower number of manpower and spending up of capitalist for the sake of parking their cars and also provides the real time monitoring of the parking places through application and through browser.

WORKING

When a vehicle enters the parking area, IR sensor that is present before IN gate will detects the passing vehicle and the gate will be opened automatically.

Infront of the parking area, there will be a LCD that is used to show the status of the parking slots, whether the parking is available or not. The operation of exit will be same as that of the entrance. When the vehicle is leaving the parking area, the IR sensor that is present before the out gate will detect the passing vehicle and the gate will be opened automatically.

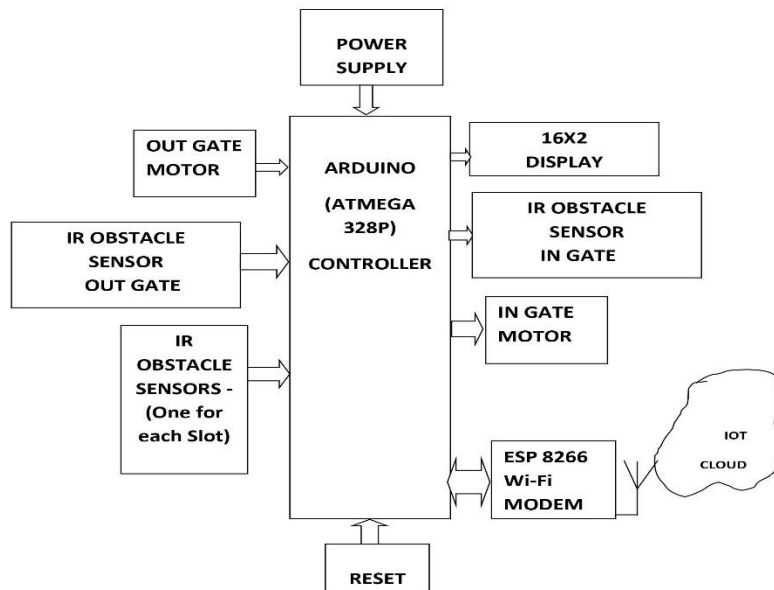
In this process wi-fi modem is used for internet connectivity. By using this, system reads the number of parking slots available or occupied and displayed it on web browser.

This allows users to check for available parking spaces at any time through web browser.

All these components are connected to Arduino. Arduino can be powered using power supply through adapter.

Thus, the system solves the parking issue and gets users an efficient IoT based parking management system.

BLOCK DIAGRAM



COMPONENTS

Arduino Uno: The Arduino uno is a microcontroller board based on the atmega328p. It has a total of 28 pins in which 14 are digital input/output pins, 6 analog inputs, a USB connection, a power jack and a reset button. It contains everything needed to help the microcontroller.

Arduino uno can be operated by connecting it to a computer with a USB cable or power it with a ac-to-dc adapter or battery to get started. The board can operate by a supply of 6 to 20 volts.

The atmega328 has a memory of 32 KB. It also has 2 KB of SRAM and 1 KB of EEPROM Input and output - 14 digital pins on the uno can be used as an input or output. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA. The Arduino Uno has 6 analog inputs, named A0 to A5.

Infrared Sensor: An infrared sensor transmits infrared waves into the air and detects the reflected waves from an object. It needs a power supply of 3.0V to 5.0V and current consumption is 20mA to 40mA, detection range is 2cm to 30cm. It has transmitter and the receiver module. Infrared obstacle sensor is used in smart parking system. It has three pins one pin is connected to 5v power supply, then the second pin is connected to ground, and the third pin act as an output pin. Active output level: Outputs Low logic level when vehicle is detected

Servo Motor: Servo motor SG90 is a tiny and lightweight server motor with high output power. It can rotate roughly 180 degrees (90 in each direction). Its operating voltage is 4.8 – 6V and a current of 10mA.

Servo motors are used to opening and closing the gates at the entry and exit of the parking area.

LCD Display: A 16x2 LCD display is very commonly used component in various devices and circuits. A 16x2 LCD means it can display 16, characters per line and there are 2 such lines.

It has an operating voltage of 3 – 5V and current of 5mA.

It shows the available slots in the parking lot.

Wi-Fi Module: The ESP8266 is a Wi-Fi module that can give any microcontroller access to your Wi-Fi network. Its operating voltage is 3.3 - 3.6V and a current of 12mA.

With the help of this module, it can monitor the number of parking slots available anywhere from the world through web browser.

MAIN FEATURES OF THE PROPOSED PROTOTYPE DESIGN

The features of the prototype are: -

Display capabilities - With the help of 16*2 LCD display it can show the real time data

Real time monitoring - With the help of Thingiew it can show real time data.

Cost effective - This prototype with only necessary components, it doesn't include any unnecessary components, what made this project cost effective.

RESULTS AND DISCUSSIONS

The hardware model is supplied by a 12V, 1A Adapter, which is fed to the Arduino Uno. All the components which are connected to the Arduino require around 5V for operating. Through Arduino all other components get operated. When supply is given to the prototype the display shows the slot numbers, which are available for parking and in Thingview application it shows a number that indicates the number of available slots. The below images are some real time examples which shows how the project works and how the data is displayed on LCD display and in Thingview application.

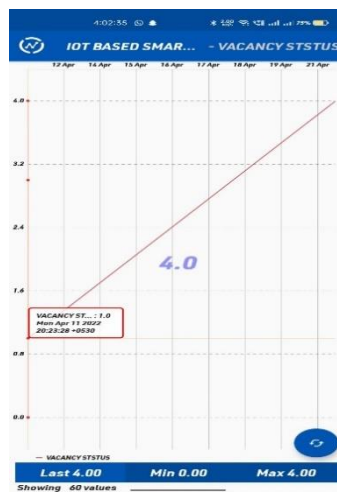
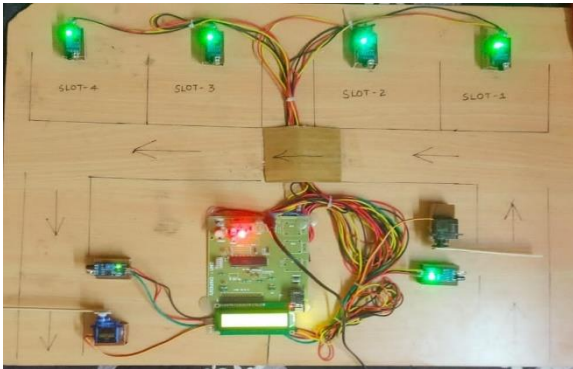


Fig 1 Prototype, LCD Display, ThingView Data at starting

The above fig 1 shows the prototype after giving the supply and LCD display displays numbers of each available slot and Thingview application indicates number of available slots.

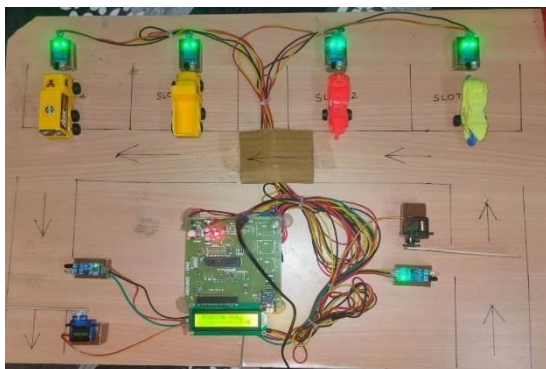




Fig 2 Prototype, LCD Display, ThingView Data when parking is full

The fig 2 shows the prototype when all slots are filled and LCD display displays null and total T-0 which indicates no slots are available and in Thinkview application it displays 0 which means no slots are available.

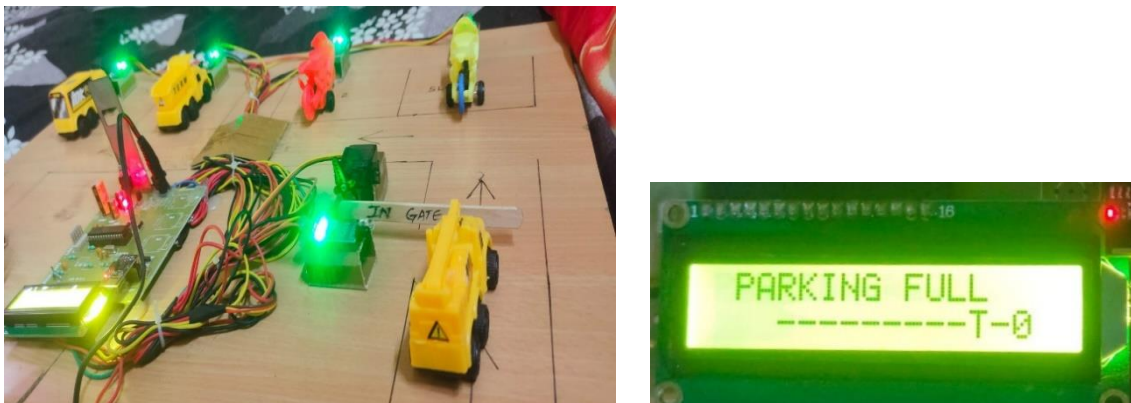


Fig 3 Prototype and LCD display while vehicle entering when parking is full

Fig 3 shows the prototype when another vehicle is trying to enter when all the parking slots are filled. In that case the gate didn't open and LCD display shows parking full.

The below table shows the values obtained while analysing the proposed model.

Observations	Time in sec
Time taken for opening of Ingate after sensing the vehicle.	1.5
Time taken for closing of Ingate after passing of the vehicle.	3
Time taken for opening of Outgate after sensing the vehicle.	1.5
Time taken for closing of Outgate after passing of the vehicle.	3
Time taken to display the data on LCD display.	1
Time taken to update the data on Thingview application.	10

Table 1 Observation table

CONCLUSION

The concept of Smart Metropolises has always been a dream for humanity. Since the past couple of years ago large advancements have been made in making smart metropolises a reality. The growth of Internet of Things and Cloud technologies have given rise to new possibilities in terms of smart metropolises. Smart parking facilities and traffic management systems have always been at the core of constructing smart metropolises. In this system, the issue of parking has been addressed and presented an IoT based smart parking system. The system provides real time information regarding vacancy of parking places in a parking area. Users from remote locations could be able to see the vacancy of parking places in parking area through mobile application and through web browser. The efforts made in this project are intended to improve the parking facilities of a megacity and thereby aiming to enhance the quality of life of its people.

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