

IoT Based Smart Shopping Cart

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Abstract— This paper focuses on reducing the time required at a queue while billing at a shopping mall. We live in a world of fast-growing population, with a wide range of demands from various domains. Customers who purchase products from supermarkets need lots of time and patience for successful and efficient shopping. We need to address this problem by effectively using the technologies. In the advancement of technologies, the world is getting automated at various aspects. In this paper, we depict responsible and cost-effective smart shopping cart using IOT innovations. In traditional shopping methods, after shopping, the customer has to wait in a long queue to get their products scanned with the help of barcode scanner to pay their bill. To modify that, each product is provided with a RFID tag which has to be scanned using an RFID scanner provided on a smart shopping cart. The cart also includes LCD display to display the name and cost of the products to be billed. The total cost of all the purchased products will be added to the final bill, which will be saved in an arduino, acting as a memory unit. This process is carried at the transmitting end. The transmitting end is also provided with a WIFI module to connect with IOT cloud which transfers the information stored in the memory unit at the receiving end. Overall, this system will ensure that the customers will have the best shopping experience and very often they will visit the shopping complex for the shop.

Keywords: IoT, Smart Shopping Cart

I. INTRODUCTION

The most valuable thing in today's world is time, people are referring those things which consumes less time. Billing in Shopping mall takes lot of time. Billing of products from mall is quite difficult because it takes more time as people have to wait for a long time in a queue for billing. Looking at the advancement in technology, we came up with an innovative idea of "IOT based smart shopping cart". In recent years a deep structural change has occurred, with consequences on economic growth and society, especially in factors such as territorial occupation, urbanization, openness to global markets, demography, family structures and cultural and consuming patterns. Innovation in communication and information technologies have caused a revolution in values, knowledge and perceptions in practically all areas of human understanding, deeply carving the so-called "Age of Information and Knowledge". The grocery industry sector is nowadays extremely important in worldwide economy, with its recent evolution in technological, political, social and economic terms making it one of the most convenient and diverse businesses across the globe. In their journal "Consumer perception of privacy, security and trust in ubiquitous commerce" mentioned that the proliferation of electronic commerce technologies has utterly transformed the way business is conducted, causes range from the new mobile technologies and ubiquitous computing, to the recognition by business of the strategic benefits offered by the implementation of communication

and ubiquitous computing structures, to the emergence of new business models made possible due to the new technologies and to the development of new economies that can be used to understand and value the ubiquitous commerce activity. The challenges and opportunities created by electronic business in the supply chain have caused the sharing of information between business patterns to improve operational performance, consumer service and solution development. Businesses have evolved from the sharing and co-ordination of information to the sharing of knowledge and advanced co-operation practices. The emergence of new technologies such as radio frequency identification device (RFID) and wireless network makes the traditional retail processes faster, transparent and efficient. The technology represents to retailers and opportunity to reduce costs and to improve services, allowing attracting clients quickly, precisely and supplying personalized services. The advances in manufacturing, distribution and information combined with the urbanization of modern society and social demographical challenges created the so-called new consumer. The consumer has a deeper understanding in comparing product costs; is more versatile in brand preferences; shows little loyalty to retailers has great expectations in services and client regard; is self-sufficient and is more demanding towards supplied information. There was clear control transference from the manufacturers and retailers to the consumer. Strong competition between larger retail changes caused the minimization of profit margins as a form of keeping aggressive prices and winning more clients. Today, this is no longer enough. One has to bet on offer differentiation and in the adoption of client retention strategies through the strengthening of the relation with the consumer, allowing adequate answers to the clients' needs through personalized service and promotion plans that augment their satisfaction and, most importantly, their enthusiasm. RFID tag, or simply "tags", is small transponders that respond to queries from a reader by wirelessly transmitting a serial number or similar identifier. They are heavily used to track items in production environments and to label items in supermarkets. They are usually thought of as an advanced barcode. However, their possible area of use is much larger. This paper presents a few new applications that are possible using RFID technology such as locating lost items, tracking moving objects, and others. RFID tags are expected to proliferate into the billions over the next few years and yet, they are simply treated the same way as barcodes without considering the impact that this advanced technology has on privacy. This paper presents possible exploits of RFID systems and some proposed solutions as well. RFID is the special type wireless card which has inbuilt the embedded chip along with loop antenna. The inbuilt embedded chip represents the 12-digit card no. RFID reader is the circuit which generates 125 KHz magnetic signal. This magnetic signal is transmitted by the loop antenna connected along with this circuit which is used to read the RFID card no. In this project RFID card is used as security access card. RFID

reader is interfaced with microcontroller. Here the microcontroller is the flash type reprogrammable microcontroller, in which we already programmed with card no.

II. LITERATURE SURVEY

The following literature survey was of great importance in writing the theoretical as well as the analytical and the comparative part of the project. Different books and studies were carried out to implement proposed system.[1]Dr. Suryaprasad J in "A Novel Low-Cost Intelligent Shopping Cart" proposed to develop a low-cost intelligent searching aid that assists the client to go looking and select product and inform the client on any special deals out there on the product as they move around within the shopping complex.[2]Amine Karmouche in "Aisle-level Scanning for Pervasive RFID-based Shopping Applications" proposed to develop a system that's ready to scan dynamic and static products in the shopping space using RFID Reader antennas. Instead of conducting the RFID observations at the level of individual carts, aisle-level scanning is performed.[3] Satish Kamble in "Developing a Multitasking Shopping Trolley Based on RFID Technology" proposed to develop a product to help someone in everyday searching in terms of reduced time spent while purchasing. The main aim of proposed system is to produce a technology oriented, low- cost, easily scalable, and rugged system for assisting shopping in person.[4] Mr. P. Chandrasekar in "Smart Shopping Cart with Automatic billing System through RFID and IOT" proposed to develop a cart with a Product Identification Device (PID) which will contain a microcontroller, a LCD, an RFID reader, EEPROM, and WIFI module. Purchasing product information will be read through a RFID scanner on cart, meanwhile product information will be stored into EEPROM attached to it and this EEPROM information will be send to Central billing System through IOT cloud. The central billing system gets the cart data and EEPROM information, it access the product database and calculates the total amount of purchasing for that particular cart.[5] Johnsen, Edward L in "Shopping cart." done on modernizing shopping carts. These works mainly focused on autonomous movement of the cart and finding the location of the desired product inside the shopping complex.

III. OBJECTIVE

Nowadays, buying and searching at huge malls is turning into a daily activity in subway cities. We can see large rush at malls on holidays and weekends. The rush is even a lot of once there are special offers and discount. People purchase totally different things and place them in trolley. After total purchase one needs to go to cashier for payments. The cashier prepare the bill victimization bar code reader that could be a time overwhelming method and leads to long queues at charge counters. This project targeted to minimize the Queue at a billing counter in a shopping complex. Smart Trolley does the same by displaying the total price of the product kept inside the cart. The currently available method in shopping malls is barcode method. In this technique there are barcode labels on every product which might be browse through specially designed barcode readers. The cashier

scans the merchandise through the barcode scanner and offers the bill. But this becomes a slow method once ton of merchandise is to be scanned, therefore creating the billing method slow. This eventually results in long queues. All the items in the mall will be equipped with RFID cards. When person puts an item in the trolley, its card will be scanned by the RFID reader. Reader send this code to Arduino Uno which further reads item's name, cost & other details. Then it displays on LCD. The item details like name, price & total bill of things inserted in cart are displayed on liquid crystal display. As we put the items, the costs will get added to total. Thus, the billing is done. Simultaneously all details are displayed on LCD. LCD used is 16x2 character alphanumeric type displays. And additionally, if we would like to get rid of some inserted item, then that amount are mechanically subtracted from the entire amount and item removal message is displayed on LCD.

IV. METHODOLOGY

Basic Block Diagram of System with Description:

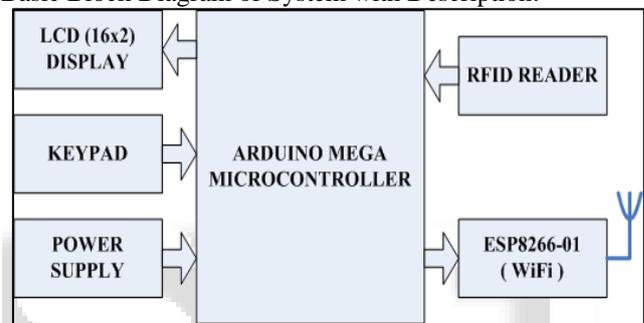


Fig 1: Block Diagram of Transmitter

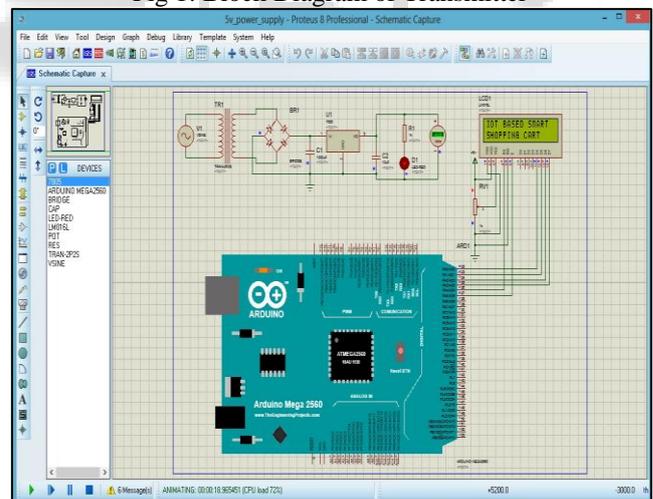


Fig 2: LCD interfacing with arduino



Fig. 3: Circuit of actual model

Power supply: 7805 is a voltage regulator integrated circuit. It is a member of 7805 series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

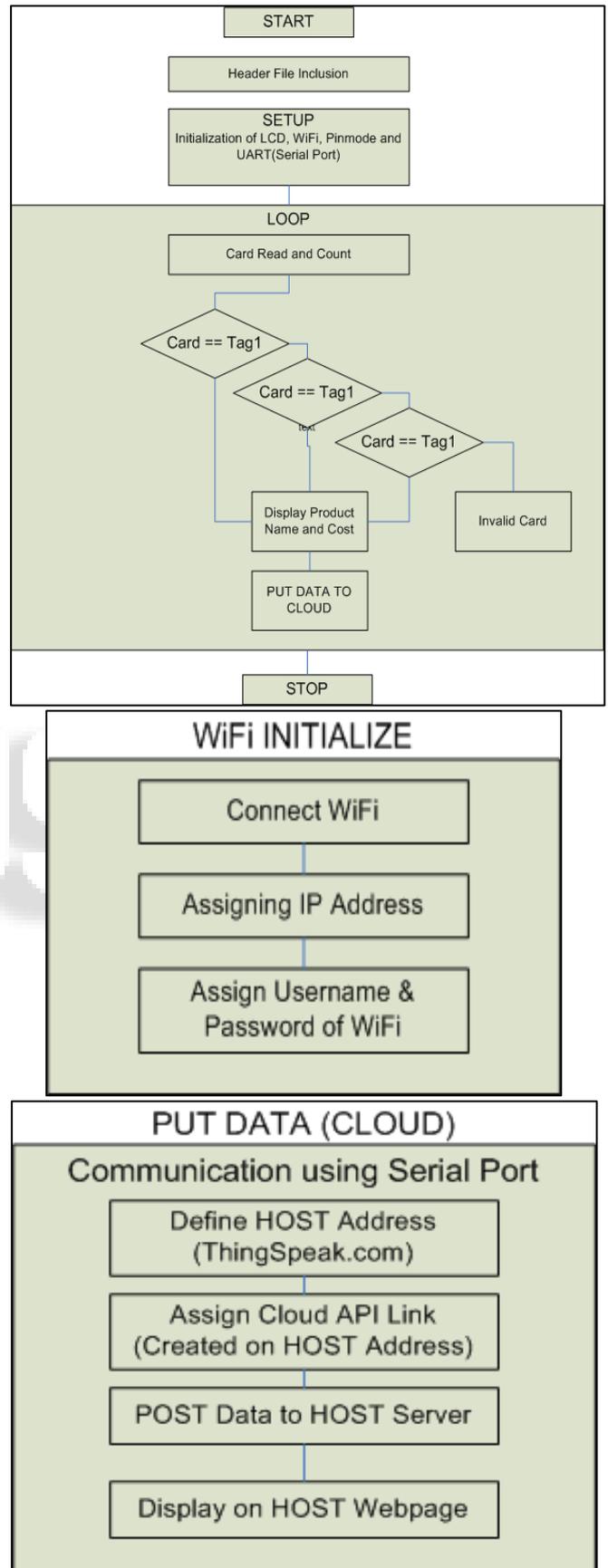
LCD interfacing: It is the display unit of the system that displays appropriate messages based on the scenario. The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. LCD consists of LCD driver/controller that is used to interface LCD and microcontroller.

ESP8266-01: ESP-01 WiFi module is developed by Ai-thinker Team. core processor ESP8266 in smaller sizes of the module Tensilica L106 integrates industry-leading ultra low power 32-bit MCU micro, with the 16 Clock speed support 80 MHz, 160 MHz, supports the RTOS, integrated Wi-Fi MAC/BB/RF/PA/LNA, on-board antenna. ESP8266EX offers a complete and self-contained Wi-Fi networking solution.

Working of project :

All the items in the mall will be equipped with RFID cards. When person puts an item in the trolley, its card will be scanned by the RFID reader. Reader send this code to Arduino Uno which further reads item's name, cost & other details. Then it displays on LCD. The item details like name, price & total bill of things inserted in cart are displayed on liquid crystal display. As we put the items, the costs will get added to total. Thus, the billing is done. Simultaneously all details are displayed on LCD. LCD used is 16x2 character alphanumeric type displays. And additionally if we would like to get rid of some inserted item, then that amount are mechanically subtracted from the entire amount and item removal message is displayed on LCD.

V. FLOW CHART:



VI. CONCLUSION

The Internet of Things is one such technology that connects various objects in a network and is a milestone in the era of smart world. The smart shopping cart features these technologies enabling users to shop efficiently. Internet of things is the leading technology that makes the world experience a seventh sense. By the year 2022, around 1 billion objects will be connected, thus making the world smart. This smart shopping cart is implemented in such a way that it allows the customer to scan the item that he or she wants to purchase and automatically updates the bill, thus preventing long queues at the checkout.

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