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Rfid Based Cash Wallet for Parking Garages using Timestamp

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Abstract: ***With the increase in usage and availability of vehicles, finding an empty parking slot becoming very difficult in many public areas. So there is a requirement for a device that identifies empty slots in a parking place and also keeps the track of vehicles which are already parked very expertly. This task reduces human activity on the parking location in searching of empty slots and scheming the payment based on the timestamp i.e. how much time the vehicle is parked at the particular slot based on the use of parking place with the resource of money pockets. Some of the steps included in this functioning are vehicle identification, detection of empty slot and scheming of amount based on the time duration of parking. Vehicle identification is achieved with the use of RFID Tag, slot detection is also shown and amount calculation is done on the duration of parking. Here we are connecting all of the sensors to Raspberry pi to stumble on RFID Tag and deduct the charge from the cash wallet.***

Keywords: IoT, RFID, sensors, cash wallet, Raspberry pi, Timestamp

I. INTRODUCTION

Here for every vehicle we are providing a RFID tag which can be tracked by the RFID tracker to identify the user and the amount could be deducted from the user wallet. This system uses Web Application for the user, where the user can take a look at the empty slots by the usage of the IP deal with of the unique location. The user scans the RFID tag at entry and exit points and it calculates the amount to be paid depends on the time period, if the customer wallet has the required amount, it will be deducted directly, if not user has to recharge.

A. Problem Definition

Now a days there is a problem with finding empty slots in malls or any other such places and also people find difficulty in paying amount at parking areas due to heavy traffic [11] in cities .This paper is aimed at doing so with the help of sensors using Raspberry pi. With the help of webpage, the users can know the status of parking slots and the payment gateway is done through the RFID reader and Tag based on time duration.

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B. Existing System

The present day device makes use of manually performed car parking management, where the man or woman is appointed at a gate who notes the vehicle entry and exit times. Based on the time duration it's miles parked, the quantity could be asked to the customer to pay. When the car enters the parking zone, the man or woman enters all of the info in a sign in. To get admission to any information approximately vehicle or owner we should undergo the registers in which the desired statistics is written. As that is a manual system[5] there may be chance of human mistakes. Very time eating task. This machine is glaringly no longer handy and cannot be used drastically. It can also bring about visitors jam in case many motors enter the parking spot at a time.

The data about the vehicle or owner that is maintained in a register can be misplaced [3]. In the existing system the accuracy of sensors for the detection of vehicle could be very low [7].

C. Proposed System

This proposed system reduces human efforts and it is completely based on a Raspberry Pi3 B+ Processor and uses a web application for the user. The customer can identify the empty slots using the Web Application. Here, the slot detection is done through IR sensors and this information is forwarded to Raspberry Pi. RFID Tag is connected to every vehicle for specific identity. The RFID reader which is fixed on the parking centers reads the RFID tag at entry factor and at exit point and it calculates the amount to be paid primarily depends on the time period, if the customer wallet is of required amount, It will be deducted routinely. The consumer can replace his balance based totally on his requirement. The consumer can pass cashless and the amount is automatically deducted from his pockets. This machine eliminates the usage of manual exertions hence casting off any kind of manual error. Entry and Exit points will be dealt with in a fast manner without preventing the vehicles so that traffic jam trouble can be averted [2].

II. SYSTEM DESIGN

Circuit Design 1
(Connecting Raspberry Pi to EM-18 RFID Module)

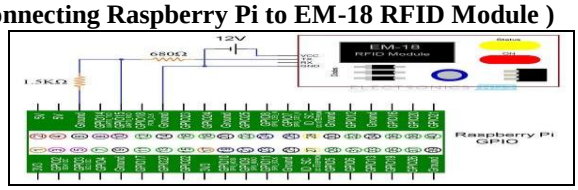

Figure 2.1.a Circuit Design1

Here, we're combining the EM-18 RFID Reader Module and Raspberry Pi then get right of entry to facts from some RFID Cards via Python Script. RFID Module is a conventional term this is used to describe a machine that transmits the identification of an item or individual wirelessly, the usage of radio waves.

RFID or Radio Frequency Identification is a communication over electromagnetic waves. RFID Tags and RFID Cards are used for authentication purpose. On RFID Reader the VCC (-negative) is attached to Ground (pin no.6 in Raspberry Pi) and GND is connected to Ground i.e.,14th pin in Raspberry Pi. On Raspberry Pi, the GPIO14 and GPIO15 i.e. Physical Pins eight and 10 are the UART TX and RX Pins respectively. As we have already enabled the Serial Port of the Raspberry Pi, now we can join those pins to the external devices. Raspberry Pi works on 3V Logic. Hence, the RX Pin of the Raspberry Pin should most effective take delivery of with 3.3V Logic. In order to do this, we need to convert the TX line of the RFID Reader to a few 3.3V using a easy Voltage Divider Network consisting to 2 resistors. The general purpose input & output has forty pins. These are used inside the raspberry pi to connect with the opposite digital boards.

These pins can be given input & output instructions based on programming raspberry pi. The raspberry pi offers digital GPIO pins. These pins are used to connect different electronic components.

Circuit Design 2 (Connecting Raspberry Pi to IR sensor)

Here, we're integrating IR Sensor to Raspberry Pi.IR Sensor module has superb adaptive functionality of the ambient mild, having a couple of infrared transmitter and the receiver tube. The sensor module output port OUT may be immediately related with the microcontroller IO port can also be driven directly to a 5V relay; Connection information is: VCC-VCC; GND-GND; OUT-IO.3-5V DC power deliver module may be used. When the electricity is grew to become on, the crimson electricity LED is lit.

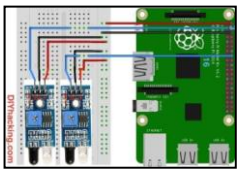

Figure 2.1.b Circuit Design2

III. PROPOSED ALGORITHM

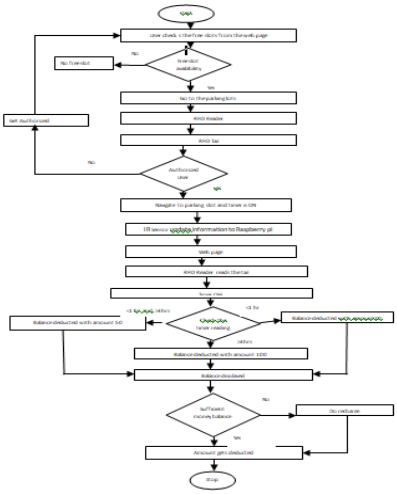

Figure 3.1. Flow Chart

First the user checks the status of parking lots[8]. If the slots are available he will navigate to parking slot where the RFID reader is fixed. Here, the RFID reader reads the Tag .If the user is authorized then it displays the user details that are contained in tag. Now, Timer is ON and the IR sensor updates the slot status and send the data to Raspberry Pi so that web page gets updated. At exit time, the Tag is read by RFID reader again and the timer is OFF. Based on the time duration the money gets automatically deducted. If the user does not have sufficient money, he can recharge his wallet. Again when the slot becomes empty the IR sensor detects and report to raspberry pi. So by using this, the user can check the status of parking slots from anywhere at any time through the Web Page.

IV. IMPLEMENTATION

Figure 4.1 Block Diagram

In this paper, we are going to use one Raspberry pi interfacing with RFID ,the use of IR sensor together with that a motor. We are using Infrared Sensors for vehicle identification inside the parking zones. The sensor nodes must study sensor measurements at a notably excessive sample rate which tell whether a vehicle is entering or leaving a parking zone. The sensor node in a parking zone reads the values of the AMR sensor at regular intervals (e.g., three seconds) and broadcasts the sensor values once they show abrupt variations. The RFID tag maintains a unique identification and glued facts. The data recorded inside the RFID tag is read by the RFID reader. A RFID reader will change the data into the digital form and computing content. Here RFID reader is placed at the gate and the RFID tags are placed inside the vehicle. When a customer's vehicle reaches the gate, the communication between RFID tag of the vehicle and antenna of RFID reader is done. Then RFID reader converts the sign records to the virtual data.

A. The steps for the process

Firstly the user checks the availability of empty slots through the Web Page by giving the IP address of that particular area. If the empty parking slots are available then the user is directed to the parking zone where the RFID Readers [4] are fixed. The RFID tag will be read by the RFID reader for identification or authentication. If the user is authorized then the details of the user are displayed. This Tag is given for unique identification [12][9] and it also serves as a wallet for payment purpose. This Tag is read both times at entry and at exit points and based on the duration of parking the money will be automatically educted. The user can also recharge his wallet based on the requirement.

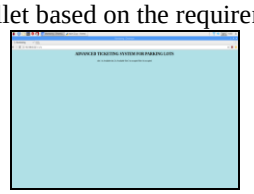

Figure 4.2
Parking slots status

Figur 4.3
RFID Reader reading the Tag

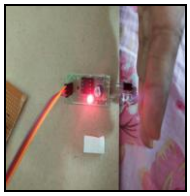

Figure 4.4 IR Sensor Object detection

After entering the parking zone, the IR sensor identifies the vehicle and sends that information to Raspberry Pi and from there to the Web page. Once the IR sensor detects the object RED LED is lit , it means that the slot is occupied. The money will be calculated based on the time duration as shown in the figure 4.5.

Figure 4.5
Money deduction based on the time duration

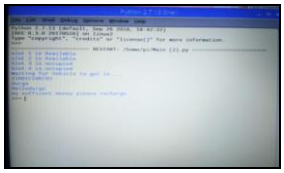

Figure 4.6
Output when the amount is zero

If the user does not have the sufficient money, it shows a message as "No sufficient money please recharge".

V. V. SYSTEM SPECIFICATIONS

A. Hardware Requirements

1. Raspberry Pi 3

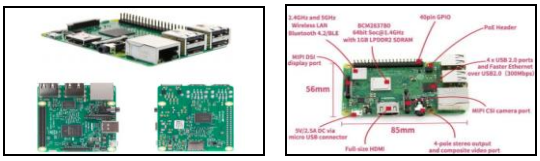

Figure 5.1Raspberry PI 3

2. IR Sensor[13][10]

An infrared (IR) sensor is an electronic device which identifies and measures the infrared radiation in surroundings where it is placed. When an object comes near the sensor, the infrared mild from the LED reflects off of the item and is detected by the receiver and here we're using the Active sensor to identify the vehicle as well as its movement. The output port OUT of the sensor module is directly connected with the IO port of microcontroller and can also be connected directly to a 5V relay; Connection information is : VCC-VCC; GND-GND; OUT-IO.3-5V DC power supply module can be used. When the power is turned on, the red power LED is lit[1].

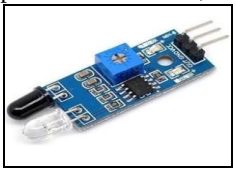

Figure 5.3
IR Sensor

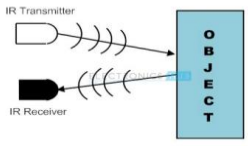

Figure 5.4
IR Transmitter &Receiver

IR Transmitter and IR Receiver

Basic characteristic of an IR transmitter and IR receiver is to send records through wireless medium. In which The transmitter is usually an IR LED whereas the receiver is a photodiode.

The IR transmitter sends IR radiations to a receiver. Due to the falling of radiation on the receiver a potential difference is created at the ends. This potential difference is diagnosed with the HIGH or LOW values of a microcontroller

3. RFID Tag

Figure 5.5 RFID Tag

Radio Frequency Identification (RFID) tag [6] is the wireless technology which uses radio frequency waves to transfer data. Scanning items with RFID tags allows unique identification and depending on the RFID type used the range of reading changes from few centimeters to over 20+ meters. The working of RFID tags have the same applications as barcodes but they are far more advanced. Suppose, reading information from a barcode require line-of-sight but RFID tag can be performed over a long distance also. This means that a single RFID tag can serve multiple readers at a time.

VI. 4. RFID READER (EM 18 MODULE)

EM – 18 is another sensor module. First we are choosing the mode of transmission between MODULE and CONTROLLER. After that we are programming the controller to acquire statistics from module to show. Next power the device. When a tag is reaching closer to the MODULE it reads the ID and sends the records to controller. The controller receives the data and do the appropriate action which is programmed by us.. EM18 is a RFID reader which is used to read RFID tags of frequency 125 kHz. After reading tags, it transmits unique ID serially to the PC or microcontroller using UART communication or Wiegand format on respective pins.EM18 RFID reader reads the data from RFID tags which contains stored ID which is of 12 bytes. EM18 RFID reader doesn't require line-of-sight. Also, it has identification range which is short i.e. in few centimetres.

RFID reader EM-18 features:

1. Serial RS232/TTL output
2. Operating Frequency is 125KHz.
3. Range is 5-8 cm.

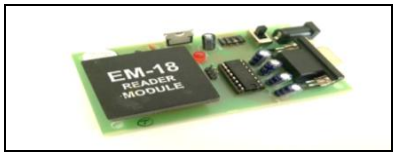

Figure 3.3.1.6 RFID EM-18 Reader Module

B.Software Requirements

- PHP, Html
- Wi-Fi, Internet
- Python

VII. CONCLUSION

IOT consists of web enabled devices that collect the data from the surrounding environments using processors, sensors and communication devices. With the increase in usage of the vehicles, finding the empty slot in the parking area is very difficult, especially at the places like airport, shopping malls and some public regions where users are likely to be in hurry more than usual .So, there is a requirement of smart way of parking with the payment gate way by adding more comfort to the users which saves time and also reduces the manual work. The amount is calculated based on time duration. In Future the plan is to extend the same work by allowing the user to select the time period for parking before only so that the same slot would be made available for the next user and scheming the time period of a vehicle in a parking lot as well as deduction of the parking charges done based on the time period. The users can recharge the tag as and when required and amount will be deducted at every visit. For this to be implemented some of the time recording technique should be used.

APPENDIX

Program code

Source Code (Python)

```
import RPi.GPIO as GPIO
import time
import serial
import subprocess
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
 buzzer=21
GPIO.setup(buzzer,GPIO.OUT)
GPIO.output(buzzer,False)
ir = [6,13,19,26]
for i in range(4):
GPIO.setup(ir[i],GPIO.IN,pull_up_down=GPIO.PUD_UP)
People={“21001C19B793”:”durga”,”4C00326E0515”:”
                                        Praveen"}
amount=1000
def slotStatus():
file = open("/home/pi/log.txt", "r+")
file.truncate(0)
if (GPIO.input(6) == 0): slot1Status="Slot 1 is occupied"
else: slot1Status="slot 1 is Available"
if (GPIO.input(13) == 0): slot2Status="Slot 2 is occupied"
else: slot2Status="slot 2 is Available"
if (GPIO.input(19) == 0): slot3Status="Slot3isoccupied"
else: slot3Status="slot3isAvailable"
if (GPIO.input(26) == 0): slot4Status="Slot 4 is occupied"
else: slot4Status= "slot 4 is Available"
Status=str(slot1Status)+"\n"+str(slot2Status)+"\n"+
str(slot3Status)+"\n"+str(slot4Status)
print(Status)
time.sleep(7)
file = open("/home/pi/log.txt", "a")
file.write(str(Status))
file.write("\n")
file.close()
slotStatus()
try:
while(1):
print("Waiting for Vehicle to get in....")
rcv = port.readline()
print(rcv)
if(rcv is not "): print(people[rcv])
name="Hello"+str(people[rcv])
print(name)
if (amount==0) print("no sufficent money please recharge")
break
GPIO.output(buzzer,True)
time.sleep(1)
GPIO.output(buzzer,False)
inTime=time.time()
slotFlag = 1
subprocess.call(["sudo", "espeak", name])
while(slotFlag==1): print("Waiting for car to leave...")
rcv = port.readline()
if (rcv is not "):
GPIO.output(buzzer, True)
time.sleep(1)
GPIO.output(buzzer, False)
print("Card swiped to leave")
outTime=time.time()
slotFlag=0
break
standbyTime=outTime-inTime
if(standbyTime < 3600.0):
print("Amount detected from your account:20")
amount=amount-20
elif(3600.0 < standbyTime < 10800.0):
print("Amount detected from your account:50")
amount=amount-50
elif(standbyTime>10800.0):
print("Amount detected from your account:100")
amount=amount-100
else: slotStatus()
print("Remaining Amount in your account:",amount)
print("! Thank you for visiting !")
msg="Thank you for visiting"+str(name)
subprocess.call(["sudo", "espeak", msg])
except KeyboardInterrupt:
print("stopping")
GPIO.cleanup()
```

PhP Code

```
<html>
<head>
<meta name="viewport" content="width=device-
width" />
<title>Monitoring</title>
</head>
<meta http-equiv="refresh"
```

```
content="1">
<bodyalign="center"
style="background:powderblue;">
<h1>ADVANCED TICKETING SYSTEM FOR
PARKING LOTS</h1>
<?php
$myfile = fopen("/home/pi/log.txt", "r") or
die("Unable to open file!");
echo fread($myfile,filesize("/home/pi/log.txt"));
fclose($myfile);
?>
</body>
</html>
```

REFERENCES

1. Abhirup Khanna, Rishi Anand, "IoT Based Smart Car Parking system", International conference on internet of things applications, IEEE conference publication, pp (266-270), Pune , India, 22Jan-4Jan,2016.
2. Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP) (pp. 1-6). 2015, April.
3. Rico, J., Sancho, J., Cendon, B., & Camus, M Parking easier by using context information of a smart city:Enabling fast search and management of parking resources". IEEE 27th International Conference on Advanced Information Networking & Applications Workshops (pp. 1380-1385). 2013, March
4. Kafle, V. P., Fukushima, Y., &Harai, H. "ID- based Communication for realizing IoT and M2M in future heterogeneous mobile networks" IEEE International conference on Recent Advances in Internet of Things, pp.(1- 6),2015.
5. Doukas, C., Capra, L., Antonelli, F., Jaupaj, E., Tamilin, A & Carreras,I. "Providing generic support for IT and M2M for mobiledevices. In Computing & Communication Technologies", IEEE International Conference on Research, Innovation, and Vision for The Future (RIVF), (pp. 192-197) , 2015 January.
6. Muftah Fraifer, Mikael fernstrom, "Smart Car Parking Prototype Utilizing CCTV Nodes" IEEE third world forum on Internet ofThings (WF-IoT)pp(649-654), 2016.
7. Zhou, F., & Li, Q. "Parking Guidance System Based on ZigBee and Geomagnetic Sensor Technology". IEEE13th International Symposium on Distributed Computing and Applications to Business, Engineering and Science (DCABES),(pp. 268-271), 2014 November.
8. Ji, Z., Ganchev, I., O'droma, M., & Zhang, X. "A cloud based intelligent car parking services for smart cities". In General Assembly and scientific Symposium (URSI GASS), XXXIth URSI (pp. 1-4).IEEE, 2014
9. Suciu, G., Vulpe, A., Halunga, S., Fratu, O., odoran, G., & Suciu, V."Smart cities built on resilient cloud computing and secure internet of things". In Control Systems and Computer Science (CSCS), 19thInternational Conference on (pp. 513-518). IEEE. 2013, May
10. Rao, B. B. P., Saluia, P., Sharma, N., Mittal, A.,& Sharma, S. V.Cloud computing for Internet of Things & sensing Based applications". In Sensing Technology (ICST), Sixth International Conference on (pp. 374-380). IEEE, 2012,December.
11. L. Foschini, T. Taleb, A. Corradi, and D Bottazzi, "M2M-basedmetropolitan platform or IMS-enabled road traffic management in IoT," Communications Magazine, vol. 49, pp. 50-57, IEEE 2011.
12. N. Hanif, M. Badiozaman, and H. Daud, "Smart parking reservation system using short message services (SMS)," in Intelligent and Advanced Systems (ICIAS), International Conference on, pp. 1-5,2010
13. S. Lee, D. Yoon, and A. Ghosh, "Intelligent parking lot application using wireless sensor networks," in CollaborativeTechnologies and Systems, 2008. CTS 2008. International Symposium on, pp. 48-57,2008.

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