

# Smart Trolley in 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 IN 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**—Optical sensor, Barcode scanner, Development Board, Zigbee Technology, microcontroller.

## 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 requ. 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:

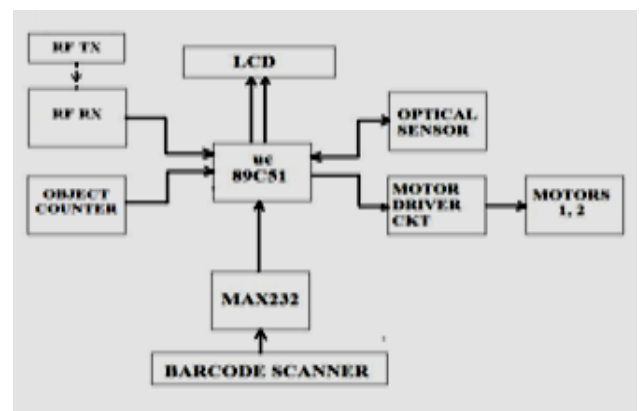
As this system uses microcontroller, it operate on less power and ire less space, it is user friendly and cost effective.

### 1.2 Generic Approaches (Present Status):-

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 IN MEGA MALL".

## II. SYSTEM DESIGN

### 2.1 Block Diagram:-

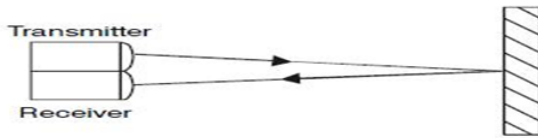


**Fig 1: Block Diagram**

### 2.2 Methodology:-

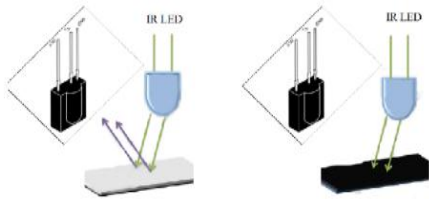
**Optical sensor:** - In this paper we have adopted the Obstacle Detection methodology. It is used to keep safe distance between trolley and customer.

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.



**Fig 2: Optical Sensor**

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



**Fig 3: Barcode Scanner**

**RF Transmitter-Receiver:-** At the transmitter section the control signals are transmitted using radio frequency. These control signals are transmitted serially. At receiver section these signals receive and decoded.

**Advantages:-**

1. Each barcode has unique identity.
2. Barcode gives total information about product related data.
3. Barcode maintains secrecy.
4. Easy to generate tags of barcode.

**2.2 Hardware Design:-**

1) **Development Board:-** The development board is hand held, battery powered microcontroller board ideal for personal, educational and research robotics projects. Based on Atmel AT89V51 microcontroller, the Development board includes 64K of flash RAM, outputs for two DC motors, inputs for variety of sensors like Barcode scanner, Optical sensor, Object counter and a 16x2 alpha numeric LCD screen.



**Fig 4: Development Board**

**Hardware Of Rf Module:-**

**RF Transmitter:-** The ST-TX01-ASK is an ASK Hybrid transmitter module. ST-TX01-ASK is designed by the Saw Resonator, with an effective low cost, small size, and simple-to-use for designing. RF transmitter section is used for the operations like i) Left turn, ii) Right turn, iii) Stopping and iv) Reversing.

**Features:** Frequency Range: 315 / 433.92 MH, Supply Voltage: 3~12V,

Output Power: 4~16dBm, Circuit Shape: Saw

**RF Receiver:-** The ST- RX04-ASK is an ASK superhet receiver module with PLL synthesizer and crystal oscillator. This module receives the transmitted data and decoding is carried out using IC HT12D. This decoded data is forwarded to microcontroller.

**Features:**

On-Chip VCO with integrated PLL using crystal oscillator reference.

Integrated IF and data filters.

Operation voltage: 5 Volts.

Available frequency at : 315/434 MHz

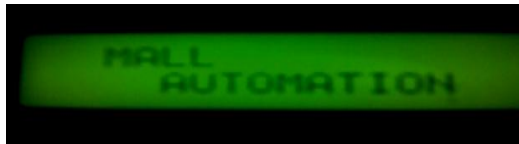
**2.4 Software Design:**

**Programming P89V51RD2:** P89V51RD2 robot programming involves two steps. First step is to write and compile the code and generate the "\*.hex" file. Second step is to load this "\*.hex" file on the microcontroller using Flash Magic software provided by NXP (formerly Phillips). We are going to use Keil-U-Vision (Version 3) software for writing the code for the Microcontroller.

### III. SYSTEM IMPLEMENTATION

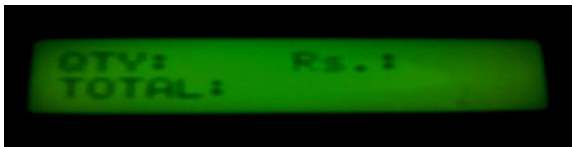
#### *System Operation:-*

The 89V51 microcontroller is heart of our system. The optical sensor which maintains distance between trolley and customer is connected to port 0 of microcontroller. According to distance between trolley and customer, microcontroller takes decision whether to drive motor or not. Motor driver circuit is connected to port 2 of microcontroller. In our system, trolley turning, stopping, reversing facility is provided using RF trans-receiver section. Barcode scanner is used for on the spot billing purpose in trolley. Barcode scanner is connected to microcontroller at serial port pins using MAX232IC. Quantity mismatch detector is nothing but 38 KHz IR trans-receiver and is connected to port\_. LCD 16\*2 alphanumeric display is used for displaying quantity & costing of products. When the power supply is switched on, system initializes and displays "MALL AUTOMATION".



**Fig 5: LCD display as Mall automation**

After certain time it displays.

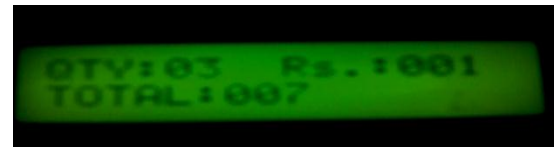


**Fig 6: LCD display as Rs. 1 and Total**

Now as we are using GP2D12 distance sensor this is analog sensor that converts distance between customer and trolley to corresponding voltage. This voltage is compared with the reference voltage at LM358 comparator. According to output level of LM358, trolley runs or stops. In this way, whenever customer walks trolley will follow him. If at any time customer wants to turn or reverse the trolley, remote controlling is available. This is provided in customer's hand. Whenever customer wants to turn, he just has to press the corresponding button on remote control. According to button pressing, code goes to IC HT12E encoder & this encoded data is given to RF transmitter & further transmitted. At receiver side, transmitted data is received by RF receiver & decoded by using IC HT12D decoder & further provided to microcontroller.

Now whenever customer wants to buy a product, he will stop & obviously trolley too. Now whenever customer will take any of the products, then he has to hold the barcode side of that product in front of barcode scanner. Then scanner will scan & corresponding data will be compared with the database which is already stored in the ROM of microcontroller. As we have assigned the specific cost for every barcode, so it will display...

1. Number of items collected
2. Cost of current item
3. Total cost



**Fig 7: LCD display as Rs.001 and Total Price**

At any instant, customer wants to remove any of the collected items, then "Delete" button is provided for that purpose. Then customer has to press the delete button & just to hold that item in front of barcode scanner. Automatically corresponding cost will be deducted. If customer will put the item directly in the trolley without holding in front of barcode scanner, then IR 38 KHz pair i.e. "Quantity mismatch detector" will detect & buzzer will give sound & display will be as...



**Fig 8: LCD display as warning remove product**

### IV. RESULT & CONCLUSION

In Automatic trolley, there is no need to pull heavy trolley, no need to wait in billing queue and no need of thinking about budget. The microcontroller based trolley automatically follows the customer. Also it maintains safe distance between customer and itself. It gives number of products in trolley and total cost of the products on the spot. It gives facilities like trolley stopping, turning right or left. So, we could successfully implement the concept of Automatic trolley.

### V. FUTURE SCOPE

Remote control handling can be eliminated using GPS system. All billing information in microcontroller can be send to central computer using Zigbee technology.

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