

# SELF-DIRECTING SHOPPER

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**Abstract:** The traditional shopping system has a trolley which will make the customers feel heavy to push the trolley with the items. This conventional shopping system aids the customers by autonomously following the customer who is shopping with that trolley. Another convenience is with the trolley is that it calculates the net amount of shopping items by scanning the RFID tag and RFID reader attached with the trolley. The trolley follows the customer with the frequency range of Wi-Fi connected to the mobile phone of the customer and it avoids the obstacles in its way. Wi-Fi is the IEEE 802.11 standard. The RFID tag is on the packet of each items and the code is read with the RFID reader. The unique RFID tag in each item has the information of that item and it is read with the RFID reader. The cost of the item can be read and the amount is displayed in the LCD screen and it speeds up the billing process. So, the customers can save their time in the billing counter rather than waiting for a long time in a queue to pay the bill. This system helps the customers enjoy shopping and shortens time spent for shopping.

Keywords: IoT, RFID, Node MCU, Trolley, Obstacle avoiding.

## I. INTRODUCTION

Embedded system is one of the recent trends to provide better automation and control process. It is widely used in automation of any product, industrial automation, process control and automobiles. The system can greatly help the customers by reducing their time and work. The main objective of this project is to automate the shopping system by automation of billing process and pushing the trolley because it is a tedious process in shopping. This can greatly reduce the human errors in the billing process.

## II. LITERATURE SURVEY

**2.1. In [1] Shopping and information providing integrated in a robotic shopping cart by Hsin-Han Chiang, Yen-Line Chen, Chi-Hong Wu and Lih-Jen Kau- 2017.**

This paper shows a mechanical shopping basket for a shopping center to give shopping help and data. At the point when clients login to the shopping basket framework, the data giving is first begun to give headings and suggestions of the shopping center. Likewise, the mechanical shopping basket is created to be self-sufficient coming back to beginning position while clients logout from the administration screen. At long last, the buy record of clients can be send to the concentrated arrangement of shopping center for further examination of different shopping practices.

**2.2. In [2] Smart trolley shopping system by Pramila Chavan, Rutuja Galande, Akash Prajapati, Pravin Rotangan and Swati Narkhede- 2018.**

In this paper, inventive idea of RFID Based Smart Shopping and Billing is presented. The key thought here is to help an individual in shopping center in wording to decrease time spent while obtaining an item. The primary objective is to give an innovation situated, minimal effort, effectively adaptable and rough framework for supporting shopping in shopping centers to clients. The created framework includes Product Identification Device (PI), Server Communication unit (SCU), User Interface and show unit (UIDU) and Billing and Inventory Management Unit (BIMU). Every result of shopping center will be given a RFID tag, to distinguish its sort.

**2.3. In [3] Automatic shopping trolley using sensors by Deepali Pandita, Ashwini Chauthi, Nikhil Jadhav-2017.**

The fundamental target of our venture is to make shopping all the more simple and agreeable for every single client by giving them numerous offices directly in their trolley. Trolley will move after the client at the looked after separation. When the shopping is completed one has not to hold up in the line as the trolley will have RFID Reader connected. The client's trolley will have the aggregate sum shown on the LCD which will be then followed by the man on the counter. So the time will be expended less.

**2.4. In [4] fabrication of automated electronic trolley by Madhukara Nayak, Karthik Kamath and Karunakara-2015.**

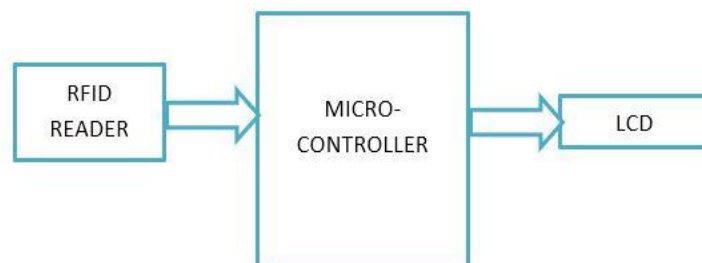
The trolley will have the drive and guiding instrument being mechanized and is sponsored by DC batteries. The IR producer label when appeared to the trolley will get initiated and the tag is stucked to the gasp and the trolley will detect the tag and starts following the tag i.e., pursues the individual. The IR producer is persistently emanating the sign and the collector is on the scanner fixed to the guiding system which occupies the course according to the producer to drive the trolley toward that path controlling the bearing according to the individual's development. On the off chance that the individual is off the beaten path, the scanner filters around to detect and once detected will move towards the individual. On the off chance that someone comes in the middle of, it stops and gives the signal sound and when the deterrent moves away, it starts moving. In the event that anything comes in the middle of and the individual is distant, the scanner filters all around and regardless of whether not detecting the individual, at that point the signal

sounds or the recorded sound calling the individual's name will over and again calls, with the goal that the individual can reach back the trolley and again take the enactment and makes the trolley to pursue.

### 2.5. In [5] Automated shopping trolley for billing system

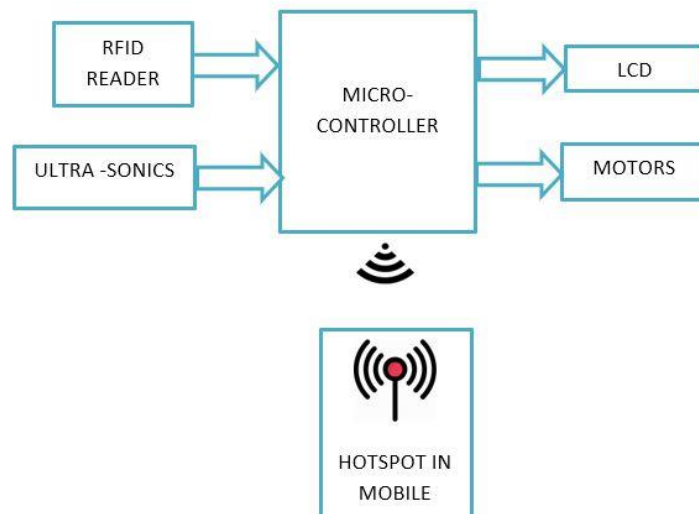
This Automated shopping trolley makes note of all the filtered wares of the specific trolley with assignment number and is connected with the general store's backend database which contains subtleties of the item, for example, cost, accessible stock, the amount of the item and area of the item.

## III. EXISTING SYSTEM



The existing system has automatic billing system with RFID tag and RFID reader and it is displayed on the LCD screen. The RFID reader has the cost of the item and the total amount is calculated with the programmed microcontroller. The ultrasonic sensor is used in the autonomous movement of the trolley. The ultrasonic sensor sends ultrasonic waves and if the wave is reflected by an object, the distance can be calculated between the object and the sensor. The trolley can follow the customer with the minimum distance between person and the trolley. It is programmed and the concept of obstacle avoidance is implemented. The drawback of the system is if a customer interrupts the trolley and the customer who is shopping with that trolley, the trolley may follow the other customer.

## IV. PROPOSED SYSTEM



The proposed system has overcome the disadvantages of the existing system. This autonomous shopping trolley has the automatic billing process and it follows the customer autonomously eliminating the obstacles in its way. The products in the mall or supermarket have the unique RFID tag and if the tag is read with the RFID reader, it has the information of the product such as product name and the product cost. The net amount is calculated at every instance when the product is put into the trolley. If a product is taken out from the trolley the customer has to read the RFID tag of the product and the amount is declined from the calculated amount. The net amount is displayed in the LCD screen. The trolley follows the customer with the constant frequency range of the Wi-Fi connected to the node MCU. The frequency range can be calculated by the RSSI. If another customer interrupts, the trolley follows the same customer with the help of constant frequency range programmed in the microcontroller. The ultrasonic sensor sends the data and the obstacle avoidance concept is implemented so that the trolley does not collide with any objects and it helps in following the same customer when another customer interrupts. This greatly helps in reducing the tedious process in shopping.

## V. RFID TAGS

Tags may either be read only, having a product line allotted sequential number that is utilized as a key into a database, or may either be read or write, where object-explicit information can be composed into the tag by the framework client. Field programmable tags might be write once, read many times. New tags might be composed with an electronic item code by the user. RFID tags contain

in any three sections. An incorporated circuit that stores and procedures data and that modulates and demodulates radio-frequency(RF) flag, a method for gathering DC control from the occurrence reader signal and an antenna for accepting and transmitting the sign. The label data is collected and stored in the non-volatile memory. The RFID tag incorporates either fixed or programmable concept for handling the transmission and sensor information, individually.



## VI. RFID READER

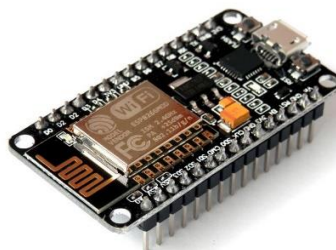
A RFID reader transmits an encoded signal to examine the tag. The RFID tag gets the message and after that reacts with its distinguishing proof and other data. This might be just a one of a kind label serial number, or might be item related data, for example, a stock number, part or cluster number, generation date, or other explicit data. Since tags have singular serial numbers, the RFID framework and configuration can separate among a few tags that may be inside the scope of the RFID reader and read them simultaneously. Fixed readers are set up to make a particular cross examination zone which can be firmly controlled. This permits a profoundly characterized area foe when tags go all through the cross examination zone. Portable readers might be handled or mounted on trucks or vehicles.



## VII. NODE MCU

Node MCU is an open source firmware and improvement pack that causes you to model or construct IoT products. It incorporates firmware which keeps running on the ESP8266 Wi-Fi SoC from Epressif systems and equipments which depends on the ESP-12 module. The firmware utilizes the Lua scripting language. It depends on the eLua venture and based on the Espressif Non-OS SDK for ESP8266.

MCU represents Microcontroller Unit, which truly implies it is a PC on a solitary chip. A microcontroller contains at least one CPU alongside memory and programmable info/yield peripherals. They are utilized to computerize vehicle motor control, implantable medical gadgets, remote controls, office machines, apparatuses, control devices, toys and so forth.



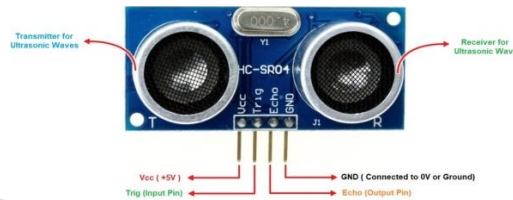
## VIII. I<sup>2</sup>C LCD DISPLAY

I<sup>2</sup>C LCD is a simple to utilize display module, it can make display simpler. Utilizing it can diminish the trouble of make, with the goal that creators can concentrate on the center of the work. The arduino library for I<sup>2</sup>C LCD is accessible and the users simply need a couple of lines of the code can accomplish complex illustrations and content display highlights. It can supplant the serial monitor of arduino in some spot, you can get running data without a PC. More than that, we additionally build up the committed picture information convert programming presently is accessible to help PC foundation of Windows, Linux, Mac OS. Through the bitmap convert programming we can get our preferred picture displayed on I<sup>2</sup>C LCD, without the requirement for complex programming.



## IX. ULTRASONIC SENSOR

Ultrasonic sensor is an electronic that can quantify the separation to an obstacle by utilizing sound waves. It allots separation by sending a sound wave at a particular frequency and tuning in for that sound wave to skip back. By account the elapsed time between the sound wave being created and the sound wave skipping back, it is conceivable to figure the separation between the sonar sensor and the article.



## X. CONCLUSION

The design and implementation of this conventional shopping system will be a one step solution for the tedious process in shopping. There are many systems for this problem but this advanced autonomous system greatly reduces the time and effort in shopping and it reduces the human errors. We have presented a person following system for a mobile assistance shopping trolley that is based on a combination of radio and ultrasound signals to perform measurements between the person and the trolley. The objective of the work is to develop a simple, reliable and easy to use system that could provide freedom of movements for the customers. The customers can interact with the shopping trolley in a better way and it is user centric.

## XI. FUTURE WORK

The future work includes the complete shopping bill being sent to the customer's mail ID with the help of the database stored in the cloud and IoT. This implementation can be further improved by an algorithm for comparing the previous and current shopping bill and giving the status of cost of each product. This can greatly help a person to know the cost reliability of every product.

## XII. REFERENCES

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