iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** II **Month of publication:** February 2018

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue II, February 2018- Available at www.ijraset.com

Smart Shopping Trolley

Dr. S. Poornachandra[1] , M. Brindha[2] , MI. Arsath Ariff[3] , C. Raviraj[4] , K. S. Srikanth[5]
[1]*Professor, Department of EIE, SNS College of Technology,Coimbatore, India*
[2]*Assistant Professor,Department of EIE, SNS College of Technology,Coimbatore, India*
[3,4,5] *UG Scholars,Department of EIE, SNS College of Technology,Coimbatore, India*

Abstract: ***In supermarkets for purchasing variety of items customer requires a trolley. Every time customer has to move the trolley from rack to rack for collecting items and drop them in trolley. After total purchase one needs to go to the billing counter for payments. At the billing counter the cashier prepares the bill which is a time consuming process and it results in long queues at billing counters. Our aim is to develop a system that can be used in super markets to solve the above mentioned challenges. In our project a new concept called "SMART SHOPPING TROLLEY" has been introduced. The proposed trolley consists of Raspberry pi which follows the customer while purchasing the items and ultrasonic sensor maintains the safe distance between the customer and itself. When a person drops any products into the trolley, its bar code will be detected and the price of those products will be displayed. As the scanned products were dropped the cost will get added to the total bill. Thus the billing will be done in the trolley itself. By using this trolley, customer can buy large number of products in a lesser time with less efforts.***
Keywords: raspberrypi, sensors, Integrated circuits(IC), data minig, Wireless sensor networks(WSN)

I. INTRODUCTION

A retailer or a shop is a business that presents a selection of goods and offers to trade or sell them to customers for money or other goods. Shopping is an activity in which a customer browses the available goods or services presented by one or more retailers with the intent to purchase a suitable selection of them. In some contexts it may be considered a leisure activity as well as an economic one.

The system discussed about the automatic billing process using wireless sensor networks [52].

Further improvement is done by using the RFID and wireless sensor networks for billing process [34].

The microcontroller based trolley which is totally automatic. It follows the customer while shopping and it maintains safer distance between customer and itself [5]. Further improvement is done by exhibiting a more uniform behavior in terms of product sequence collection which was easier for shoppers to find products based on user intention [43]. The micro controller based system is further improved, in which customer has to show the color code side of the product wrapper in front of color sensor [44].

A system with the help of microcontroller to assist a person for shopping with lesser time [6].further improved the system in which barcode scanner reads the barcode of the product and each products gets added to the total bill [7].

Billingprocess have been improved by using QR scanner in which customer has to hold the QR code side of the product wrapper in front of QR code scanner [49]. Each shopping cart is implemented with a Product Identification Device (PID), in this the total bill will be transferred to PC with the help of Bluetooth module [47].

A new methodology with automatic goods carrier navigation and the billing system in the shopping malls have been developed in 2017. The structure of the goods carrier consists of the robotic structure and the keypad which is used to navigate the robotic goods carrier along the particular way. The wireless billing system is made up of Wi-Fi communication module [15].

The RFID based systems have been developed in in which RFID tag reads the information of products and are transmitted through the server to the main billing computer [11][17]. wireless RF module for data transmission [22], whereas DATA MINING for the automatic billing process has been developed [25].

Shopping by acquiring user attention have been introduced . Thus, the interactive trolley guides and directs shoppers in the handling and finding of groceries than traditional trolley shoppers by exhibiting a more uniform behavior in terms of product sequence collection and easier for shoppers to find products and shorter distance using raspberry pi [43].

A methodology which integrates a Raspberry Pi Embedded Chip with two Bar code Scanners and a Battery kit to allow users to self checkout at Super Markets [41].

The developed system enabled with a device consisting of Arduino board which can identify the products by communicating with the racks which in turn consists of an arduino board which is programmed with the details of the product in the rack [19].

RFID and Raspberry Pi controlled trolley was developed whereas trolleys in the shopping malls are protocoled so as to automatically bill the products put into them and the final bill is sent to a web application which can be accessed in any phone or any hand held device. The system is also subjected to anti-theft management where the system doesn't let any customer take non-billed items [28].

The methodology was introduced in which the Supermarkets or Hypermarkets provides the facility to only those customers who having membership cards. When the customer inserts the membership card in the basket or trolley only then it will work as a smart trolley. Otherwise, it will work as a normal trolley [18].

In this paper, The shopping trolley has been automated using raspberry pi and billing system .

II. CHALLENGES

Shoppers buy groceries on a budget. Most of the times, it is only at the end of purchase shoppers comes to know that the overall purchase total is greater than their budget. Due to this, several times shoppers couldn't buy all their desired products and miss out few items. The billing process is quite tedious and highly time-consuming and shop owners want to employ more and more human resource in the billing counter and waiting in long queues negatively affects human morale and may cause misunderstandings or conflict amongst people. For instance, when someone breaks the line and stands in front of other people it causes waiting time even higher.

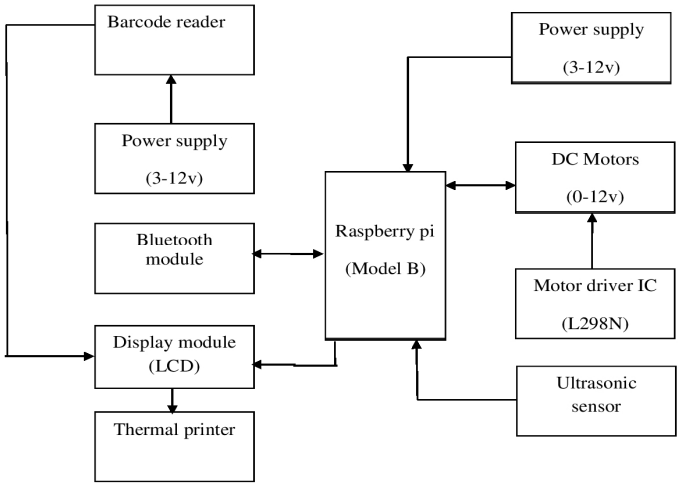


Fig1.Block Diagram

A. Basic Design

The design is based on the normal shopping carts which have been used in the shopping malls. The design has four wheeled cart, which contains two transmission wheels and two assistant wheels which is controlled by the Raspberry Pi and Driver IC.

B. L293d Motor Driver ic

L293D is a motor driver IC which allows the DC motor to drive on either forward or reverse direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motors with a single L293D IC. Dual H-bridge motor driver integrated circuit (IC). The l293d can drive small and quiet big motors as well.

It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in any one direction. As known voltage need to change its polarity for the rotation of the motor in clockwise or anticlockwise direction. In a single L293D chip there are two H-bridge circuit inside the IC which can rotate two DC motors. Due its specifications it is used in all robotic applications for the movement of DC motors. There are two enable pins on l293d. Pin 1 and pin 9, for driving the motor, the pin 1 and 9 need to be high. To drive the motor with left H-bridge you need to enable pin 1 to high. And To drive the motor right H-bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low, then the motor will suspend working and act like a switch. We can simply connect the pin16 (VCC (5V)) to pin 1 and pin 9 of to make them high.

This motor driver is used because of its voltage rating and current rating. It can drive two motors at same time. Due to its voltage rating it can drive small and quite big as well, the maximum voltage for motor supply is 36V. It supplies a maximum current of 600mA per channel, since it can drive motors up to 36V.
There are 4 input pins for L293D (2 and 7) on the left and (15 and 10) on the right as shown on the pin diagram. Left input pins will regulate the rotation of a motoron left side and right input will regulate the rotation on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as 0 and 1. In simple you need to provide 0 or 1 across the input pins for rotating the motor.

C. L293d Logic Table

Let's consider a Motor connected on left side output pins (pin 3, 6). For rotating the motor in clockwise direction the input pins have to be provided with 1 and 0 logic.
Pin 2 = Logic 1 and Pin 7 = Logic 0 | Clockwise Direction
Pin 2 = Logic 0 and Pin 7 = Logic 1 | Anticlockwise Direction
Pin 2 = Logic 0 and Pin 7 = Logic 0 | Idle [No rotation] [Hi-Impedance state]
Pin 2 = Logic 1 and Pin 7 = Logic 1 | Idle [No rotation]
Same as motor can also operate across pins 15, 10 for the motor on the right hand side.

D. Dc Motor

A DC motor is a rotary electrical machine that converts electrical energy into mechanical energy. The most commonly used permanent magnet type motor. The direction of current flow can change in the motor. It is used for its low cost and high efficiency properties. It runs on the voltage between 4V to 12V, it gives 16 RPM when it is powered by 4v and it gives 60 RPM when it is powered by 12V. It is a commonly used motor for simple robotic systems. DC motor's +ve and –ve is connected to the 3 and 6th pin of L293D driver circuit. Where 16 of the driver pin is connected to the power pin of the Raspberry Pi and pin 3 and 7 is connected to the GPIO 22 for controlling the motors. The pin 1 is connected to raspberry pi for enabling the driver IC for driving the motors. An external battery or power supply is connected to the pin 8th of the driver IC to drive the connected motors. These motors are used because of its high torque and heavy duty gear model. Where it has spur model gear, so this can produce the torque up to 40kgcm. This motor can be used for the heavy duty motion systems and particularly used for the wear and tear usage.

E. Ultrasonic Sensor

Ultrasonic transducers consists of three zones: transmitters, receivers and transceivers. Transmitters transmits the ultrasound, receiver's receives the transmitted ultrasound and process it and transceivers do both transmit and receive ultrasound. Ultrasonic transducers are used in systems which evaluate obstacle by calculating the time being of the reflected signals. Passive ultrasonic sensors are basically microphones that detect the ultrasonic noise that is present under certain conditions.

F. Module working principle

Supply to IO trigger should be at least 10us sequence.
The module automatically sends eight 40kHz square wave and automatically detect whether to receive the returning pulse signal.
If signals returned, an outputting high level and the time of high level continuing isthe time of that of the ultrasonic transmitting to receiving. Test distance = (high level time * sound velocity (340M/S) / 2. Sensor

G. pins

VCC: +5VDC
Trig: Trigger (INPUT)
Echo: Echo (OUTPUT)
GND: GND

H. Specification

The sensor is used because of its non-contact type measurement of distance. It offers excellent range detection with accuracy and reading stable in easy package. The range of the sensor is 2cm-400cm and the measuring angle is 300 degree. The resolution of the sensor is 0.3cm.

I. Connection

The Vcc pin from the sensor is connected to the power pin of raspberry pi. Trigger and Echo pin of the sensor is connected to the GPIO 17 and 27 respectively. Where GND pin of the sensor is connected to the ground pin of the raspberry pi.

J. Raspberry pi

The Raspberry Pi is a mini computer developed by the Raspberry Pi Foundation in UK. It have Broadcom(BCM2835) chip, which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU and it has 1GB RAM and built-in Bluetooth module . It does not include a hard disk, but uses an SD card for storage. It has Base T Ethernet socket. The Raspberry Foundation provides Debian and jessiee platform for download. Tools are available for Python as the main programming language, C, C++, Java, Perl and Ruby. Raspberry pi 3 model B features a Broadcom system on chip (SOC), which includes an ARM compatible central processing unit (CPU). Raspberry Pi 3 model B has

1) 1GB RAM
2) 4 USB ports
3) 40 GPIO pins
4) Full HDMI port
5) Ethernet port
6) Combined 3.5mm audio jack and composite video
7) Camera interface (CSI)
8) Display interface (DSI)
9) Micro SD card slot (now pushes-pull rather than push-push)
10) Video Core IV 3D graphics core

V. RESULT

The figure 2 shows the result of an ultrasonic sensor connected with Raspberry pi, which calculates the distance between the obstacle and trolley to avoid the collision of obstacle and trolley.

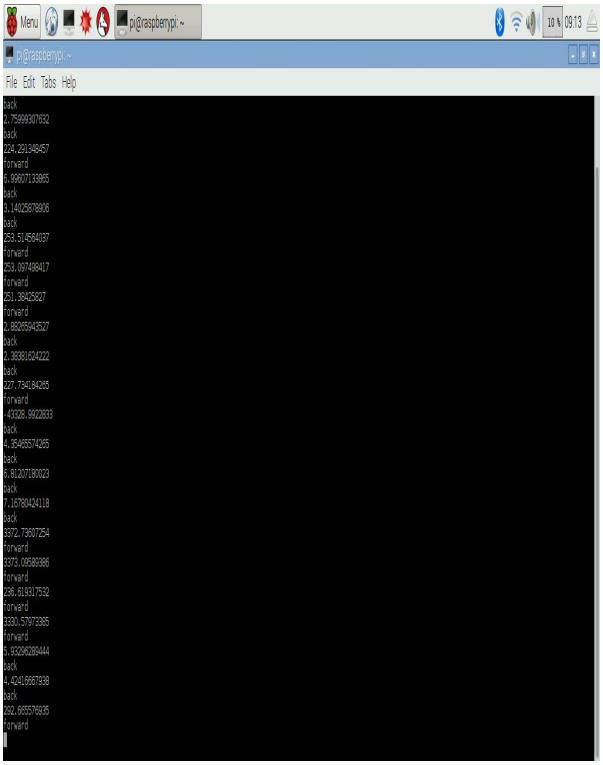


Fig 2: Screenshot Of O/P

The Fig 3 shows the webpage of the cart control. Where there are three four buttons respectively which controls the movement of shopping cart by pressing the buttons on the webpage.

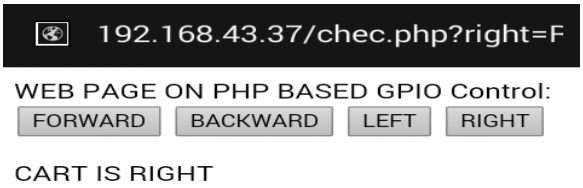


Fig 3: Screenshot Of Webpage

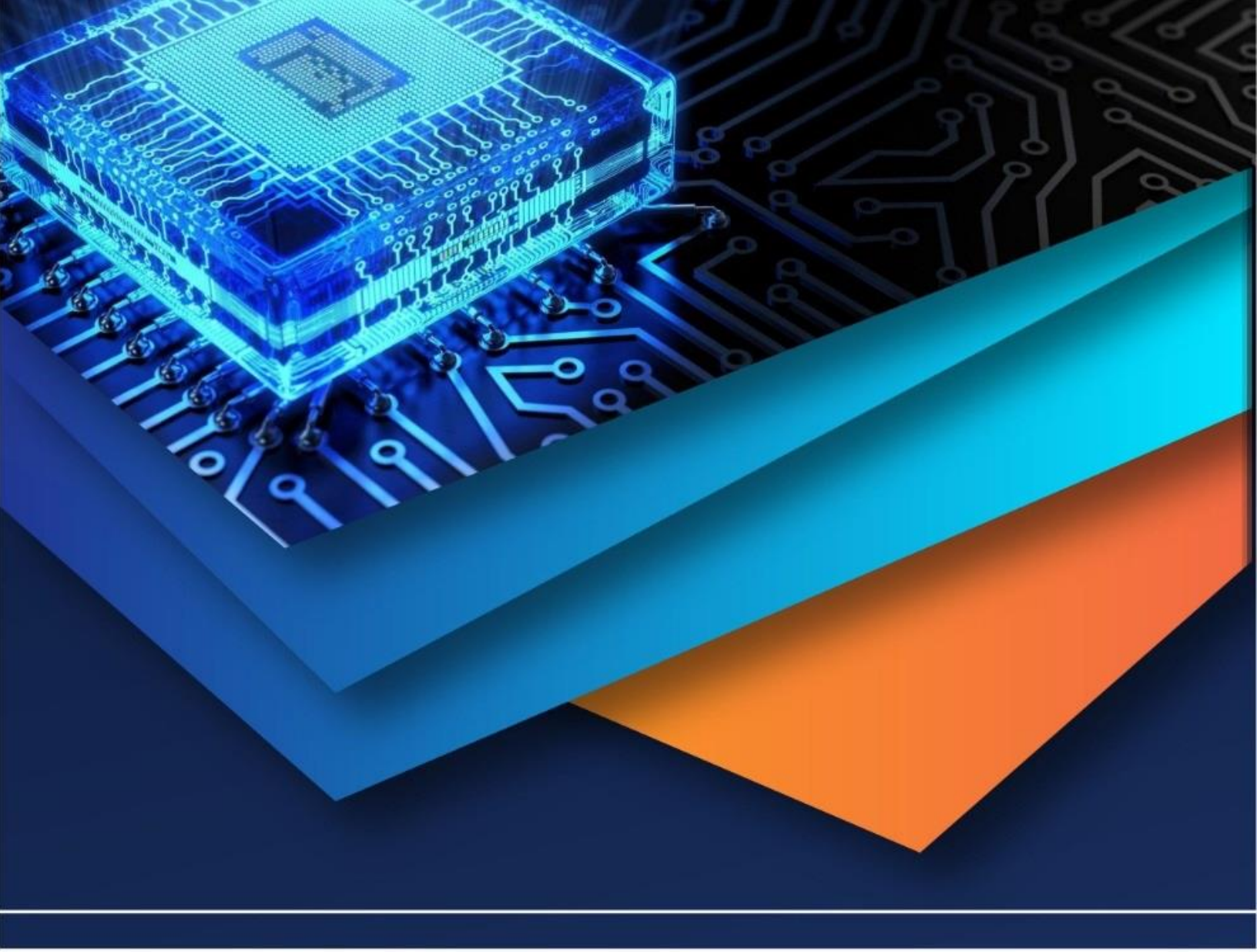
VI. CONCLUSION

The prototype involves in providing the customers with a new and easy shopping experience. New technologies are implemented to provide the lowest delay time and smarter solutions. This shopping cart will enhance the method of shipping. Our hypothesis was to design a user friendly shopping cart that would enhance the shopping experience. The customer doesn't have to wait till the checkout or use their calculators or prick their heads to know how much the shipping cost has come up to and to see if they got it within their money constraints using the alert. Also for a person who is unable to read or find the product price printed on the product while purchasing doesn't have to seek the help of anyone to know it. They just have to scan the product and the product details are displayed. This shopping cart is user friendly, reliable and very convenient for the customer.

REFERENCES

[1] Aboli Hanwate "Smart Trolley Using RFID", International Journal of Research In Science & Engineering, Vol. 1, Issue. 1, 2015
[2] Arjun .P "RFID based intelligent shopping cart using 2.4 GHZ open band transmission", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 6, Issue 5, May 2016
[3] Areeb Asif "Intelligent Trolley System", International Journal of Emerging Technology and Innovative Research, Volume 3, Issue 5, May 2016.
[4] Arpita Sen "Advanced Shopping Cart and Billing Using RFID Technique", International Journal of Electrical and Electronics Engineering Research (IJEEER), Vol. 7, Issue 2, Apr 2017
[5] Awati .J.S "Smart Trolley in Mega Mall", International Journal of Emerging Technology and Advanced Engineering, Vol 2, Issue 3, March 2012
[6] Arbaaz Khan "Smart Trolley Using QR Code", International Journal of Computer Science and Information Technology Research Vol. 3, Issue 4, 2014.
[7] Adarsh Borkar "Smart Shopping- An Android Based Shopping Application", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Vol. 4 Issue 3, March 2015
[8] Aniket Wani "RFID Based Intelligent Trolley System using Zigbee", International Journal Of Engineering and Computer Science, Vol. 4 Issue. 3 March 2015.
[9] Anjali Verma "RFID based Smart Multitasking Shopping Trolley System", International Journal for Scientific Research& Development Vol. 3, Issue 06, 2015
[10] Ankush Yewatkar "A smart cart with automatic billing, product information, product recommendation using RFID &Zigbee with Anti-Theft", 7th International conference on communication, computing and virtualization, 2016
[11] Bhagyashreer Bhumkar "Automatic Billing Trolley using RFID and ZigBee with Android Application Rewarding System", International Journal of Research In Science& Engineering, Vol. 1, Issue 6, 2014.
[12] Chandrasekar. P "Smart shopping cart with automatic billing system through RFID and ZigBee", International Conference on Information Communication and Embedded Systems (ICICES), 2014
[13] Deepali Pandita "Automatic Shopping Trolley using Sensors", International Research Journal of Engineering and Technology (IRJET) Vol. 4 Issue, 4, April 2017
[14] Dhavale Shraddha "IOT Based Intelligent Trolley for Shopping Mall", International Journal Of Engineering Development And Research, Volume 4, Issue 2, 2016.
[15] Gogila Devi. K "Smart Shopping Trolley Using RFID Based on IoT", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 5, Issue 3, March 2017
[16] Gaikwad Payoj Dilip "Intelligent Trolley for Automatic Billing in Mall Using Internet Server", International Journal of Computer Science and Information Technology Research, Vol. 4, Issue 1, March 2016
[17] Galande Jayshree "RFID Based Automatic Billing Trolley", International Journal of Emerging Technology and Advanced Engineering, Vol 4, Issue 3, March 2014
[18] Harpreet Singh Bedi "Smart Trolley using Smart Phone and Arduino", Journal of Electrical & Electronic Systems, Vol. 6, Issue 2, 2017
[19] P. Iyappan "An Enhanced Shopping Model for Improving Smartness in Markets using SABIS architecture", International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 25 March 2016 IEEE
[20] JanhaviIyer "Smart Trolley System for Automated Billing using RFID and ZIGBEE", International Journal of Emerging Technology and Advanced Engineering, Vol 5, Issue 10, October 2015
[21] Jonathan Edward Smith "A New Technique for Smart Shopping Cart", 5th National Conference on Frontiers in Communication and Signal Processing Systems (NCFCSPS), Vol 6, Issue 3, March 2017
[22] Kalyani Dawkhar "Electronic Shopping Cart For Effective Shopping based on RFID", International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering, Vol. 3, Issue 1, January 2015
[23] Komal Machhirke "A New Technology of Smart Shopping Cart using RFID and ZIGBEE", International Journal on Recent and Innovation Trends in Computing and Communication, Vol. 5 Issue: 2, 2017

[24] Komal Ambekar "Smart Shopping Trolley Using RFID", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), Vol. 4 Issue 10, October 2015
[25] Kor Dhanan Jay "Smart Shop Using Smart Cart", Global Journal of Advanced Engineering Technologies,Vol 4, Issue 4, 2015
[26] Mrs.Lekshmy S "RFID Based Shopping Trolley", International Journal of computer engineering In research trends, Vol 2, Issue 12 December, 2015.
[27] Mayur Chaudhari "Intelligent Shopping Cart With Goods Management Using Sensors", International Research Journal of Engineering and Technology (IRJET), Vol. 3 Issue 5, May 2016
[28] Dr. Mary Cherian "BillSmart - A Smart Billing System using Raspberry Pi and RFID", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 5, Issue 5, May 2017Mohit Kumar "Smart Trolley with Instant Billing to Ease Queues at Shopping Malls using ARM7 LPC2148", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 4, Issue 8, August 2015
[29] Ms. Neha A Anpat "Smart Trolley System Based on Android", International Journal of Science Technology & Engineering, Vol. 3, Issue. 10, April 2017.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY