JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

IOT BASED SMART PARKING SYSTEM BY USING XTENSA LX6

Mrs. K. Shanmukha Priya[1], Asst Professor, Department of ECE,

KKR & KSR Institute of Technology and Sciences, Vinjanampadu, Guntur Dt., Andhra Pradesh

Shaik Aafrin[2], Pallerla Bhargavi[3], Talathoti Anu Deepika[4], Pulusu Poojitha[5]

[2345]UG Students, Department of ECE,

KKR & KSR Institute of Technology and Sciences, Vinjanampadu, Guntur Dt.,Andhra Pradesh

Abstract: **The world's population is growing, and cities are becoming more crowded, resulting in an increase the number of auto mobiles on the road. The management of car parking is one of the primary difficulties in cities. In the past, studies on how to structure parking systems were done. Smart parking systems, on the other hand, are still in demand and are attracting researcher interest as a potential upgrade to meet modern needs and requirements. As a result, the goal of this study is to create and construct a Smart Parking System by displaying the available slots employing mobile application technology. Here, an ultrasonic sensor is used and deployed at each slot which senses that the area is occupied or empty. An app is introduced in which the sensor data is deployed/updated every second by using an IOT module. Here, the user has a chance to check the status of a slot before reaching there in app or at the parking area. The payment of car parking can be done through online. Here, parking should be done in time efficient way without having stress to the user with the help of an app.**

Keywords: **ESP32s, Ultrasonic Sensor, Servo motors, LM2596, IOT Blynk app.**

I. Introduction

IOT based Smart parking system by using Xtensa lx6 include ESP32s, ultrasonic sensor, servo-motor, payment switch, mobile phone connected to Blynk cloud through an IoT application. Using a mobile phone consisting of IoT application Blynk which is connected to the cloud and to the Esp32s microcontroller we send commands regarding the operation to be performed. When we press gate open button in mobile application, it sends request to the Esp32s whereas it respond with the corresponding command such as to rotate 90 degrees anti clockwise direction. By the parking slots availability that are viewed in mobile application, the cars will be parked. After the complete utilization of parking slot. The parking bill will be paid by pressing the button that is placed in mobile application. Through this the command in mobile application gets refreshed, such that by typing valid username and password the successful payment would be done. Then the exit servo motor will gets rotated by 90 degrees anti clockwise direction automatically. Hence the car will exit from that place.

By using this system, user interruption is get reduced and the payment is also done in mobile application only and the gates also gets open with commands which reduces the labour cost.

Advantages

- Time saving, avoids lot of time for the search of parking area
- It ensures security
- It reduces the employee work in the parking station
- Optimize parking

Applications

- It is useful at regular parking stations
- Cashless bill payment
- EV charging spots
- Malls

In Section I, we have discussed about Introduction, and in Section-II about Components, and in Section III about Methodology, Flowchart are in Section IV, Results in Section V, Conclusion in Section VI, Future Enhancement and Future Scope in Section VII and references in Section VIII.

II. Components

2.1 ESP32

ESP32 is a low-cost System on Chip Microcontroller from Espressif Systems, the developers of the famous ESP8266 SoC. It is a successor to ESP8266 SoC & comes in both single-core and dual-core variations of the Tensilica's 32- bit Xtensa LX6 Microprocessor with integrated Wi-Fi and Bluetooth. The good thing about ESP32, like ESP8266 is its integrated RF components like Power Amplifier, Low-Noise Receive Amplifier, and Antenna Switch, and Filters and RF Balun. This makes designing hardware around ESP32 easy as you require very few external components. The fact that ESP32 is produced utilising TSMC's ultra- low power 40 nm technology is another crucial information to be aware of. Hence, employing ESP32 should make it very simple to create battery-powered applications like as wearables, audio equipment, baby monitors, smart watches, etc.

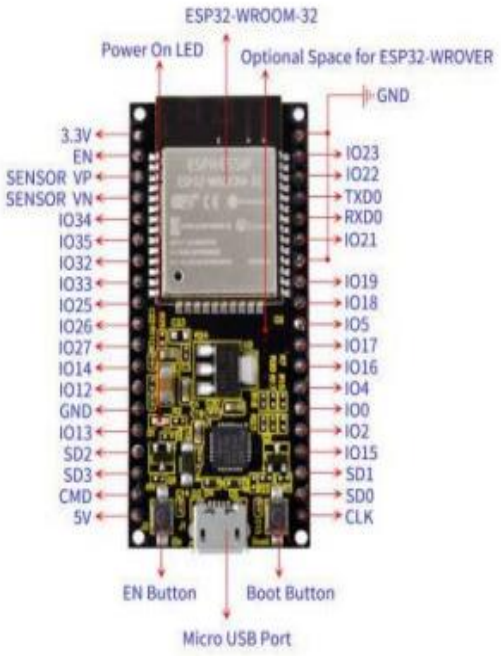

Fig:2.1.1 ESP32

Specifications	Range
Operating voltage	2.2V TO 3.6V
GPIO	36 ports
ADC	14 ports
DAC	2 ports
Flash memory	16 Mbyte
SRAM	250 Kbyte
CLOCK SPEED	upto 240 MHz
Wi-Fi	2.5 GHz
Sleep current	2.5 uA

Fig:2.1.2 Specifications of ESP32

2.2 Ultrasonic sensors

Ultrasonic sensors are electronic devices that calculate the target's distance by emission of ultrasonic sound waves and convert those waves into electrical signals. The speed of emitted ultrasonic waves traveling speed is faster than the audible sound.

Ultrasonic sensor working principle is either similar to sonar or radar which evaluates the target/object attributes by understanding the received echoes from sound/radio waves correspondingly. These sensors produce high-frequency sound waves and analyze the echo which is received from the sensor. The sensors measure the time interval between transmitted and received echoes so that the distance to the target is known. Since it is known that sound travels through air at about 344 m/s (1129 ft/s), you can take the time for the sound wave to return and multiply it by 344 meters (or 1129 feet) to find the total round-trip distance of the sound wave.

Fig:2.2.1 Ultrasonic sensor elements

2.3 Servo Motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It can rotate 90 degrees in either direction from its neutral position. It has torque of 2.5 kg- cm and operating speed of 0.1sec/60 degrees. It consists of three pins (Vcc, GND, Out)

Fig:2.3.1 servo motor

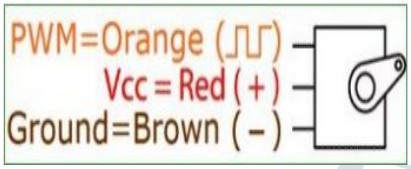

Fig:2.3.2 pin description of servo motor

2.4 LM2596

LM2596 step down module is based on LM2596S-ADJ chip is one of the most cheap, easy to use, step down buck converter with adjustable output voltage, with high current output of upto 3A. this LM2596 step down module has a wide input voltage range from 4.5V to 35V. the LM2596 also has thermal shutdown, and current limit protection. It operates at switching frequency of 150 kHz, and output is adjustable according to the need by using the on board potentiometer.

2.5 IOT Blynk app

Blynk was designed for the internet of things. It can control the hardware remotely, it can display sensor data, it can store data, visualize it and do many other things. There are three major components those are blynk app, blynk server and blynk libraries.

In blynk app, if we press a button then the message travels to the blynk cloud, where it magically find its way to the hardware. It works the same in the opposite direction and happens in a blink.

III. Methodology

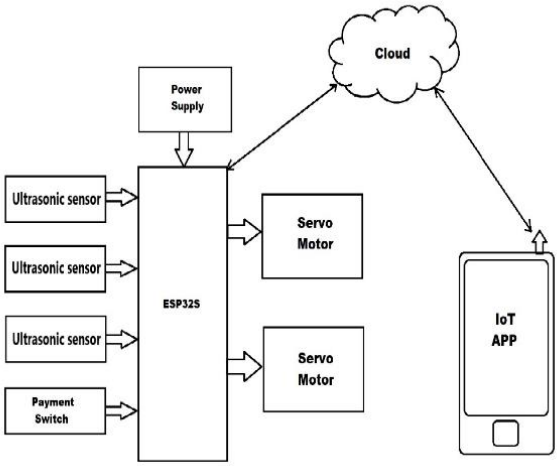

Fig:3.1 block diagram of proposed system

ESP32s is a microcontroller with built in Wi-Fi and Bluetooth which is connected to cloud for data transfer. Ultrasonic Sensor are placed in parking slots of parking area and connected to esp32s. when a car is parked in a parking slot the ultrasonic sensor detect that and sends the data to ESP32s and it stores in a cloud. With the help of cloud the data can be seen in Blynk that parking slots are filled or empty. Servo Motor are used at entry and exit points as doors when there is empty space in parking area then the user will give command in app then the entry door open and at exit door that means if we press the payment button in app then we get the payment terminal and after completing the payment with correct username and password the gate will opens. So that the data in cloud can be erased and in Blynk app it shows parking slot as Empty.

IV. Flow chart

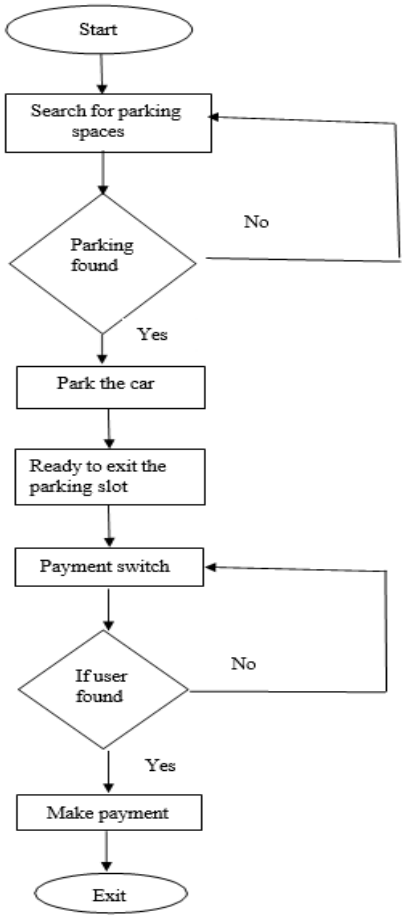

Fig:4.1 flowchart of proposed system

V. Results

In this, the user can see the available slots in app from everywhere. After reaching the parking area, the user has to give command in app to open the entry gate and can park their car in available slots.

Fig:5.1(a) giving command to open entry gate in app

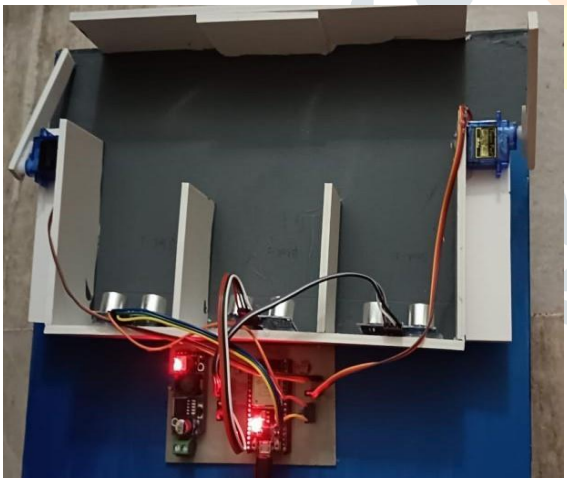

Fig:5.1(b) Entry gate opens

Once the entry gate opens the user enters the area and the user has to give command once to close the entry gate.

Here, the car is parked at slot 2. The hardware and the app status as shown below:

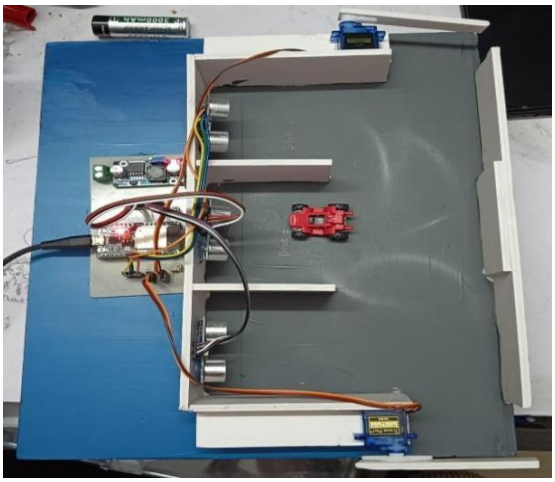

Fig:5.2(a) car is parked in slot 2

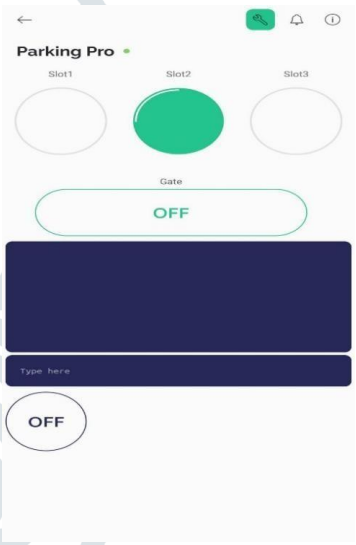

Fig:5.2(b) slot 2 is filled

The car is about to leave the area and user has to make payment by giving command in app

Fig:5.3(a) giving command and making payment

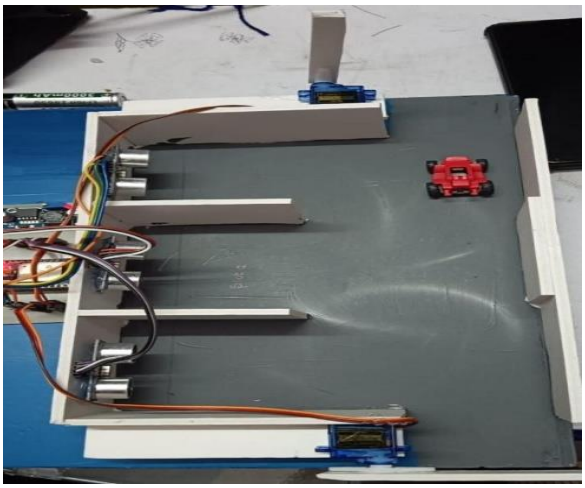

Fig:5.3(b) the exit gate opens

Once the payment done with correct username and password the exit gate opens automatically and the user will leave the parking area.

VI. Conclusion

This system gives solution to the problem of traffic congestion in front of the parking garage. Conventionally there is no such automated system for allocating spaces for parking vehicles. So, this will make parking allocation simple and well organized with systematic first come first serve basis. Directing people to empty parking slots and indicating exact locations adds more credibility to this system. Users from remote locations could get details of empty parking slot with mobile application and the payment also done through app. Using Cloud makes it easier to store data and fetch it simultaneously. This proposed architecture for a smart parking system would decrease the searching time for parking space and reduce instances of improper parking of the car. It also reduces labour cost and manual efforts by which investment in man Power is not needed, and a large amount of money could be saved. The efforts made in this project are intended to Improve the parking facility of the city and there by aiming to enhance the quality of life.

VII. Future Enhancement and Future Scope

This prototype can include auto detection and allow of vehicle at the entrances by pre-booking facility. Making collection of parking charges through some secure digitalized platforms. Application of IoTs in this field will open many channels and address many short comes. Pre-booking of slots using mobile applications of the specific malls, offices will be helpful in parking and it will be helpful for the persons with EVs since they require charging spots. Making utilization of website as well to book the parking slots in various places like shopping malls, regular parking places, EV stations etc.

VIII. References

[1] Noor N.M, Z Razak and Mohd Yamani, “Car Parking System: A Review of Smart Parking System and its Technology,” Information Technology Journal, 2009.

[2] Mohammed Ahamed, Wangguangwei “Study on Automated Car Parking System Based on Microcontroller”. International journal of engineering research and technology, vol. 3, no. 1, January 2014.

[3] Wuhongwang “Metropolis Parking Problems and Management Planning Solutions for Traffic Operation Effectiveness” Hindawi, volume 2012.

[4] M. J. J. Gumasing and C. A. V. Atienza, "A design of automated parking system for shopping centers in Metro Manila," 2018 5th International Conference on Industrial Engineering and Applications (ICIEA), Singapore, 2018, pp. 415-419.

[5] D. Kanteti, D. V. S. Srikar and T. K. Ramesh, "Intelligent smart parking algorithm," 2017 International Conference on Smart Technologies for Smart Nation (Smart Tech Con), Bengaluru, India, 2017, pp. 1018-1022.

[6] A. Sungheetha and R. R. Sharma. “Cost Effective Energy-Saving System in Parking Spots,” in Journal of Electronics and Informatics, vol. 2, no. 1, pp. 18-29, 2020