

**تصميم نظام قوي لتصديق
 وتمييز الوثائق المزيفة باستخدام
 تقنية الباركود**

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**Design a robust system for ratification and distinguish
 Fake documents using barcode technology**

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هناك العديد من الترتيبات في حياتنا اليومية معرضة للتلاعب ، و على أية حال يجب أن تكون تلك الوثائق محمية من الغش. حيث هناك طرق قديمة مثل الأختام والطوابع وبصمات الأصابع والعلامات ويمكن تغييرها والتلاعب بها بشكل فعال، من حيث الطراز أو حتى السرقه، وهناك حاجة إلى استراتيجية غير تقليدية لتأمين هذه الترتيبات من التلاعب. وبالإضافة إلى ذلك، تحتاج إلى تطبيق برمجة الكمبيوتر وأفكار الإدارة الجديدة لعمليات إدارة مثالية وآمنة. ويركز هذا العمل على استخدام الباركود العلامة المائية، لحماية المعلومات في الوثائق من أي تغيير. ويستند النظام المقترح في هذه الورقة إلى مرحلتين أساسيتين: مرحلة التوثيق ومرحلة اختبار الوثائق. يتكون أول واحد من استخراج المعلومات الهامة وترميزها وتحويلها إلى الباركود التي وضعت على شعار الوثيقة كخلفية مائية. بينما في مرحلة الاختبار، يعطي البرنامج رسالة تنبيه لإبلاغ المستخدم عن صحة الباركود وصلته بمعلومات المستند. تم تحقيق نتائج دقة عالية للنظام تصل إلى ١٠٠٪. بالإضافة إلى سرعة وسهولة عالية جدا في جميع المراحل.

كلمات البحث: تكنولوجيا الباركود، وثائق وهمية، الباركود ٣٩، معيار التشفير المُطَوَّر (AES)، العلامة المائية

Abstract

Consistently, there are many arrangements in our lives, that need documentation and these documents should be secured from being fraud. In any case, seals, stamps, fingerprints, and marks are antiquated and can be effectively changed, fashioned or even stolen, making the arrangement's records simple to be defiled. There is a requirement for the nontraditional strategy to secure these arrangements out of defilement. In addition, need to apply computer programming and new administration ideas for the ideal and safe managing operations. This work concentrates on the utilization of watermark barcode, to protect the information in the documents from any change. The system proposed in this paper is based on two basic phases: Documentation phase and testing phase of the documents. The first one consist of extracting the important information and coded and convert to the barcode that placed on the logo of the document as a watermark background. While in the testing phase, the program gives an alert message to inform the user about the authenticity of the barcode and its connection to the document information. Finally, the barcode was achieved ١٠٠% as accuracy results at very high speed in all stages, it was noted that the program works easily and excellent in the process of reading.

Keywords: Barcode technology, fake documents, Barcode ٣٩, AES, watermark,

Introduction

In our daily life and regularly manage different reports: certificates, licenses, solicitations, tickets. And all the time we need to choose whether this report is a legitimate or a fake. Every profitable record has a specific arrangement of assurance components. The archive security is quite a while investigated and very much created. Due to the sensitivity of the large amounts of data which is processed on a daily basis, verifying the authenticity and integrity of a document are more important now than it ever was. Unsurprisingly document authenticity verification has become the Centre of attention in the world of research. Mechanical insurance and protection is an arrangement of elements which are discernible amid an investigation of materials, papers or document components. Thus, this research is worried about making a device which manages this issue. This exploration proposes the utilization of Automatic Identification and Data Capture Specifically using barcode. The mindfulness and comprehension of general direct barcode quality, and the entire procedure to decide and comprehend it can have many advantages to the clients of standardized identification driven frameworks. A barcode is considered as one of an optical, appliance- decipherable, protest of data; the data generally describes nearly about the determination that usages the barcode. Primarily barcodes systematically categorized data by altering the distances of parallel lines and widths, a barcode is sequences of bars and spaces masterminded by an arrangement of principles that decide how information is to be characterized. Varies bars and spaces of symbols are utilized to express extraordinary images. These images are coherent just by a scanner. Indeed, barcode technology innovation is an imperative identification instrument that gives a precise and opportune support of the information prerequisite for appropriate administration frameworks one and two-dimensional codes were available in variant types and variant practices. Barcodes Firstly were evaluation using barcode readers or may be reading using cameras of smartphones. This purpose study was to protect the estimate documents against any unauthorized process and that will be directed depend on primary and secondary sources of information. For primary sources of information, the paper was conducted based the information that extracted from the Graduate Students database upon student name and the sequence of a student in the database and other important information, While the secondary sources based on the Encrypted information. Apprehensive that we can

choose any other information extracted from the database for adoption in the creation and generation of barcode used at the same time, the extracted barcode is placed as a watermark in the background of the document. A watermark is a recognizing picture or example in document that shows up as different shades of lightness/darkness when seen by transmitted light (or when seen by reflected light, on a dull foundation), caused by thickness or thickness varieties in the document. Watermarks have been utilized on postage stamps, cash, and other government records to weaken fabricating. It is utilized to guarantee credibility, duplicate control or to characterize the proprietor personality and ensure copyright [١].

From the above, the objective of this was created in order to conclude the subsequent purposes: Firstly, to explore the present status of uses and apply of barcode technology to certificate and distinguish fake documents. Secondly, to find out the areas in which the barcode technologies are being used public universities and all institutions of higher education. Thirdly, provide high speed and accuracy in the completion of transactions especially that require certification of documents, for example sending documents from university to university or from department to department. Then, it is easy to check the validity of a document using only the barcode used in our search. Finally, to categorize the advantages and disadvantages of using barcode technology as special cases in the registration of the University.

Related works

Some of the related works will be discussed in this section. Exhibited a quick and powerful acknowledgment strategy for uproarious Code ٣٩ standardized identification, by rapidly reading all the barcode on a picture examined from a paper with numerous standardized identifications coded with Code [٢]. utilized the standardized barcode as an example to produce the watermarks to improve the effect of the advanced rights administration by blend codec, hamming codec and spread range systems are utilized to build an SCDMA structure, and after that, it is utilized to configure a various watermarking plan for still pictures[٣]. the study to use and utilizations of standardized Barcode advancements through a study did in eight libraries in Dhaka City of Bangladesh and it establishes that the greater part of the libraries are applying barcode innovation in the ranges of accessioning recording, look at in, archive following, stock verification, enrollment identification and creating measurable reports was proposed and investigated in [٤] besides [٥] was presented a scope of advancements that have been actualized in the store network to discourage forgers. Innovation for both item

verification and following and following items in the store network will be talked about, alongside the favorable circumstances and hindrances of every arrangement. While an archive validation conspires in which a watermark is specifically inserted into the record document organize as a feature of the report itself was proposed in [٦]. a novel tough watermarking plan, where the watermark is encoded utilizing double square coding procedure and in this way spread all through the info archive was proposed in [٧]. Whereas [٨] introduced anti-fraud and counterfeiting watermarking innovation gives a potential approach to forestall snappy reaction (QR) Barcode from being replicated or manufactured and present the essential execution parameter, identification rate of QR Barcode and additionally location rate of the computerized watermark, is characterized and talked about. A multi-channel hearty watermarking plan in view of discrete wavelet change (DWT) was proposed. Although [٩] was advancement and examination of calculations for execution of the computerized watermark (DWM) on the premise of the brilliance tweak in squares of realistic archives, permitting in the meantime giving secretive addition of any arrangement of a given measure of data and verification of the picture, in which Digital Watermark was consolidated. Despite the fact [١٠] was suggested a novel watermarking reinforcement method that confirms an appropriate negotiation among the safety stage of a person's biometric data and the computational difficulty of the proposed system while maintaining a decreased the space of storage besides a good visual superiority of the watermarked host image.

Barcode ٣٩

Code ٣٩ standardized identifications are a typical barcode kind, utilized as a part of a wide range of ventures for stock following, recognizable proof like participant identifications, and parts naming for the in-house following. The code ٣ of ٩ comprises of two expansive bars, one wide between character space, three restricted bars and three restricted between character spaces. Because of the utilization of ٣ components out of ٩, it is known as code ٣ of ٩ or Code ٣٩ Standard Code ٣٩ consistent barcode can incorporate capitalized letters, numbers, and the accentuation marks \$ % + - / and the space character. Full ASCII Code ٣٩ standardized barcode can incorporate upper-and lowercase letters, accentuation stamps, and 'control characters' which are spoken to by sets of two Code ٣٩ characters. A standardized identification wizard to make uniform documentations each one in turn, and add-ins to make and print consistent documents in your most desired database, report, name or plan application.[١١]

System Components

The system consists of two main parts: software part and hardware part.

*The hardware part consists of: - (computer, printer barcode reader for printing documents for graduate students.)

*Software part. The proposed system works on Windows ٧, Visual Basic ٦, and Database

The proposed system in this paper is based on two basic phases: the documentation phase and testing phase of the documents

Proposed system of database

The database used to examine and test the system is a database for graduate's students. This database contains information about graduate students, including student number, full and explicit name of the student, university name, department name, branch name, year of graduation, student rank on graduate students) in addition to the student document sequence in the database All of this information appears in the curriculum when it is issued except for the document sequence in the database. In order to produce a particular graduate document, I begin to search for the graduate student by specifying the key of the document that is extracted from the information previously documented in the database. The student information record is then taken out on the document form.

Document protection phase:

In this research, I adopted an effective method to protect the document from any manipulation or falsification of any information about the document information by relying on barcode technology to achieve this stage.

Configure the barcode for the document: -

Each document is issued with a barcode that is different from the rest of the other documents. This barcode is the primary key of the document by containing the basic information of the graduate student, for example, extract and joint together the database parameters like (The attempt number, Year of graduation. Document sequence, Student rank) and send it as a key to AES encryption algorithm. More details will be discussed later in Encryption phase which in turn is converted into barcodes^{٣٩} that are considered as a key to search for the student in the examination and testing phase. At the same time, the key that used in the encryption process was also converted to barcode^{٣٩}.

The two barcodes are put together to look like a single barcode. To sum up with, the main key of the document that was passed to the barcode production algorithm, where barcode ٣٩ is used to accomplish this important stage to get the header of the barcode that used in the next stage to test and check the document. The barcode is placed into the background as a watermark inside the Logo of the document form by using the programming language tools to do this issue. Figure ١ demonstrate the main stages of the proposed system.

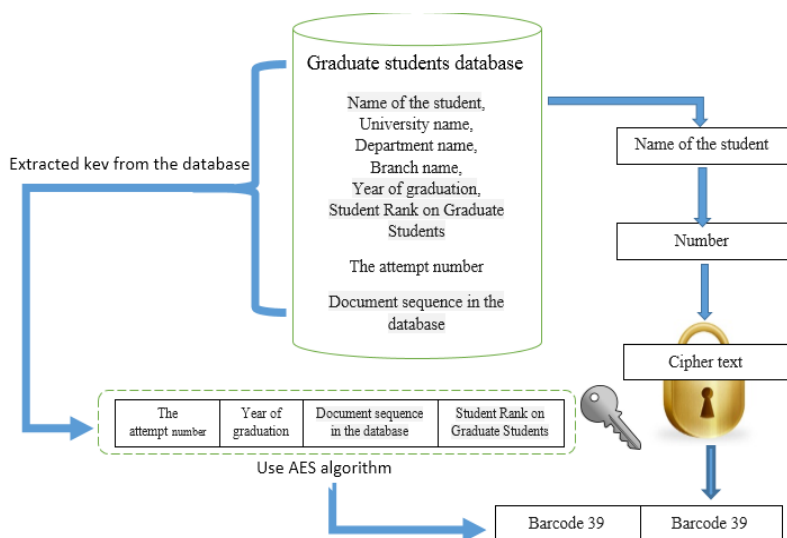


Figure ١: show the outline of the proposed system

Following is the algorithm of the proposed system that use graduate students database named "A" as input and graduate student document with secret barcode as output

Proposed algorithm (graduate students A, graduate student document with secret barcode)

Step ١: Set k to ١

Step ٢: if $k > n$ then go to step ١١

Step ٣: if $A[k] = \text{student_name}$ then go to step ٦

Step ٤: Set k to $k + ١$

Step ٥: Go to Step ٢

Step ٦: convert Element of student_name Found at index k to its numbers

Step ٧: extract and combined together the database parameters (The attempt number, Year of graduation. Document sequence, Student rank) as a key of AES algorithm

Step ٨: apply the AES algorithm to the output from step ٧ to get cipher text

Step ٩: use the output from step ٨ as input to barcode ٣٩ algorithm

Step ١٠: Print barcode Found at step ٩ on graduate_student_document and go to Step ١٢

Step ١١: Print element not found

Step ١٢: Exit

Check and test the document

To examine the validity of a document issued by a particular university Read the barcode printed on the document in the release phase through our use of the barcode reader device, where the application day built in this paper for documents in the retrieval and retrieval of information by converting the data that is read to the encryption algorithm again In order to open the encryption and obtain the primary key, which represents the explicit information through which the database can be searched to match the information and notify the user of the validity of the document or the authenticity of the document.

Encryption phase

In the encryption phase, I use in this paragraph the more prevalent and broadly received symmetric encryption algorithm prone to be experienced and best in these days is the Advanced Encryption Standard (AES). That represents Symmetric key and at the same time symmetric block cipher. The size of data was ١٢٨ bit while the key size was ١٢٨/١٩٢/٢٥٦ individually. Curiously, AES plays out every one of its calculations on bytes as opposed to bits. Thus, AES treats the ١٢٨ bits of a plaintext obstruct as ١٦ bytes. These ١٦ bytes are masterminded in four sections and four lines for preparing as a lattice. The number of rounds in AES is flexible and be contingent on the size of the key. The rounds of AES is (١٠, ١٢, ١٤) depends on the keys size (١٢٨, ١٩٢, ٢٥٦) bit respectively Everything about rounds utilizes an adjusted ١٢٨-piece round key, which is viewed as beginning the first AES key. For more information about AES encryption algorithm see. [١٢] At this stage, the technique was used to encrypt data to provide more security and strength to the information that extracted from the proposed database as a case study in this research

before converting it to a barcode which is placed in the document in the printing phase. While, in the examination phase, reverse steps are performed by using the encoded name after reading it using barcode reader to open the serial number code and obtain the master key, which in turn opens the name code, and search the name in the database

Tests and results

Each document has its own barcode that is placed in the background of the document and is considered as a watermark to maintain security documents. The barcode generated from the application program of the proposed system is a barcode generated by the encryption algorithm used and mentioned in advance. Thus, it is considered a strong watermark (barcode containing encrypted information), where it is distinguished by the person who wants to manipulate the document.

If we suppose that counterfeit person has a barcode reader but he does not have the program that used in the process of generating this barcode and that also, if we have argued that the program has the user but does not have the database of the system that associated with this program, which is usually stored in a secure place in the registration unit of the university therefore Barcode is a watermark that is difficult to explain.

In addition the results of the tests after the application of the program that generated achieve a high quilt -precision barcode, by noting that the stage of extraction of information required to generate the barcode through the coding phase and then generate the barcode and placed as a watermark in the background document model is not accompanied by any errors.

Finally, In the case of reading the barcode to verify the authenticity of the issuance of the document, it was noted that the program works easily and excellent in the process of reading the barcode using barcode reader.

Where we can note that the program gives in the examination and testing stage an alert message to inform the user about the authenticity of the barcode and its connection to the document information. After reading the barcode, the program opens the barcode code based on the encryption algorithm used and verifies the validity of the information resulting from the decryption and verify the authenticity of the database. In the process of document validation and validation, the system gives an error message in case the barcode is invalid. If the barcode is valid, the output will be the document information, for testing the system ٥٠ graduation document forms containing a barcode extracted from this system were selected. Simultaneously, ١٠ documents containing an incorrect barcode were used. Which is extracted from the barcode and achieved ١٠٠٪ as accuracy results at very high speed in both stages (the barcode generation and create watermark as background of the

Document and barcode testing by scan and read document), figure ٢ illustrates the outline of testing phase of the system.

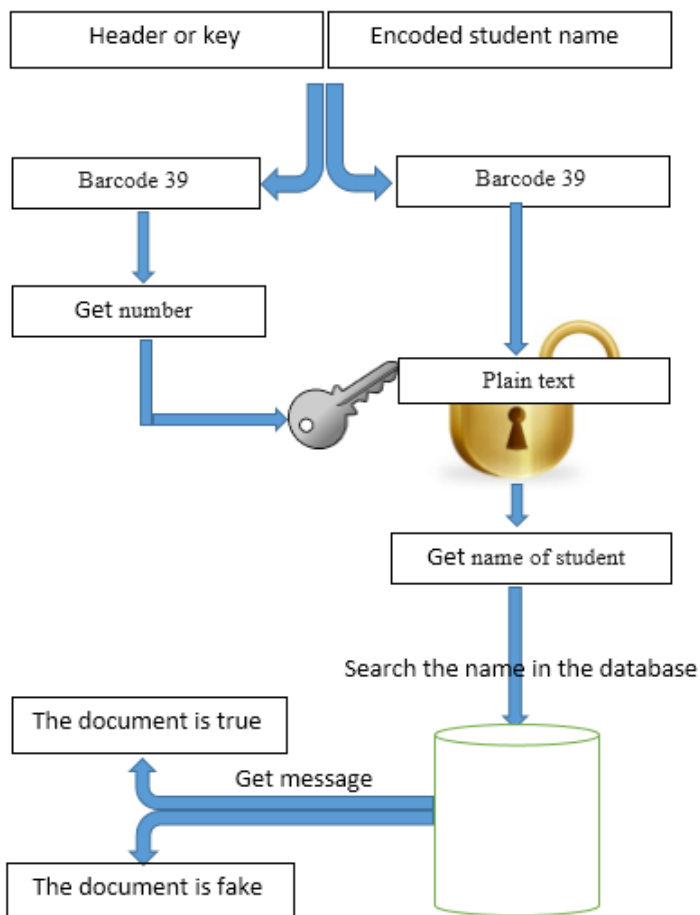


Figure ٢: Demonstrates testing phase of the system.

Following is the algorithm of Testing phase that use (graduate students database named "A" and graduate student document with secret barcode) as input and get message to distinguish Fake documents as output

Testing phase algorithm (graduate student A ,graduate_student_document)

Step ١: start

Step ٢: read the barcode from document

Step ٣: divided the barcode into two part "header " and " Encoded student_name "

Step ٤: use "header barcode" as a key to get plaintext of "student_name"

Step ٥: Set k to ١

Step ٦: if $k > n$ then go to step ١١

Step ٧: if $A[k] = \text{student_name}$ then go to step ١٠

Step ٨: Set k to $k + ١$

Step ٩: Go to Step ٦

Step ١٠: if the name is found then print the document is true go to step ١٢

Step ١١: print the document is fake

Step ١٢: exit

Conclusions and future works

In our daily life we frequently cope with deferent documents: diplomas, licenses, and others documents besides altogether the period we have to agree whether this document is an (Authentic)safety and true or it was fake To explore the present status of uses and apply of barcode technology to certificate and distinguish a fake documents. This purpose study was to protect the estimate Documents against any unauthorized process of forging and that will be directed depend on primary and secondary sources of information.

The completely valuable document has a specific regular of fortification components. The document fortification is an extensive period discovered and well established. Thus, the suggested scheme presents a different method to keep documents rather than the old-style methods of the signature official stamp.

Finally, the system provides high speed and accuracy in the completion of transactions especially that require certification of documents, for example sending documents from university to university or from department to department the barcode was achieved 100% as accuracy results at very high speed in both stages (the barcode generation and create watermark as background of the Document and barcode testing by scan and read document) , it was noted that the program works easily and excellent in the process of reading the barcode using barcode reader and It is easy to check the validity of a document using only the barcode used in our search.

Future outlook, present to find out the areas in which the barcode technologies are being used public universities and all institutions of higher education.

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