Products Purchase Using Technologies Like RFID, Arduino and Zigbee

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Abstract—**Purchasing products from the supermarket is a day-to-day activity carried out by people on all over the world. Supermarket is the place where people get every product that is required for their daily activities. There has been an increasing demand for easy Quick payment of bill in the supermarkets. To satisfy the user needs various components like RFID tags, RFID readers, Arduino boards, Zigbee Systems are used. But using these much components leads to complications. To overcome these problems a mobile application can be used. Each product available in the supermarket comes with an barcode unique for each product and these barcodes on the RF label are scanned the using the mobile application provided to the customer. The purchasing information Will be read about the mobile application connected to the database of the supermarket. The building is also done by their mobile application and hence the customer can shop the products hassle free.**

Keywords—RFID,RFID-Reader,Arduino,ZigBee,Barcode,Smart Shopping.

I. INTRODUCTION

Shopping-The term shopping refers to purchasing of products required for the consumers.It all started with the products exchange in late 1700's. Initially the purchasing products were considered to be an private affair.The vendors sold products or items only to certain families.Then in late 80's after the invention of television set Telemarketing became a popular amongst the community.This trend lead people to buy products that were shown on the TV. By the millennium year departmental stores and supermarkets began to appear in every urban cities.Then slowly Internet started to take part in day-to-day activities of human.By the year 2004 social media sprang up in every parts of the world.Marketing through social media created a big boom in the shopping universe.The products in the markets easily reached millions of people through social media.This imitated the online shopping method.By the end Of 2010 internet shopping became a trend in various country as it save time of people.People would rather prefer shopping from home instead of visiting the market plface.In earlier days people had time to visit shops but with the present scenario people have less time more need for the products.Hence the customers hesitate for the regular shopping method.Moreover users can compare price of products over online but whereas in case of physical shopping it is not possible, the customer will be forced to pay the price mentioned.Now-a-days online sellers have started to include the option called Virtual Tryout which enables the users to virtually try out their desired product.

The number supermarkets has been increased dramatically and usually a supermarket shopping has grown to a higher level. The increasing number of products they sell by where comes for billing they have a list number of counters, and hence people find it difficult to bill their products quickly and easily. The development of technology and the rise of smart phone people can use their handheld Devices for shopping purpose. The industry of smartphones has grown up rapidly since the number of users have increased steadily. This kind of change also created many number of job opportunities for the people as well. By developing a new smartphone application the smartphone industry has taken it to the next level. There are various kinds of smartphone application which allows the user's to buy Products online. As a result users started to depend on the online services instead of off-line showrooming. This kind of online show looming this is much preferred because it doesn't consume much of the users time and also easy to use. Hence the entire idea of the project is to make use of the online showrooming in the place of offline showroom.

II. LITERATURE SURVEY

i)TeleMarketing: With the invention of television set telemarketing reached its peak.Many sellers/retailers started to advertise and sell their products via television.The term marketing refers to direct marketing in which their order is placed over a phone or through a face to face communication. Telemarketing is carried out using the following procedures.It involves a live operator voice broadcasting which is most frequently associated with political messages. An effective telemarketing process every now and again incorporates no less than two calls. The primary call chooses the customer's needs. The last call impels the customer to make a purchase. Arranged customers are

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perceived by various means, including past purchase history, past sales for information, credit confine, competition area structures, and application outlines. Names may in like manner be gained from another association's buyer database or got from a telephone inventory or another open once-over. The capacity strategy is proposed to make sense of which customers are well while in transit to purchase the thing or organization.

ii)E-Commerce: E-Commerce came into existence after the rise of internet.After the development of social media, E-commerce became much popular.Many seller all over the world started to sell their product via online.The major E-commerce website are Amazon,flipkart,ebay etc.the working procedure of E-commerce as follows. Initially the user or customers are given the privilege to access the product details from the seller.He/she can go through n number of products that are available in store.Once the user/customer select the desired product,He/she may directly move out for the payment or add the product to the cart and continue to shop for the another product.Once the shopping is done by the customer they will be directed to the payment gateway.After the payment is done,user is given with unique tracking id.With the help this tracking id the user can keep track of the products which he has ordered online.The tracking id is valid until the products is delivered to customer. [5] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This "Intelligent Sensor Network for Vehicle Maintenance System" is best suitable for vehicle security as well as for vehicle's maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police, insurance company as well as to the family members.

iii)RFID Tags: The RFID System has two major Components they are the Tag and the Reader[1].The RFID Framework gives a Programmed Distinguishing proof technique, which depends on putting away the recovering information utilizing the RFID Labels[2]. RFID Readers are used to check the RFID tags continuously[3].While RFID is relatively old new

technologies like Barcode Scanners are implemented[4]The majority of modern supermarkets use by Barcode to identify products and take in customers really in queue. The majority of modern supermarkets use Barcode to identify products and take in customers really in queue. Bar-Codes are represented by a series of logical black line of different thickness and separation distance which can be according to data information. Figure one sure the image of the barcode on a product packaging. In modern supermarket this Data involves a unique ID of each product.By using Beacon Technology the Barcodes are scanned and received coupons from the nearest store.This is implemented using mobile application[18].The RFID Technology is widely being used in the recent years and is also a major technology applied in IoT Applications[13].The RFID tag serves as an product identifier which can be easily hacked or rewritten by the customer.Developing a smart cart system will only simplify the shopping experience, but not reduce the queue size.[17] The Wifi modules connected to the RFID system. THese WIFI modules plays an important part in adding the products to the cart[17].The Zigbee Device connected to the entire system is used to transmits data over long distance by passing through various intermediate devices, hence using zigbee system in smart shopping equipment needs several intermediate devices which are not reliable[16].Zigbee application can create and evolve a design pattern for its application. So the ultimate aim of the Appleton is to look at the tools required for automating the layout of Zigbee embedded software[15].A start shopping cart application has been implemented using based on the pattern provided by the framework of Zigbee[15].The current location of the user is constantly updated by the WSN Network[15][18]. [10] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day."Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident. Here, an eye blinking sensor is used to sense the blinking of the eye. spO2 sensor checks the pulse rate of the patient. Both are connected to micro controller.If eye blinking gets stopped then the signal is sent to the controller to make an alarm through the buffer. If spO2 sensor senses a variation in pulse or low oxygen content in blood, it may results in heart failure and therefore the controller stops the motor of the vehicle. Then Tarang F4 transmitter is used to send the vehicle number & the mobile number of the patient to a nearest medical station within 25 km for medical aid. The pulse rate monitored via LCD .The Tarang F4 receiver receives the signal and passes through controller and the number gets displayed in the LCD screen and an alarm is produced through a buzzer as soon the signal is received.

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Fig 1

All information describing a particular product name, cost, weight, etc are stored in primary database and this product is addressed by unique ID that is read from the barcode.The figure 1 represents a sample barcode. By using that method one can easily find they details about the product he wishes to buy. Therefore this existing System of barcode can be used find automatic calculation of total cost of the purchased items.

iv)Smart Trolleys: Smart trolleys are nothing but a normal trolley containing the various components mentioned above.All the above mentioned components like RFID reader, arduino boards,Zigbee Systems are integrated into a single device and is attached to the trolley .The figure 2 represents a smart trolley.

Fig 2

v)Arduino: Arduino was developed by Ivrea interaction design institute.It is an easy tool used for fast prototyping,commonly aimed for the students who have background in electronic and programming.An arduino is an open source electronic platform it is easy to use and it is based on both hardware and software.The arduino boards have the sensor on them namely,light sensor,finger on button, or twitter a message and can turn the inputs from the sensor into an output by activating a motor,or turning on an LED light,or even posting something online. The user can control the board by sending a set of instruction to the microcontroller present on the board.In order to do so the user need to have a knowledge about arduino programming language and arduino software(IDE),based on processing.These kind of arduino are used in smart shopping by connecting them with the RFID readers.It takes input from these readers and convert them into

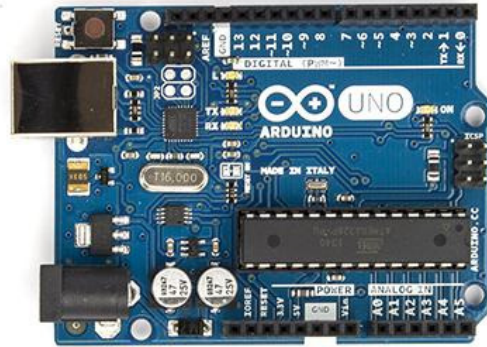suitable set of outputs which are required to purchase the products.

Fig:3

Zigbee System:The technology defined by the Zigbee specification is intended to be less difficult and low priced than different wireless non-public vicinity networks (WPANs), consisting of Bluetooth or greater trendy wireless networking along with wireless. programs consist of wireless mild switches, home strength video display units, visitors management structures, and other consumer and business device that requires brief-range low-charge wireless data transfer Zigbee systems uses various components to communicate,hence each device connected to this must always remain online.Failure of any one component may lead to complications.
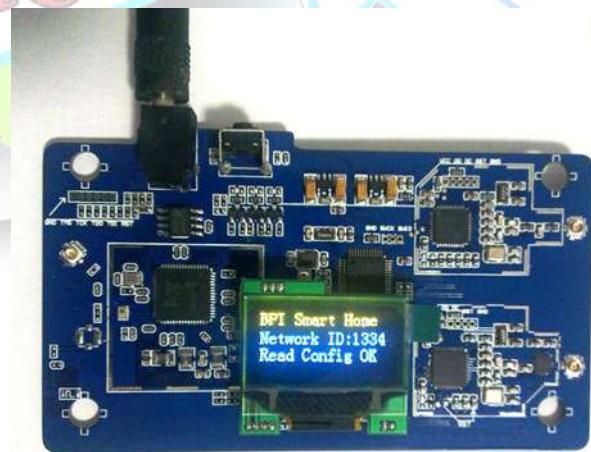
FIG:4

COMPARISON

We compare these models with various parameters like hardware , software and various components which were used in the implementation of these models. Each model uses different implementation methods. Each model varies from one another by a major factor called queue time reduction. But no model has ever achieved zero queue time. All these models focus only on adding the product to the cart through different methods, but they don't really care about the cost of implementation of the model.These all together make up as various limitations and drawbacks of the models that were implemented .

The various factors that affect online shopping are as follows,

- The major factor is budget constraints,it contributes about 30% to the factor which affects online shopping.Many people around the globe try to maintain their expenses within the allocated budget.But buying thing leaves them with no option bargain and hence they have to pay the price as mentioned in the website.
- The legacy Systems-There are too many leagy systems to be handled by the customer and hence it affects the efficiency by 21%.
- Difficulty in integrating with the existing system is also one among the factor.
- Internal Resources play a vital role in handling Online Shopping.Lack of internal resource leads to failure.

Comparison based on components used

Author	Components Used	Advantages	Limitations
Shopping and Automatic Billing Using RFID Technology[24]	RFID Tags,RFID Reader,ZigBee Technology,18F 46K22 Microcontroller.	Easy to use,Easy Product Identification,Ea sy Billing.	Doesn't Support Online Payment, Billing is done only at the PoS counter.
IoT Application on Secure Smart Shopping[18]	RFID Tags,RFID Reader,LCD Screen,ZigBee.	Easy to use,Easy Product Identification,U nique tag for each products.	Implementatio n Cost,Does not Support Online Payment,Lot of Sensors

			used.
Smart Shopping Cart[29]	RFID Transponder,RF ID Tag Reader,LCD Screen,ZigBee Transmitter,Zig Bee Receiver,Microc ontroller,Mzm3 23	Reduces Shopping Time	Cannot be used to track the sales,Item cannot be identified,Item Availability,C annot recognize products bigger than the size of trolly
RFID Based Smart Shopping: An Overview[26]	RFID Transponder,IR Encoder,Decode r,ZigBee system,RFID Reader,Microco ntroller	Easy to use and economical	Communicatio n is not Secure,Does not support online Transaction
An Automatic Smart Shopping Shopping Cart,Deployment Framework based on pattern design[3]	ZigBee Target Tag,ZigBee reference reader,ZigBee Master Reader,ZigBee Reader,PXA 255 board	Location of the products is given,Shopping Pattern of customers is observed.	Doesn't Support online payment,Pots of sensor is used.
Smart Shopping cart With automatic Billing[12]	RFID Tag,RFID Reader,LCD Screen,Product Identification,E EPROM,ZigBee System	Easily identifies the product,Easy to use	Usage of WPROM is Costlier,Imple mentation cost is costlier,Micro controller needs separate set of instruction.
RFID-Cloud Smart Cart System[25]	HF RFID,Arduino, Embedded System,PoS	Easy to use,Products are easy to identify,Easy Billing System.	Online payment is not supported,Pay ment is done only at the PoS system
Design of smart shopping application using barcode scanning and location based coupon services	Smartphone mobile application	Easy to use Beacon list offers coupon for users,identifies nearest stores on Location	Doesn't support online Payment
RFID Based Automatic Shopping Cart[2]	RFID Tags,RFID Reader,Host System	Automatic Billing,Easy Product Identification	Payment is done only at the billing counter.
A novel low cost	RFID,	Dynamic	Online billing

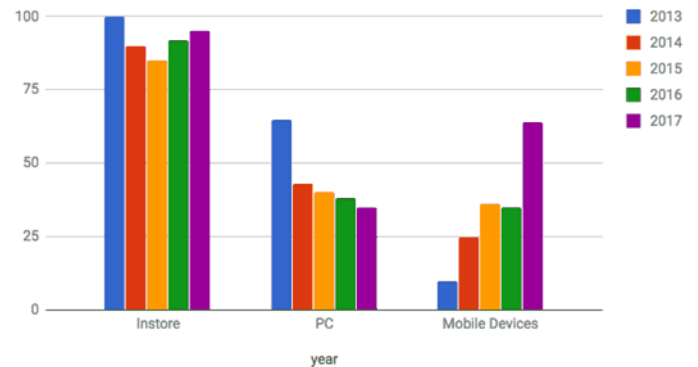| intelligent shopping cart[6]	Wireless,ZigBee module,IR transmitter and receiver,microc ontroller,WEPR OM	location detection,Billing and inventory management.	is not supported,Imp lementation cost is higher.

Due to the tremendous development of online shopping, people in several countries have stopped visiting the stores.The image 2 represents the comparison of online vs physical shopping**.**

Internet Shopping Vs Physical Shopping

Products	Online	Instore
Books,music, movies, Video Games	60%	28%
Toys	39%	37%
Electronics	43%	51%
Sports Equipments	36%	44%
Health & Beauty	37%	47%
Clothing & Footwear	40%	51%
Jewelry & Watches	32%	49%
Household Appliances	33%	56%
DIY/Home Improvements	30%	52%
Furniture and Homeware	30%	59%
Grocery	23%	70%

The above table describes about the comparison between the the online shopping and instore shopping.Purchase of products like books,music ,video games is maximum in online compared to the instore shopping.The item toys is almost equal in both the cases.Electronics item is bought in the

instore rather than online shopping. Sports equipments ,health and beauty items are sold maximum in instore.The above table infers that the products required for the day to day activity are bought maximum in instore rather than the online shopping.

The graph below represents the preference for the medium of shopping in recent years.

Comparison Chart for Medium of Shopping

Conclusion

With this paper we like to conclude that there are various smart shopping methods have been implemented using different methods to increase the efficiency of shopping but still a perfect zero queue queue rate is not yet achieved completely. Instead of using multiple sensors and various high priced equipments are used to implement an hassle free shopping experience for the customers.Instead mobile application with various functionalities can be developed and implemented to make an effective and a queue free shopping.

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