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A prototype IOT based car Parking Management System for smart cities

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Abstract:

As an important component of traffic system, parking management system is playing an important role and affecting people's daily life. By detecting and processing the information from parking lots, smart parking system allows drivers to obtain real-time parking information and alleviates parking contentions. The use of intelligent systems have become the most prevalent among the world contribute to the implementation of daily business in a more efficient and flexible reveal. In this we show the importance of using smart parking systems. Our design goals of the smart parking systems include: simplify the operations of parking systems, improve drivers' satisfaction, increase parking revenue, and alleviate traffic congestion. Through analysis, design, implementation and testing phases, we introduce the proposed reservation-based parking system prototype that has the potential to achieve the above goals.

Keywords: Smart Parking, IoT, Mobile Application, RFID, Analytics.

I. INTRODUCTION:

Drivers finding out parking are calculable to be answerable for regarding half-hour of tie up in cities. Traditionally, cities, businesses, and property developers have tried to match parking supply to growing demand for parking areas. It's become clear, though, that merely making more parking areas isn't comfortable to handle the matter of congestion. New approaches using sensible parking systems look to produce a lot of balanced read of parking that higher manages the link between offer and demand. Sensible parking is outlined because the use of advanced technologies for the economical operation, monitoring, and management of parking within associate degree urban

quality strategy. The worldwide marketplace for sensible parking systems reached $93.5million, with us representing forty sixth market shares, and providing a robust growth opportunity for firms providing services within the us and overseas. Variety of technologies offers the idea for sensible parking solutions, together with vehicle sensors, wireless communications, and information analytics. Sensible parking is additionally created viable by innovation in areas such as smart phone apps for client services, mobile payments, and in-car navigation systems. At the center of the sensible parking construct is that the ability to access, collect, analyze, circularize, and act on info on parking usage. more and more, this info is provided in time period from intelligent devices that alter each parking managers and drivers to optimize the employment of parking capability.

II. LITERATURE SURVEY:

Anthony Mwabaze [1] represents Intelligent Parking system primarily based on wireless device network technology. Victimization (CCTVs) which can be used as a sensing node to spot vacant parking lot. The captured image are processed through the ARM Microcontroller and also the processed information are transmitted via ZIGBEE to a central laptop to store and update the occupancy status of obtainable parking lot vacancies within the information. Chandnipatel et.al [2] describes Rotary automatic automotive Parking System. Cars square measure 1st placed onto motorized mono-directional or Bi-directional platforms and so transferred to the closest available parking lot. All operations square measure PLC-Controller. Shitaln B.Dhote [3] planned the idea of small controller based automotive parking system within which small controller senses the of cars and open the gate is vacancy accessible. And security is provided by victimization RFID module through RFID card and displays the knowledge to liquid crystal display. IR device determine entry and exit of car.

III. SYSTEM ARCHITECTURE:

Whenever the mains are switched on, so show the message “parking area for ten vehicles”. the amount indicates the utmost capability of park during this project. Whenever a automobile comes ahead of the gate, the IR signal gets disturbed and therefore the microcontroller can open the gate by rotating the DC motor. The gate are closed solely when the automobile leaves the second IR combine since the microcontroller ought to understand whether or not the car left the gate or not. currently the microcontroller decrements

the worth of the count and displays it on alphanumeric display. during this means, the microcontroller decrements the count whenever the automobile leaves the park and displays it on alphanumeric display .If the count reaches '0', i.e. if the park is totally crammed, the microcontroller can show "NO area FOR PARKING" on alphanumeric display. And currently if any vehicle tries to enter the park, the gate won't be opened since there's no area. If any vehicle leaves the park, the controller can increment the count and permits the opposite vehicles for parking. This project uses regulated 5V, 500mA power offer. Unregulated 12V DC is employed for relay. 7805 3 terminal transformer is employed for voltage regulation. Bridge kind full wave rectifier is employed to rectify the ac output of secondary of 230/12V step down electrical device. And receivers to attach cameras, sensors, video displays etc. distinctive personal number are given to put in these wireless sensors. Wireless sensors have extremely become a decent advantage wherever environmental conditions are thought-about very threatening and person cannot access any data through wired connections .Wireless sensors will have access to any reasonably condition ,but just for a restricted distance. Recharging the batteries

The Figur1 shows Architecture for parking slot for each parking region, Infra-Red (IR) sensors are deployed and IR sensors would detect the number of parking slots, Number of free and booked slots are graphically displayed in LCD screen, WIFI module is used for communication between mobile app and sensors.

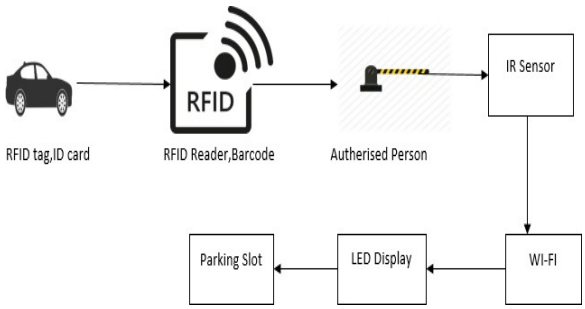

Fig: 1 Car Parking slot for each parking region

Each of the phases is explained below:

1. Development of free Android app.
2. Free Space Identification.
3. Authenticating user vehicle.
4. Classify parking slot.
5. Visualization in Server for Owner to Analyze

To enable a user to use the smart parking system, parking slot, if the vehicle enters the entrance gate, it is assumed that each car has registered RFID card in car and RFID reader verifies the vehicle and is authenticated.

HARDWARE COMPONENTS

LPC2148 Processor:

LPC2148 Microcontroller Architecture. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core.

Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.

The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

• The standard 32-bit ARM set.
• A 16-bit Thumb set.

The Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65% of the code size of ARM, and 160% of the performance of an equivalent ARM processor connected to a 16-bit memory system

RFID:

RFID = Radio Frequency IDentification.A n ADC (Automated Data Collection) technologythat:uses radio-frequency wave s to transfer data between reader and a movble item to identify, categorize, trackI s fast and does not require physical sight o r contact between reader/scanner and the ta gged item.Performs the operation usinglow cost components.Attempts to provide uniq ue identification and backend integration that allows for wide range of ap

plications.Other ADC technologies: Bar co des, OCR.

WIFI:

HLK-RM04 could be a new low-priced embedded UART-ETH-WIFI module (serial port - LAN - Wireless network) developed by Shenzhen Hi-Link Electronic Technology co., Ltd This product is associate embedded module supported the universal serial interface network customary, intrinsically transmission control protocol / information processing protocol stack, sanctioning the user port, Ethernet, wireless network (wifi) interface between the conversions. Through the HLK-RM04 module, the standard serial devices don't have to modification any configuration; information may be transmitted through the web network. give a fast answer for the user's serial devices to transfer information via LAN.

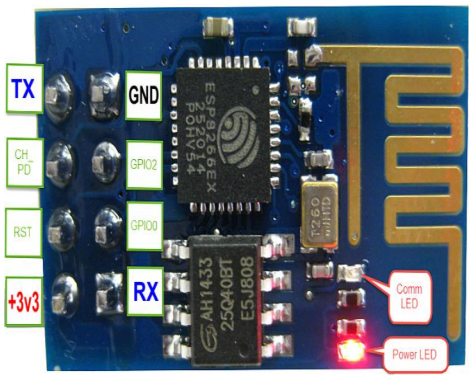

FIG: ESP 8266

The **ESP8266** is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) capability produced by Shanghai-based Chinese manufacturer,

The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, AI-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module which suggests that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.

The **ESP8285** is an ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

IV. IMPLEMENTON:

A. Mobile App: Parking App

Application Modules are for Login. We need to install the connection terminal app. Before going to connect

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with app, open Wi-Fi and select the network **w2s001** and give the password as **12345678.**

Fig: 2 Network Connections

The above figure shows, connecting to the Wi-Fi network.
Before, connecting to this server or to this network we need to download the **Connection Terminal** app for android. Then after connect to this network.

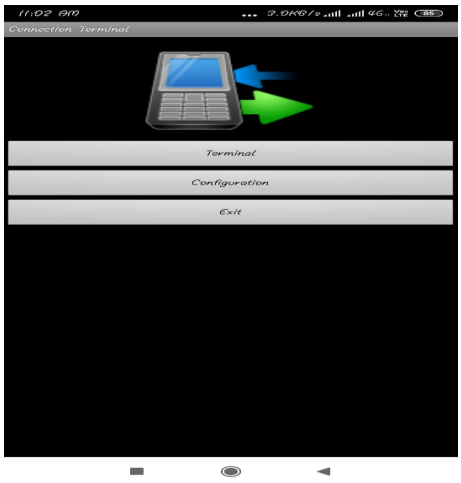

Fig: 3 Configuration Setup

After the app downloaded, we need to set the configuration in terminal of our app.

The figure 3 shows, how to set the configuration. Click on configuration button, it will navigate to next page of application.

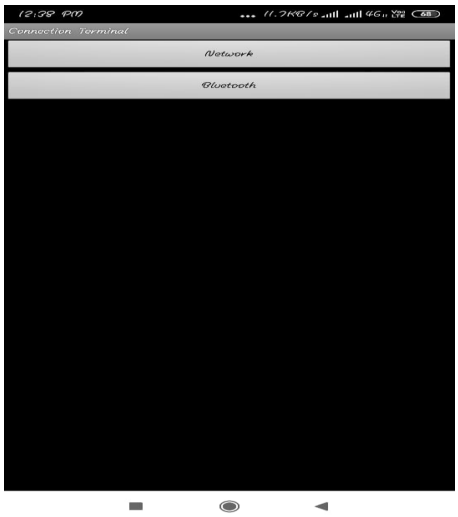

Fig: 4 Connect to Network

The figure 4 shows, connecting to the network.

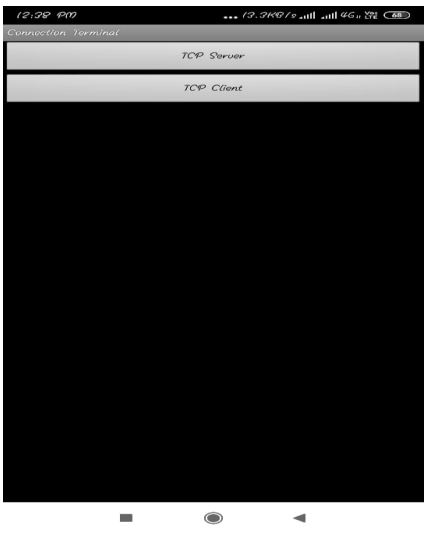

Fig: 5 connecting to the client.

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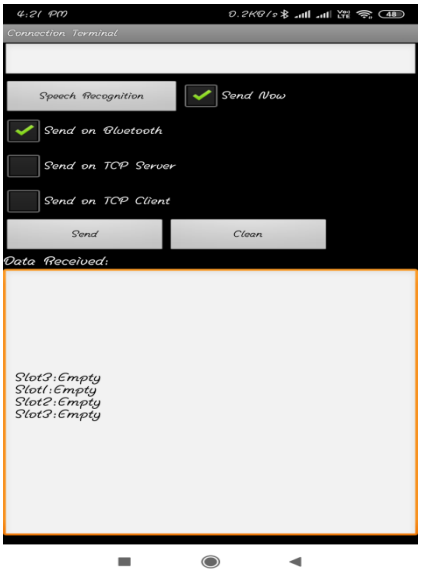

Fig: 6 checking all the Slots.

A. Experiment Details:

In this diagram shows an overall working of the application

Fig: 7 Entry of Car

The above figure shows, when the car coming inside it will detect validating the object.

Fig: 8 Authorizing the vehicle

The above figure shows, once car is validated it shows the output as validated.

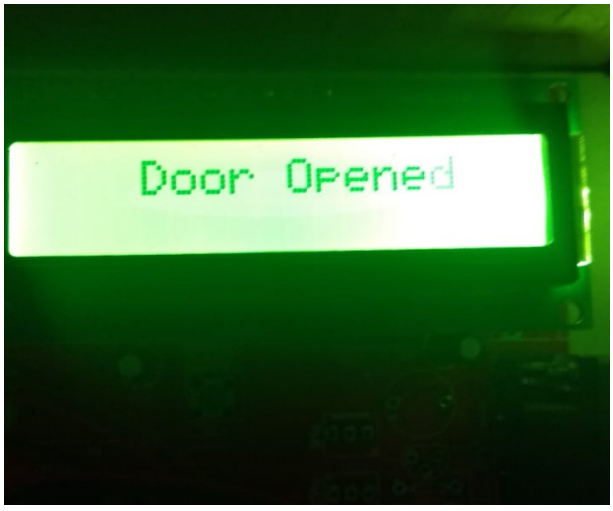

Fig: 9 Opening the Door

The above figure shows, Once the car is validated the Door will be opened.

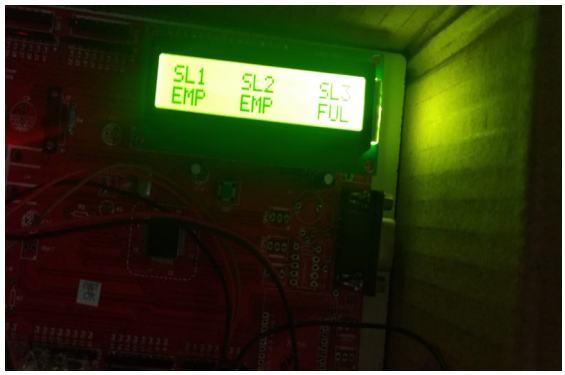

Fig: 10 Displaying the Slots

The above figure shows, after the car is parked in the particular slot it displays the slot is full.

V. RESULT:

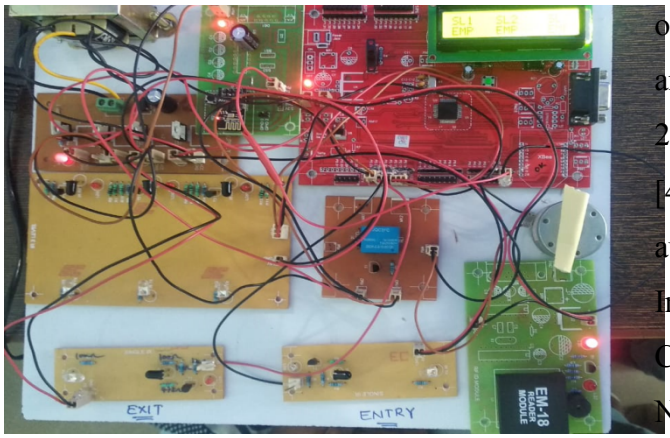

Fig: 11 Complete Result

VI. CONCLUSION:

The system advantages of good parking go well on the far side avoiding obstruction. Enables cities to develop totally integrated multimodal intelligent transportation systems with nice security and potency. Developing good parking solutions inside a town solves the malicious mischief and pollution drawback. Fuel saving (According to a report, good parking may end up in 220,000 gallons of fuels saving until 2030 and approx,300,000 gallons of fuels saved by 2050).

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