

# All-In-One Intelligent Shopping Trolley with Automatic Billing and Payment System

Sanjay DN<sup>1</sup>, Pushpalatha S<sup>2</sup>

<sup>1</sup>Student, Dept. of Digital Electronics & Communication Systems, VTU PG Centre, Mysuru.

<sup>2</sup>Assistant Professor, Dept. of Digital Electronics & Communication Systems, VTU PG Centre, Mysuru.

\*\*\*

**Abstract** –As technology evaluated from day to day, Life styles also upgrading in a higher extent, in the recent years ecommerce getting a huge success and making retail business as a poor choice, Retailers facing lot of Issues like less customers, Huge investment, man power issues and becoming edged over ecommerce, Many technologies are developed for retails and supermarkets to attract or bring back the customers, but many of them have their limitations, Safety risks and facing compatibility issues, Keeping all this in mind, Developing a all in one kind Intelligent shopping trolley based on IOT and Sensor fusion this Specialized magic cart has the capability of providing features like Automated billing, Automated payment and many other features in the cart itself, this cart has fully automated like customer can control trolley by accelerometer from beginning of the shopping to till reaches the Parking area. This cart supports all kind of payment gateways such as Debit cards, credit cards, net banking and Wallet payment Systems, in order to implement using Arduino Mega as Central System with a Sensor network. Keeping Indian population and Shopping Style in mind designing a Specialized Shopping Trolley.

**Keywords**--Shopping trolley, Sensor fusion, barcode network, shopping marts, ecommerce, Arduino Mega, retail.

## 1. INTRODUCTION

Smartphone industry has been grown rapidly since the supply and subscription rate of smartphone increase steadily. This change has created more jobs as well as opportunities to develop the nation. By developing new smartphone application, the industry has been extending the smart market and resulted in economic activation. As a result, people start depending on the online service. It means that people purchase more products from the internet rather than shopping at the offline store. "Showrooming" that checks out a product but then purchases the product online from home has been increased because one of the disadvantages of online store is they cannot see products with their eyes. "Reverse-Showrooming" that goes online to research products then goes to offline store to make the purchase is also increased recently as people easily can find out the information from the internet.

## 2. LITERATURE SURVEY

In Contemporary embedded systems are habitually based on microcontroller's i.e. CPUs in the company of integrated memory[1] as well as peripheral interfaces but ordinary microprocessors by means of external chips for memory and peripheral interface circuits are also still common, especially in more complex systems. Radio frequency identification (RFID) technology may not only be useful for streamlining inventory and supply chains: it could also make shoppers swarm. Each product of shopping mall, super markets will be provided with a RFID tag, to identify its type. Each shopping cart is designed or implemented with a Product Identification Device (PID) that contains microcontroller, LCD, an RFID reader, EEPROM, and ZigBee module..

The rate of mobile shopping has been increased since people are able to use the internet[2] while walking on the street or taking public transportation. Many enterprises make efforts to build new business model to attract a mobile shoppers. Therefore, this paper intends to design an application, which is able to add products into mobile shopping cart by scanning

Wireless Sensor Network Architecture for Interactive Shopping Carts to Enable Context-Aware Commercial Areas[3] An interactive shopping cart to enable context aware environments within large commercial areas is presented. A wireless sensor network was designed with specific nodes embedded within the shopping carts and infrastructure nodes in the shopping area. Due to the complexity of wireless propagation, given the large amount of obstacles and the inclusion of users, an in-house deterministic method based on 3D ray launching was employed, providing results in terms of adequate transceiver deployment to minimize interference, energy consumption, and maximize data throughput.

## 3. EXISTED SYSTEM

This concept of Shopping as Central Automated Billing System. Since each cart is attached with product identification device (PID), through ZigBee communication PID sends its information to central automated billing

system, there it calculates net price for the purchased products. The Automated central billing system consists of a product database.



Fig. 1 Existed block diagram

The automated billing system will be developed using visual basic. Visual Basic was designed to accommodate beginner programmers. Programmers can not only create simple GUI applications, but to also develop complex applications.

#### 4. PROPOSED SYSTEM

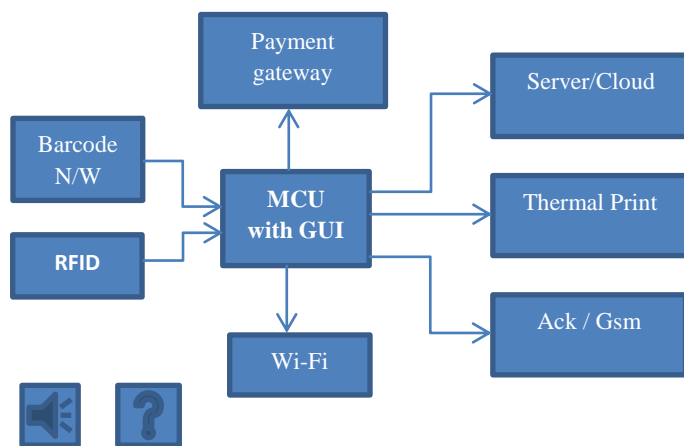


Fig. 2 Proposed block diagram

#### 4.1 WORKING PRINCIPAL

Intelligent shopping trolley is a all in one featured user friendly for super markets it contains barcode reader inside the cart it have capacity to read the things which we put inside the cart and once done with shopping means it have check out facility inbuilt and this cart as Cloud based IOT Product, Where all the accessed data will be hosted in to server, can be accessed remotely, cloud will be accessed by customer's using Android app, they are able to get the Previous Shopping history, Offers available on the different Shopping Malls, Payment history, Redeem Points and Their Profile Shoppers are accessed to URL/Website to update the

database, track shopping activities and can post the Advertisements and offers, It works like a Admin panel, Secured Authentication system will be used to authorize the payment done by the customers in the Cart, even the System supports the Cash Payments also.

#### 5. SYSTEM IMPLEMENTATION

We are implementing the system in two flow, because its firmware and android based application, the design will go through:

1. Hardware design
2. Software Design

#### 5.1 Arduino Mega :

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller

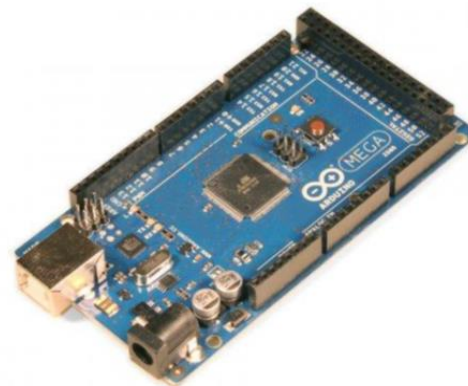


Fig. 3 Arduino Mega Development board

#### 5.2 Barcode Reader:

This all in one module is the most microcontroller-friendly we could find. It is powered over 5V and instead of a USB port, it has a PS/2 interface and acts like a 'keyboard'. In fact, its designed to be a 'pass through keyboard wedge' device for point-of-sale terminals.

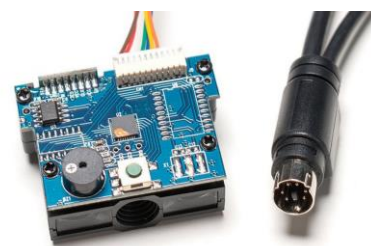


Fig. 4 Barcode reader

### 5.3 GSM:

The GSM net used by cell phones provides a low cost, long range, wireless communication channel for applications that need connectivity rather than high data rates. Machinery such as industrial refrigerators and freezers, HVAC, vending machines, vehicle service etc. could benefit from being connected to a GSM system. The protocol used by GSM modems for setup and control is based on the Hayes AT-Command set.



Fig. 5 GSM module

### 5.4 Accelerometer:

The MMA8451Q is a smart, low-power, three-axis, capacitive, micro machined accelerometer with 14 bits of resolution. This accelerometer is packed with embedded functions with flexible user programmable options, configurable to two interrupt pins.

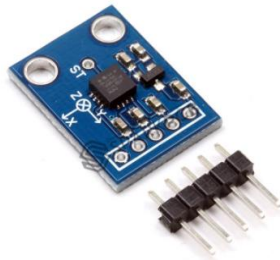


Fig. 6 Accelerometer device

## 6. RESULT & DISCUSSION

This intelligent cart as included the barcode reader as input device to read the barcode on things and the centralized system as Arduino Mega 2560 and output as checkout as well as gsm this cart fully covered trolley we should put the things into the cart that time the barcode reader as read the barcode and add the database to EEPROM and compare existed database of shop and goes on adding the contents as per customer action, parallelly LCD display will show the status of shopping and finally checkout section as inbuilt to trolley in the need to do online payment and that bill amount will be sent SMS to registered customer mobile number.



Fig 7 proto type

## 7. CONCLUSION

This Project creates an automated central bill system for supermarkets and mall. Using INTELLIGENT CART, customers no need to wait near cash counters for their bill payment. Since their Purchased product information is displays in the screen itself and allows to do payment online, Customers can pay their bill through credit/debit cards net banking and also through wallets. The Arm7 microcontroller used here has the capability of receiving 8-bit data from Barcode sensor network reader and Arduino Mega using as Central IOT Processor, Android APK and URL are used as a GUI Tools.

## 8. FUTURE SCOPE

This Intelligent cart as IoT end product it may move rapidly increase marketing in good nature and also it have another most of trending for nave days generation it will reflect to future users, this cart have plan implement include NFC Technology for cart follow application.

## REFERENCES

- [1] Mr.P. Chandrasekar Ms.T. Sangeetha "Smart Shopping Cart with Automatic Billing System through RFID and ZigBee" ICICES2014
- [2] Peio Lopez-Iturri, José Javier Astrain, "Implementation of Wireless Sensor Network Architecture for Interactive Shopping Carts to Enable Context-Aware Commercial Areas" Ieee Sensors Journal, Vol. 16, No. 13, July 1, 2016
- [3] Xuan Liu<sup>1</sup>, Haitao Zhang<sup>2</sup>, Jingxian Fang<sup>1</sup> "Intelligent Shopping Cart With Quick Payment Based On Dynamic Target Tracking" Proceedings of CCIS2016.

[4] J. D. Porter and D. S. Kim "An RFID-enabled road pricing system for transportation", IEEE Syst. J., vol. 2, no. 2, pp.248 -257 2008

[5] H. H. Bi and D. K. Lin "RFID-enabled discovery of supply networks", IEEE Trans. Eng. Manage., vol. 56, no. 1, pp.129 -141 2009

[6] K. Finkenzeller RFID Handbook: Fundamentals and Applications in Contactless Smart Cards and Identification, 2003 :Wiley

Websites:

<http://ieeexplore.ieee.org/Xplore/login>

<https://na.industrial.panasonic.com/products/>

<https://www.melexis.com/en>