International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-7, Issue-6, June 2021
ISSN: 2395-3470
www.ijseas.com

Development of Blind Assistive Device in Shopping Mall

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Abstract
Finding groceries and products in a shopping mall is a challenging task for visually impaired people. This project will help them to assist the impaired to encourage their individuality and help them to shop out their required and favorite groceries without any human interaction. The use of the effective RFID technology to find their groceries by using the voice signals and RFID technology. There will be the involvement of components like RFID Reader, RFID tag and Voice Modules.
Keywords: *RFID Technology, Visually Impaired, Voice Module.*

1.Introduction

According to a statistical report recently released by WHO , at least 2.2 billion people are struggling with vision impairment or blindness. The burden of vision impairment is most significant in those aged 50years and older:31 million out of 36 million (86%) of blind people. Besides low vision caused by old age , vision impairment can be congenital , mostly in the younger age groups. Visually impaired are often challenged in their day-to-day tasks. They often lead a normal life; however , they face many troubles due to inaccessible infrastructure and social challenges. Moreover, the misunderstood perspective of society often leads to inconvenience. Blind or visually impaired professionals also encounter barriers with their ability to interact with the objects .

This motivated us to work on the project to help visually impaired people to detect both product name and product price through the RFID Technology and the details will be sent to the Impaired through audio signal. Therefore, this application should be simple, user-friendly, practical and affordable to those with visual disability.

2.Proposed Work:

The above Proposed System can be implemented using RFID reader and RFID tag contains all the information the object such as product name, price, and offer and stored in store server. Impaired person will be holding an RFID reader, as soon as he reaches the wrack where products are placed. RFID detector detects the RFID tag and sends the tag number to the server. The server will send the information stored of the RFID tag to the user's smart phone through voice command .In the smart phone the text to speech conversion takes place .An audio message is played to assist the user in navigating and identifying the items. The system will work without any human help. No need to carry any costly hardware for visually impaired people only they need smart phone and RFID reader.

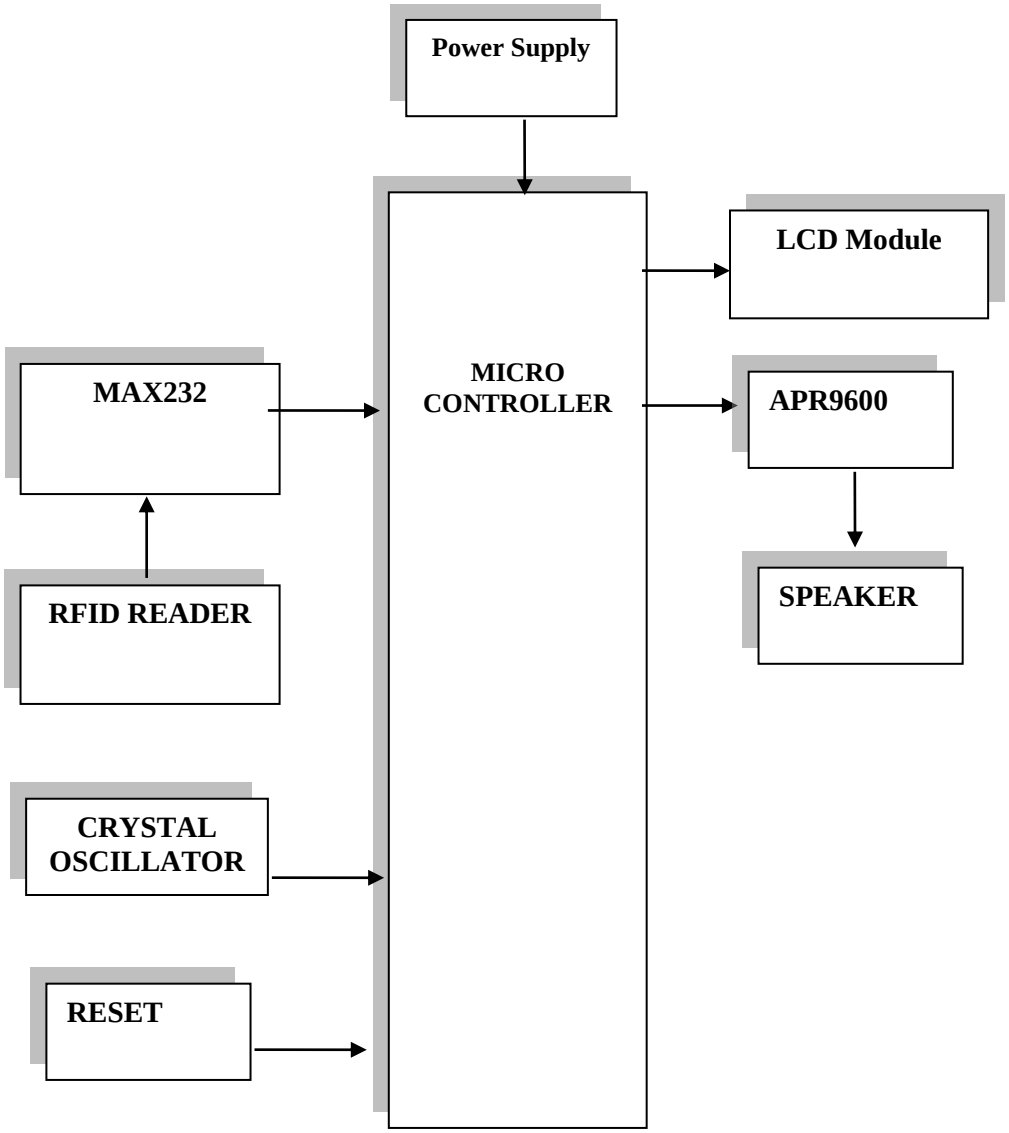

Fig 1: Block Diagram of Proposed System

2.1) Description of Components in Proposed System:

Microcontroller: A Microcontroller (or MCU) is a computer-on-a-chip used to control electronic devices. It is a type of microprocessor emphasizing self-sufficiency and cost-effectiveness, in contrast to a general-purpose microprocessor (the kind used in a PC). A typical microcontroller contains all the memory and interfaces needed for a simple application, whereas a general purpose microprocessor requires additional chips to provide these functions.
A microcontroller is a single integrated circuit with the following key features like:

(a) central processing unit ranging from small and simple 8-bit processors to sophisticated 32- or 64-bit processors.
(b) input/output interfaces such as serial ports.
(c) RAM for the data Storage.
(d) ROM, EEPROM or Flash Memory for the program storage.

(e) clock generator – often an oscillator for quartz timing crystal.

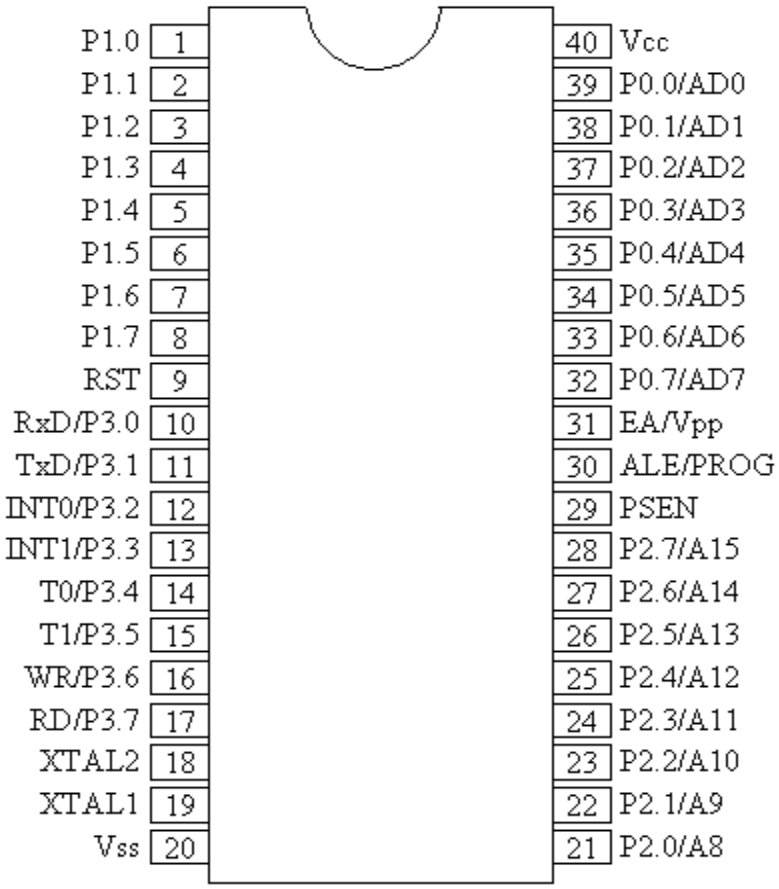

Fig 2: PIN Diagram of Microcontroller(8052)

MAX232 IC: The MAX232 is an IC, first created by Maxim Integrated Products, that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.

LCD Module: LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. 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. A 16x2 LCD means it can display 16 characters per line and

there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

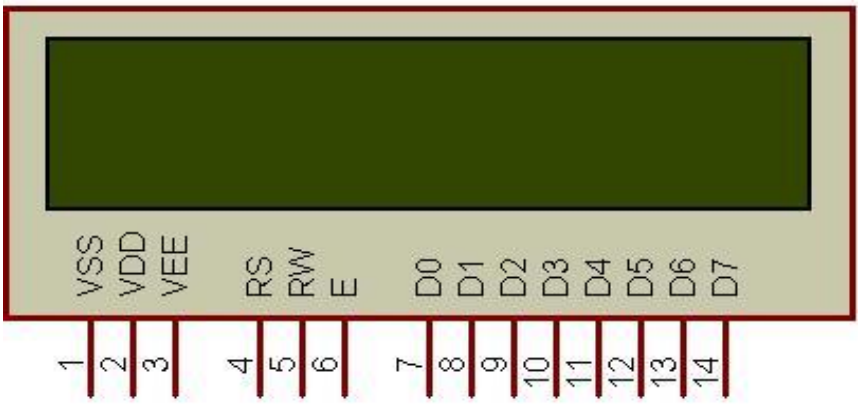

Fig 3:LCD Display Module

RFID Technology: RFID, short for Radio Frequency Identification, is a technology that enables identification of a tag (that is normally attached with an entity) by using electromagnetic waves. RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz. It involves two components named:

(a**) RFID Reader:** The reader, or scanner, functions similarly to a barcode scanner; however, while a barcode scanner uses a laser beam to scan the barcode, an RFID scanner uses electromagnetic waves. To transmit these waves, the scanner uses an antenna that transmits a signal, communicating with the tags antenna. The tags antenna receives data from the scanner and transmits its particular chip information to the scanner.

Fig 4: RFID Reader Module

(b)**RFID Tag:** RFID tag is a small device which stores and sends data to RFID reader. They are categorized in two types – active tag and passive tag. Active tags are those which contain an internal battery and do not require power from the reader. Typically active tags have a longer distance range than passive tags. Passive tags are smaller and lighter in size than the active tags. They do not contain an internal battery and thus depend on RFID reader for operating power and certainly have a low range limited up to few meters.

Fig 5: RFID Tag

APR9600 Voice Module: The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. The IC is 28 pin device used to record & playback of maximum of 8 messages. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable. The replayed sound exhibits high quality with a low noise level. Sampling rate for a 60 second recording period I s 4.2 kHz that gives a sound record/replay bandwidth of 20Hz to 2.1 kHz. However, by changing an oscillation resistor, a sampling rate as high as 8.0 kHz can be achieved. This shortens the total length of sound recording to 32 seconds. Total sound recording time can be varied from 32 seconds to 60 seconds by changing the value of a single resistor. The IC can operate in one of two modes: serial mode and parallel mode. In serial access mode, sound can be recorded in 256 sections. In parallel access mode, sound can be recorded in 2, 4 or 8 sections. controllers and computers. This APR9600 voice IC has 28 pin DIP package works in supply voltage between 4.5V & 6.5V. During recording and replaying, current consumption is 25 mA. In idle mode, the current drops to 1 mA.

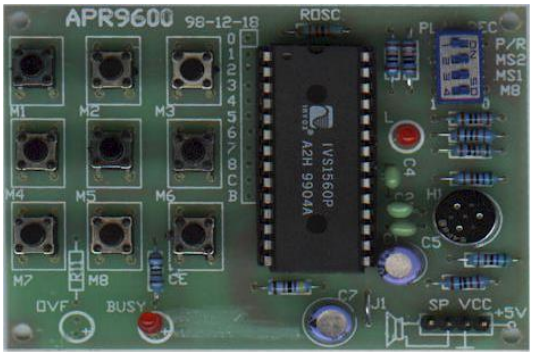

Fig 6: APR9600 Experimental Board

2.2) Description about Software Technology Used:

KEIL µVision3 Software: Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil C51 Compiler is the de facto industry standard and supports more than 500 current 8051 device variants. Now, Keil Software offers development tools for ARM. Keil Software makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, and evaluation boards for the 8051, 251, ARM, and XC16x/C16x/ST10 microcontroller families. Keil Software is pleased to announce simulation support for the Atmel AT91 ARM family of microcontrollers. The Keil µVision Debugger simulates the complete ARM instruction-set as well as the on-chip peripherals for each device in the AT91 ARM/Thumb microcontroller family. The integrated simulator provides complete peripheral simulation. Other new features in the µVision Debugger include:

- An integrated Software Logic Analyzer that measures I/O signals as well as program variables and helps developers create complex signal processing algorithms.
- An Execution Profiler that measures time spent in each function, source line, and assembler instruction. Now developers can find exactly where programs spend the most time.

KEIL compiler also supports C language code. The µVision3 IDE is a Windows-based software development platform that combines a robust editor, project manager, and makes facility. µVision3 integrates all tools including the C compiler, macro assembler, linker/locator, and HEX file generator. µVision3 helps expedite the development process of your embedded applications by providing the following:

- Full-featured source code editor.
- Device database for configuring the development tool setting.
- Project manager for creating and maintaining your projects.
- Integrated make facility for assembling, compiling, and linking your embedded applications,
- Dialogs for all development tool settings.

3. Schematic Diagram of the System:

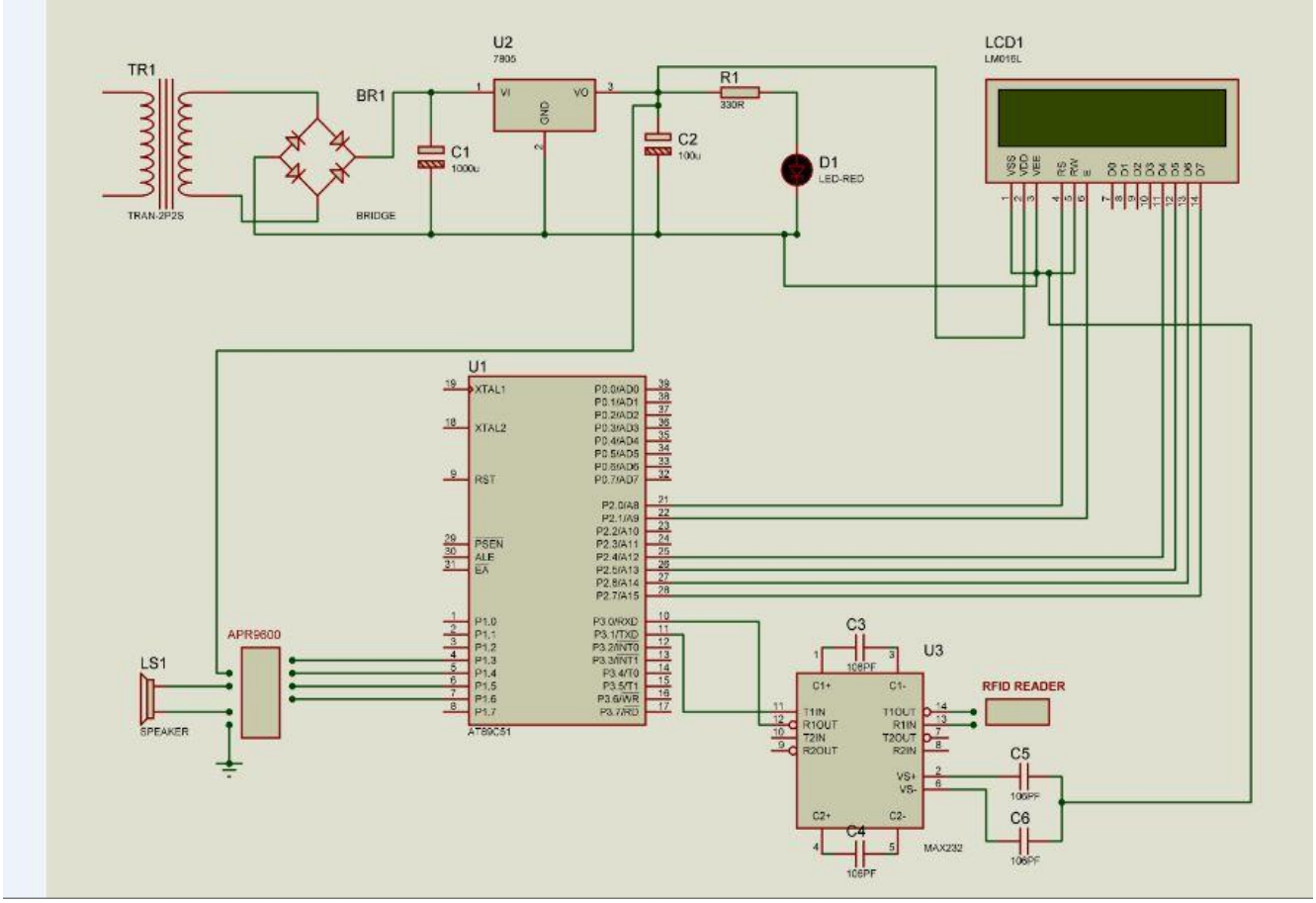

Fig 7: **The Diagram describes all the connections made in the proposed system.**

As we can observe , the microcontroller which has 4 ports is connected accordingly like

Port1 – connected to APR9600 voice module.

Port 2-connected to the LCD display .

Port 3 – given to transmit and receiver pin of RFID Reader .

4. Result:

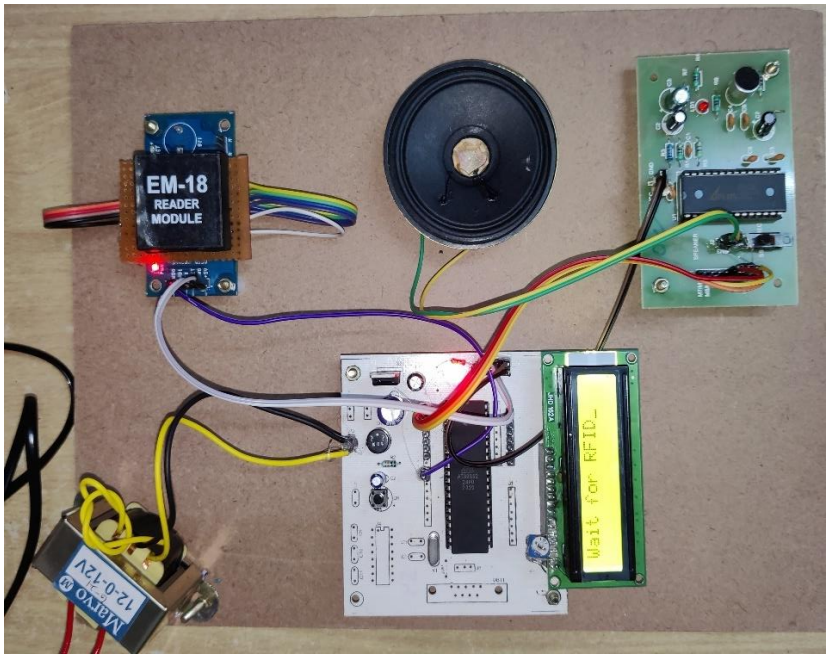

Fig 8: This Ouput is shown when the System is waiting for an RFID tag to make a contact.(here we used LCD just for Reference) in real scenario we can skip this module.

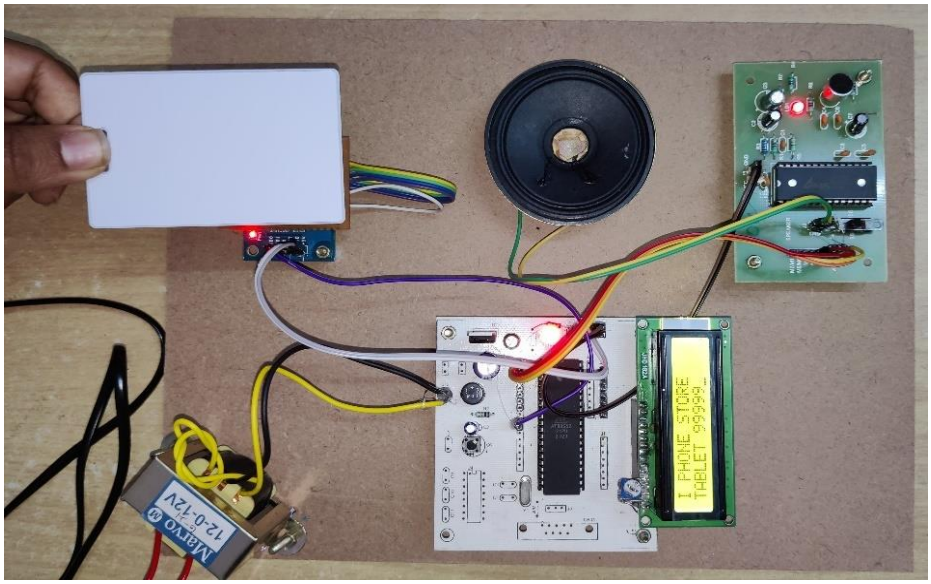

Fig 9: The product name and product price will be display and also will be audible at the speaker when there is a contact between RFID Reader and respective Product RFID tag.

5.Conclusion:

We can draw following conclusions from this paper. We used an appropriate technology that would help visually impaired people to shop their necessities by being self-reliant. This technology will accommodate all the facilities that would help visually impaired people. In addition to this,the selection of proper RFID technology, Microcontroller has been taken such a way that the whole device will be at the reasonable price to afford. We conclude that this device is easy to use as it is just the concept of having a point of contact with the reader and the tag through which the product details will be given to the impaired. We also conclude that , the RFID range may be the concern, but we conclude that we can deal with the large distance data transfers between a reader and a tag by using a reader modules of higher power.

6.Future Scope:

This Device is built using the Embedded Technology, but the application can be deployed by using IOT where by using IOT in collaboration with the Cloud server we can store a large datasets of products.

References:

[1] https://ieeexplore.ieee.org/document/7808083
[2] Dr. K .V.K.K Prasad “Embedded /Real-Time Systems: concepts, design & programming”
[3] Stapleton-Gray R. Scanning the horizon: A skeptical view of RFIDs on the shelves. 2005; Available from: www.rfidprivacy.us/ 2003/papers/stapletongray3.pdf.
[4] The 8052 Micro controller and Embedded Systems -Muhammad Ali Maizidi.
[5]http://www.lbenchindia.com/finalyearprojectdatasheets/APR9600%20user%20manual.pdf