

# Intelligent Parking Space Detection System

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**Abstract**— The increasing range of vehicles on the road alongside the direction of obtainable car parking zone ends up in the parking connected issues additionally as accrued hold up in urban areas. Thus it's extremely needed to develop an automatic good parking management system that might facilitate the driving force to seek out some appropriate car parking zone for his/her vehicle terribly quickly. Although ample quantity of analysis works on the event of good parking system exist in literature, however most of them haven't self-addressed the matter of period detection of improper parking and automatic collection of parking charges. In this paper, a prototype of internet-of-thing based E-parking system is proposed. The planned E-parking system uses associate degree integrated element known as timer to handle the above- mentioned problems additionally on offer good parking management throughout town.

**Keywords:** Intelligent Parking System (IPS), RFID, Internet of Things (IoT)

## I. INTRODUCTION

The huge proliferation in the number of vehicles on the road along with mismanagement of the available parking space has created parking related problems as well as increased the traffic congestion in urban areas. Thus, it is required to develop an automated smart parking management system that would not only help a driver to locate a suitable parking space for his/her vehicle, but also it might cut back fuel consumption yet as pollution. It has been found that a Drivers search for a suitable parking facility takes almost 15 minutes which increases the fuel consumption by the vehicle, traffic congestion and air pollution. A significant quantity of analysis works exist within the space of style and development of good parking system. Various options of good parking system square measure listed below:

- Inquiry on handiness of parking lot and reservation of car parking zone.
- Vehicle occupancy detection and management of parking heaps.

Most of the Intelligent parking systems (IPS) projected in literature over the past few years provides answer to the look of parking handiness data system, parking reservation system, occupancy detection and management of car parking zone, time period navigation among the parking facility etc. However, very few works have paid attention to the real-time detection of improper parking and automatic collection of parking charges. Thus, this paper presents associate internet-of-thing (IoT) based mostly E-parking system that employs associate integrated element referred to as timer (PM) to handle the subsequent problems.

- Real-time detection of improper parking.
- Estimation of each vehicles duration of parking lot usage.

- Automatic collection of parking charges.

The E-parking system proposed in this paper also provides city-wide smart parking management solution via providing parking facility availability information and parking lot reservation system and it is named as parking meter (PM) based E-parking (PM-EP). The performance of this method has been showed in a very real-world outside IoT experimental setup and analyzed the procedure complexness and network overhead with as open supply software system and availability for developers.

The idea of creating a Smart City is now becoming possible with the emergence of the Internet of Things. One of the key problems that good cities relate to is automotive parking facilities and traffic management systems. In present day cities finding an available parking spot is always difficult for drivers, and it tends to become harder with ever increasing number of private users. In this study, the enforced software system and hardware parts square measure given with details and comparative results are provided for the effectiveness of the projected approach within the normal off-street parking management system.

## II. OVERVIEW

The Arduino Uno is a microcontroller board supported the ATmega328. It has fourteen virtual enter/output pins (of that six will be used as PWM outputs), six analog inputs, a 16 MHz ceramic resonator, a USB affiliation, a power jack, an ICSP header, and a reset button. It consists of the whole lot had to aid the microcontroller; honestly join it to a laptop with a USB cable or electricity it with a AC-to-DC adapter or battery to get commenced.

The Uno differs from all preceding boards therein it does not use the FTDI USB- to-serial driver chip. rather, it alternatives the Atmega16U2 (Atmega8U2 up to model R2) programmed as a USB-to-serial device.

Revision 2 of Uno board has a resistor pulling the 8U2 HWB line to ground, making it less difficult to pit into DFU mode.

Revision 3 of the Uno board has the subsequent capabilities:

- Pinout: delivered SDA and SCL pins that are close to to the AREF pin and two other new pins located close to to the RESET pin, the IOREF that allow the shields to evolve to the voltage provided from the board. In destiny, shields are going to be well matched with every the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. the other may be a no longer linked pin that's reserved for destiny features.
- more potent RESET circuit.
- ATmega 16U2 replace the 8U2.

"Uno" means that one in Italian and is thought on mark the upcoming unhitch of Arduino one.zero. The Uno and model one.0 can be the reference variations of Arduino,

transferring forward. The Uno is that the present day in a very collection of USB Arduino boards, and additionally the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

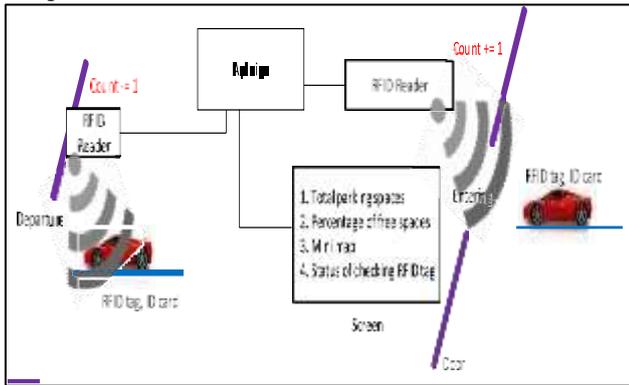


Fig. 1: Diagram of Intelligent Parking System

### III. MICROCONTROLLER

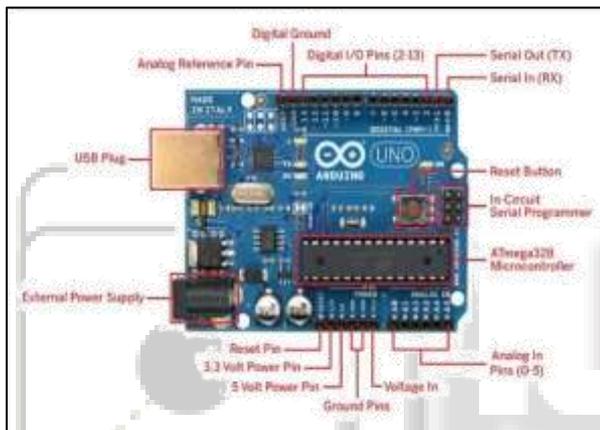


Fig. 2: Diagram of Arduino board

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. The EEPROM reminiscence is like the flash reminiscence and it is non risky.

#### A. LCD



Fig. 3: Image of LCD

An liquid crystal display is a small low, value show. It is simple to interface with a ARM because of an embedded controller. This controller is preferred across many displays which means that many ARM Controllers have libraries that make showing messages as easy as a single line of code. It gives high flexibility to users.

#### B. Rfid

The RFID era is a means of amassing records about a certain object with out the need of touching or seeing the information provider, thru the use of inductive coupling or electromagnetic waves. One critical feature allowing RFID for monitoring gadgets is its functionality to provide specific identity. Enterprise and public interest in RFID technology took a main bounce in 2003. Transmits the identification of an object the usage of radio waves. Identification is transmitted inside the shape of a serial variety that distinguishes each object from the opposite. RFID machine composed of a RFID Reader and a RFID Tag.

#### C. RFID Reader



Fig. 4: Image for RFID reader

An RFID reader acts as a bridge between the RFID tag and the controller and has some simple functions to carry out:

- 1) study the records contents of an RFID tag
- 2) Write information to the tag (within the case of clever tags)
- 3) power-up the tag (inside the case of passive tags).

RFID reader are composed of approximately three elements: an antenna, an RF electronics module, answerable for communicating with the RFID tag, and a controller electronics module, liable for speaking with the controller.

#### D. WI-FI

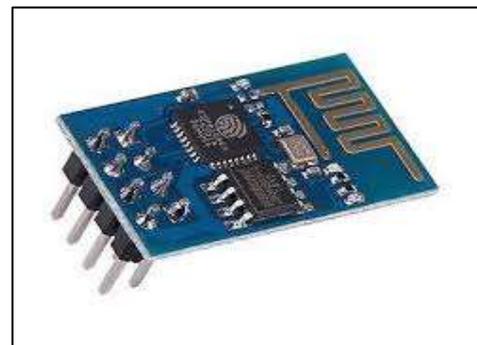


Fig. 5: ESP8266 Wifi module.

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability.

ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi. Wi-Fi module used here is for app updation.

#### IV. BLOCK DIAGRAM

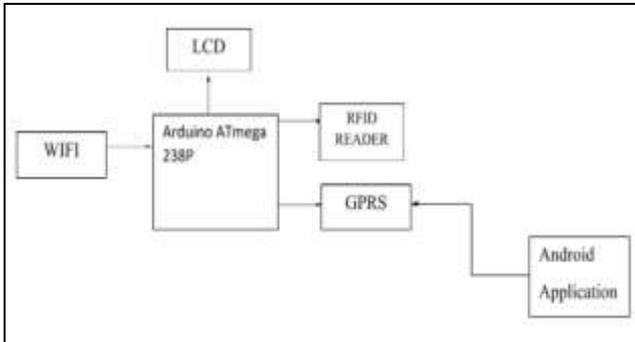


Fig. 6: Block Diagram of Intelligent Parking System

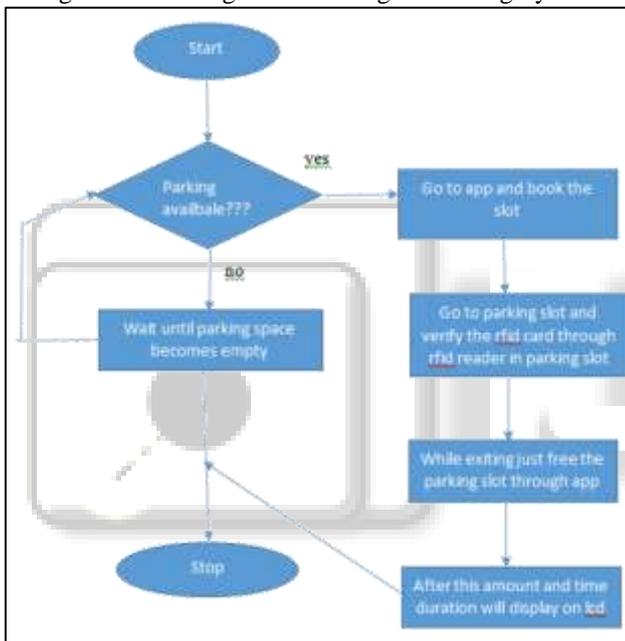


Fig. 7: FLOW DIAGRAM

#### V. WORKING

The parking system proposed in this paper consists of the following components. A WLAN or Wi-Fi integrated laptop/workstation called local parking management server along with some Wi-Fi access points (APs) deployed within each parking facility and a central server for providing parking availability information throughout the city and receiving parking lot reservation request from the driver of a vehicle. The network architecture of the proposed parking system is shown in figure. According to the proposed intelligent parking system, the user is provided with an android application which he/she can use to book the parking slot. The initial status of the parking slots are fed in the system. The user can check the app to see if the slot is empty or full. If the slot is empty user can book the slot and then the status of the slot is updated in the app as full. Now, when the user reaches the parking it can show the slot booking

information on the app and the RFID scanning is done and the user is given access to the slot.

- 1) Car Parking App: This is an application software system. Running on Android operating system, the users will install it on their smartphones and use it to reserve parking spaces. The users access the system via 3G/4G mobile connections.
- 2) IoT System: This module acts as the intermediate device in the system and is a modelled version of the car parking system. The major part of this module is constituted by the Renesas controller, LDR sensors, RFID, GPRS.
- 3) Arduino UNO: It is an open source microcontroller board based on the Microchip ATmega328P. The processing unit acts like an intermediate between the sensors and cloud. All the sensors are wirelessly connected to the processing unit.
- 4) General Packet Radio Service [GPRS]: It helps in transmission of data to the internet for mobile phone.
- 5) RFID: Provides unique identification number for each slot. Acts as a bridge between microcontroller and RFID reader.
- 6) Wi-Fi: Helps provide internet connectivity from the hardware to application.

#### VI. SCOPE

In future most of the circuits inside the device can be fabricated on a unmarried chip, thereby making it compact in size and for this reason discount in price. For task demo challenge, we've evolved a prototype module. In destiny, this assignment may be taken to the product degree. To make this challenge as consumer pleasant and sturdy, we together with the controller on a single board with exchange in era, thereby lowering the dimensions of the device need to make it compact and price effective. Going in addition, most of the gadgets can be embedded.

#### VII. CONCLUSION

The mission is designed using based modeling and is capable of offer the favored results. It may be successfully carried out as an actual Time device with sure changes. Science is coming across or developing primary step forward in numerous fields, and as a result generation continues converting from time to time. Going in addition, most of the devices may be fabricated on a single alongside microcontroller hence making the machine compact thereby making the present machine more powerful. To make the gadget relevant for real time purposes additives with extra range wishes to be applied.

#### VIII. FUTURE ENHANCEMENT

FURTHER improvements to the machine may be the creation of the inbuilt RFID tag inside the vehicles. Implementation of google maps to expose the path to the parking slot area. Implementation to send the messages to the registered cell number of the parker approximately their parking slot reservation. Use of automatic control gadget to block the reservation of booked slots. Implementation of the device to the exit degree also. Implementation of clever parking to the

multilevel car parking system. As a result the approach is to march toward a clever and virtual city.

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