

## Automated Shopping Trolley for Mega Mall

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**Abstract**— Microcontroller based design, has acquired the status of most happening field in electronics. This is highly specialized field that has the power of integrating thousands of transistors on single silicon chip. Nowadays, in mall for purchasing variety of items it requires trolley. Every time customer has to pull the trolley from rack to rack for collecting items and at the same time customer has to do calculation of those items and need to compare it with his budget in pocket. After this procedure, customer has to wait in queue for billing. So, to avoid headache like pulling trolley, waiting in billing queue, thinking about budget, We are introducing new concept that is “SMART TROLLEY FOR MEGA MALL”. In modern era, for automation of mall we are developing a microcontroller based TROLLEY which is totally automatic. It follows the customer while purchasing items and it maintains safe distance between customer and itself. Only customer has to hold the barcode side of the product wrapper in front of barcode scanner. Then corresponding data regarding product will be displayed on display. By using this trolley, customer can buy large number of product in very less time with less effort. At the billing counter, computer can be easily interfaced for verification and bill print out.

**Keywords**-body sensors, parameters, feedback from doctor

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### I. INTRODUCTION

#### 1.1 Motivation

- *Reason Behind Choosing Microcontroller Based System:*

In this paper, we have designed system by using microcontroller, because microcontroller based system are less bulky and also easily transferable. It requires less power. So the system becomes cheap. It requires less space, easy to install, so can fitted easily in the robot.

- *Benefits To The Customers :*

This paper has an artificial intelligence of tracking the customer path requires. So that, if track has been set then there is no need of manual function. That's why customer needs less effort to pull trolley. Customer gets on the spot billing facility.

- *User Friendly And Cost Effective:*

As this system uses microcontroller, it operate on less power and ire less space, it is user friendly and cost effective.

#### 1.2 Generic Approaches

Microcontroller based design, has acquired the status of most happening field in electronics. This is highly specialized field that has the power of integrating thousands of transistors on single silicon chip. Nowadays, in mall for purchasing variety of items it requires trolley. Every time customer has to pull the trolley from rack to rack for collecting items and at the same time customer has to do calculation of those items and need to compare it with his budget in pocket. After this procedure, customer has to wait in queue for billing. So, to avoid headache like - Pulling trolley, waiting in billing queue, thinking about budget. We are introducing new concept that is “Smart Trolley For Mega Mall”.

### II. DETAILED DESCRIPTION

#### 2.1 Block Diagram

##### 2.1.1 Transmitter

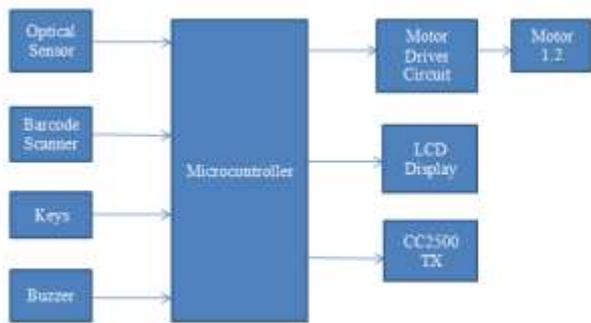


Fig 2.1: Block Diagram of Transmitter Section

It consists of given blocks areas follows:

➤ **Microcontroller:**

Here the microcontroller is a brain of this system which control all the program regarding to project work.

➤ **Optical sensor:**

Optical sensor is used to maintained the sufficient distance between customer & trolley.

➤ **Barcode scanner:**

It is used to scan the barcode which is given on the particular product means whenever customer will take any of that product, then he has to hold the bar code in front of that sensor and then it will scan.

➤ **Motor Driver Circuit:**

Motor driver is used to make an interaction between motor & microcontroller. In this system DC motors are used because DC motor is able to control the speed

➤ **LCD Display:**

LCD is used to display the complete information about overall shopping LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

➤ **CC2500 transmitter:**

CC2500 is familiar to zigbee; it is a wireless communication which is used to transmit the same information from LCD to receiver.

➤ **Keys:**

There are two key present in this system i.e. delete key & billing key  
 Billing key is used for billing purpose & delete key is use to remove the product from trolley, when the customer do not want to purchase it.

➤ **Buzzer:**

IF customer adds new product without scanning the barcode that time buzzer will sound & indicate to remove the product.

2.1.2 Receiver

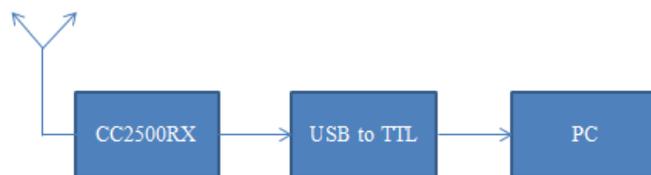


Fig2.2: Block Diagram of Receiver Section

It consists of three blocks which is given below:

➤ **CC2500 Receiver:**

CC2500 receiver is familiar with zigbee, it is a wireless communication which is responsible to receive the information from transmitter.

➤ **Pc:**

Which is placed at the cashier counter used to display overall information regarding to shopping which is displayed on LCD.

2.2 Circuit Diagram

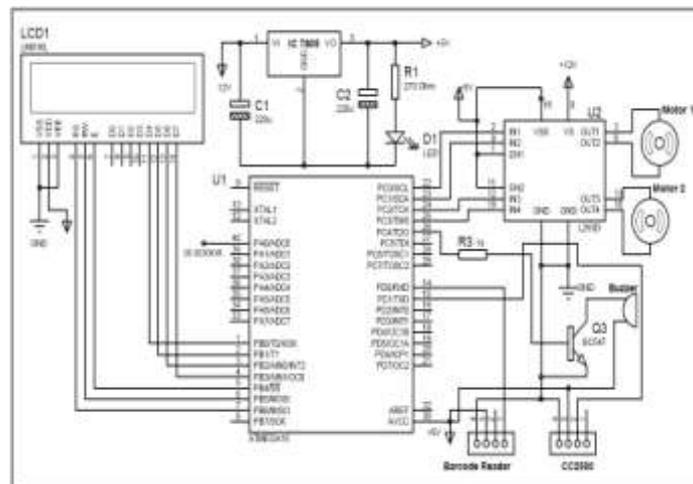


Fig2.3: Circuit Diagram of Smart Trolley

III. WORKING AREA DETAILS

3.1 Software

3.1.1 Microcontroller:

Microcontroller can be termed as a single on chip computer ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about RISC and CISC Architecture) architecture with 131 powerful instructions.

Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively. ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD. ATmega16 has various in-built peripherals like USART, ADC, Analog Comparator, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals. The following table shows the pin description of ATmega16.

**Pin Diagram:**

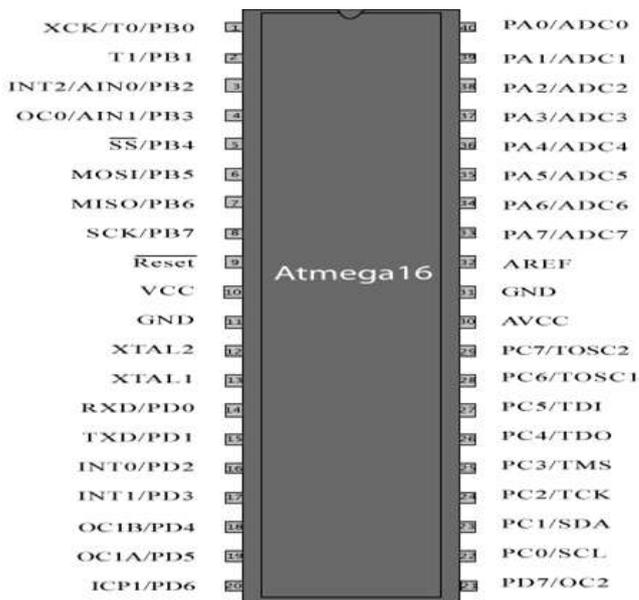


Fig3.1: Pin Diagram of Atmega 16 Microcontroller

**3.1.2 CC2500 RF Module**

The fig of CC2500 RF Module is as shown bellow:



Fig3.2: CC2500 RF Module

• **Overview**

CC2500 RF Module is a transceiver module which provides easy to use RF communication at 2.4 Ghz. It can be used to transmit and receive data at 9600 baud rates from any standard CMOS/TTL Source. This module is a direct line in replacement for your serial communication it requires no Extra hardware and no extra coding to It works in Half Duplex mode i.e. it provides communication in both directions, but only one direction at same time.

• **Features of CC2500 Module**

Following are the features of CC2500 Module

- Supports Multiple Baud rates ( 9600 )
- Works on ISM band (2.4 GHz)
- No complex wireless connection software or intimate knowledge of RF is required to connect our serial devices.
- Designed to be as easy to use as cables.
- No external Antenna required.
- Plug and play device.
- Works on 5 DC supply.
- **Specifications**
- Input Voltage - 5Volts DC
- Baud Rate - 9600
- RS 232 Interface & TTL Interface
- Range – Max 30 Mtrs - Line of Sight
- Channels - 3 Ch - JP1 & JP2 - Ch 1 On – On
- **Applications**
- Wireless Sensor Network.
- Wireless Device Control.
- Wireless Data Transfer.
- Wireless Energy Metering
- Home Automation

**3.1.3 Atmel Studio: Release 6.0**

Atmel Studio is the new integrated development environment from Atmel. It provides you a modern and powerful environment for doing AVR and ARM development. Get started by exploring the included example projects. Run your solution on a starter or evaluation kit. Program and debug your project with the included simulator, or use one of the powerful on-chip debugging and programming tools from Atmel. Get productive with the various navigate, refactor and intellisense features in the included editor. Experience seamless integration with various Atmel WEB services like Atmel Video Lounge, Atmel Store and datasheets to keep you updated and help you to design your solutions. With strong extension possibilities and online gallery, it is possible for both designers and 3rd party to provide plug-ins and customize the environment for best use and productivity. Atmel Studio carries and integrates the GCC tool chain for both AVR and ARM, Atmel Software framework, AVR assembler and simulator. All newest Atmel tools are supported including AVR ONE!, JTAGICE mkII, JTAGICE3, STK500, STK600, QT600, AVRISP mkII, AVR Dragon and SAM-ICE.

### 3.1.4 Flash Magic:

This application is very useful for those who work in the electronics field. The main window of the program is composed of five sections where you can find the most common functions in order to program a microcontroller device. Using the “Communications” section you will be able to choose the way a specific device connects to your computer. Select the COM port to be used and the baud rate. It is recommended that you choose a low baud rate first and increase it afterwards. This way you will determine the highest speed with which your system works. In order to select which parts of the memory to erase, choose from the items in the “Erase” section. The third section is optional. It offers you the possibility to program a HEX file. In the next section you will be able to find different programming options, such as “verify after programming”, “gen block checksums”, “execute” and others. When you’re done, click the Start button that can be found in the “Start” section. The program will start the device, and you will be able to see the progress of the operations at the bottom of the main window. Using Flash Magic, you are able to perform different operations to a microcontroller device, operations like erasing, programming and reading the flash memory, modifying the Boot Vector, performing a blank check on a section of the Flash memory and many others.

## 3.2 Hardware

### 3.2.1 Optical sensor

In this paper we have adopted the Obstacle Detection methodology. It is used to keep safe distance between trolley and customer

If obstacle is far away from sensor, it does not give reflected back signal and if obstacle is in range of sensor then it will get the reflected signal then obstacle is detected.

The fig of optical sensor is as shown bellow:

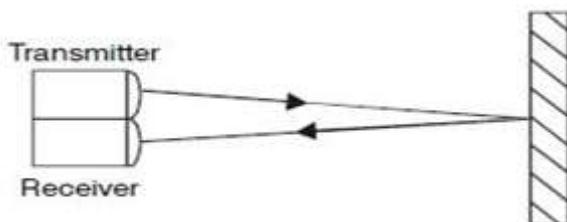


Fig 3.3: Optical Sensor

### 3.2.2 Barcode scanner

In barcode black and white strips are present. Black strip absorbs all light transmitted by transmitter and doesn't reflect back. White strip reflects the light rays. This is the basic principle of barcode scanner

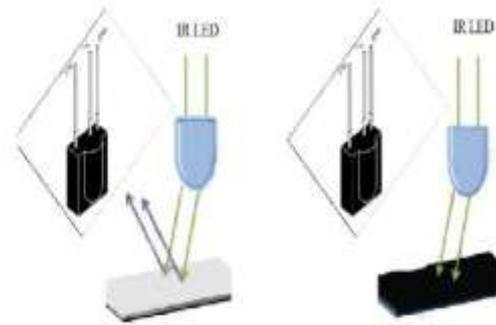


Fig 3.4: Barcode Scanner

### 3.2.3 Buzzer

A buzzer is an audio signaling device, which may be mechanical, electromechanical or piezoelectric. Typical uses of buzzers and beepers includes alarm devices, timers and confirmation of user input as a mouse click or keystroke.

Different types of buzzer are as shown bellow:



Fig 3.5: Different Types of Buzzer

### 3.2.4 Motor Driver (L293D)

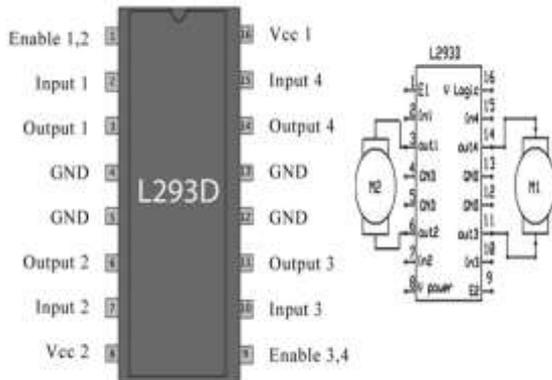
L293D is a dual [H-bridge](#) motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs.

Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

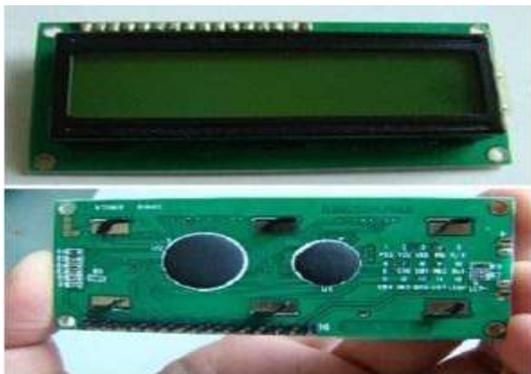
**Pin diagram:**



**Fig 3.6: Pin Diagram of Motor Driver (L293D)**

**3.2.5 Liquid crystal display (LCD)**

The fig of LCD is as shown below:



**Fig3.7: Liquid Crystal Display**

It is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. LCDs are used in a wide range of applications including computer 12 monitors, televisions, instrument panels, aircraft cockpit displays, and signage. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in.

LCDs are, however, susceptible to image persistence. The LCD screen is more energy efficient and can be disposed of

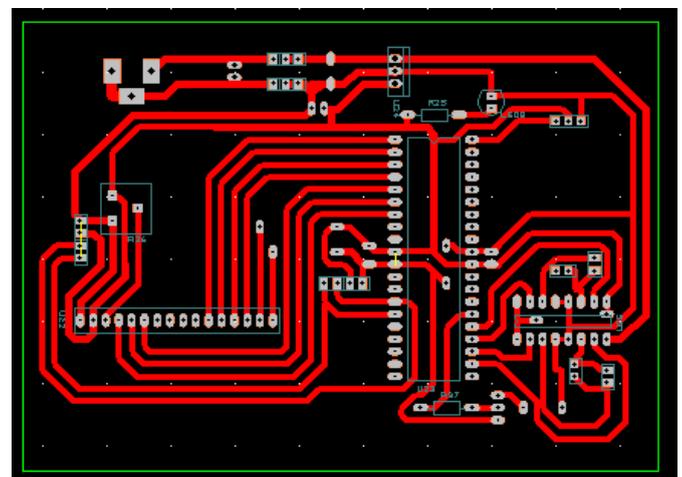
more safely than a CRT. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. Liquid crystals were first discovered in 1888. By 2008, worldwide sales of televisions with LCD screens exceeded annual sales of CRT units; the CRT became obsolete for most purposes.

**3.3 PCB Layout Design:**

The first stage in the development of a PCB design is to capture the schematic for the circuit. This may be achieved in variety of way. Circuit may be entered into a schematic capture tool this may from part of the PCB design suite, or it may be an external package whose output can be expanded in a suitable format

In addition to purely performing the schematic capture, simulations of the circuit may be undertaken at this stage. Some packages may be able to interphone to simulation packages for applications such as RF circuit design simulations of the circuit will enable the final circuit to be optimise more without building a prototype.

With the schematic capture complete the electronic design of the circuit is contain within the file and can be converted to what is term a” net list”. The net list is the interconnectivity information and it essentially the component pins and the circuit nodes, or nets, to which each pin connect.



**Fig3.8: PCB Layout**

**IV. APPLICATIONS & FUTURE SCENARIO**

**4.1 Application:**

- Very useful concept in mega mall
- Airport luggage handling system
- In super markets or shops

**4.2 Future scenario:**

- In future, the locations of shopping trolley are tracked & can be displayed to allow supper market staffs & users know the shopping trolley current

locations.

## V. CONCLUSION

It is a smart shopping system which follows customer & automates the entire billing procedure. The system which is developed highly reliable because of effectiveness of IR sensor to follow the customer & barcode scanner to scan and display the information on LCD display. It involves a CC2500 system which provides the automatic billing facility.

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