

العلامة المائية لصور جهاز الجوال

اسراء عبد الامير عبد الجبار

قسم علوم الحاسبات، الجامعة التكنولوجية

الخلاصة

اصبحت خدمات الجوال الاكثر اهمية من بين وسائل الاتصال كما هو الحال مع الانترنت وشبكة الهاتف بسبب المحاسن المتوافرة فيه والمتمثلة بتوافرها العالي واستقلاليتها عن الزمان والمكان ، لذلك ظهرت الحاجة الى حماية المعلومات المتوافرة في جهاز الجوال من التغيير والتلاعب لاسيما مع هذا التطور الواسع والسريع لشبكة الجوال وشمولها لانواع مختلفة من المعلومات مثل : الرسائل ، والصور، والفيديو . يقترح النظام المصمم استخدام العلامة المائية أداة لحماية الصور على اجهزة الجوال وذلك عن طريق تسجيلها في خادم العلامة المائية المقترح ، هذا الخادم يسمح للمالك بحماية صورته باستخدام العلامة المائية غير المرئية كما يمكنه اثبات ملكيته عن طريق الخادم الذي يعمل بمثابة المحكمة الالكترونية.

Image Watermarking for Mobile Device

A.A. Abdul-Jabbar

Computer Science Department, University of Technology

Abstract

The mobile services are the most important media between many of telecommunication means such as the Internet and Telephone networks, And that is because of its advantage represented by the high availability and independence of physical location and time, Therefore, the need to protect the mobile information appeared against the changing and the misuse especially with the rapid and wide growth of the mobile network and its wide usage through different types of information such as messages, images and videos.

The proposed system uses the watermark as a tool to protect images on a mobile device by registering them on a proposed watermarking server. This server allows the owner to protect his images by using invisible watermarking. Also the user can prove his ownership to the images by the server which works as an electronic court.

Introduction

The progress of wireless communication is dramatically changing our life. The ability to communicate at any time and in any where increases our quality of life and improves our business productivity. Mobile telecommunications emerged as a technological marvel allowing for access to personal and other services, devices, computation and communication, in any place at any time through effortless plug and play. This brilliant idea became possible as the result of new technologies developed in the areas of computers and communications that were made available and accessible to the user (1)

Mobile devices fulfill the need for real time information and communication through desktop PCs, which are dependent on user's location, will never be able to do (2). The types of mobile devices are (3)

1. PDAs (Personal Digital Assistants):-These devices are connected to the Internet through wireless modems or synced offline with a web enabled PC.
2. Low - end Smart phones: These are web enabled cellular phones either supporting Wireless Application Protocol (WAP) technology or some proprietary micro browser.
3. High – end Smart phones: These devices are hybrid of mobile phone and PDA, supporting voice and data services like email, Internet access, SMS and personal organization tools. Examples include Nokia Communicator and Ericsson MC218.

The most famous communication protocol to access the Internet by Mobile communication systems is WAP Technology (4)

WAP forum is an industry group dedicated to the goal of enabling sophisticated telephone and information services on handheld wireless devices such as mobile telephones, pagers, PDA and other Wireless Terminal (WTs). WAP specification extends and leverages mobile networking technologies (such as digital data networking standards) and Internet technologies, such as IP, HTTP, XML, URL, Scripting and other content format. WAP enables manufacturers, network operators, content providers, and application developers to offer compatible products and secure

services and networks , resulting in greater economies of scale and universal access to information . WAP objectives are:

1. To bring Internet content and advanced data services to digital cellular phones and other WT.
2. To create global wireless protocol specification that work across different wireless network topologies.
3. To enable the creation of content and application that scale across a very wide range of wireless bearer networks and wireless devices types.
4. To embrace and extend existing standards and technology wherever appropriate.

New generations of HTML are based on XML and include features that make them more efficient for mobile use. The other XML application would be (WML) Wireless Markup Language synchronized multimedia integration language. Thus , WAP forum is working to increase the bandwidth efficiency of web technology to make it more applicable to the wireless environment (5)

Wireless-to-Wire Communication Protocol

The WAP gateway is the link between the wireless and the wired or “web” world , basically given the WAP device access to the common Internet. For instance, typical scenario a would be when you type in the URL for a site on your WAP device , for example <http://www.amazon.com/>. The WAP device first checks if it already has an open connection , if not it dials up the server(Remote Access Service RAS) , this server gives the WAP Device the protocols it needs. These are the same lower level protocols as a normal Internet Service Provider that give what are known as Point- to – Point Protocol (PPP). The PPP provider has given the WAP Device the required protocols and assigned it an IP address, the request for the URL is sent to the gateway. The WAP device requests the URL with a normal HTTP request, such as GET <http://www.amazon.com/> (6).

On the Internet , here is a normal “web” server which in this case holds both WAP and “web” contents, which now receives the request to send out the contents located at the <http://www.amazon.com/> URL. The web server, depending on which type of browser it is talking to (WAP or “web”), sends out WAP, Then the requested content would be back to the WAP device which have standard language represented by Wireless Markup Language (WML), WML is based on XML ; or rather it is an XML application. Just like HTML and XML, WML which is read and interpreted by a browser built into the WAP device. For WAP devices, the browser is commonly called a micro browser, indicating that its capabilities are somewhat limited (7).

Finally, at the WAP device that requested the URL, the WML browser, when receiving the tokenized WML code renders the contents on the WAP device display to present a card for the user. This is how the majority of WAP devices are connected to the Internet. If the content provider wants the total control over the stream of data which are sent back and forth between the web server and the WAP device, they would install something called a WAP server. Providing internet and WWW services on a wireless data network presents many challenges because most of technologies developed for the Internet were designed for desktop and larger computers that support medium to high bandwidth connectivity over general reliable data network (7).

The proposed system

The proposed system consists of two parts the first one explains the design with some details and the second will display the results of the proposed system.

The Design of the System

This system is a three tier architectures, the first tier is the Wireless Mobile Client (WMC) with the tools needed to perform the interaction with server computer, and the second tier is the server computer with the tools needed to provide the service to WMC, and the third

is the SQL Database The block diagram of the system is shown in Figure (1).

- **Client Tier**

Client tier is a WMC component represented by Micro Browser which is WAP device. The WAP device send requests to the system by using Uniform Resource Locator (URL), then the displays the home page to the client which represents the interface of the system. This interface allows the wireless mobile client to interact with the system.

- **Server Tier**

This tier contains the watermarking module which consisting of watermark embedding and extracting operations. It take the client information that entered by Active Server Page (ASP) by using Active Data Object (ADO) from SQL database to watermarking embedding operation which adds the watermark to the image dy using Least Significant Bit (LSB). The system operates invisibly to client and its result return to wireless mobile client dy using ASP with the release of Internet Information Service (IIS).

- **Database Tier**

The third tier of the system is the database system, the ASP is the primary interface to relational SQL database. It deals with it by using (ADO) and Open Database Connectivity (ODBC). Where (ADO) Objects provide an object oriented programming interface for accessing data sources such as Microsoft SQL server and ADO directly in ASP. In this work the ADO is used directly in ASP to access data source. (ODBC) mean is developed by Microsoft to simplify the development of applications that need to be independent of database platforms(8).

The Automatic System Work

The work of this system can be briefly described by the mechanisms that allow the wireless mobile client to interact with the server, how the wireless mobile client would request for embedding and extracting operations, and how the server would response to these requests by using server watermarking application. The system is worked automatically without interfere of wireless mobile client and the user does not see the entire work of the system.

Wireless Mobile Client Request for Embedding Operation

The watermark embedding gateway program accomplishes a watermarking request in the following algorithm (1):

Algorithm (1) WMC request for embedding operation

Input: URL, the watermark and a secret key

Output: WML page.

Step1: The server gets the request from the information provided by the WMC by using the ASP, including URL of the image; the watermark is to be embedded in the image and a secret key.

Step2: The server gets the image data to be watermarked according to its complete URL address.

Step3: Embed the watermark in image by Calling LSB embedding application that work by replacing the LSB of image's pixel value with one of watermarking bit.

Step4: Create a WML page which will be shown on the requester's micro browser, this page reports the status of the watermark embedding process.

Wireless Mobile Client Request for Extracting Operation

This operation can be done by the following steps as shown in algorithm (2):

Algorithm (2)WMC request for extracting operation

Input: URL, secret key

Output: The watermark

Step1: The server gets the request from the information provided by the WMC using the WAP, Including the complete URL of the watermarked image and a secret key.

Step2: The server gets the watermarked data according to its URL address.

Step3: Call watermark extraction application.

Step4: Create a WML page, and show it on requester's micro browser using ASP, this page displays the extracted watermark and shows the verification result.

Server Embedding Application

This application works automatically, once the WMC requests the system service and deals with system interface to fill the image's ownership information (Image URL, Watermark to be embedded, and the Secret key) and sending this page to server to store it in its database, the embedding application contains a timer which is an O'clock or pulse access to database each second checking if a new information was added to database from any WMC, and if there is any information added, it will be picked by this pulse, then the application would load the image from the specified URL, and embed the watermark invisibly to image, then it would store it on server hard disk.

Server Extracting Application

Once an image has been watermarked, the WMC can verify the presence of the watermark and prove that the watermark that was added to this image is the same one stored in server Database.

The proposed verification operation which depends on the server uses the original watermark in its database. The verification process is done by the server automatically and it consists of three steps (9):

- Retrieve the embedded watermark from the image to be verified.
- Retrieve the watermark from the server database according to the unique image identification (URL).
- Compare the two watermarks that are retrieved from the image and the database, if the matching occurs the server would send "The Watermark "to the client, otherwise the server would send "not proved image" to the client.

System Implementation

The proposed system consists of two applications which are web application (server website application) and windows application (Watermark Embedding and Extracting application).The windows application run automatically and it has no interface with the user.

The web applications have two main web pages that represent the user interface of search engine. These pages are:

A- Embedding form page.

B- Retrieval form page.

These entire pages will be displayed and explained with an example, Figure (2) depict the "friendship" image which is located at Mobile with its own phone number for example (123456789).

The WMC should fill all fields in the WML form appeared on its WAP device with image information (URL, the watermark and the secret key) and click on the submit button as shown in Figure (3). After submitting, the client should download the image from specific file, then the server detect the WMC phone number and store it with the name of image in its database with the other information that is entered in WML. This information that is stored in the server database would become the parameter that activates the embedding module to embed the watermark to the image and returns timer to SQL database to activate the ASP to return HTML page result which would appear as WML at WAP device.

For Extracting choice the WMC can click on extracting button, and then the Extracting Form page will appear to the user, the client should fill the field with his image URL (as illustrated in table -1) and his secret key, then click on the submit button, Then, verification result will be done automatically by the server and the watermark send to WMC in a new WML page in order to prove the ownership as shown in Figure (4).

Conclusions

From this research, one can deduce the following:

1. The exhaustive study of mobile commerce principles, technology and security challenges gives us a big view about the gaps of security in mobile commerce technology and architecture.
2. Information hiding application has its flexibility to be used with different environments such as (PC, Wire and Wireless) environments.
3. Unique Image Identification is assigned to each image by using its URL, This means that the watermark is added to the image only once, so there is no way for the thief to register the same image at server, since there is a conflict between two users and the same image registered with two WMC (Different Mobile number) the server would give the right to the one which has date and time older than the second.

References

1. Nee., and Prasad.; (2000), Wireless multimedia communications, Artech House, Norwood,MA.
2. Kothapalli, S. and Agarwal, P. (2004), Mobile commerce: a survey on underlying technologies and security challenges, Computer science department, University of Victoria, Canada.
3. Ganz, A., Ganz Z., and Wong K.; (2004), Multimedia Wireless networks technologies standard and QOS, Prentice Hall PTR.
4. Suokaena, H., (2006), Modification to Improve the Mobile Commerce Security, PhD Thesis, University of Technology, Computer Science Department, Baghdad, Iraq.
5. Passani, L.; (March 2000), Building WAP services .XML and ASP will set you free, Web techniques, volume 5, issue 3, pages 48-53.
6. Buckingham, S. ; (2005), What is WAP, mobile life stream Ltd, GSM association.
7. WAP forum series ; (2001), Wireless Markup Language (WML), version 2.0.
8. Manas Tungare, (2004), A practice Guide to Microsoft Active Server page 3.0, PDF available at <http://www.manastungare.com> ..
9. Zhao, J. (1996), A WWW service to embed and prove digital copyright watermarks, In: Proc. of the European Conference on Multimedia Applications, Services and Techniques.

Table (1): WMC information stored at server

	URL Address	Watermark	Skey	em-date
*	123456789*friendship	Hello world	1234	25/1/2008
▶				

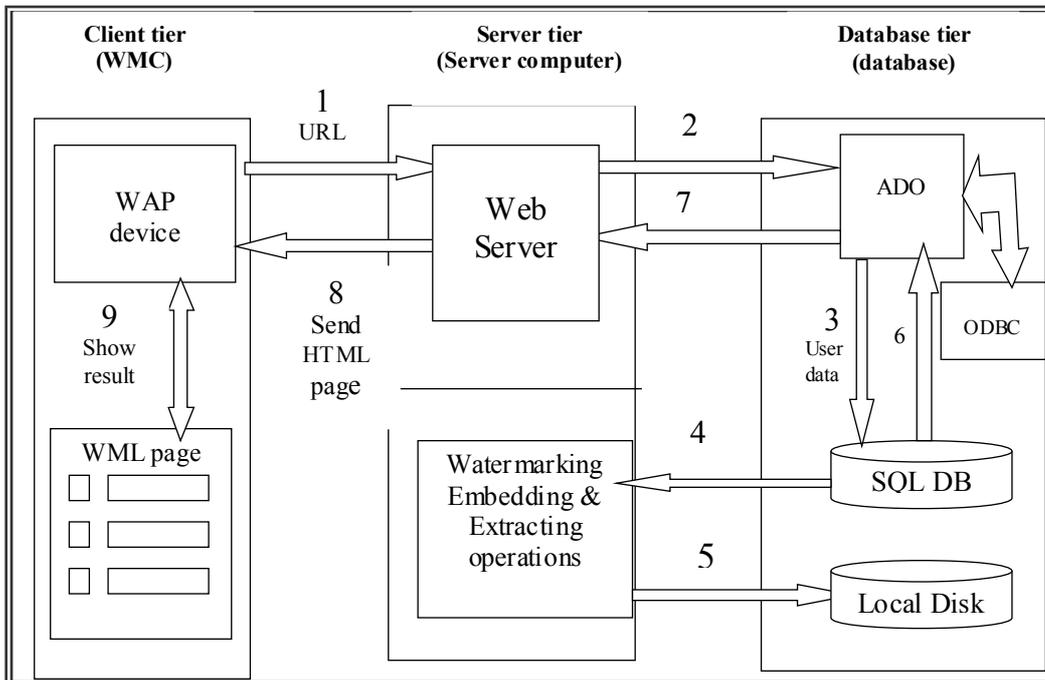


Fig. (1): The proposed system design



Fig. (2): original image on WMC

Fig. (3): Embedding Form with WMC Information

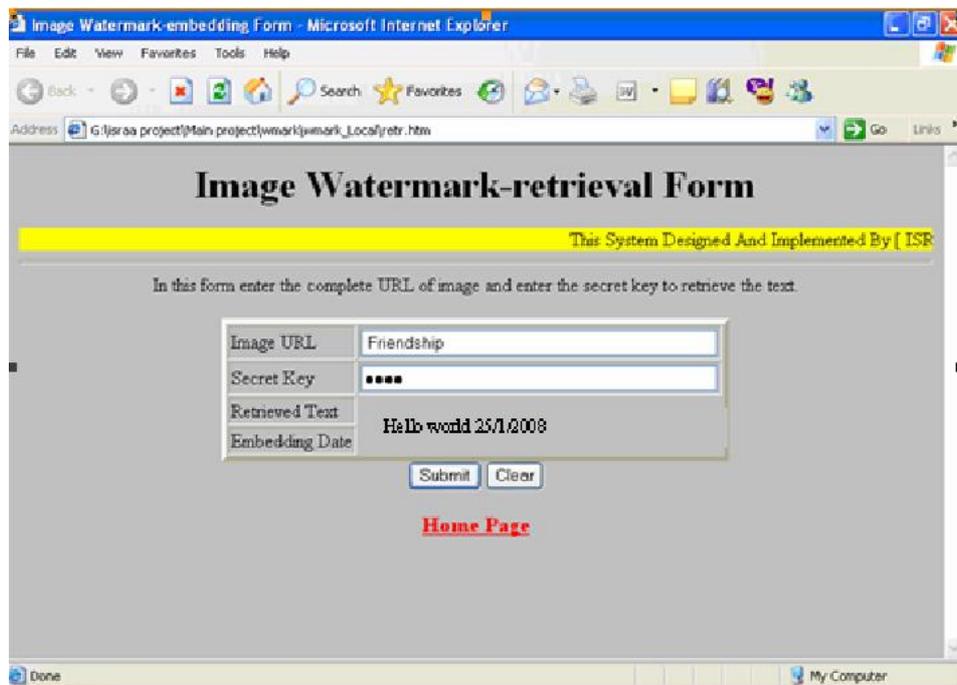
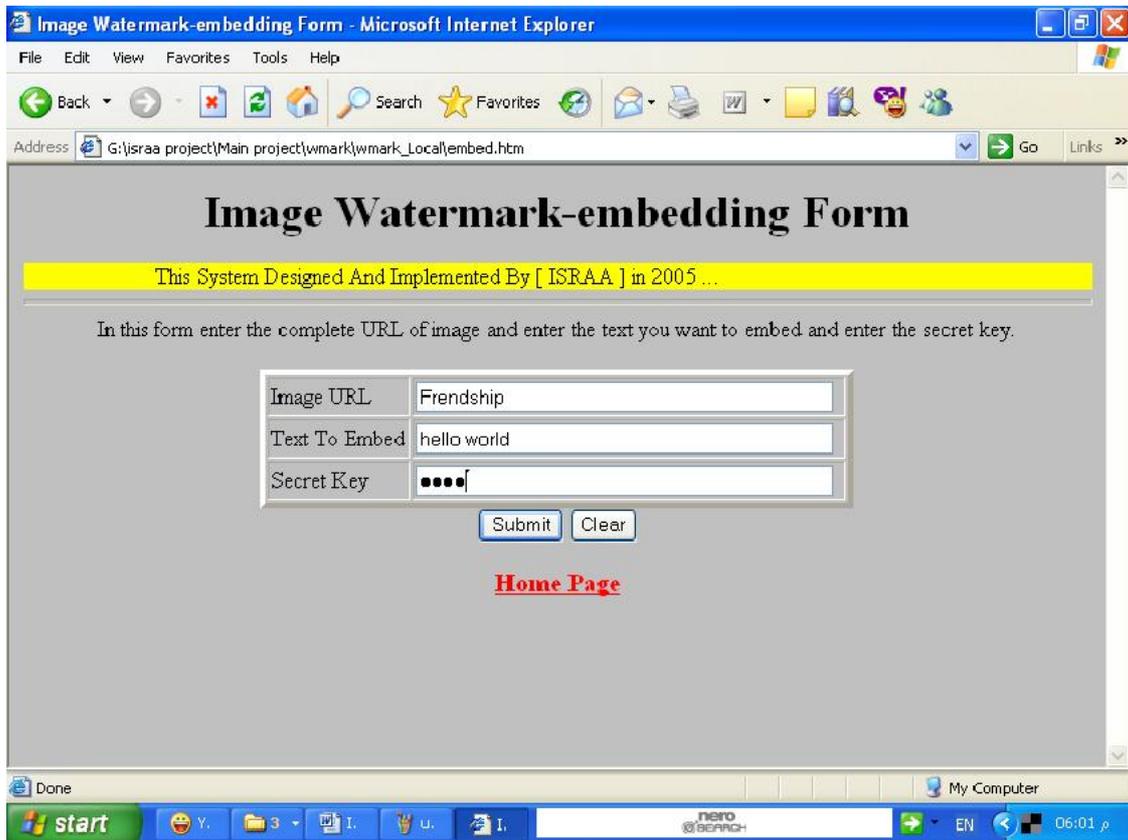


Fig. (4): verification result