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IOT Based Smart Shopping Cart Using ESP8266-01

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Abstract–

Even though E Commerce has grown exponentially in the past few years, sales made from retail still account for around 85% of the total sales made. Among the difficulties faced by customers, one difficulty is to line up in a queue to follow through with the billing process. Even when they just want to buy one or two products, waiting for the goods to be billed takes time and is annoying. inconvenient in today's busy world. The objective is to create technology that can satisfy all client requirements while streamlining the billing procedure and saving the customer time. It is suggested that customers process things themselves and bill them in the tram rather than spending a lot of time in queue. Following a brief scan, the clients must put the items to the cart; once they have, the total will be shown. The customer can also sign in to the app, which will show a list of every item added along with its quantity. Following completion, the consumer can pay digitally via the app, saving time that would otherwise be spent in lengthy lines and relieving them of the tiresome task of scanning barcodes.

RFID, ESP8266, ATMEGA328P, and ionic framework are some of the terms used in it.

INTRODUCTION

In many places, shopping at malls has become a daily activity. Every supermarket has a staff member with a shopping cart to help consumers choose the items they want to buy. At the cash register, customers may complain about a variety of issues, including waiting and not knowing whether they have enough money to pay for the item they bought.It takes a long time to bill at the counter, therefore additional people are needed for that task. The Internet of Things (IoT) has made it possible for physical items to interact with one another.

Day to day items would now be able to be outfitted with computing power and communication functionalities, permitting objects everywhere to be associated with one another. This has brought a new revolution in industrial, financial and environmental systems and triggered great challenges in data management, wireless communications and real-time decision making With the increasing reliability and cost effectiveness of—It makes more sense to ensure that Internet of items (IoT)-based connected smart items are used in consumer applications to solve the daily problems of the average man. In this, we show how a dependable, sensible, and economical Smart Shopping Cart would operate. Such a system is appropriate for usage in physical store, such as grocery shops, where it could decrease effort and enhance the shopping process of customers. The system aids in automating the billing process rather than making customers waiting in a lengthy queue to view their purchased items. Along with this capability, the framework's design also ensures the detection of cases of fraud perpetrated by dishonest clients, making the sophisticated system appealing to both buyers and sellers.

Here, the execution is shown along with the outline of the framework. The results are encouraging, and they make buying easier and more beneficial for the customers. The main goal of the suggested framework is to provide a clientele in the modern world with an innovation organised, keen, ease, flexible and rough framework for a superior in-shop experience. When you walk into a Walmart store, you might finally put an end to the frustration of being unable to find the final item on your shopping list for food and being completely confused. As consumer applications based on the objects (IoT)-based connected smart objects become more reliable and cost-effective.

The system assists in automating the billing process rather than making customers stand in lengthy lines to view their purchased items. Along with this capability, the framework's design also ensures the detection of cases of fraud perpetrated by dishonest clients, making the sophisticated system appealing to both buyers and sellers. Here, the execution is shown along with the outline of the framework. The results are encouraging, and they make buying easier and more beneficial for the customers. The main goal of the suggested framework is to provide a clientele in the modern world with an innovation organised, keen, ease, flexible Its basic structure for a better in-shop experience. When you walk into a Walmart store, you might finally put an end to the frustration of being unable to find the final item on your shopping list for food and being completely confused.

2. LITERATURE REVIEW:

[1] describes how the authors created a clever cart for a store with characteristics for facial recognition and information retrieval. In order to provide a comfortable shopping experience, they have also implemented an automatic invoicing system to prevent lines at checkouts. "Internet of Things" has also been integrated into the cart to create a clever system that benefits the clients.

In [2], the authors were successful in building a low-cost, clever, and fully working system to make customers' shopping experiences convenient and comfortable. Due to its effective tracking capabilities and security

characteristics, they used RFID technology. The system implemented functionality including setting a budget, adding and removing products, recommending products, and adding and subtracting the cost of the product based on whether it was in the basket or not.

By attaching RFID readers to a shopping cart and utilising ZigBee wireless technology to connect them to a central server, the authors of [3] created a smart shopping cart. By scanning the merchandise, it enabled automatic bill production, which was then sent to a central department for billing. This system's limitation to only accepting payments in person over the counter hurt user experience.

The authors of [4] developed a concept model that used ZigBee and RFID tags attached to the products to send invoices to a main server. Again, the problem is that there aren't any other ways to pay the bill besides the conventional counter payments. The customer waits in lines since the worker is supposed to collect the bill as soon as they are recognized.

In [5], the authors conceptualized an advanced shopping trolley, wherein each trolley had an RFID reader and RFID tags were present for each product. Once the product is scanned, the information is displayed on the LCD screen to show all product related information to the consumer. Although the intention was to let customers avoid long lines, it also presented the risk of theft and crashes.

By establishing a centralised system for automatic billing, the authors of [6] succeeded. A Product Identification Device (PID) comprising an RFID reader, LCD, EEPROM, microcontroller and ZigBee module was installed in every trolley. The ability to go cashless provided by this technology was its greatest benefit, since it effectively eliminated the need for lines.

3.METHDOLOGY:

The primary objective is to create and build a structure that will ease the billing process A node microcontroller serves as the system's brains and is the system's main component.

BLOCK DIAGRAM AND DESCRIPTION

- It Consists of AT mega 328 microcontroller and EM-18 RFID reader, EM reader, IR sensor and keypad are connected to respective pins Of microcontroller.
- User will Put product with tag in to the cart.
- IR sensor will validate EM Reader Has Scanned Product or not.
- If Product not scanned by EM reader Lcd will display message with error occurred.
- If user want to remove any product will use keypad to decrement bill and if shopping is completed will press switch from keypad to generate bill amount with payment link to user.
- Payment confirmation message with bill amount will be verified by counter person by checking value getting from IOT.
- User will get one-year analysis of payment and purchases history from the store.

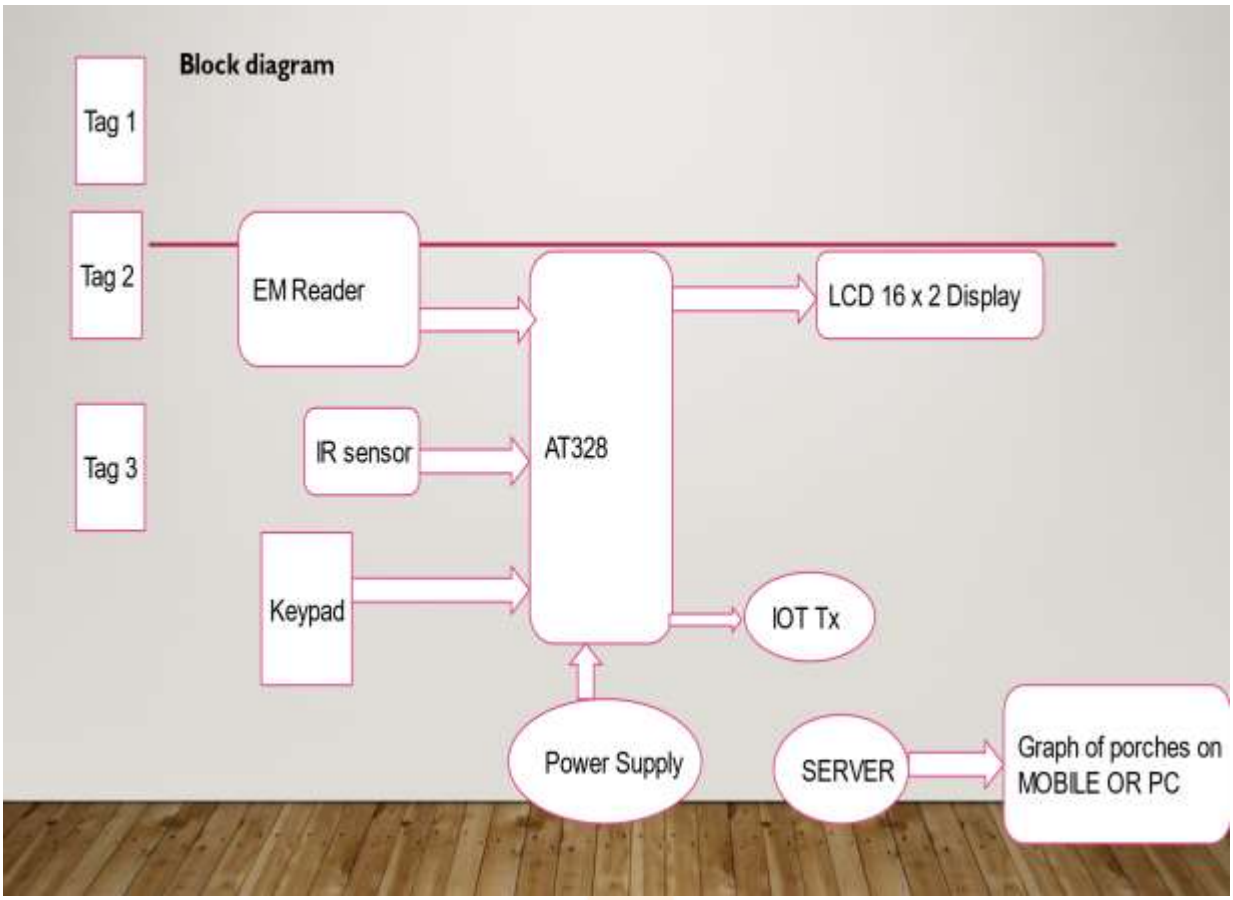
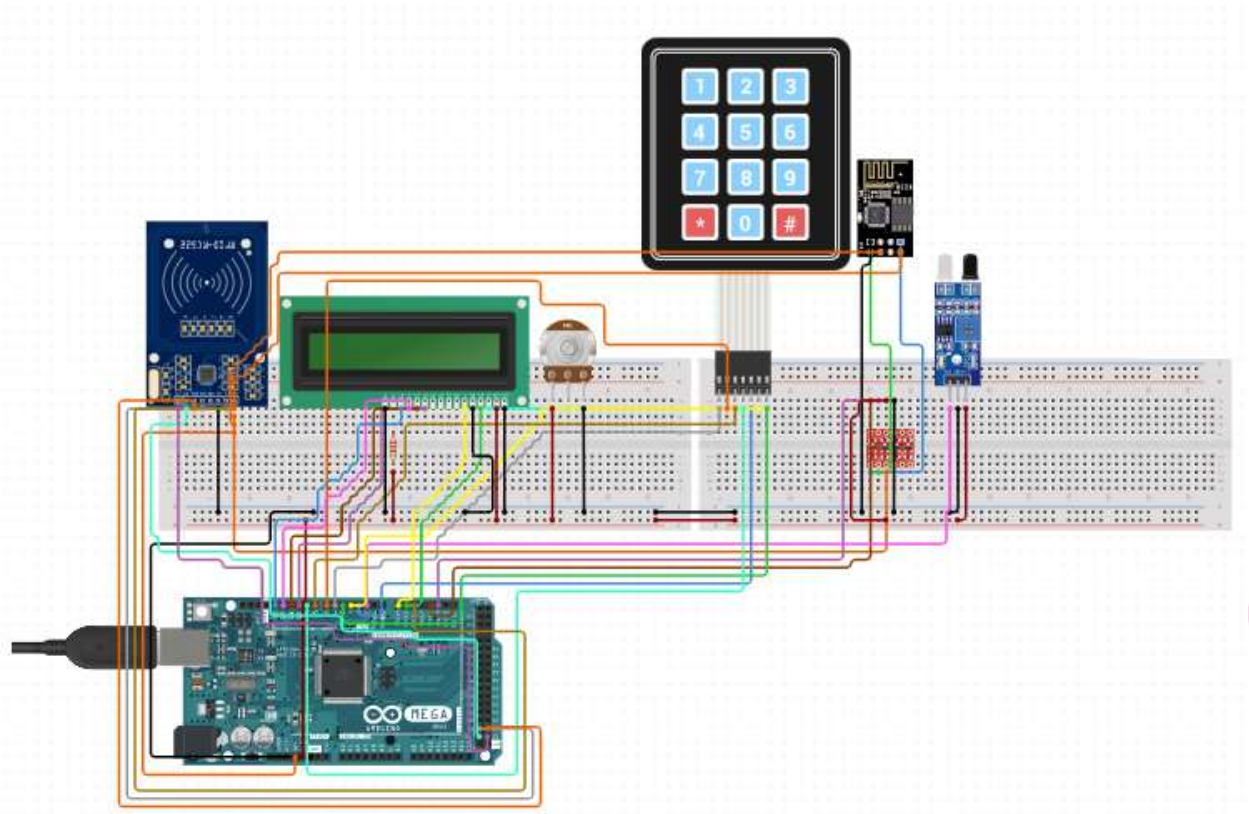


Fig. 1: Block Diagram of the System

SYSTEM DESIGN

CIRCUIT DIAGRAM



SYSTEM SPECIFICATIONS

1 HARDWARE SPECIFICATIONS

MICROCONTROLLER:

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. The Arduino board started evolving as soon as it gained a larger audience, diversifying its offering from basic 8-bit boards to items for Internet of Things (IoT) applications, wearable technology, 3D printing, and embedded environments.

Microcontroller:

ATmega328

• Operating Voltage: 5V

• Input Voltage(recommended):7-12V

• Input Voltage (limits): 6-20V

• Digital I/O Pins: 14 (of which 6 provide PWM output)

• Analog Input Pins: 6

• DC Current per I/O Pin: 40mA

• DC Current for 3.3V Pin: 50mA

• Flash Memory: 32 KB(ATmega328)

• SRAM: 2 KB (ATmega328)

• EEPROM: 1 KB (ATmega328)

• Clock Speed: 16 MHz

LIQUID CRYSTAL DISPLAY:

The term LCD stands for liquid crystal display. It is a particular electronic display module type found in a variety of circuits and gadgets, including as cell phones, calculators, computers, TVs, and other electronics. These displays

are mostly preferred for seven segments and multi-segment light-emitting diodes. The main benefits of using this module are its inexpensive cost, simplicity in programming, animations, and limitless capacity for displaying customised content,characters, unique animations, etc.

16X2 LCD

The following are the primary features of this LCD.

This LCD's operating voltage ranges from 4.7 to 5.3 volts, and it has two rows, each of which can display 16 characters.

• With no backlight, 1mA of current is being used.

Every character may be constructed using a 58 pixel box, and the alphanumeric LCDs display both letters and numbers.

• This display has two operating modes: 4-bit and 8-bit, and it is available with blue or green backlight.

• A few custom-generated characters are displayed.

BUZZER

Piezo Electric Buzzer

An auditory signalling device, such as a buzzer or beeper, might be mechanical, electromechanical, or electronic. Buzzers and beepers are frequently used for alerts, timers, and user input confirmation, such as mouse clicks and keystrokes.

An electronic circuit that is oscillating or another source of audio signal could be used to drive a piezoelectric element. A click, a ring, or a beep are three common sounds used to signal that a button has been pressed.

RFID Tags:

There are two types of tags: passive tags that have no battery life and active tags that do. A person, a delivery, or an item can now be automatically identified using RFID tags. They are information-transmitting transponders. A RFID tag has two components. One is an integrated circuit for demodulating radio frequency (RF) signals and modulating, storing, and processing information. An antenna is used to both receive and send signals. RFID readers and RFID tags: Customers with membership cards are allowed to utilise the Smart Trolley. RFID tags are typically attached to When a consumer places an RFID tag close to an RFID reader, the reader recognises the tag and the trolley transforms into a smart trolley. Radio frequency is going to be used during the entire process.

RFID reader:

An RF module that functions as a radio frequency signal transmitter and receiver makes up the RFID reader. An oscillator is part of the transmitter to create the carrier frequency; a modulator to make impact on data commands upon this carrier signal & a receiver that contains demodulator to extract the data returned.

IR SENSOR:

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation.

Infrared Sensor

IOT MODULE

ESP8266 WiFi Module

Introduction

ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for development of IoT (Internet of Things) embedded applications.

The ESP-01 has 8 pins, including 2 GPIO pins. - Antenna on a PCB trace. (As in the figure above)

The ESP-02 has 8 pins, including 3 GPIO pins. –U-FL antenna connection.

Seven of the ESP-03's 14 pins are GPIO pins. antenna made of ceramic.

The ESP-04 has 14 pins, 7 of which are GPIO pins.

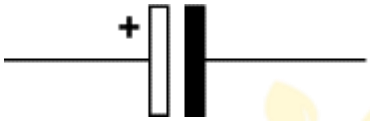
RESISTOR:

Resistors "Resist" the flow of electrical current. The higher the value of resistance (measured in ohms) the lower the current will be. Resistance is the property of a component which restricts the flow of electric current. As the component's voltage drives the current through it, energy is used up, and this energy manifests as heat in the component.

CAPACITOR:

Capacitors store electric charge. They are used with resistors in timing circuits because it takes time for a capacitor to fill with charge. Because it takes time for a capacitor to fill with charge, they are utilised in timing circuits along with resistors. They serve as a charge reservoir and are used to balance out fluctuating DC supplies Capacitors are also used in filter circuits because they freely flow AC (changing) signals but block DC (stationary) signals.

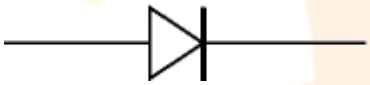
Circuit symbol:



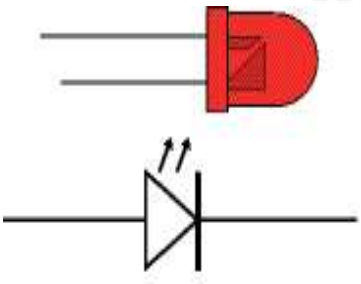
DIODES:

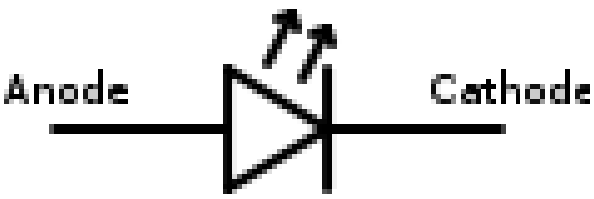
Electricity can only flow in one way through a diode. The circuit symbol's arrow denotes the potential direction of current flow. Early diodes were originally referred to as valves since they were the electrical equivalent of a valve.

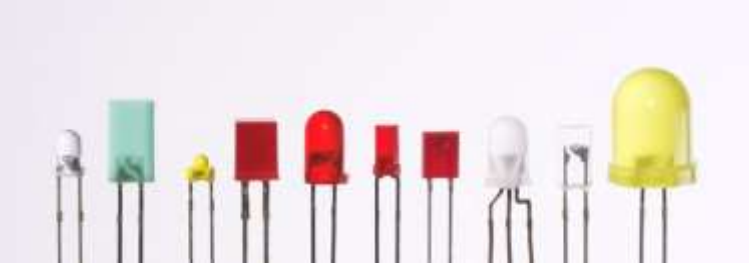
Circuit symbol:



The anode (+) is the longer lead, and the cathode (&minus) is the shorter lead. The anode is on the left and the cathode is on the right in the schematic symbol for an LED (bottom). LEDs are components used in electronics for light signalization..

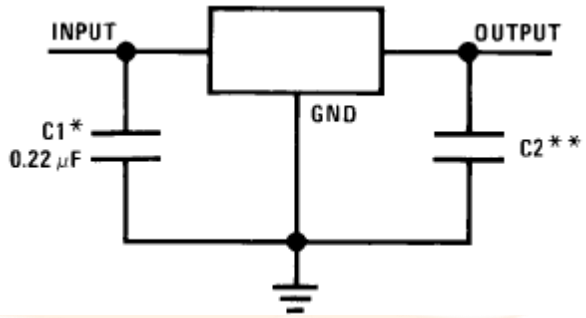






VOLTAGE REGULATORS:

As the name suggests, a voltage regulator controls the input that is applied to it. An electrical regulator that automatically keeps the voltage at a consistent level. is known as a voltage regulator. 5V and 12V power supplies are needed for this project. The 7805 and 7812 voltage regulators must be used to achieve these voltage levels. The digits 05 and 12 represent the necessary output voltage levels, whereas the first number, 78, denotes the positive supply. Three-terminal positive regulators in the L78xx series come in a range of fixed output voltages and package formats including TO-220, TO-220FP, TO-3, D2PAK, and DPAK.



3.2 SOFTWARE SPECIFICATIONS

ARDUINO software is used

HOW TO START WITH ARDUINO SOFTWARE

Obtain a USB cord and an Arduino or Genuino board.

2. | Get the Arduino S/W (IDE) and install it.

3. | Attach the board.

4. | Set up the drivers for the board.

5. | Open the Arduino IDE software...

6. | Click on the blink example.

7. | Choose your board.

8. | Choose a serial port.

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