



# SMART ROBOTIC SHOPPING CART USING RADIO FREQUENCY IDENTIFICATION

<sup>1</sup>DR. Siva Subramanian S, Ph.D. <sup>2</sup>Shivanjali Sivakumar, <sup>3</sup>G. Soniya

<sup>1</sup>HOD, Computer Science and Engineering  
Dhanalakshmi College of Engineering, Tambaram, Chennai -601301

<sup>2,3</sup>UG Scholar, Department of Computer Science and Engineering  
Dhanalakshmi College of Engineering, Tambaram, Chennai – 601301

## ABSTRACT

The IoT has already started working its way into retail stores, and technologies will continue to disrupt the traditional retail process in the coming years. From a retail perspective, IoT takes on greater importance with the prospect of sensors that can enable their enterprises to take advantage of every possible piece of shopper data available to them. The growth of IoT technologies, opportunities, and use cases which are now available have made this even more compelling to retailers. This paper proposes a smart way for people to bill their products while they shop and it provides an android audio assistant for people to navigate in big shopping malls.

**KEY TERMS:** RFID, Arduino UNO, DC motor, Bluetooth module, Driver IC, IOT(NodeMcu).

## INTRODUCTION

Sensors are electronic devices that can collect information from the surrounding environment. Wireless Sensor Network (WSN) is used to interfacing of multiple sensors to work together and share collected information wirelessly. Isolated systems are less valuable than networked systems which generate more intelligent and autonomous applications. A wide range of information can be collected, when the coupling of the wireless sensors with networked systems. IoT is directly or indirectly tightly coupling of communication network and sensor network where the data management and data processing achieved by monitoring these processes intelligently. The sensors and actuators have an important role in IoT that enables us to communicate with the physical world. It consists of three terms physical, smart and connectivity which defines how smartly the sensors, microcontrollers, microprocessors and physical devices such as actuators which connect wirelessly or wired to manage information with other electronic devices. IoT enables people to manage their lives, business in effective manners and provide fundamental changes to the world that can completely transform business and industry. The potentialities offered by the IoT make it possible to develop numerous applications that belong to the industry of aerospace and aviation, automotive, telecommunication, medical, healthcare, Independent living, Pharmaceutical, Transportation, Manufacturing, Retail, logistics and supply chain management. The most important objective of IoT is to monitor individual objects and environment wirelessly. This introduces electronic tags attached to individual objects. When these tags become in the range of reader it reads the stored information of object wirelessly which is known as RFID technology. RFID plays an integral role in the applications of IoT. It consists of three components such as RFID tags attached to the object that contain identity or data about an object, RFID reader that read the data from the tags and central processing system that perform communication in between RFID system to other electronic devices. It emerging a revolutionary effect on a wide range of applications like aircraft maintenance, anticounterfeiting, health care, baggage handling, and supply chain management.

## PROJECT DESCRIPTION

### Existing system

- ✓ The present process in Shopping Malls are done with the help of Barcode scanner. Vendor scans the product through the barcode scanner which is a time consuming process and Customer will have to wait in long queues.

- ✓ The existing system uses the Quick Response code (QR code) technology which is implemented to identify the product. The audio instructions can assist them within the grocery store supported by real-time situations.

### Proposed System

- ✓ Our proposed method introduces automatically moving trolley. The trolley has a robotic structure. The proposed method has RFID tag and reader, Bluetooth module, Driver IC, IOT and DC motor.
- ✓ The DC motor is attached to the trolley, which is used to move the robot to reach the exact location of the product in the shopping mall. The Bluetooth module is used to select the products. When the user selects any product through voice command it gives the command to the controller and make the robotic trolley to move to the exact location.
- ✓ The proposed system has the feature of automatic billing when a customer carries a trolley full of items through RFID tag and reader.
- ✓ All products have unique id, with that code it will identify the product price and generates the bill automatically through internet.

## RELATED WORKS

### Electronic Shopping using Barcode scanner

A modern forward-looking product is the one that aids the comfort, convenience and efficiency in everyday life. In this paper, we discuss an innovative concept of 'ELECTRONIC SHOPPING'. The key idea here is to assist a person in everyday shopping in terms of reduced time spent while purchasing a product. The main goal is to provide a technology oriented, low-cost, easily scalable, and rugged system for aiding shopping in person.

### Smart Shopping cart with Automated Billing system

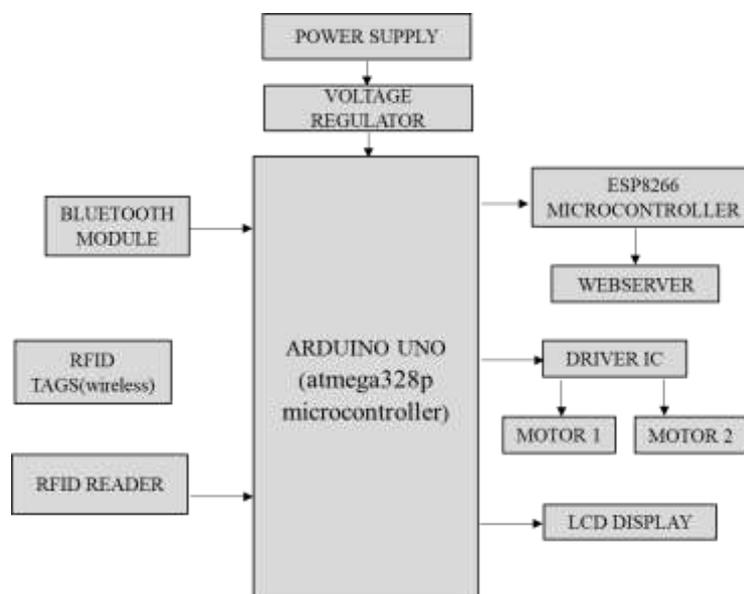
To overcome this, a smart way to shop in malls has been developed. Each product has an RFID tag instead of a barcode. The Smart Trolley features an RFID reader, LCD module. When a person places any product on the trolley, it is scanned and the product's cost, name, and expiration date are displayed. The total cost will be added to the final check out bill. The bill is stored in the microcontroller's memory. Once the purchase is complete, the purchase details are sent to the customer through the GSM module.

### Virtual cart: Novel approach for revamping smart shopping experience

Shopping at malls is a frequently carried out activity in. There can be a big rush at malls on holidays, weekends especially during special offers and discounts. Contrast to shopping in malls, people prefer online shopping to get required items through Amazon, Flipkart and Snapdeal etc., where they cannot have the look and feel of items unless they receive the delivery. So, to solve this problem we have proposed Virtual Cart, using which, one can overcome the complications of online and offline shopping by ensuring a better shopping experience.

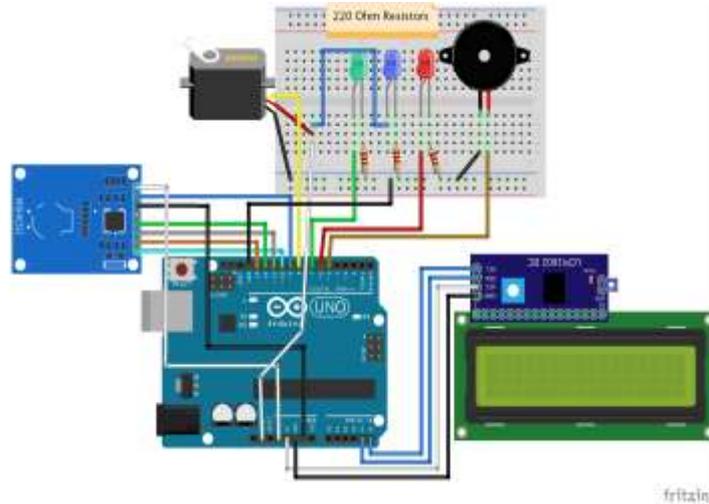
## HARDWARE CONFIGURATION

### Block Diagram

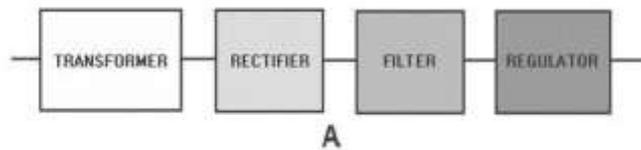


### CONNECTION DIAGRAM

### Interfacing RFID reader, Bluetooth and LCD display using Arduino UNO



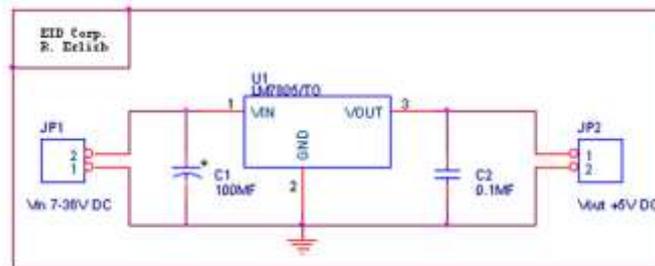
### Block diagram of a basic power supply



### Circuit description

This circuit is a small +5V power supply, which is useful when experimenting with digital electronics. Those transformers are easily available, but usually their voltage regulation is very poor, which makes them not very usable for digital circuit experimenter unless a better regulation can be achieved in some way.

This circuit can give +5V output at about 150 mA current, but it can be increased to 1 A when good cooling is added to 7805 regulator chip. The circuit has over overload and terminal protection.





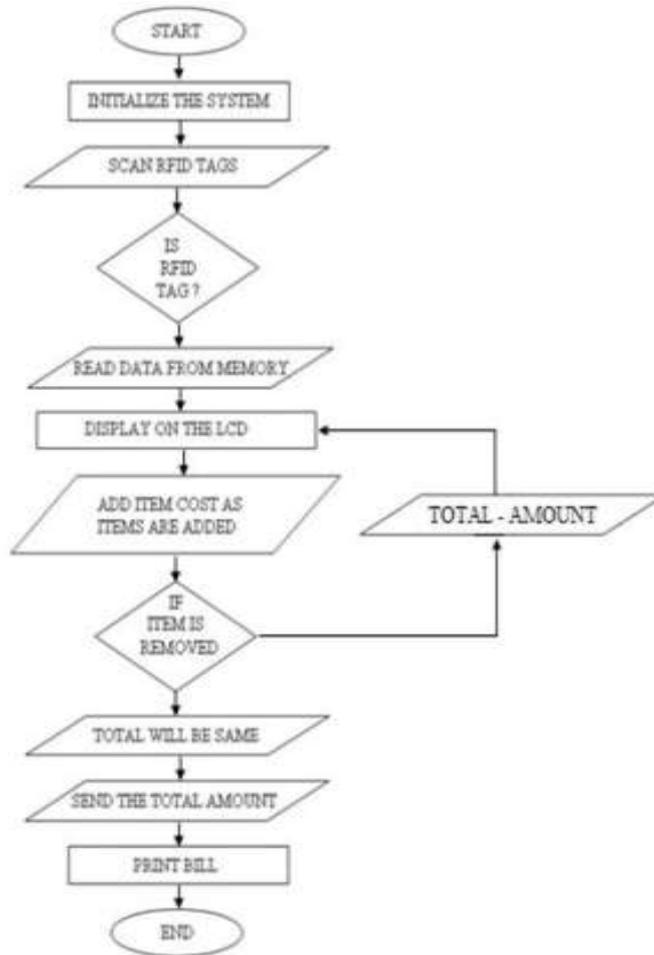
## RFID and Arduino configuration and interaction



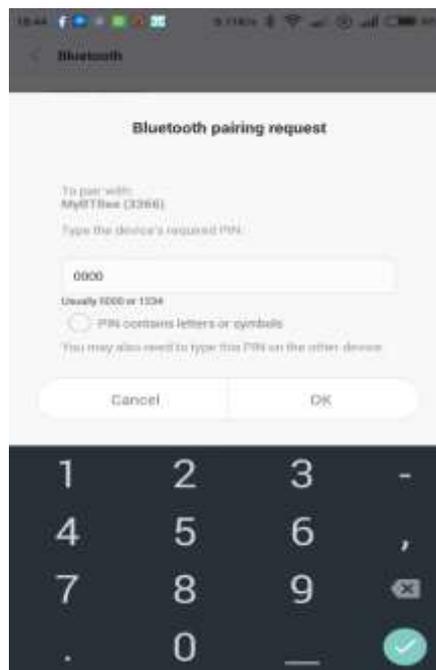
### Software configurations Arduino Bluetooth controller app



### Program flow

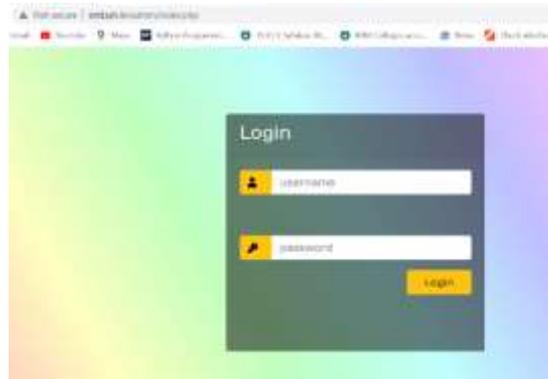


### Bluetooth Pairing



### Billing server page

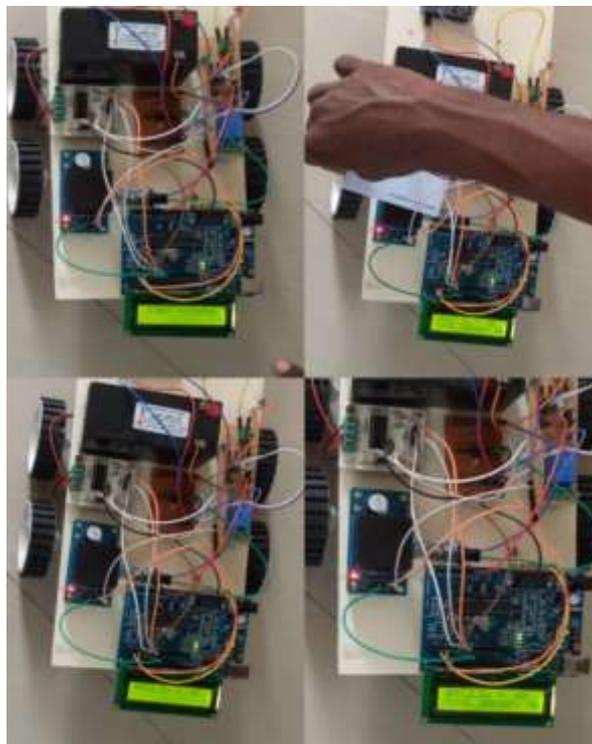
This page is built in PHP. When the shopper drops his products into the trolley the amount of the product dropped into the trolley and the total amount of trolley is displayed near the building counter through this server and it is also displayed on the LCD display of the trolley.



### Working of Trolley

After the Bluetooth pairing and Wi-Fi pairing, the audio command is passed from the android Bluetooth controller app to the Arduino. For example, if the person wants to navigate to the fruits session he can give the audio command as “fruits”. The trolley moves toward the fruits session.

After the trolley navigates to expected session the person can start purchasing. When the tag on the product is placed on the RFID reader the amount of the respective product is added to the total amount of purchased products. If the person wishes to remove product from the trolley he can again scan the product on the RFID reader so that the amount of the removed product will be deducted from the total amount of purchase.



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