RFID based Smart Trolley using ARM Processor

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Abstract - *We all love shopping but there is one thing all of us hate that is standing in long queues after shopping for the billing process. We wait to get to the billing counter and then again for the person at the counter to check our purchased items, scan them and calculate the bill. Overall it is a time consuming process .We have here intended to develop a system that can facilitate fast billing and make shopping a smooth experience. In this system each product will be equipped with a RFID(Radio frequency identification) tag ,trolley will have RFID receiver, lcd display, arm controller, RF module .As soon as customer puts a product in the trolley it will be stored in the memory, when another product is added its cost is added ,finally total bill be calculated and displayed on the lcd. This information will be sent to the billing counter wirelessly via RF modules.*

***KeyWords*: RFIDtags, RFID receiver, ARM7,Transreceiver, IR Sensor, LCD.**

1.INTRODUCTION

Shopping has become an essential part of our lifestyle. We visit shops, supermarkets, stores for our needs. Sometimes consumer falls short of cash as he does not have an idea about the total bill amount and this is an irritating scenario.The intended system displays total amount on the lcd mounted on trolley itself and this information is sent to the billing pc.So the consumer already knows the amount, this in turn saves time, manpower and makes shopping efficient. Principle used is RFID, rfid tags are used for products and trolley consists of a rfid receiver. Wireless RF modules are used to transmit information from trolley to billing pc.

1.1 Objective of project:

The main goal of the project is to make shopping experience smooth and efficient. The customer in advance will know the total bill amount before reaching the counter. The customer just has to pay the amount at the counter this in turn will save time and make the entire process swift and smooth.

Advantages :

- Time efficient shopping
- No need to wait in queue during shopping
- Maintain record of product
- Easy for user to handle the system

2.PROJECT METHODOLOGY

Product Side :

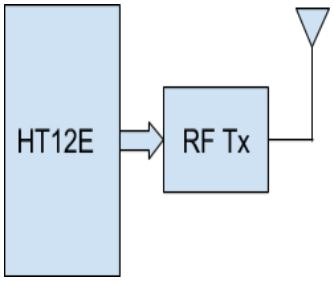


Fig.1-RFID transmitter(tag)

Trolley Side :

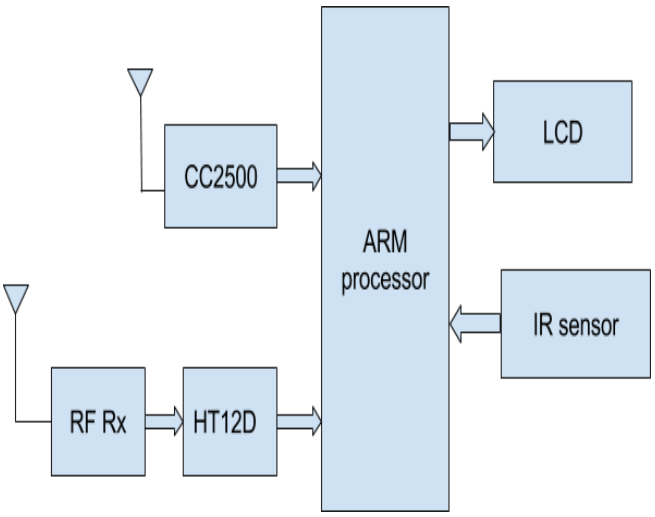


Fig.2- Receiver

PC Side :

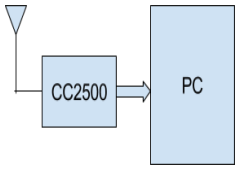
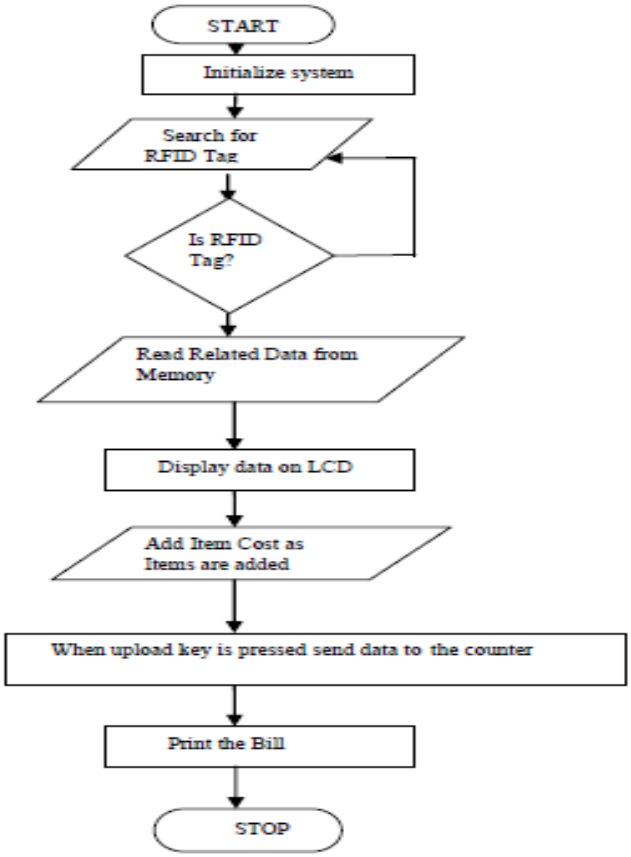


Fig.3-Pc side

2.2 Algorithm

Step 1:Start
Step 2:Initialize system
Step 3:Search for RFID tags
Step 4:Check RFID tag
Step 5:Read data related to tag from memory
Step 6:Display cost on LCD
Step 7:Add cost to total
Step 8:When key is pressed send data to billing counter
Step 9:Print bill
Step 10 :Stop

Flowchart



3. DESCRIPTION

3.1 Hardware Description:

3.1.1 ARM7TDMI-S Microcontroller

- 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 to 40 kB of on-chip static RAM and 32 to 512 kB of on-chip flash program memory.
- 128 bit wide interface/accelerator enables high speed 60 MHz operation.
- In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software.
- Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms.
- Embedded ICERT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high speed tracing of instruction execution.
- USB 2.0 Full Speed compliant Device Controller with 2 kB of endpoint RAM.
- In addition, the LPC2146/8 provide 8 kB of on-chip RAM accessible to USB by DMA.
- One or two (LPC2141/2 vs. LPC2144/6/8) 10-bit A/D converters provide a total of 6/14analog inputs, with conversion times as low as 2.44 µs per channel.
- Single 10-bit D/A converter provides variable analog output.
- Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.

• Low power real-time clock with independent power and dedicated 32 kHz clock input.

• Multiple serial interfaces including two UARTs (16C550), two Fast I2C-bus(400 kbit/s), SPI and SSP with buffering and variable data length capabilities.

• Vectored interrupt controller with configurable priorities and vector addresses.

• Up to 45 of 5 V tolerant fast general purpose I/O pins in a tiny LQFP64 package.

• Up to nine edge or level sensitive external interrupt pins available.

• 60 MHz maximum CPU clock available from programmable on-chip PLL with settling time of 100 µs.

• On-chip integrated oscillator operates with an external crystal in range from 1 MHz to 30 MHz and with an external oscillator up to 50 MHz.

• Power saving modes include Idle and Power-down.

• Individual enable/disable of peripheral functions as well as peripheral clock scaling for additional power optimization.

• Processor wake-up from Power-down mode via external interrupt, USB, Brown-Out Detect (BOD) or Real-Time Clock (RTC).

• CPU operating voltage range of 3.0 V to 3.6 V (3.3 V ± 10 %) with 5 V tolerant I/O pads

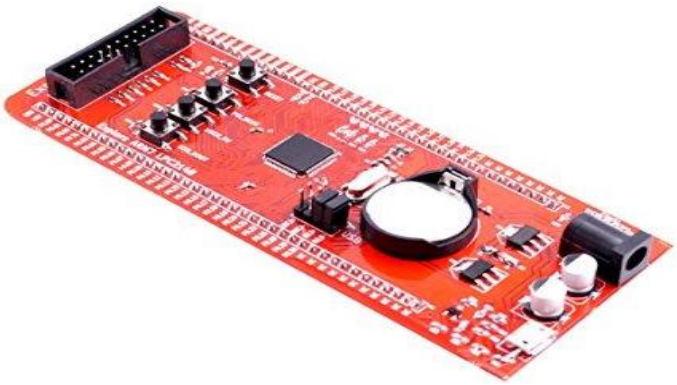


Fig.4- ARM7TDMI controller

3.1.2 RFID transmitter

The transmitter has three pins – ATAD (DATA), VCC, GND. Setting the transmitter's data pin to HIGH leads to a radio transmission which will set the receiver's data PIN to HIGH then a serial association will be enforced, by process a standard information measure. once trying from the front aspect, there's tiny hole on the highest right corner of the module that is wherever associate degree external antenna will be connected, if needed

Fig.5- RFID transmitter (tag)

3.1.3 RFID receiver

The receiver has four pins- Vcc, DATA1, DATA2, GND. There are unit pair of data pins, and any of them may be used to scan the output of the module. Once trying from the front

aspect, there's a little hole on low left corner of the module, that is wherever associate external antenna may be connected if required. Receiver Module connected with 4-bit decoder, user will evaluate RF signal with the assistance of light-emitting diode indications

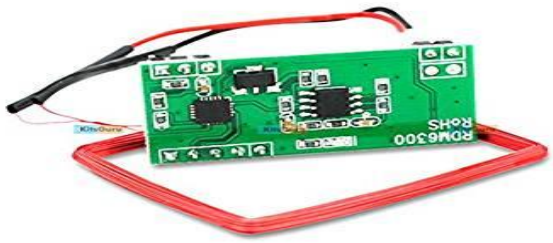


Fig.6-Receiver

3.1.4 CC2500 Module

CC2500 RF Module is a transreceiver module that provides straightforward to use RF communication at a pair of.4 Ghz. It may be accustomed to transmit and receive data at 9600 baud rate rates from any customary CMOS/TTL supply. It's sort of a plug and play device. This module may be a direct line in replacement for your serial communication it needs no further hardware and no further writing to works in half Duplex mode i.e. it provides communication in each directions, however just one direction at same time.

Fig.7-CC2500 module

3.1.5 LCD display

LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 20x4 lcd display is very basic module and is used in many devices and circuits.These are preferred over seven segment displays and other systems. LCD's are economical, programmable have no limitation of displaying special custom characters unlike seven segment displays.

Fig.8-LCD Display

3.2 Software description:

EMBEDDED c is used for programming the arm controller which is the heart of this project and does the calculation so that accurate bill is generated .VB(visual basic) is used as front end software to display the bill on the billing Pc ,it ensures simple user interface.

3. CONCLUSIONS

By means of this project we have a tendency to intent to change the asking method, build it swift & increase the safety victimisation RFID technique. This can take the searching expertise to a distinct level. Completely different parameters like the system parameters of sensible tramcar like product name, product value, product weight etc are unceasingly displayed. This project reviews and exploits the present developments and differing kinds of frequency identification technologies that are used for product identification, billing, etc. It's additionally been learned the design of the system which will be utilized in the searching systems for intelligent and straightforward searching within the malls to avoid wasting time, energy and cash of the shoppers. Therefore

RFID contains a wide scope within the offer chain management.

therefore with the assistance of the conclusion we will saythat-

1. Automatic asking of product by victimisation RFID technique are going to be a lot of viable choice within the future.

2. The system supported RFID technique is economical, compact and shows promising performance.

4. RESULTS

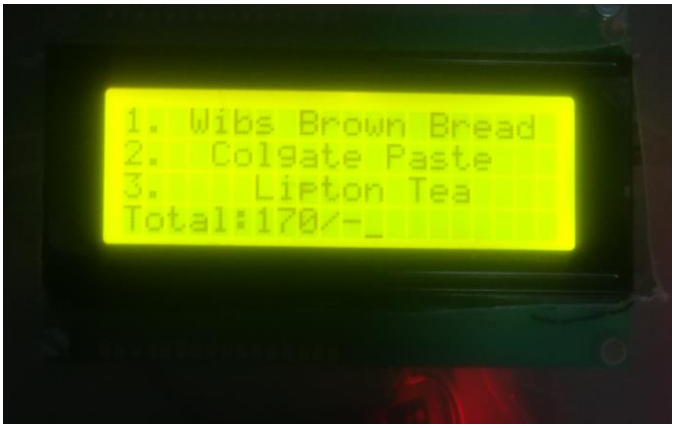


Fig.9- Products displayed on LCD with Total Amount

Fig.10-Products and total bill amount displayed on PC side

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