**ABSTRACT**

Internet of Things (IOT) plays a key role in connecting the surrounding wireless things to the system and made easy to access information from remote location. The researches and implementations are currently on -board in all the respective areas. The study based on efficient real time traffic congestion enable us to design a Smart Parking and Advanced Booking System(SPABS) to find the nearest parking area and gives availability of parking slots. 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 and reduces the fuel consumption.

The existing parking system which uses video sensors and cameras to collect the real-time information. But these parking system are expensive and utilizing more bandwidth. In consideration with cost and performance, our project embedded-wireless sensor based system called Smart Parking and Automatic Booking System(SPABS) is to detect the empty parking spaces and sends this data to users. In this system user will send a request to the server of their choice. The central database will send a request to embedded system, for availability of parking slot.. The user will access the confirm request provided by the server. The information also include terms and condition where in, the booking will be cancelled, if the user did not turn up within the given time slot.

The user can access the allotted parking slot through his smart card, in order to avoid illegal activities. By swiping the smart card the system or the server will match the user ID, if it is matched the user will be allowed for parking. The project is also interested in extending the generating the parking bill to the user.

**INTRODUCTION**

IOT technology grows in various fields of smart applications but we have not yet found boundary constraints of this technology. Some smart applications which it has implementing currently such as on smart grids, smart lighting, smart energy, smart city, smart health etc.

This is broadly classified into three categories such as sensing, processing and connectivity. Whereas sensing includes sensing the speed of vehicles and humans or any objects (accelerometer), sensing of temperature, pressure etc. And these can be processing by using some processors such as network processor, hybrid processor MCU/MPU etc. The devices are connected by using some technologies called GPS, Wi-Fi, BT/BTLE, RFID etc.

More than half of the world’s people are living in the cities. So the cities have reached full of its occupancy. As people uses vehicles for transportation so there is large number of vehicles exists for people convenience. Most of the time people spend their precise time on searching parking lots to park their vehicles. Thus congestion occurs in the traffic it leads to a hectic job to find the parking space to park their vehicle. The most traffic occurs only because of vehicle congestion in the urban areas thus people are wasting time in searching the parking area abnormally to park their vehicles.

**METHODOLOGY**

In SPABS advanced parking system we have three layers. First layer is location controlled embedded system it consist of ARM based microcontroller to perform ground level operation. To identify the slot availability by using IR sensor and the security purpose the RFID based gate control system is enabled.

The second layer is server, it virtualizes the slot site and creates a data base of filed slots booked slot and free slots and keep track of timing for arrival and canceling of booking.

The server is main base of user end application is the third layer it request server to access the virtual site map and allows to book the slot as per user need.

**HARDWARE DISCRIPTION**

**Raspberry pi:**

The **Raspberry Pi** is a series of [credit card](https://en.wikipedia.org/wiki/Credit_card)–sized [single-board computers](https://en.wikipedia.org/wiki/Single-board_computer) developed in [Wales](https://en.wikipedia.org/wiki/Wales), [United Kingdom](https://en.wikipedia.org/wiki/United_Kingdom) by the [Raspberry Pi Foundation](https://en.wikipedia.org/wiki/Raspberry_Pi_Foundation) with the intention of promoting the teaching of basic [computer science](https://en.wikipedia.org/wiki/Computer_science) in schools and developing countries. The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations through licensed manufacturing agreements with [Newark element14](https://en.wikipedia.org/wiki/Newark_element14) ([Premier Farnell](https://en.wikipedia.org/wiki/Premier_Farnell)), [RS Components](https://en.wikipedia.org/wiki/RS_Components). The hardware is the same across all manufacturers.

All Raspberry Pi include the same [Videocore](https://en.wikipedia.org/wiki/VideoCore) IV [GPU](https://en.wikipedia.org/wiki/Graphics_processing_unit), and either a single-core [ARMv6](https://en.wikipedia.org/wiki/ARM_architecture)-compatible [CPU](https://en.wikipedia.org/wiki/Central_processing_unit) or a newer [ARMv7](https://en.wikipedia.org/wiki/ARM_architecture)-compatible [quad-core](https://en.wikipedia.org/wiki/Multi-core_processor) one (in Pi 2); and 1 [GB](https://en.wikipedia.org/wiki/Gibibyte) of [RAM](https://en.wikipedia.org/wiki/Random-access_memory) (in Pi 2), 512 [MB](https://en.wikipedia.org/wiki/Mebibyte) (in Pi 1 models B and B+), or 256 MB (in models A and A+, and in the older model B). They have a [Secure Digital](https://en.wikipedia.org/wiki/Secure_Digital) (SDHC) slot (models A and B) or a [MicroSDHC](https://en.wikipedia.org/wiki/MicroSDHC) one (models A+, B+, and Pi 2) for boot media and persistent storage. In 2014, the Raspberry Pi Foundation launched the Compute Module, for use as a part of embedded systems for the same compute power as the original Pi. In early February 2015, the next-generation Raspberry Pi, Raspberry Pi 2, was released. That new computer board is initially available only in one configuration (model B) and has a [quad-core](https://en.wikipedia.org/wiki/Multi-core_processor) [ARM Cortex-A7](https://en.wikipedia.org/wiki/ARM_Cortex-A7) CPU and 1 GB of RAM with remaining specifications being similar to those of the previous generation model B+. The Raspberry Pi 2 retains the same US$35 price point of the model B, with the US$20 model A+ remaining on sale. In November 2015, the Foundation launched the Raspberry Pi Zero, a smaller product priced at US$5.

The Foundation provides Debian and Arch Linux ARM [distributions](https://en.wikipedia.org/wiki/Linux_distribution) for download. And promotes [Python](https://en.wikipedia.org/wiki/Python_(programming_language)) as the main programming language, with support for [BBC BASIC](https://en.wikipedia.org/wiki/BBC_BASIC) (via the [RISC OS](https://en.wikipedia.org/wiki/RISC_OS) image or the Brandy Basic clone for Linux),[C](https://en.wikipedia.org/wiki/C_(programming_language)),[C++](https://en.wikipedia.org/wiki/C%2B%2B), Java,[Perl](https://en.wikipedia.org/wiki/Perl), [Ruby](https://en.wikipedia.org/wiki/Ruby_(programming_language)),[[Squeak Smalltalk](https://en.wikipedia.org/wiki/Squeak) and more also available.

**POWER SUPPLY UNIT:**

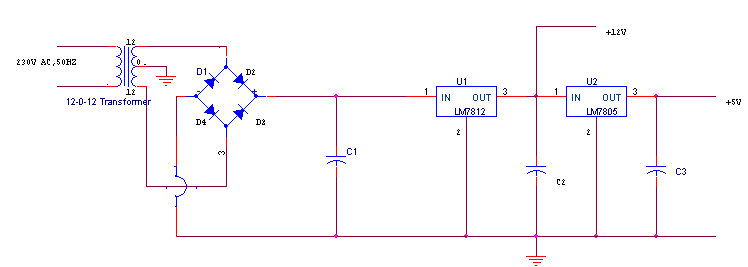


Figure 3.1: Dual Power supply unit for 5V and 12V

In every project we need different voltages for different circuits. So we need to construct different power supply of different voltages employing different voltage transformers, rectifier circuits, filter circuits and regulator circuits.

This type of construction requires many components (transformers, capacitors, regulators.......etc.). So the size of the power supply becomes bulky and costly. To overcome above disadvantages by using regulator IC’S the different voltages (12V, 9V.....etc.) can be obtained with only one transformer.

The circuit diagram of Dual power supply is shown in the figure 3.1. The function of each component of the circuit is explained below. The circuit consists of following stages.

1. Transformer

2. Rectifier

3. Filter

4. Regulator

**3.1.1. Transformer**:

It is an electrical device which transfers the power from one winding to the other winding with isolation. All the electronic gadgets work for less voltage (normally 3V to 12V).So a step down transformer is used, whose function is to step down the AC voltage from 230V to required voltage depending on the need. In this project 12V-0-12V is used. The output of transformer is 12V AC which is connected to the diodes for rectification.

**3.1.2. Rectifier Circuit**:

It employs diodes, which converts AC voltage into DC voltage. The output of rectifier circuit is not a pure DC. It also consists of some AC components, which is called ripples. In order to remove these AC components, filter circuits are employed. So the output of rectifier circuit is fed to the filter circuit (capacitor).

**3.1.3. Filter Circuit:**

Filter circuit employs electrolytic capacitors in order to remove the AC components. As we know the capacitor does not allow DC components to pass through it because it offers high reactance to the DC component. And offers less reactance to the AC component, so all AC components will be bypasses through the capacitors to ground.

**3.1.4. Regulator:**

Regulator is an electronic circuit whose function is to keep output always constant though the input is varied. In this project the three terminal IC regulators of 7812 & 7805 is used for providing output DC voltages. E.g. 7809, the number 78 represents the positive regulator IC and 09 represents the output voltage i.e. output is 12V.

**3.2 Component List:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SL.NO.** | **Component Name** | **Specification** | **Value** | **Quantity** |
| 1. | Transformer | Step-down | 12-0-12 | 1 |
| 2. | Diode | D1  D2  D3  D4 | IN4001  IN4001  IN4001  IN4001 | 1  1  1  1 |
| 3. | Capacitors | C1  C2  C3 | 1000uF,25V  0.01uF  0.01uF | 1  1  1 |
| 4. | Regulator | U1  U2 | LM7812  LM7805 | 1  1 |

Table 3.2 Component list for power supply unit

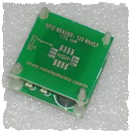
**RFID READER NSK EDK - 125 -TTL**

The NSK125 series RFID Proximity OEM Reader Module has a built-in antenna in minimized form factor. It is designed to work on the industry standard carrier frequency of 1KHz.  
  
This LF reader module with an internal or an external antenna facilities communication with Read-Only transponders-type UNIQUE or TK5530 via the air interface. The tag data is sent to the host system via the wired communication interface with a protocol selected from the module both TT1 and wiegend protocol.  
  
The LF module is best suited for applications in Access Control, Time and Attendance, Asset Management, Handheld Readers, Immobilizers, and other RFID enabled applications.

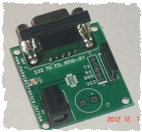
**CONNECTION DETAILS**  
  
Connect - 5 volts and GND   
TX - TTL output Can be directly connected to Microcontroller ( To covert TTL to UART use Converter Board )  
D0 & D1 - is used for wigend protocol - [What is weigend Protocol](http://nsk-embedded-downloads.googlecode.com/files/wiegand_app_note.pdf)

Features

* Output- TTL or Wigand26
* Plug-and-Play, needs +5V to become a reader
* Buzzer indicates tag reading operation
* Compact size and cost-effective

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RFID TTL

NSK RFID TTL

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RFID TTL to RS232 board

interface board



RFID READER

**STEPPER MOTOR**

A Stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a Stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied.