Automated Bot for Shopping E-Cart

Kaustubh R. Sonar[1], Girisha Metta[2], Rakesh Mehar[3], Romesh Dudhbarwe[4], Madhavi Charde[5]

[1]Assistant Professor, Department of Electrical Engineering, Kavikulguru Institute of Technology and science, Ramtek, Maharashtra, India.
[2,3,4,5]B. Tech Scholar, Department of Electrical Engineering, Kavikulguru Institute of Technology and science, Ramtek, Maharashtra, India.

ABSTRACT

As we know shopping is very fascinating and alluring, at the same time it involves getting tired due to carry that heavy carts and stand in the long queues for billing our things. Again we have seen that sometimes an old age people, mothers or any other people who are physically disabled visiting shopping malls, grocery units, etc. where these people face a lot of problems regarding to carry their carts and select their products simultaneously.

This bot will help and ease them in shopping by following automatically through human detecting sensors or line follower. Container with a propelling system that can be controlled remotely, and a sensor system to help to navigate the container. Self-propelled luggage system comprising a propelling system for driving at least one drive wheel associated with a container; user device via a wireless connection so that the robot follows the line.

Keywords: RFID Tags, RFID reader, SMPS, LCD, IR sensors, IC, Proximity sensor

1. INTRODUCTION

In this modern twenty-first century mostly all families like to spend time shopping in malls, shopping complexes and retail stores. In all these shops, people usually carry trolleys on their shopping complexes and retail stores. In all these shops people usually carry trolleys on their own in which they collect the desired items and then locomote the trolley to the billing counter where they have to wait in long queues but nowadays there is a need to convert the old traditional trolley with a modern automatic trolley, which is exactly our project. The main idea of the project is to automate the process of shopping in such a manner that we will scan the products using RFID attached to the products and an RFID reader attached to the trolley as well as display the total amount on the LCD. The robot is equipped with sensors, often infrared or camera-based, that detect contrasting colors or patterns on the floor. These sensors help the bot stay aligned with the path. By following the lines, the robot can navigate through the aisles or designated paths within the store or warehouse. The bot may also be equipped with additional sensors or cameras to detect obstacles, people, or products in its path. This helps prevent collisions and ensures safe navigation. Overall, an automated bot for shopping e-cart using a line follower offers the potential to streamline the shopping experience, improve efficiency in stores or warehouses, and reduce the need for human labor in tasks like restocking shelves or retrieving items for customers.

2. LITERATURE SURVEY

A literature review involves a critical assessment of existing research on a particular topic. For this project, Automated Bot for Shopping E-Cart here's a condensed literature survey.

Smart Trolley with Automatic Billing System using Arduino of International journal of advanced and science engineering paper is identified for smart trolley using billing system for time efficiency while shopping which eases the user[1].Smart trolley system of International journal for research in applied science and engineering technology paper is identified for smart trolley system helps the customer in paying the bills without waiting in the queues especially on weekends and it also follows the human element[2].Follow me suitcase of International Journal of Research in Engineering, Science and Management paper is identified for a follow me suitcase which follows you were ever you go and the problem of carrying your luggage wherever you go can be solved with this robot[3].

3. HARDWARE SPECIFICATIONS

1. **W78E052DDG 8051 8-bit controller:** W78E052DDG is an 8051 compatible 8-bit controller from Nuvoton with 8K programmable flash memory in 40 Pin DIP package.

2. **12v 3000mAh:** The 12V 3000mAh Rechargeable Battery is great for EL Wire, EL Panel and LED applications where portability.

3. **Battery management system (BMS):** Battery Management Systems is a solution used to manage batteries, designed to ensure the highest level of safety of lithium-ion cells.

4. **IR LED:** The IR LED or Infrared LED has polarity i.e.it has a positive and negative pin. The pin which is long is the positive pin (anode) and the pin which is short is the negative pin (cathode) as shown in the above IR LED pinout.

5. **LCDdisplays:** The shopping trolley is designed to just scan the RFID tag and the 16×2 LCD displays the product name and total cost of the product. this technology offers convenience and ease for shoppers to do shopping and enjoy their experience.

6. **RFIDReaderEM-18:** RFID is wireless identification technology which uses radio waves to identify RFID tags. RFID Reader has 9 pins from which we are using 3 pins in our project. VCC, GND and TX are used.

7. **Diode:** The diode works in DC since it is a unidirectional device. The diode allows the current to pass only in one direction.

8. **RFIDtags:** RFID tags are cards which are used to store information about any person or object. RFID reader continuously emits radio waves and when RFID tags are detected in range information in the tag is read by the RFID reader and displayed on display.

9. **ProximitySensors:** Proximity Sensors convert information on the movement or presence of an object into an electrical signal.
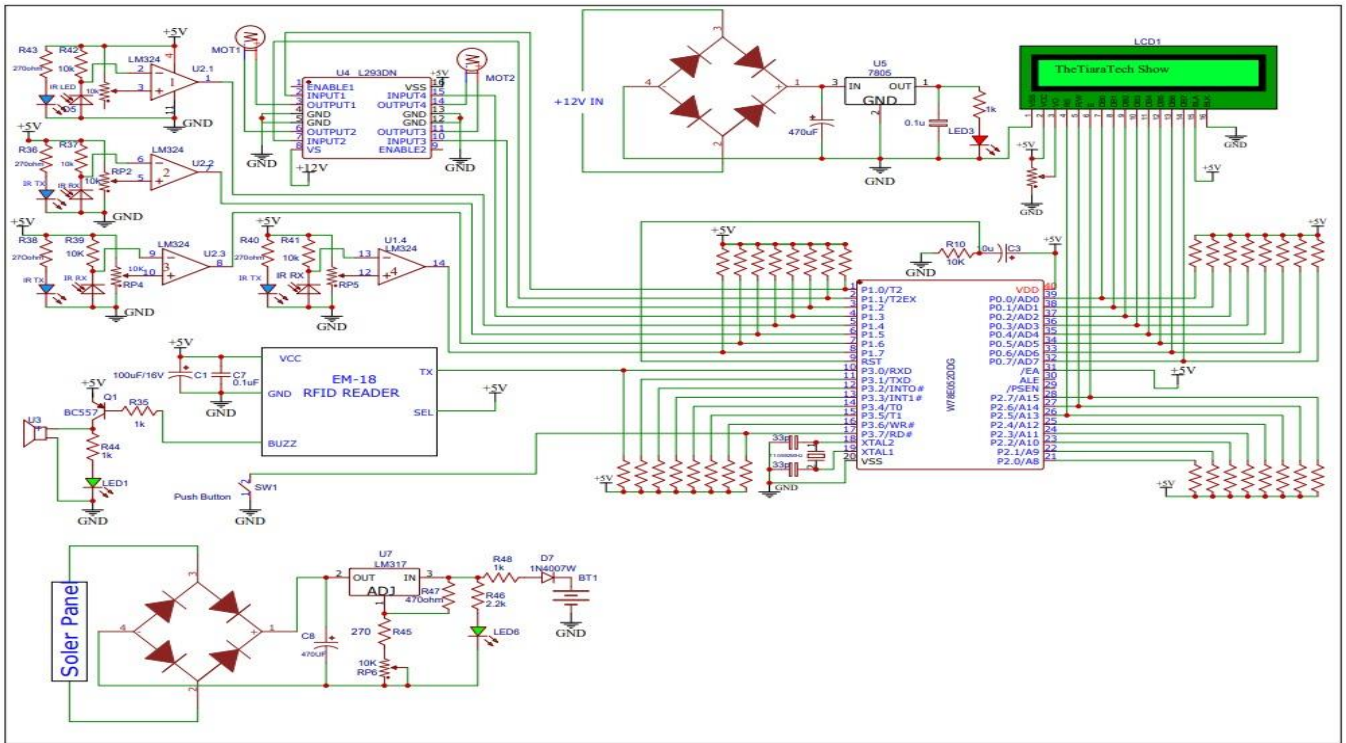
10. **DCmotor**

4. MODELING AND ANALYSIS

Fig 1. Simulation circuit

As the above circuit diagram shows the connections of Automated Bot for shopping E-cart. Here the different components has been used as already mentioned in the above slides.

The battery is charged using the adapter or using solar panel. Then the circuit gets energized and start to work. The battery used is of 12V and our circuit is based on 5v supply so 7805 IC is used to convert the 12v to 5v. And the connections are given to each and every component through the connectors. The EM-18 RFID Reader sends the data to data pins of microcontroller and it receives the data after scanning and shows on display screen. At the same time the IR sensor gets energized and comes into role play.
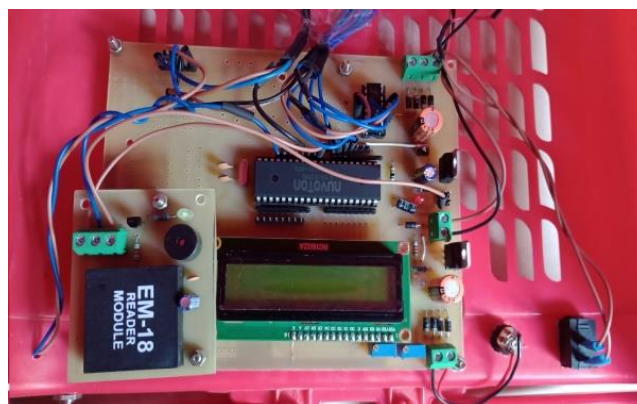

Fig 2. Billing Circuit
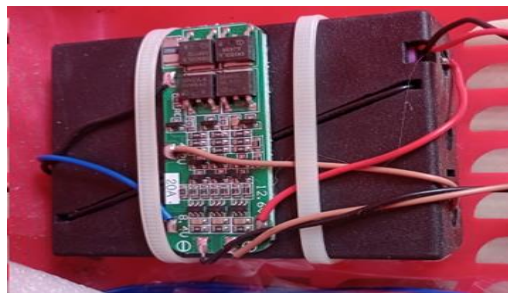
Fig 3. Line follower
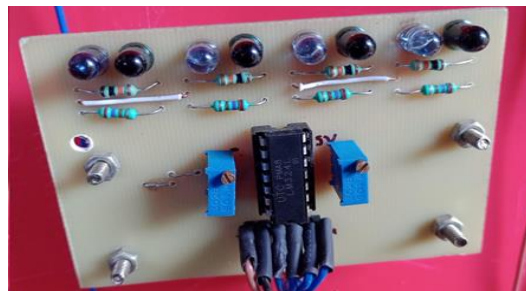

Fig 4. IR sensor circuit

Fig 5. BMS

5. WORKING

In this circuit, 3.7 rechargeable battery management system is used to provide 12V supply to the circuits. And this battery will provide supply to the whole circuit including RFID reader which is used to scan the card connected with one of the pin of microcontroller. Microcontroller is connected with LCD display of 16×2 which is used to display price of the products . LM377 IC used in battery charging system with regulator IC. L293D motor IC is connected to control motor attached on wheels. 4 motors of 45 rpm have been used which are connected to the wheels of the trolley to drive the trolley and are parallel with each other. IR sensor pairs at the bottom of the trolley have installed with Op-Amp IC. In front side of the trolley, IR Proximity sensor detects the obstacle if in case any object comes in front of it which is then sensed by IR sensor. IR sensor is again connected with the microcontroller and get the control from microcontroller. Backside of trolley there is a socket available for charging which is connected to the battery which can be charged with the help of SMPS . Switch is available at the back side of the trolley which is used for on and off the circuit.

6. CONCLUSION

The project designed in this report is based on the working of a smart shopping trolley, which works in such a manner that customer needs to just lead the trolley and the trolley will automatically follow the customer with the help of a line sensors which will be attached at the bottom of the trolley.

7. RESULTS

The Smart shopping trolley was turned into a clever billing system providing users flexibility to carry the shopping loads from it within grocery store. It is designed to be highly effective and fully synchronized with the retailer's present system.

8. ACKNOWLEDGEMENTS

9. REFERENCE

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