

# Embedded IoT Car Parking and Billing System

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## Abstract

As of late, huge vehicles are going through trouble finding a parking area because no appropriate data is available on whether the leaving space is full or void. Altogether this can cause a clog, contamination, and fuel failure. Because of these conditions, there could likewise be trouble in controlling the stopping the board. By utilizing a Microcontroller keen stopping framework (given IOT), stopping issues are regularly settled. The Web of things might be a new subject that assumes a pivotal part in our everyday lives. IOT decreases human work, exertion, time, and mistakes because of human carelessness. Subsequently, an Embedded IOT Smart Parking System is proposed which is intended to shape it simpler for stopping clients to encourage data on the stockpile of unfilled and filled stopping spaces and can likewise book stopping openings utilizing electronic applications.

## Introduction

Sales of the cars in India have been increased rapidly in last few years compared to all the other developing countries in the world. If the purchase of cars increases then the parking allotted for the cars must also be increased. Nowadays people visiting malls have been increased due to there as on that all the goods are available in single market place and more over theaters also. IOT plays a vital role in finding a solution to the parking. IOT is the emerging trend in the 21st century. IOT is a network of connecting devices; those devices could be tracked, controlled and monitored using remote processors that are connected to the internet. Different protocols are used for communication between two devices. The cloud is the best technology to store the current data and information; it can also be processed for future reference

## **Literature Review**

### **Existing System**

In the Existing System they use parking camera for detecting the number of available cars in the parking area using threshold optimizing technique in image processing. The camera send the information to the fog node, fog nodes process the pictures from multiple camera in order to identify the number of available parking slots. Fog nodes connect to cloud through proxy server and user can access the information using internet. Fog nodes deployed at parking lots, cooperating with each other, enable real time parking slot information provisioning as well as parking requests processing. The cloud center will enforce global optimization on parking requests allocation. The experimental results of our approaches show higher efficiency compared with other parking strategies. The fog computing based smart parking can lower the average parking cost and minimize gasoline wastes and vehicle exhaust emission. One main disadvantage of the existing system is the user will not know the shortest path available to the parking slots. For example, if there are slots 2 and 5 free and cloud will not update the shortest path available to the user and this may lead to high fuel consumption in search of the parking slot.

The existing system will send the information from the cameras to fog nodes and it takes higher time for processing of these images . The user will not be aware of the shortest available parking slot in the parking space and also the user will not know are there any available parking slots in the parking space before entering . Resources such as fuel and time are wasted in search of the parking slot .

### **Proposed System**

Due to the few parking spaces in some regions, the best method to park a vehicle is to have advance notice that a space is going to be freed up. The suggested system addresses this key issue. In this system we are using ESP32 micro-controller with IR sensors to keep a track of the vacated parking slot, system is built over advance web based application for status with LCD which will display the parking slots. After the parking is made the Billing information is shared with the user through IOT. In this paper, we will make of micro-controller and this is used to process the instructions continuously in a loop . The user will first scan the RFID card using the RFID reader and The web page will update the user details and even before the user scans the RFID card, the web page will display is there details on web page, a DC motor is used to open the gate for the user. Now the web page displays the available parking slots as well as the nearest parking slot to the user . IR sensors are used for the object detection the paper and by object in this is the vehicle. As soon as the user parks the vehicle in the parking slot. The IR sensor will detect the object and forwards the information to micro controller and the micro controller will process this information and update on the web page. The web page will be updated for every few seconds and this helps to keep the information of the parking slot updated, Internet of Things is used to for sending the web page from the micro controller to the cloud and IOT a system of interrelated computing devices.

Mechanical and digital machines are provided with unique identifiers and the ability to transfer data over a network without requiring human to human to computer interaction. The main advantages of this paper is the user can easily find the nearest available parking slot with the help of shortest path detection. The safety will be highly increased as the web page displays the nearest parking slot and the user does not have to search for a slot.

## Hardware Description

### Circuit Block Diagram

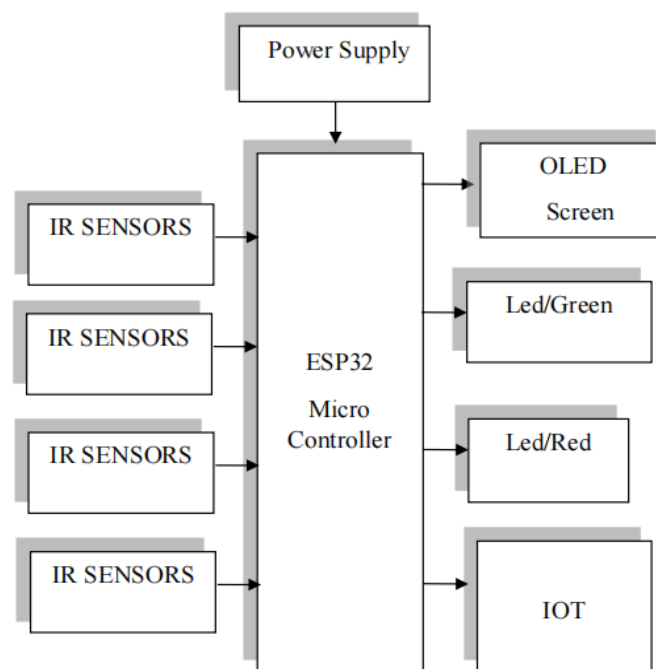
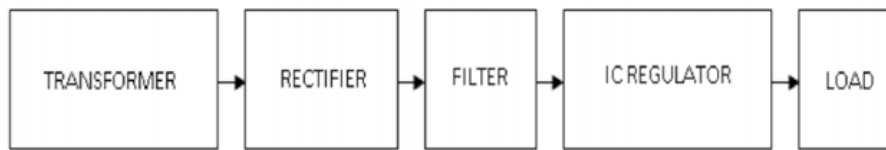


Figure : Circuit Diagram

### Power Supply

The power supply section is the section which provides +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down the ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.



## Transformer

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in India) to a safer low voltage. Transformers waste very little power so the power out is (almost) equal to the power in. Note that as voltage is stepped down current is stepped up .

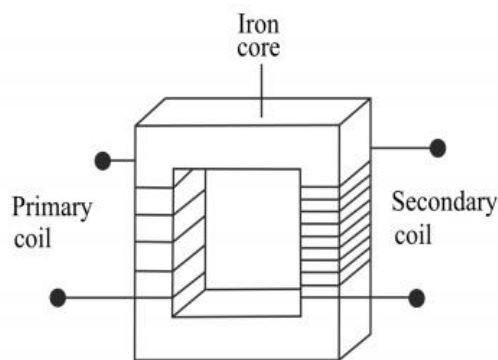


Figure: Transformer

## ESP32 MODULE

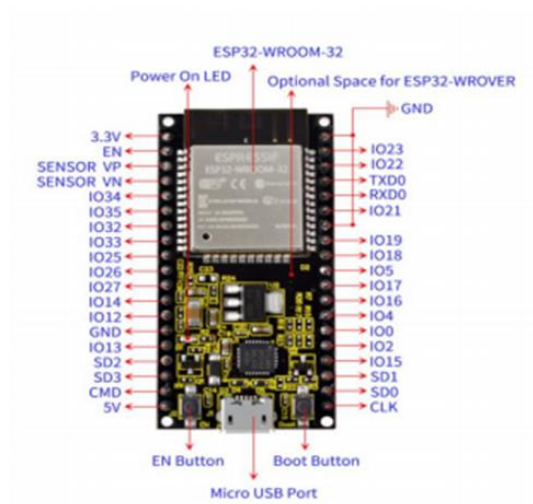


Figure : ESP32 Module

The ESP32 module is a low-cost, low-power system-on-chip (SoC) Microcontroller with integrated Wi-Fi and Bluetooth capabilities. It is manufactured by Espressif Systems, and is designed for use in a variety of applications, including Internet of Things (IOT) devices, wearable electronics, and other embedded systems. The ESP32 module features dual-core processors running at up to 240 MHz, as well as a variety of built-in peripherals, including touch sensors, analog-to-digital converters, and pulse width modulation (PWM) controllers. It also includes support for a wide range of communication protocols, including Wi-Fi, Bluetooth, and Ethernet. DEPARTMENT OF ECE 17 The ESP32 module is available in a variety of form factors, including modules that can be directly soldered onto printed circuit boards (PCBs), as well as modules that can be used with development boards such as the ESP32 DevKitC. The module can be programmed using a variety of programming languages, including C++, Python, and Lua, and development tools such as the Arduino IDE and ESP-IDF (Espressif IOT Development Framework) are available for working with the module. Overall, the ESP32 module offers a powerful and versatile platform for building a wide range of IOT and embedded systems projects.

## IR Sensor

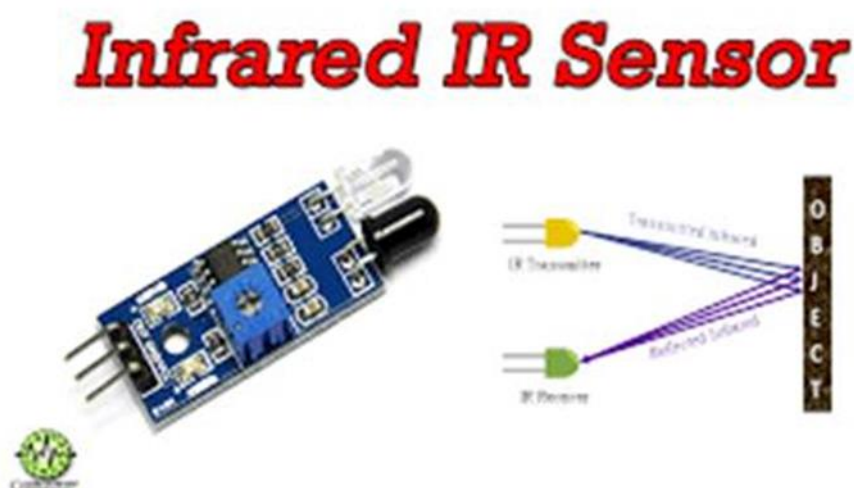


Figure:IR Sensor

An IR (Infrared) sensor is a type of electronic device that is used to detect the presence of infrared radiation. Infrared radiation is a form of electromagnetic radiation that is invisible to the human eye, but can be detected by electronic sensors. IR sensors typically consist of an IR source, such as an LED, and an IR detector, such as a photodiode or phototransistor. The IR source emits a beam of infrared radiation, which is reflected off of objects in its path. The reflected radiation is then detected by the IR detector, which generates an electrical signal that is proportional to the intensity of the reflected radiation.

## Oled Screen



Figure 3.12 SENSOR

An OLED (Organic Light Emitting Diode) screen is a display technology that use a series of organic compounds to emit light when an electric current is applied. The screen is made up of a thin film of organic material placed between two electrodes, which emits light when an electrical current is applied. Unlike LCDs, OLED screens do not require a backlight, which makes them thinner and lighter.

An OLED screen consists of a layer of organic materials that are sandwiched between two conductors. When an electric current is passed through the conductors, the organic material emits light. This light is produced by a process called electroencephalographs, which occurs when electrons and holes combine within the organic material. The color of the light emitted depends on the type of organic material used.

## Internet of Things



Figure Internet Of Things

Internet of Things (IOT) describes an emerging trend where a large number of embedded devices (things) are connected to the Internet. These connected devices communicate with people and other things and often provide sensor data to cloud storage and cloud computing resources where the data is processed and analysed to gain important insights. Cheap cloud computing power and increased device connectivity is enabling this trend.

IOT solutions are built for many vertical applications such as environmental monitoring and control, health monitoring, vehicle fleet monitoring, industrial monitoring and control, and home automation.

## Result



Before Execution

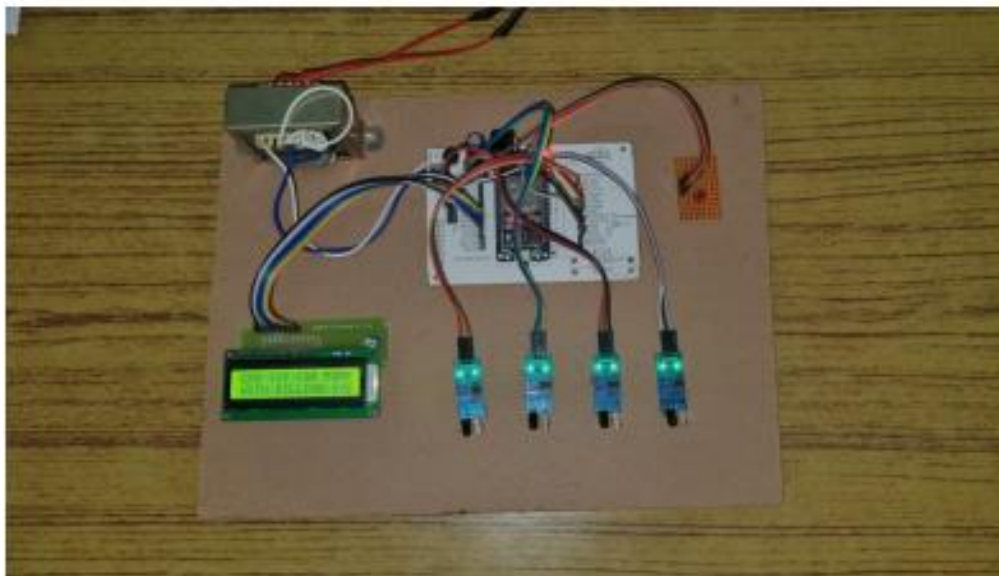


Figure: Hardware Kit

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