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# A SMART BUILDING SYSTEM USING RASPBERRY PI ,ZIGBEE AND GSM TECHNOLOGY.

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## ABSTRACT

*The main aim of this technology is give security and reduce parking problem of less area of building. In day to day life people are facing the parking problem at building, society, offices, etc. The main Moto of this technique is only to reduce people problem regarding parking. Purpose of this technique is only that to solve the parking related issue and give some security to the building. For security purpose we are using image processing technique for vehicle (car, scooter, etc.) Driver. This technique is more useful to reduce the people problem.*

***Keywords: Raspberry Pi, Camera, Cam-Scanner, Rfid, Zigbee, Etc.***

## I.INTRODUCTION

Now-a-days, in our daily life, we face many issues related to car parking in society. Especially, the societies in cities like Poona, Nagpur, etc. and Metropolitan cities like Mumbai, Chennai, Delhi etc. the issues of parking and securing the entry of the society is the huge need. Many times a person unknown to the society enters with a known vehicle, may be the person is relative of a owner in the society, but still it must be recognized at the entry of the society gate.

To overcome such issues the smart intelligence technology can be used and thus that is the aim of this paper.

## II. HISTORY AND BACKGROUND

We have seen in TV news or in the Newspaper about the crimes, such as robbery in a flat, car stolen from a society even though it have surveillance by watchman. Also on other hand, there is lack of parking area, unmanaged parking, and car traffic in a society when multiple car starts searching for a single car parking. The Smart Building System will be reliable and helpful for the watchman as well as the owner to manage security and parking issues.

## III. SYSTEM DESIGN

The main objective of this paper is to show the proper parking area or to indicate whether the particular parking area is vacant or not. This will overcome the efforts to find the free area again and again. The GSM and ZigBee Technology will be used to make the better transmit of data between the owner and the watchman's room of

surveillance. Buzzer will be used to indicate a car entered in the society. The RF-ID will recognize the entered car and will show to owner details.

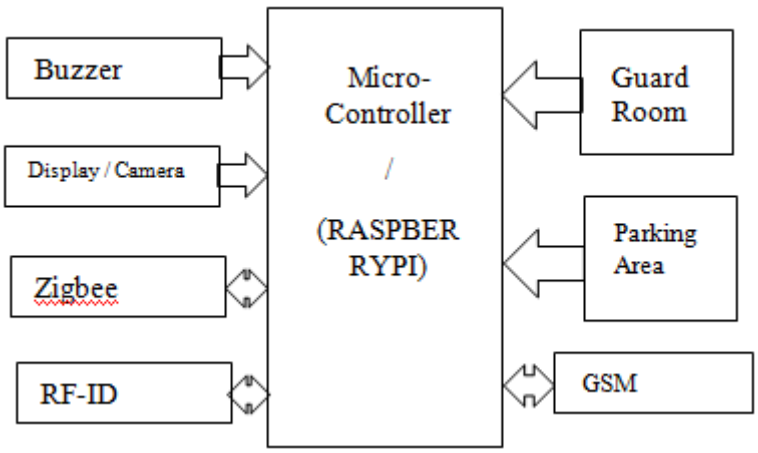



**Fig. Block Diagram of Parking Unit**

## IV. DIAGRAM

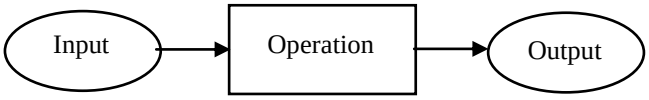



**Fig. Operational Diagram**

Input: - It will check some parking area i.e. available parking area.

Operation: - It will check sine parking using GPS, GSM or location detection algorithm.

Output: - We will find out availability of parking.

## V. SENSOR

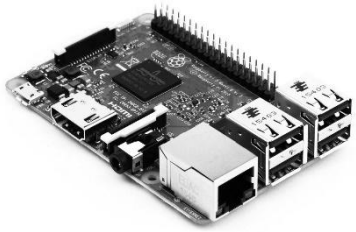


**Fig.Raspberry pi**

The Raspberry Pi 3 Model B has a quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz. This makes the Raspberry Pi 3 more 50% faster than the Raspberry Pi 2. In comparison with the Raspberry Pi 2, the RAM and Graphics Capabilities Remains same provided by the VideoCore IV GPU. The Raspberry Pi 3 also includes on-board 802.11n WiFi and Bluetooth 4.0.

## VI. GPIO PORTS

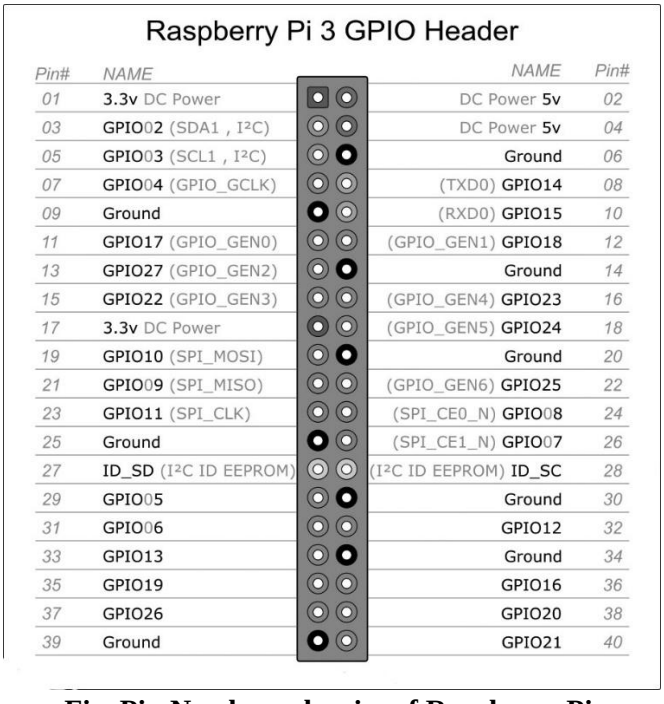
Thw further details expands on the technical features of the GPIO pins available on BCM2835 Ports.

GPIO pins can be configured as either general-purpose input, general-purpose output or as one of up to 6 special alternate settings, the functions of which are pin-dependant.

The Raspberry Pi 3 consists of 3 GPIO banks on BCM2835.

Each bank has its own VDD input pin. The GPIO pins in Raspberry Pi supports the supply from 3.3V.

The selection of pins from Bank '0' is available on the 'P1' header on Raspberry Pi. Voltage more than 3.3V may damage the GPIO blocks




| Pin# | NAME | NAME | Pin# |
|---|---|---|---|
| 01 | 3.3v DC Power | DC Power 5v | 02 |
| 03 | GPIO02 (SDA1 , I²C) | DC Power 5v | 04 |
| 05 | GPIO03 (SCL1 , I²C) | Ground | 06 |
| 07 | GPIO04 (GPIO_GCLK) | (TXD0) GPIO14 | 08 |
| 09 | Ground | (RXD0) GPIO15 | 10 |
| 11 | GPIO17 (GPIO_GEN0) | (GPIO_GEN1) GPIO18 | 12 |
| 13 | GPIO27 (GPIO_GEN2) | Ground | 14 |
| 15 | GPIO22 (GPIO_GEN3) | (GPIO_GEN4) GPIO23 | 16 |
| 17 | 3.3v DC Power | (GPIO_GEN5) GPIO24 | 18 |
| 19 | GPIO10 (SPI_MOSI) | Ground | 20 |
| 21 | GPIO09 (SPI_MISO) | (GPIO_GEN6) GPIO25 | 22 |
| 23 | GPIO11 (SPI_CLK) | (SPI_CE0_N) GPIO08 | 24 |
| 25 | Ground | (SPI_CE1_N) GPIO07 | 26 |
| 27 | ID_SD (I²C ID EEPROM) | (I²C ID EEPROM) ID_SC | 28 |
| 29 | GPIO05 | Ground | 30 |
| 31 | GPIO06 | GPIO12 | 32 |
| 33 | GPIO13 | Ground | 34 |
| 35 | GPIO19 | GPIO16 | 36 |
| 37 | GPIO26 | GPIO20 | 38 |
| 39 | Ground | GPIO21 | 40 |

**Fig. Pin No. dependencies of Raspberry Pi.**

## VII. GPIO PADS

The GPIO connections on the BCM2835 package are sometimes also referred as the peripherals datasheet as "pads" - a semiconductor design term meaning "chip connection to outside world".

The pads can be configured via CMOS push-pull input/output driver's buffers. The register based control settings are available for

- Internal pull-up / pull-down enable/disable
- Output to increase drive strength.
- Input Schmitt-trigger filtering

## VIII. SPECS

Unlike Raspberry Pi (First Model) and Raspberry pi 2 B+ model, the Raspberry Pi 3 has inbuilt Wi-Fi and Bluetooth, which reduces the external use of USB Wi-Fi/Bluetooth Dongle.

Socket On Chip: Broadcom BCM2837 (more 50% faster than the Raspberry Pi 2)

CPU: 1.2 Ghz quad-core ARM Cortex A53

GPU: Broadcom VideoCore IV @ 400 MHz

Memory: 1 GB LPDDR2-900 SDRAM

USB ports: 4

Network: 10/100 MBPS Ethernet, 802.11n Wireless LAN, Bluetooth 4.0

## VIV. POWER-ON STATES

Every GPIO Port reverts to general purpose inputs on power on reset. The default pull states are also applied, which are detailed in the alternate function table in the ARM peripherals datasheet.

## VV. ALTERNATIVE FUNCTIONS

Almost every GPIO pin have alternative function. Peripheral blocks internal to BCM2835 can be selected to appear on one or more of a set of GPIO pins.

## VVI. SOFTWARES

The Raspberry Pi was always intended to run a variety of operating systems, and for the past four years, we've seen just about everything. From the stock Debian distribution to much more esoteric options, ranging in Windows 10 IoTCore .

## VVII. ZIGBEE


**Fig. ZigBee**

The XBee-PRO OEM RF Module is engineered for IEEE 802.15.4 standards and supports the unique needs of low-cost, low-power wireless sensor-networks. The modules require minimum power and provides reliable delivery of data between two or more devices.

The module operate within the ISM 2.4 GHz frequency band and are pin for pin compatible with each other.

**SPECIFICATION**

| Specification | XBee-PRO |
|---|---|
| Indoor/Urban Range | Up to 300''(100m) |
| Supply Voltage | 2.8-3.4V |
| Operating Frequency | ISM 2.4GHz |
| Supported Network Topologies | Point-to-Point, Point-to-Multipoint and Peer-to-Peer |
| Operating Temperature | -40 to 85$^{o}$C(industrial) |
| Addressing Options | PAN ID, Channel and Addresses |
| Antenna Options | Integrated Whip, Chip or U.FL Connector |

**WORKING OF ZIGBEE**

The module can achieve transparent data transmission between most of the devices, and it can be able to form a MESH network. The device has the characteristics of small volume, ultra-low power consumption which help it work on low-power and low-cost. It can terminate the independent data transmission or can be easily embedded to a variety of products to form a solution for short-range wireless data transmission.

The device can be used for of automatic control in various field and the network has the characteristics of reliability, electric power-saving, low cost, security and large capacity. The target application domains are aimed at home automation, industry, telemetry and remote control, vehicle automation, medical care,

agricultural automation and so on, such as lighting control automation, wireless data acquisition and monitoring sensor, oil field, mining, electrical mining and logistics management etc.

## VI. IMAGE PROCESSING

The Digital Image Processing is used to process the image taken via camera at the entry gate. The Snapped image will be processed and compared with the various images stored in the database. It will compare the owner's face and will give a green signal when recognized as correct person. It will also notify the free parking area /open parking area available in the society/office.

## VII. RESULT

Using this type of Technology can reduce the efforts of the car owner as well as the watchmen. The surveillance will also improve and the time-to-time track will be recorded with or without manual checking of car.


**Fig. Graph of increasing ratio of safe Parking**

## VIII. CONCLUSION

It is concluded as, the parking related problem in less area of infrastructure will be solve by this technique. It also gives to the security to the building infrastructure.

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