
Automatic Smart Parking System using Internet of Things (IOT)

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Abstract--Internet of Things (IOT) plays a vital role in connecting the surrounding environmental things to the network and made easy to access those un-internet things from any remote location. It's inevitable for the people to update with the growing technology. And generally people are facing problems on parking vehicles in parking slots in a city. In this study we design a Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area. And it mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere.

Keywords--IOT, sensors, web page, Wi-Fi

I. INTRODUCTION

The project aims at designing an advanced smart parking system using IOT technology. The devices can be switched ON/OFF using a mobile through server(Wi-Fi).

Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in home which produces sparks and also results in fire accidents in few situations. Considering the advantages of Wi-Fi an advanced automation system was developed to monitor the status of parking slots.

Wi-Fi (Short for **Wireless Fidelity**) is a wireless technology that uses radio frequency to transmit data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps. Wi-Fi transmits data in the

frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet.

The controlling device for the monitoring in the project is a Microcontroller. The data collected by the Microcontroller. Microcontroller reads the data and sends the data over Wi-Fi to the IOT web page. The Microcontroller is programmed used embedded 'C' language.

II. PROJECT OVERVIEW

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers.

Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result.

The project "**IOT based Smart Parking system**" was designed such that the status of parking slots can be known from anywhere in the users webpage.

III. BLOCK DIAGRAM

In this chapter the block diagram of the project and design aspect of independent modules are considered.

IOT BASED SMART PARKING SYSTEM

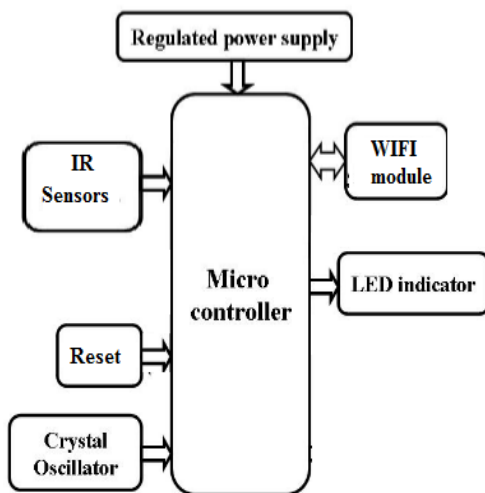


Fig.1. Block diagram of IOT based Smart Parking system

The main blocks of this project are:

1. Micro controller (16F73)
2. Crystal oscillator
3. Regulated power supply (RPS)
4. LED Indicator
5. Wi-Fi module
6. IR sensor

IV. MICRO CONTROLLER

Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. The microcontroller used in this project is PIC16F73. The PIC16F73 CMOS FLASH-based 8-bit microcontroller. It features 200 ns instruction execution, self-programming, an ICD, 2 Comparators, 5 channels of 8-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

Pin description:

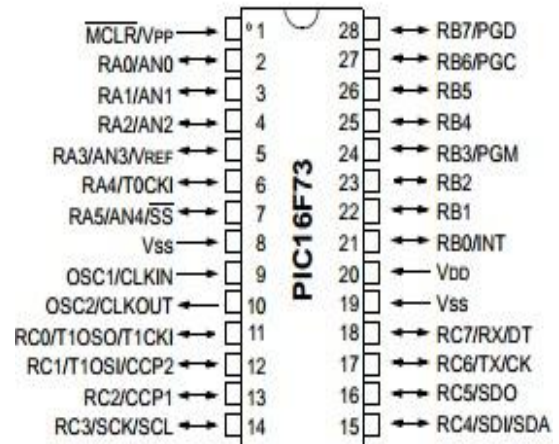


Fig.2. Pin Description of microcontroller

V. REGULATED POWER SUPPLY

Regulated Power supply

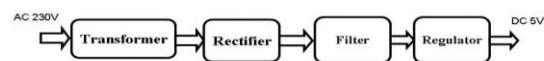


Fig. 3. Regulated Power Supply

REGULATED POWER SUPPLY

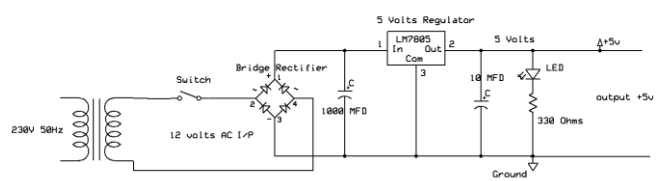


Fig.4. Circuit diagram of Regulated Power Supply with Led connection

The components mainly used in above figure are

- 230V AC mains
- transformer
- bridge rectifier(diodes)
- capacitor

- voltage regulator(IC 7805)
- resistor
- LED (light emitting diode)

VI. WIFI MODULE

Espressif Systems Smart Connectivity Platform (ESCP) of high performance wireless SOCs, for mobile platform designers, provides unsurpassed ability to embed Wi-Fi capabilities within other systems, at the lowest cost with the greatest functionality.

VII. IR OBSTACLE DETECTION SENSOR



Fig.5.IR Sensors

This sensor is a short range obstacle detector with no dead zone. It has a reasonably narrow detection area which can be increased using the dual version. Range can also be increased by increasing the power to the IR LEDs or adding more IR LEDs.

VIII. SOFTWARE DESCRIPTION

This project is implemented using following software's:

- 1) Express PCB – for designing circuit
- 2) PIC C compiler - for compilation part
- 3) Proteus 7 (Embedded C) – for simulation part

IX. WORKING

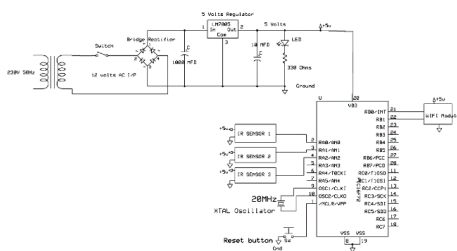


Fig.6.Schematic diagram

Our project “**IOT based Smart parking system**” is mainly intended to monitor the status of the devices through server (Wi-Fi).

The controlling device of the whole system is a Microcontroller. Wi-Fi module, IR sensors are interfaced to the Microcontroller. IR sensors are fed as input to the Microcontroller. The Microcontroller processes this data and transmits over Wi-Fi, which will be received from MOBILE. In achieving the task the controller is loaded with a program written using Embedded ‘C’ language.

The user who wants to park the vehicle is connected to the Wi-Fi network of that particular parking lot through the password. The IR sensors send the status to the microcontroller where the data processing is done. The microcontroller sends information to the webpage about the status of the slot to the user using IOT. This way the user can easily find a parking slot without any congestion and in less time.

X. RESULTS

The project “IOT based Smart Parking system” was designed such that the status of parking slots can be known from anywhere in the users webpage. This is achieved using Wi-Fi communication.

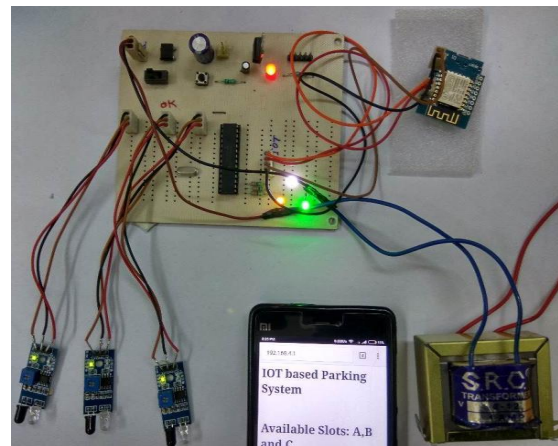


Fig.7. Working model of project

In this system, the user has to be connected to the Wi-Fi network of that particular parking area through which he is given access to the webpage and can know about the status of the parking slot.

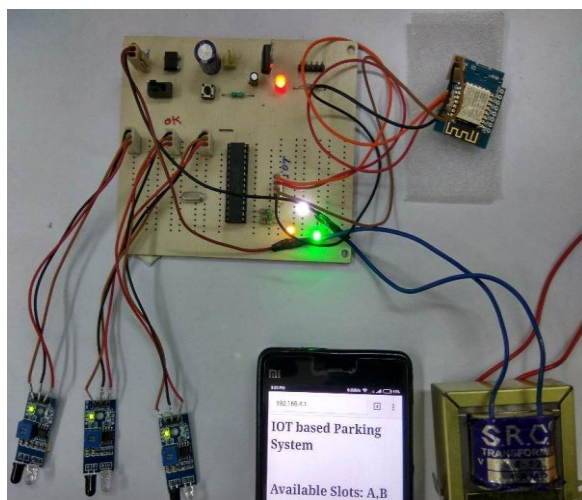


Fig 8. Display of availability of slots

XI. CONCLUSION

1. The objectives of this project have been achieved. The hassle in searching for available parking lots has been completely eliminated by reserving the lots via IOT system.
2. The security feature of the system is enhanced with the password requirements upon entrance to the parking lot.
3. The designed system could be applied everywhere due to its ease of usage and effectiveness.

XII. FUTURE SCOPE

This project can be extended by adding an application of booking the parking slot before reaching the destination. This can be achieved by using GSM and RFID communication.

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