
BLUETOOTH BASED HUMAN GUIDED SHOPPING CART WITH SMART SHOPPING SYSTEM

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Abstract- We can't think of shopping without the mention of a shopping trolley. It has become an essential tool in supermarkets, malls and upcoming grocery stores. In this ever modernizing world everything is becoming small and smart from a hair clip to a silicon chip or to an automatic transmission car. People nowadays, want the least human efforts involved with maximum output. This has motivated us for this project. In this paper we discuss about a product "Bluetooth Based Human Guided Shopping Cart with Smart Shopping System" being developed to make shopping a less cumbersome experience. This cart will be able to pair up with a Smartphone via Bluetooth as both will be having a Bluetooth module and will be taking instructions from a Smartphone; based on this, it will be moving in any direction. The cart also comes up with one more feature of calculating the bills which adds weight to the word 'Smart', by the use of a bar code reader. This is a prototype which is ready to be used for commercial purpose.

KEYWORDS: *Bluetooth module, Bar Code, Transmission car, Shopping Cart, Smart cart*

I.INTRODUCTION

Someone rightly stated that 'Necessity is the mother of all inventions'. Since, the Stone Age; man has been known to make his world easier by each passing decade. Human Beings have invented technology and has used it according to their needs since their existence. Similarly, innovation in communication and information technology has changed the world around us and has made the world a small space. The main purpose of the revolution in communication and IT has been simplifying our life on earth and making the job faster, easier and a better place to live in. Shopping is something in which human beings spend a great amount of time. According, to a survey done by a website *becoming minimalist* an average American spends nearly 12 hours every month shopping, according to another survey done by *VISAEUROPE* 89% have left a shop due to excessive queuing and why go by these surveys only, aren't we the ones who have experienced similar situations of vexation when we find long discouraging queues. In today's world of losing patience easily and where time is considered pricey we cannot afford to lose so much so cheaply. The proposed systems are built with such intent in mind. This Bluetooth enabled cart has got dual benefits ,one, it doesn't need to be pushed or pulled manually ,second, it will also be able to add the prices of all products through bar code reading. Now, how does it do that? The cart is fitted with a Bluetooth module which on being getting a request to pair from a smart phone gets connected and then follows the instructions given on the phone like being instructed to turn left, right, forward or backward, The gesture given can be both touch based as well as motion sensed. The cart also comes with the facility of blowing a buzzer and getting stopped automatically when it detects an obstacle in front of it. The shopping cart is equipped with a bar code reader which will be able to read the bar codes of the products and show all details of it on an LCD screen. It is smooth and easy to use as it just needs to get paired up with a smart phone and you are ready to go and also doesn't need any special

care from the staff and will definitely reduce man power by doing most of the stuff itself and also gives the customer a pleasurable experience.

II. DETAILED DESCRIPTION OF THE SMART SYSTEM

The features supported by the Smart Shopping Cart and the idea behind how these features are achieved are explained in the next two sub-sections.

A. FEATURES OF THE SMART SHOPPING CART

The capabilities of the Smart Shopping Cart are listed below:

- 1) The basic function is to follow a person based on the instructions given on the Smartphone and move according to that.
- 2) The customer can also scan the details of the product, its price and can also add the prices of all the products put in it.

B. THE DESIGN IDEA

The design has been focused to tackle all the scenarios which are mentioned above. The first goal is to make the cart follow the person, this is done by putting a Bluetooth module on the cart so as the cart can pair up with the smart phone and follow the person based on the gestures given on it. Now, the next challenge was to develop or find an application which would let the cart move left/right/forward/reverse, the apps which let to control an arguing Bluetooth car are easily available online, one such example of an app is Adriano Bluetooth RC Car. This app will not only let the user pair up with the Smartphone but will also let the phone give instructions to the cart to move according to the gesture ,this app will also let the user give motion sensed based instructions. The cart also comes with the provision of using ultrasonic sensors which on detecting any obstacle at a distance of one metre blows a buzzer and automatically stops the cart so that the cart doesn't collide with anything. The second goal of the cart is making the cart read the details of the product such as name, price, etc and to calculate the total bills that the word 'Smart' attached to it is justified. Therefore, a bar code scanner is attached with every cart it is required to identify a product so that its price can be determined from the database, which stores all the relevant information about all the products.



III.SYSTEM ARCHITECTURE

The modules included in the system architecture are as follows:

1. Microcontroller
2. Ultrasonic sensor
3. LCD
4. Bluetooth Module
5. Barcode Reader
6. Cart Lock Mechanism

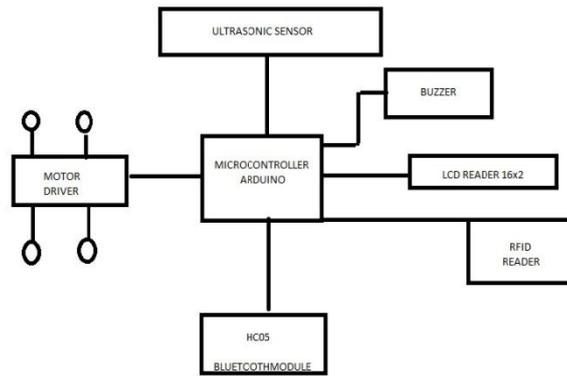


Fig:1 Block Diagram

1. MICROCONTROLLER:

The microcontroller we are using here is Arduino Mega 2560(which is an extension of At Merga 328),it is the heart of the circuit on the platform Arduino Mega. Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. Today we will help you get started by showing you some of the options available and how easy it is to get started. Arduino hardware is an open-source circuit board with a microprocessor and input/output (I/O) pins for communication and controlling physical objects (LED, servos, buttons, etc.). The board will typically be powered via USB or an external power supply which in turn allows it to power other hardware and sensors. The Uno is a great starter Arduino, it provides a solid foundation for those just getting started and has a lot of the options you will want as you explore the platform. It also works with almost every shield available.

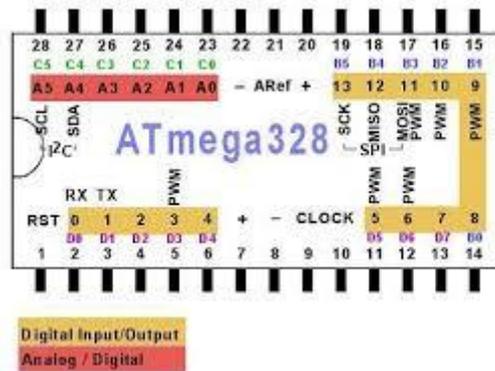


Fig:2 Atmega 328

2. ULTRASONIC SENSOR

The ultrasonic sensor used here is HC-SR04. Its range is from 2cm - 400cm, the ranging accuracy can reach to 3mm. The range limit in the prototype is till 100cm.The basic principle of work is, it has got four pins Trigg, echo, GND and +5V.The trigger sends automatically sends eight 40 kHz and detects whether there is a pulse returning back. If the signal comes back, the receiver pin catches the pulse and calculate the distance with the following formula. Test distance = (high level time×velocity of sound (340M/S) / 2.

3. LCD

Liquid Crystal Display is an electronic display module and find a wide range of applications. A 128X64 graphic LCD, since smaller LCDs have got there own limitations the graphical LCDs are used in many devices like video games, mobile phones etc as display units. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special even custom characters (unlike in seven segments), animations and so on.

4. BLUETOOTH MODULE

Bluetooth is a revolutionary wireless transfer technology standard used to share or exchange data between two devices in the bandwidth of 2.4-2.485 GHz invented by Ericsson in the year 1994. It can connect at the most twelve devices which each other and form network called piconet. The module being used here is HC-05.

5. BAR CODE READER

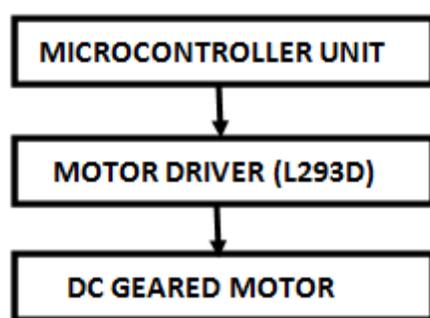
A barcode reader is an automatic input device which is used to scan or 'read' the barcode by using a visible red light. The reflected light is translated into digital data that is interpreted by the computer to identify the product and price from the database. The main advantage of using a barcode system is that any price change only needs to be made to the database and not every single product package. A barcode reader is a hand-held or stationary input device which is used to capture and read data stored in a barcode. A barcode reader consists of a scanner, a decoder, and a cable which connects the reader with a computer. A barcode reader merely captures and translates the barcode of product into numbers and/or letters, the data must be sent to a computer so that that a software application can make sense of the data.



Fig:3 Bar Code scanner

6. CART LOCKING MECHANISM-

For locking the cart motor is used along with motor driver L293D. To derive the DC geared motor near about 50-100 mA current is required. But any I/O pin of any MCU can source/sink a current of near about 20 mA. So for its interfacing with microcontrollers a power or current amplifier circuit is required, known as motor driver circuits (Refer Fig.5) L293D is used which is a H bridge IC to control the direction of motor rotation.



Cart Lock Mechanism

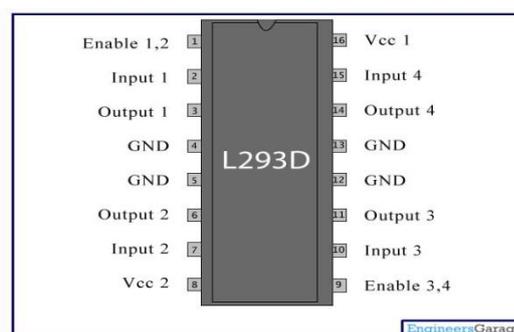


Fig:4 Motor Driver

When the cart is connected via serial port and details are transferred to the laptop then the motor rotates in anticlockwise direction and the cart is unlocked. The term H bridge is derived from the graphical representation of such a circuit. An H bridge has got 4 switches. In this when two switches are closed a positive volt will be applied across the motor and vice versa. It should be kept in mind that no two switches should be close at the same time as it would lead to a short circuit. This condition is known as shoot-through.

IV.FUTURE SCOPE

Smart cart can be interfaced with wireless technologies to make it completely portable in the near future. Payment of bills using mobile can be implemented. Automatic scanning & availability of products can be introduced. Pay scheduling feature will be the latest trend in upcoming years due to the boost in the e-commerce industry.

V.CONCLUSION

The payment of bill by standing in long queues is a tiring factor when people want to purchase commodities from marts. Though people can pay instantly using electronic money facility, they are forced to wait in the queue for longer time. The idea which is proposed using Bar code technology will overcome the problem and it gives us the combined effects of easy and flexible implementation. It will save time, energy and manpower of Customer, Owner and the supplier.



Figure:5 Cart without barcode



Figure:6 Cart with barcode

VI.REFERENCES

1. Enid Kwong, W. Y., Claudia Lai, K. Y, Ernesto, S. and Wong, C. M. (2010). "Views of Adults on Shopping Trolleys : Implications for the Development of a Shopping Trolley". *The Ergonomics Open Journal*. 32–37.
2. He, S. (2005). Feedback Control Design of Differential-drive Wheeled Mobile Robots. *12th International Conference Adv. Robot*. 135–140.
3. Hugh, F. D. (1996). "An Autonomous Guided Vehicle for Cargo Handling Applications". *The International Journal of Robotics Research*. 15(5), 407– 440. SAGE.
4. Suryaprasad, J., Praveen, K., Roopa, D. and Arjun, A. K. (2011). "A Novel Low-Cost Intelligent Shopping Cart". 1–4.
5. Lin, J. (2009). Implementation of Enterprise Instant Communicating System Based On Application Layer With Java Programming. *International Forum on Information Technology and Applications*.
6. Tan, T. C. and Muhammad, N. M. (2009). Implementation of Behaviour-Based Mobile Robot for Obstacle Avoidance Using a Single Ultrasonic Sensor. *Conference on Innovative Technologies in Intelligent System and Industrial Applications*. July. 244–248.
7. Valentinos, K. K. and Charles, R. A. (2002). Wireless communication between A.G.V.'s (Autonomous Guided Vehicle) and the industrial network C.A.N. (Controller Area Network). *Proceedings of the 2002 IEEE International Conference on Robotics & Automation*. May, 2002. May. Washington: IEEE. 2002. 434–437.
8. Sainath,s. (2014). "Automated Shopping Trolley For Super Market Billing System," .*International Journal of computer Applications*. 0975-8887.
9. Ali,Zeeshan. (2013). "RFID Based Smart Shopping and Billing,". *International Journal of Advanced Research In Computer and Communication Engineering*.