International Journal on Applications in Information and Communication Engineering
Volume 3: Issue 1: February 2017, pp 46-49. www.aetsjournal.com ISSN (Online) : 2394-6237

ENHANCED QR-CODE BASED APPLICATION FOR LIBRARY MANAGEMENT SYSTEM USING ANDROID

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***Abstract*—** QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte / binary, and kanji) to efficiently store data; extensions may also be used. The QR Code system has become popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. A QR code consists of black modules (square dots) arranged in a square grid on a white background, which can be read by an imaging device (such as a camera) and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data are then extracted from patterns present in both horizontal and vertical components of the image. In this project we will be using QR codes for data analysis and data mining on different sectors of marketing.

Keywords — : quick response code, mobile phone, library, information centers

I. INTRODUCTION

A Library is an organized collection of sources of information which is made accessible to the people of different Community. The Library usually contains the information physically or in a digitized format. In the Olden period the access was usually in the Library room as the Technology grew up the access was made online [1, 9]. Android is basically an OPEN SOURCE which is based on the Linux Kernel which was introduced by Google. Android operating system is mainly designed for Smart Phone and tablet devices.

The Android platform has an embedded feature called the Google Play Store which enables the developers to distribute their applications to the potential users World Wide**.** A library usually includes books, periodicals, films, maps, cd's, DVD, video tapes, newspaper and so on. The size of the Library usually varies from place to place depending on the items it contains. Initially Computer played a major role in the banking and other sectors latter on the introduction of the Internet made them to go a long way[10].Internet made the Users to access their database 24x7 which was stored centralized. Later emerged the mobile technology [12] and now mobility has become everything. Initially many famous mobility platforms which includes Flash UI, Bada, Symbian etc., later on the introduction of the Android operating System for mobile and other tablet device created a revolution due to its easy User Interface, fast access and response time. Database Technology plays a vital role in business applications which helped us to move from paper work to the query processing. Since the Users Internet activities have shifted from browsers to mobile, there emerged new opportunities to interact with products from online. Library Access App is a retail application which is targeted for Android device (i.e. a mobile operating system which works on Linux kernel and also used in televisions and wrist watches)[3].Which helps the Users to view their Library related Information. This paper describes how the user can find out details about the available books in the Library and also they can view their due dates of borrowed books.

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The Library Access System Application saves Users valuable time by making complete procedure online. The application developed here is designed for KitKat version. And also the embedded SQLite database which is used to store Library related Information. Only registered users can perform login and access the Library database.

Android allows users to customize the home screen with the shortcuts of the application. The Android applications have an extension .apk (i.e. Android Application package which is a package file format used to install application onto the android phones) [3]. Android Operating System is a collection of software components such as Libraries, Linux Kernel, Android Runtime, Application Framework and Applications layer where the user can interact with applications like Contacts [3], Phone, Browser and so on.

II. BLOCK DIAGRAM

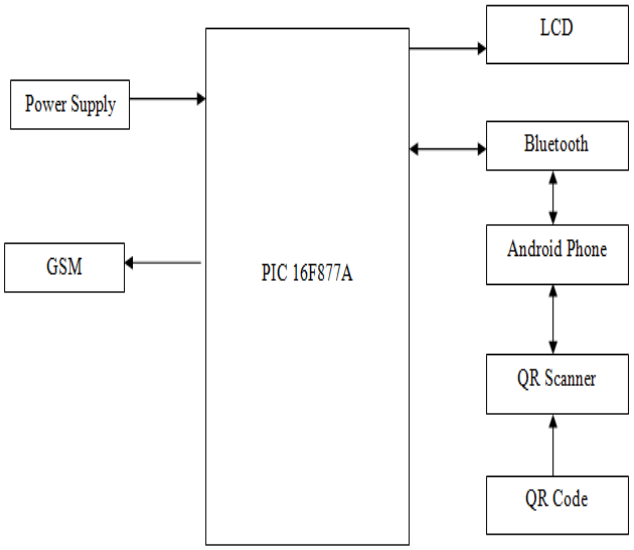


Fig 1: Block diagram of QR Scanner using Library Management

III. PIC MICRO CONTROLLER

The high performance of the PIC micro devices can be attributed to a number of architectural features commonly found in RISC microprocessors. These include:

- Harvard architecture
- Long Word Instructions
- Single Word Instructions
- Single Cycle Instructions
- Instruction Pipelining
- Reduced Instruction Set
- Register File Architecture
- Orthogonal (Symmetric) Instructions

IV. BLUETOOTH

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security. Created by telecom vendor Ericsson in 1994,[2] it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

Bluetooth is managed by the Bluetooth Special Interest Group, which has more than 19,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics.[3] Bluetooth was standardized as **IEEE 802.15.1**, but the standard is no longer maintained.

The SIG oversees the development of the specification, manages the qualification program, and protects the trademarks.[4] To be marketed as a Bluetooth device, it must be qualified to standards defined by the SIG. A network of patents is required to implement the technology, which is licensed only for that qualifying device.

LCD

LCD stands for liquid crystal; this is a output device with a limited viewing angle. The choice of LCD as an output device was Because of its cost of use and is better with alphabets when compared with a 7-segment LED display. We have so many kinds of LCD today and our application requires a LCD with 2 lines and 16 characters per line, this gets data from the microcontroller and displays the same. It has 8 data lines, 3 control line, a supply voltage Vcc (+5v and a GND. This makes the whole device user friendly by showing the balance left in the card. This also shoes the card that is currently being used.

V. ANDROID PHONE

A. GSM

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

A GSM modem can be an external device or a PC Card / PCMCIA Card. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. A GSM modem in the form of a PC Card / PCMCIA Card is designed for use with a laptop

computer. It should be inserted into one of the PC Card / PCMCIA Card slots of a laptop computer. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. As mentioned in earlier sections of this SMS tutorial, computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem.

B. QR CODE & SCANNER

QR code (abbreviated from Quick Response Code) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and kanji) to efficiently store data; extensions may also be used.

The QR code system became popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. Applications include product tracking, item identification, time tracking, document management, and general marketing.

A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image.

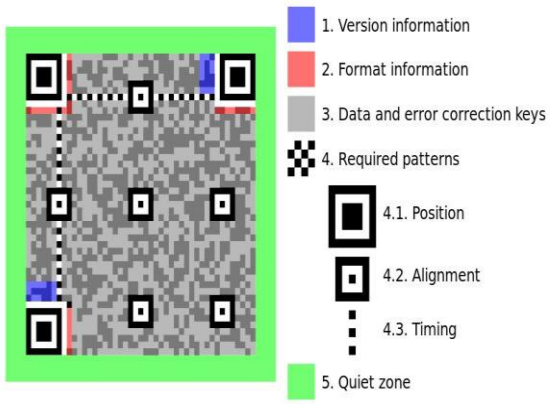


Fig QR Code structure

C. POWER SUPPLY

Available power source is an Ac voltage arrives at 230V.Since our electronic circuits require only very minimal voltage and current we use step down power transformer. Step down transformer is designed in such a way that the input is 230V and output of 12V. Another thing is, that electronic circuits operate in DC where as available output of transformer is Ac of 12V. So rectifier circuit is used to convert AC to DC. Rectifier circuit consists of four diodes formed in bridge fashion so as to convert incoming AC to DC.

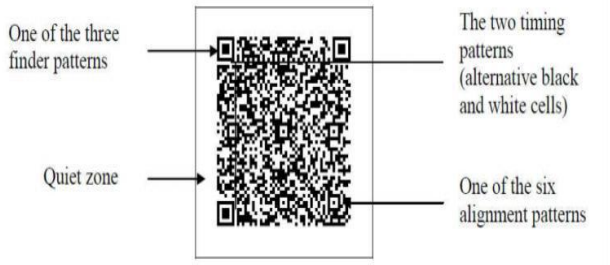
D. QR Code Structure

QR codes were developed in by Denso Wave, a Toyota subsidiary as a matrix code to maintain information in two vertical and horizontal dimensions. QR codes were introduced freely as a method for qualifying shelving in production units in 1994. These codes are in line with the international standard of ISO/IEC18004, although it does not support all existing smart phones. The aforementioned standards increase the number of producers and readers of QR codes and also make them compatible with each other, although one must consider the possible problems of these standards in smart phones. QR codes features include high reading speed, data storage and transfer, 360 degree readability, resistance to contamination and defects and adding up to 16 symbols to the structure (2). The QR code typically appears as a small white square with black geometric shapes, colored and even branded QR codes are now being used, though. QR codes can hold much more information than a regular barcode.

The information encoded in a QR code can be a URL, a phone number, an SMS message, a Vcard, or any other type of texts. They are referred to as QR (Quick Response) because they allow the contents to be decoded at a high speed (8). A QR code is capable of holding 7,089 numeric characters, 4,296 alphanumeric characters, 2,953 binary bytes, 1,817 Kanji characters or a mixture of them. The data capacity is much higher than other 2D codes such as PDF417, Data Matrix and Maxi Code and it stores information in both vertical and horizontal directions. A QR code can be read from any direction in 360° through position detection patterns located at the three corners as shown in Figure 1. A QR code can be read even if it is somewhat distorted by either being tilted or on a curved surface by alignment or timing patterns.

The error correction capability against dirt and damage can be up to 30%. A linking functionality is possible for a QR code to be represented by up to 16 QR codes at maximum, therefore, a small printing space is possible. The size of a QR code can vary from 21x21 to 177x177 cells by 4 cell increments in both horizontal and vertical direction. Data can be easily encrypted in a

QR code to provide a confidentiality of information embedded in the code. It can also handle various languages. For examples, there are a number of standards adopted by Asian countries like GB/T 18284 by Chinese National Standard in 2000, KS-X ISO/IEC 18004 by Korean National Standard in 2002, and TCVN7322 by Vietnam National Standard in 2003(9).



VI. WORKING PRINCIPLE

The android phone camera using capture the QR code from books in library. To capture the QR code sends via Bluetooth device to PIC 16F877AMicro controller. The PIC 16F877Amicro controller receives details and value to display in LCD.

The PIC 16F877AMicro controller QR information details to message send particular user or vendor using GSM device.

A. QR Application

Librarians and staff of a large university, small institutions, public libraries and museums provide useful ways for implementing QR both in traditional and online. In general the applications of these codes in libraries are as follows:

- Providing ready-to-use guidelines at required locations.
- Step by step guides for machines such as printers and copy machines.
- Providing a list of library guides on the subject of books on shelves.
- Showing the whereabouts of e books on the shelves.
- Linking the user to digital libraries on campus.
- Offering services such as chat, instant messaging and mobile version of the electronic library
- Catalog or database.
- Usable for services like ask the librarian, and in the traditional reference desk and all public
- Access to computer stations.
- Usable in library tours. -Providing maps of the library instead of a single map.
- Providing relevant reviews of library resources.
- Linking to a phone number shown on a web page without having to dial the number
- Manually.
- Linking to the web page relevant to an event.

VII. CONCLUSION

In this paper we have presented a Library Access System Application, developed for android using to PIC 16F877AMicro controller. The main aim of the application is to make people to easily access their library account in order to check the availability of the books in the library. The Library Access System Application saves Users estimable time by making complete procedure online. The problem of data storage is solved by storing them in popular open source to PIC 16F877AMicro controller.

VIII. FUTURE WORK

The bar code scanner can be used by the librarian in order to borrow the books. In order to improve the efficiency of data processing, cloud messaging can be used.

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