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22 – 25 August 2013
Mysore, India

Host: Sri Jayachamarajendra College of Engineering (SJCE)

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**2nd International Conference on Advances in Computing, Communications & Informatics
22–25 August 2013, Mysore, India**

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WELCOME TO ICACCI 2013

It is our great pleasure to welcome you to Second International Conference on Advances in Computing, Communications and Informatics (ICACCI'13). Globalization today pervades almost every facet of human life thanks to the emergence of new digital technologies in computing and communications. At the same time, informatics with its strong focus on providing fast and ready access for human based on these developments in computing and communications plays more very crucial role in people's lives and permeates all it in all respects, from entertainment to healthcare and from databases to e-governance. ICACCI'13 being organized in Mysore, India during August 22-25, 2013 and being hosted by the Sri Jayachamarajendra College of Engineering (SJCE), Mysore provides an ideal international forum for exchange of ideas among interested researchers, students, developers, and practitioners in these areas. ICACCI-2013 is technically co-sponsored by IEEE Communications Society.

ICACCI'13 received research papers from over 47 countries including Iran, Egypt, Australia, USA, Malaysia, P.R. China, Indonesia, Germany, United Kingdom, Colombia, Canada, Bangladesh, Saudi Arabia, Denmark, Portugal, Korea, Tanzania, Pakistan, Iraq, UAE, France, Algeria, Vietnam, Mexico, Sri Lanka, Estonia, Kuwait, Japan, Spain, Albania, Nigeria, Israel, Poland, Singapore, India, Thailand, Oman, Tunisia, Italy, Sweden, Macedonia, Brazil, Kazakhstan, Romania, Russia, Croatia, Taiwan and Lebanon. The programme committee has through a rigorous process of review and selection chose 339 regular papers and 33 work-in-progress papers for presentation in the conference and for publication in the proceedings. There are seven workshops and eight symposia affiliated with the main track events. Three sympoiums – ISI'13, SSCC'13 and SRS'13 are co-located events.

We hope that you will find this program interesting and thought-provoking and that the conference will provide you with a valuable opportunity to share ideas with other researchers, students, developers, and practitioners from institutions around the world. We look forward to your participation in the conference.

Dr. B. G. Sangameshwara, *Organising Chair and Principal, SJCE, Mysore*
Dr. Sabu M Thampi, *General Chair*
Dr. V. N. ManjunathAradhya, *Organizing Secretary*

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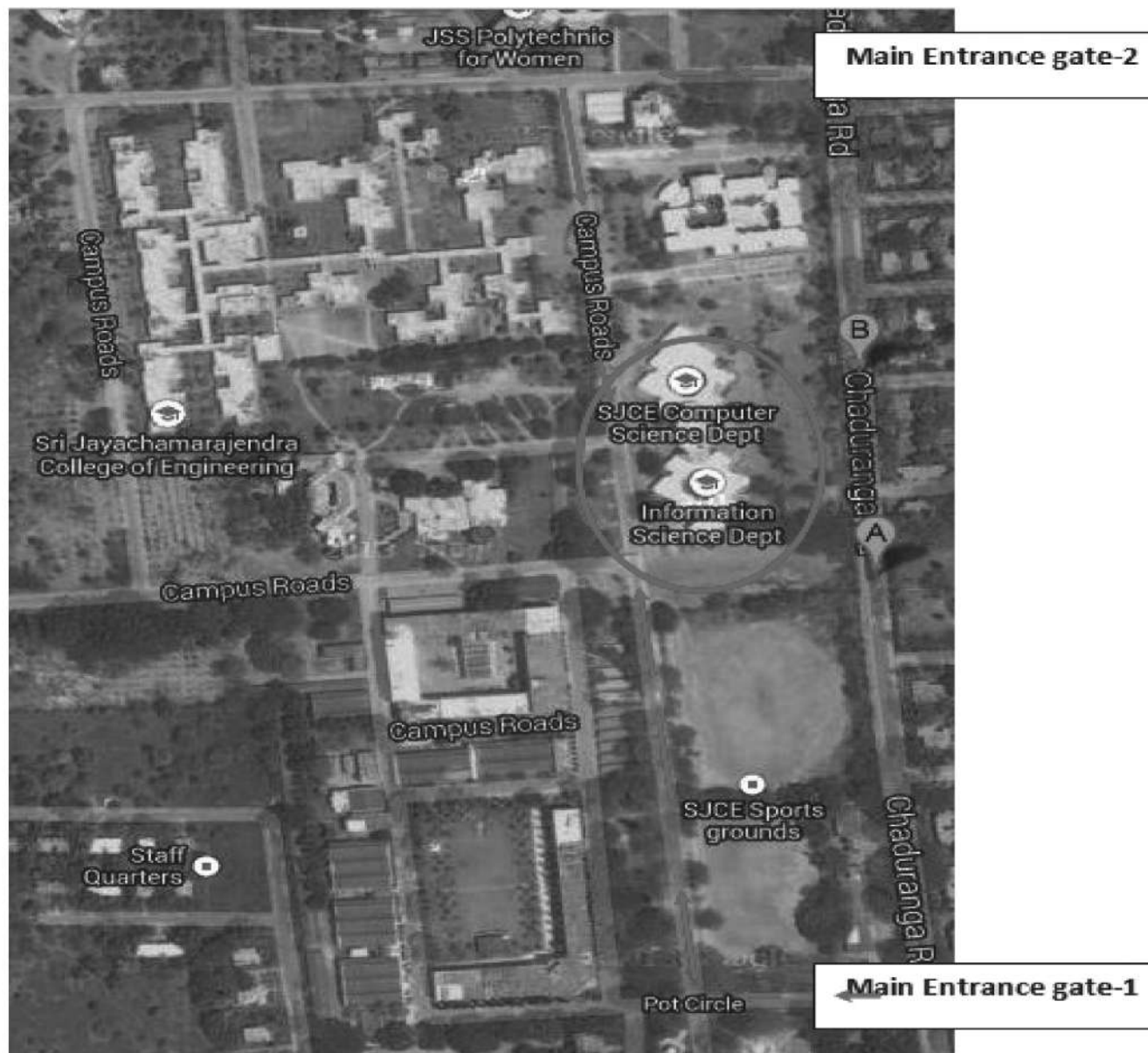*Sri Jayachamarajendra College of Engineering (SJCE),* Mysore, India was established in the year 1963 under the aegis of JSS Mahavidyapeetha. It has carved a niche for itself as a premier centre for Technical Education. Well equipped and sophisticated laboratories, library, and highly qualified and experienced faculty and staff members, well-designed college campus are the reason for their success. As one of the leading institutes in India, SJCE has been recognized under the Technical Education Quality Improvement Programme (TEQIP). The Conference is supported by TEQIP-II. SJCE serves as one of the major landmarks of the western part of Mysore, with its sprawling 117 acres of campus and several recognizable buildings.

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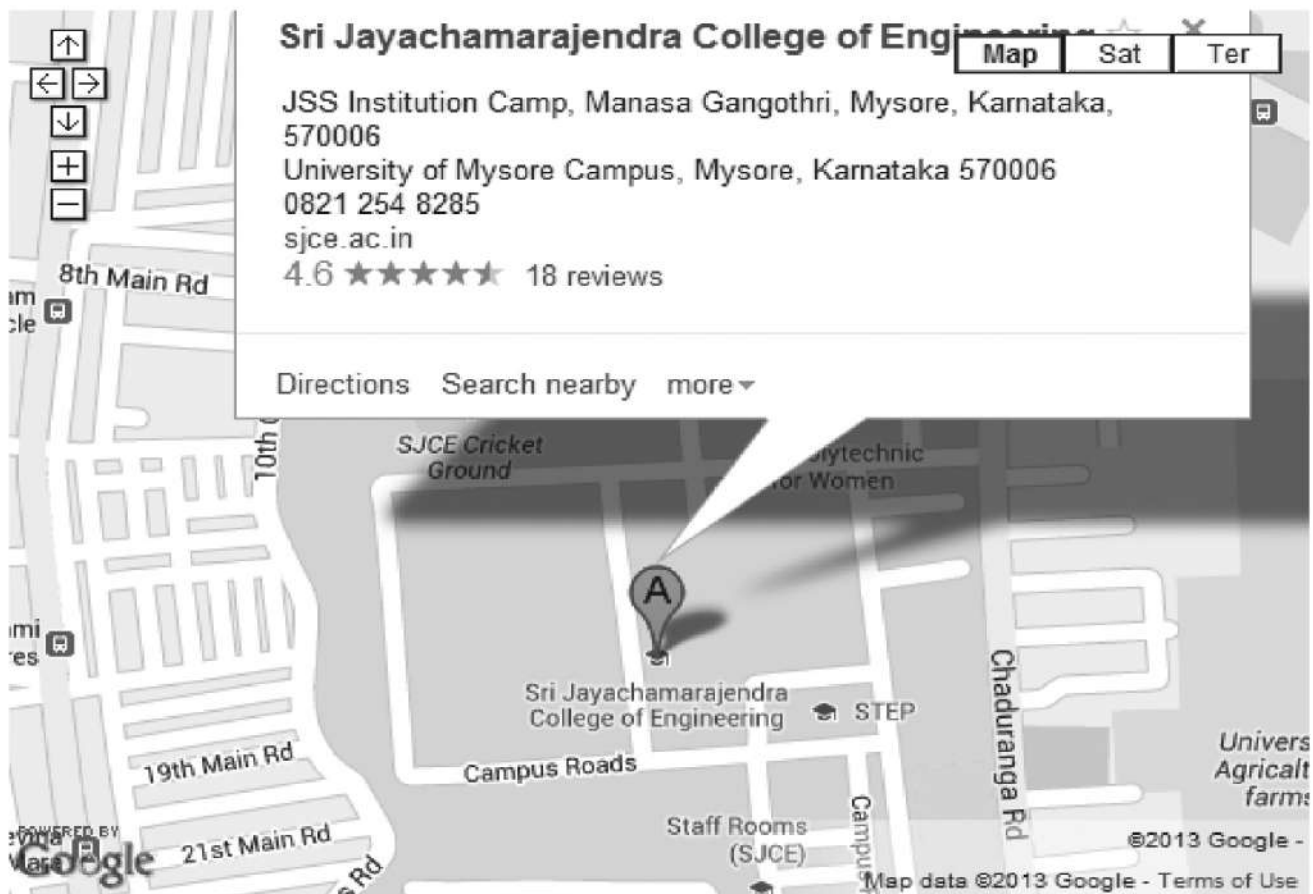
SJCE CS/IS Block

GENERAL INFORMATION

Transportation

The city is well connected with inter city and sub-urban public bus transportation. The bus routes from city bus stand to SJCE (Gangotri) are 129, 129D, 130 and 135N. Pre-paid auto facilities are & available both at Railway and Suburban Bus station. More information on Mysore is available at http://mitra.ksrtc.in/MysoreMBus/index_e.jsp & http://www.inmysore.com/mysore-transportation

Internet Access

There will be limited internet access available at the conference rooms. This service is supplied free of charge by the Conference for its participants during the time of the conference. Please be considerate of your colleagues and limit your time spent online. There are no guarantees of speed and connectivity. Wi-Fi Zones will be provided to delegates for using Internet in the seminar halls and session rooms. In addition, there will be computers with Internet Connection for delegates in the Computer Room in the Ground Floor of CS/IS Block. For Internet acess, please contact the Information Desk.

Registration

The ICACCI'13, ISI'13, SSCC'13 and SRS'13 registration area is located at the "**Entrance of CS/IS Block".** Pre-registered participants must pick up their badges and conference materials in this area. On-site registration for the Conference (subject to availability)/Tutorials is located here as well.

Registration Starts at 8.15am on all days

Information Desk

Conference information, publications, CDs will be available at the Registration Desk. The desk is staffed by Local Arrangements Members and Student Volunteers who can answer your questions and assist with special needs.

First Aid/Emergency

Your safety is our primary concern. In case of an emergency, please contact the Conference Registration Desk immediately for assistance. There is also a First Aid office located in the ground floor of the main building.

Lost & Found

Please turn all lost and found items in to the Registration Desk.

Cell Phone Courtesy

Cell phones should be turned off or placed in silent mode.

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Name Badges

Your ICACCI'13 name badge serves as your admission pass to conference sessions and events. Please wear your name badge at all times while inside the conference venue. Conference organisers reserve the right to deny admission to any persons not wearing an ICACCI name badge.

Attire

Attire for ICACCI'13 is casual but appropriate.

Smoking and Alcohol Policy

ICACCI'13 is smoke-free and the meeting center is a non-smoking facility. Consumption and/or possession of alcohol will not be tolerated under any circumstances.

Electrical Power

Electricity in India is 240 Volts, alternating at 50 cycles per second. If you are traveling from outside India, you will require a voltage converter if you are carrying a device that does not accept 240 Volts at 50 Hertz. ICACCI'13 does not provide power converters, extension cords, power strips or other electric accessories. However, the staff at the Registration Desk may be able to assist with some needs. **You have to carry an electrical adapter which supports western style pin options for charging the Laptop.**

Weather in Mysore

The month of August in Mysore is the rainy season **with little rain** and there is typically a cool sea breeze from the late afternoon. ICACCI advices you to carry an umbrella to protect yourself from rain.

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HIGHLIGHTS

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- Eighteen Keynote/Plenary Talks
- Four Tutorials
- Second International Workshop on Advances in Data Management (ADM'13)
- International Workshop on Vehicular Communication Systems and Networks (VCSN 2013)
- Second International Workshop on Recent Advances in Medical Informatics (RAMI-2013)
- Second International Workshop on Cloud Computing & Identity Management (CloudID 2013)
- International Workshop on Energy Efficient Wireless Communications and Networking (EEWCN 2013)
- International Workshop on Mathematical Modelling and Scientific Computing (MMSC-2013)
- International Workshop on Advances in VLSI Circuit Design and CAD Tools (AVCDCT13)
- International Symposium on Control, Automation, Industrial Informatics and Smart Grid (ICAIS'13)
- The New Internet Symposium (NIS-2013)
- International Symposium on Knowledge-intensive Software Engineering (KiSE'13)
- Second International Symposium on Natural Language Processing (NLP'13)
- Second International Symposium on Pattern Recognition and Image Processing (PRIP-2013)
- International Symposium on Education Informatics (ISEI-2013)
- International Symposium on Women in Computing and Informatics(WCI-2013)
- International Symposium on Green Networks and Distributed Systems(GNDS-2013)
- Second International Symposium on Intelligent Informatics (ISI'13) [Co-located Event]
- International Symposium on Security in Computing and Communications (SSCC'13) [Co-located Event]
- Second Student Research Symposium (SRS'13) [Co-located Event]
- Geographical Coverage – 47 Countries
- Fifty Two Technical Sessions

Honorary Chairs

Dr. Vinton Gray Cerf
VP and Chief Internet
Evangelist, Google, USA

Prof. Jeffrey D. Ullman
Stanford University, USA

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ADM: Second International Workshop on Advances in Data Management (ADM'13)

1569763209	Aspect Based Sentiment Analysis Using Support Vector Machine Classifier	Regular Paper	Raisa Varghese (University of Calicut, India); Jayasree M (University Of Calicut, India)
1569763679	Extracting Anomalies from Time Sequences Derived from Nuclear Power Plant Data by Using Fixed Width Clustering Algorithm	Regular Paper	Aditya Gupta (Indian Institute of Technology Roorkee, India); Durga Toshniwal (Indian Institute of Technology Roorkee, India); Pramod K Gupta (Nuclear Power Corporation of India Ltd., India); Vikas Khurana (Nuclear Power Corporation of India Ltd., India); Pushp Upadhyay (Nuclear Power Corporation of India Ltd., India)
1569764285	Novel Technique to Reduce PAPR in OFDM Systems by Clipping and Filtering	Regular Paper	Bahubali Shiragapur (Faculty, India); Uday Wali (VTU Belgaum, India); Sandeep Bidwai (VTU Belgaum, India)
1569769535	Pattern Identification Using Rough Set Clustering for Spatio-Temporal Dataset	Regular Paper	Christina Jayakumaran (SRM Easwari Eng College, Anna University, India); Komathy Karuppanan (Anna University, India)
1569769813	Secure Login by Using One-Time Password Authentication Based on MD5 Hash Encrypted SMS	Regular Paper	Eko Sediyono (Satyawacana Christian University, Indonesia); Kartika Imam Santoso (STMIK Bina Patria Magelang, Indonesia); Suhartono (Diponegoro State University, Indonesia)
1569770115	Book Recommendation System Using Opinion Mining Technique	Regular Paper	Shahab Saquib Sohail (Aligarh Muslim University, India); Jamshed Siddiqui (Aligarh Muslim University, India); Rashid Ali (College of Computers and Information Technology, Taif University, Saudi Arabia)
1569772801	An Efficient Approach for Intrusion Detection Using Data Mining Methods	Regular Paper	Kapil Wankhade (G. H. Raisoni College of Engineering Nagpur, INDIA, India); Sadiya Patka (G. H. Raisoni College of Engineering Nagpur, INDIA, India); Ravindra Thool (SGGS Institute Of Engineering & Technology Vishnupuri Nanded Maharashtra State, India)
1569772807	A Method for Evolving Data Streams	Regular Paper	Kapil Wankhade (G. H. Raisoni College of Engineering Nagpur, INDIA, India); Tasneem Hasan (G. H. Raisoni College of Engineering Nagpur, INDIA, India); Ravindra Thool (SGGS Institute Of Engineering & Technology Vishnupuri Nanded Maharashtra State, India)
1569773325	Performance Evaluation of Unstructured NoSQL Data Over Distributed Framework	Regular Paper	Suyog Nyati (Pune University, India); Shivanand Pawar (Augment IQ data Science, Pune, India); Rajesh Ingle (PICT Pune, India)

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Secure Login by Using One-time Password Authentication Based on MD5 Hash Encrypted SMS

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Abstract— **the combination of One Time Password (OTP), SMS Gateway, and MD5 Hash encryption algorithm are used to develop a more secured login procedure to access the web-based Academic Information System. The code to be encrypted consists of Student ID, phone number, and access time. The System needs three minutes for security login with SMS-based OTP. The constraint is narrowing the time for hackers to tap and infiltrate. This delay time is an average obtained from the survey among several service providers in Indonesia. The code generated from the system is better than Pseudo Random Number Generator (PRNG) in that the resulting code is never the same.**

Keywords—Academic Information System; Login, MD5 Hash; One Time Password; SMS

I. INTRODUCTION

Web based Information System is practical to use and can be used to increase the organization performance. But, in other site while it is connected to the Internet, there are many vulnerable. The first and common security mechanism to get into the web based system is a username and password. But it depends on the complexity of the password. The simple one is easy to guess by intruder, while the complex one usually makes the user forget her/his password. Efforts are made to create simple and secure passwords. One of them is by using encrypted password.

The latest technology to counter the password attack is using a one-time password (OTP). An OTP is a password that is valid for only one login session or transaction. OTPs avoid a number of shortcomings that are associated with traditional (static) passwords. The most important shortcoming that is addressed by OTPs is that, in contrast to static passwords, they are not vulnerable to replay-attacks. This means that a potential intruder who manages to record an OTP that was already used to log into a service or to conduct a transaction will not be able to abuse it, since it will be no longer valid. On the downside, OTPs are difficult for human beings to memorize. Therefore they require additional technology to work [1].

Tsuji [2] proposes a simple and secure password authentication by applying a one-way hash function three times to generate OTP. He changes the random number generation by using hash function to reduce hash overhead by about 40%. Unfortunately he uses the same protocol to send the OTP and authenticate the registered user.

In this paper we use SMS to send the OTP. OTP is created from some attributes of the user identity instead of random

numbers. Those sets of attribute are encrypted prior by using MD5 Hash. The algorithm has been implemented to the Academic Information System. The system was created using PHP programming language and MySQL. We install Gammu SMS Gateway in the server to send automatically OTP via SMS to the authenticated user.

II. RELATED RESEARCH

Many researches on OTP have been done recently. Prakash, Infant, and Shobana [3] use OTP and Pass Text to eliminate attacks. On this research they designed a combined schema of One Time Password (OTP) algorithm concatenated with Pass Text which makes uncomplicated to memorize and is computationally powerful. It can be fairly and rapidly provided to the system, while at the same time remaining impractical to break with the brute force attack. OTP algorithm powered with user's unique identifications like International Mobile Equipment Identification and Subscriber Identification Module; makes a finite alphanumeric token valid for a session and for a single use. Pass-Text is an easy way of system authentication schema which frees users from memorize any difficult passwords or character combinations. Concatenation of these two schemas gives maximum security for authentications and almost impossible to break.

Aloul Fadi, Syed Zahidi, Wasim El-Hajj [4] have done the research to generate the OTP using a mobile phone as a software token for OTP generation. The generated OTP is valid for only a short user-defined period of time and is generated by factors that are unique to both the user and the mobile device itself. Additionally, an SMS-based mechanism is implemented as both a backup mechanism for retrieving the password and as a possible mean of synchronization.

Rao and Vedavathi [5] propose the use of the mobile phone as security token. They also discuss several different authentication solutions using the mobile phone as authentication token, where these solutions vary in complexity, strength, security, and user friendliness. They implemented and verified the OTP authentication schemes usability.

In this research we combine the two concepts to develop the authenticated, secured, and non-memorized OTP. These concepts are concatenating some user ID attributes, and send the generated OTP via SMS. Furthermore, we encrypt the concatenated some user ID attributes using MD5 Hash encryption algorithm. The use of MD5 Hash Encryption is the

new feature in relation with OTP. It will be proved that this method is secure against attacker.

III. THEORETICAL BACKGROUND

A. Computer Security

In designing Information System, security is a major aspect to be noticed. Moreover, on a web based Information System connected to the Internet. Security is complex and important, because there are some aspects of computer security, such as:

- *Authentication*: the security to authenticate the information comes from the authorized sender.

- *Integrity*: to be sure that the message sent over the network unmodified.

- *Nonrepudiation*: to ensure that a transferred message has been sent and received by the parties claiming to have sent and received the message. Nonrepudiation is a way to guarantee that the sender of a message cannot later deny having sent the message and that the recipient cannot deny having received the message.

- *Authority*: this allows the user access to various resources based on the user's identity.

- *Confidentiality*: refers to the transmitting data to receiver. It means that there is limiting information access and disclosure to authorized users -- "the right people" -- and preventing access by or disclosure to unauthorized ones -- "the wrong people."

- *Privacy*: refer to the private data or information.

- *Availability*: refers to the availability of information resources. An information system that is not available when you need it is almost as bad as none at all. It may be much worse, depending on how reliant the organization has become on a functioning computer and communications infrastructure.

- *Access control*: it refers to the information access regulation. It is also related to the authentication and privacy. Access control done by combination of user id and password.

The OTP proposed in this paper just pay attention to authentication, privacy and access control aspects.

B. Security Attack

Based on the way and position of someone getting messages on the communication channel, Ariyus [6] classify the security attack into:

- *Sniffing*; it is a form of wire-tap applied to computer networks instead of phone networks. This means that traffic on a segment passes by all hosts attached to that segment. Sniffing programs turn off the filter, and thus see everyone's traffic. It is common in public channels that are not secure.

- *Replay Attack*; if someone could record the handshake messages, he/she may be able to repeat the messages that have been taped to trick one of the parties.

- *Spoofing*; as an example, attacker C could be disguised as user A. It makes all users believe that C is identified as A. The attacker tries to convince other users that there was nothing wrong with the communication, whereas communication is done by the attackers.

- *Man-in-the-middle*; if spoofing sometimes only deceiving one party, in this scenario it can be more than this. As an example, while A communicate with B, C can be viewed by A as B. C can also deceive B by looking at the C as if it is A. In this case C has a full authority and it can do anything including disseminating news of a libel undetectably.

C. One Time Password (OTP)

OTP is a password that applies only to single sign or single transactions session. In general, OTP generate randomly. But there are three main approaches in the process of generate OTP [7] [8].

- Based on time-synchronization between the authentication server and the client providing the password. In this case OTPs are valid only for a short period of time.

- Using a mathematical algorithm to generate a new password based on the previous password. In this case OTPs are effectively a chain and must be used in a predefined order.

- Using a mathematical algorithm where the new password is based on a challenge, e.g., a random number chosen by the authentication server or transaction details.

These approaches are simple, and prone to be guessed by attackers. Along with the development of SMS technology, and sophisticated encryption algorithms we combine the three to be a better main security.

D. MD5 Hash Function.

According to the Munir textbook [9] the MD5 function is a cryptographic algorithm that takes an input of arbitrary length and produces a *message digest* that is 128 bits long. The digest is sometimes also called the "hash" of the input. MD5 is used in many situations where a potentially long message needs to be processed and/or compared quickly. The most common application is the creation and verification of digital signatures.

One-way Hash is a hash function that work in a single direction. The message that was converted to be a message digest cannot be reverse to the prior. Two different messages will always produce different hash values [9]. The characteristics of one-way hash function are :

- Function of H can be applied any size of data block.

- H produces value (h) with the fixed-length output.

- H(x) easily computes for every x.

- For every given h, it could not be found x such that H(x) =h.

- For every given x, it could not be found y ≠ x such that H(y) = H(x).

- In computing cannot be found pair of x and y such that *H(x) = H(y)*.

E. Gammu

Gammu is a cross-platform application that is used to communicate the database of the SMS Gateway with the SMS devices. In this paper Gammu application is used to send generated OTP to registered users. Gammu application is a daemon that runs in the background. Gammu application monitors SMS devices and database of the SMS gateway every moment. While SMS comes into SMS device, gammu moves it to the inbox of the database. Otherwise, while SMS Sender application input SMS to outbox of the database, gammu deliver it via SMS devices, and move the SMS to the sent item database [10].

IV. RESEARCH DESIGN

To implement the model proposed in this research we develop Academic Information System with the login using OTP with MD5 Hash. The architecture of the system is described in figure 1.
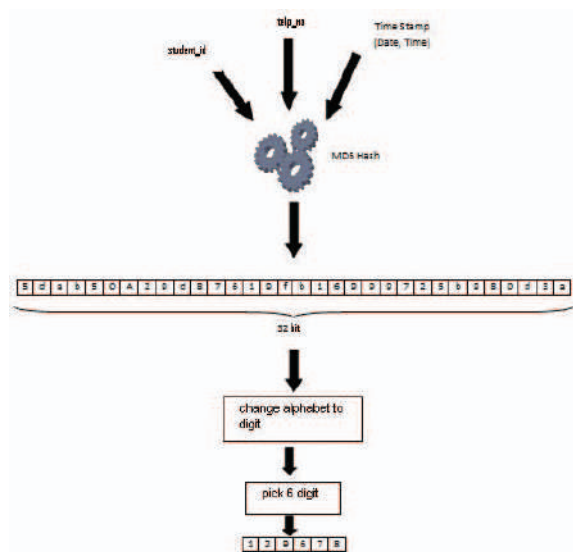
Fig. 1. Process of creating OTP using MD5 Hash

Figure 1 explains the process of creating OTP using MD5 Hash implemented to the Academic Information System:

1) Some attributes from students, i.e. Student ID, phone Number, and Time Stamp (date and hour of access) be encrypted using MD5 Hash.

2) The resulted Hash is 32 digits of hexadecimals.

3) Change alphabets (a, b, c …) into digit (0, 1, 2…)

4) Pick six digits of it randomly as an OTP (token) and save it to the OTP table.

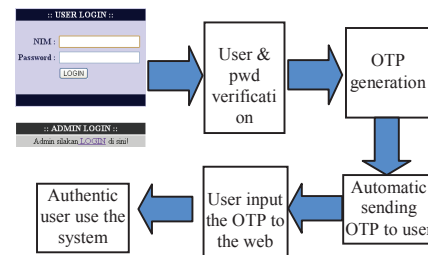From the user's (students) point of view, the system is described in Figure 2

Fig. 2. System from user's point of view

The complete application scheme for the login security SMS based OTP with MD5 Hash is described in Figure 3.
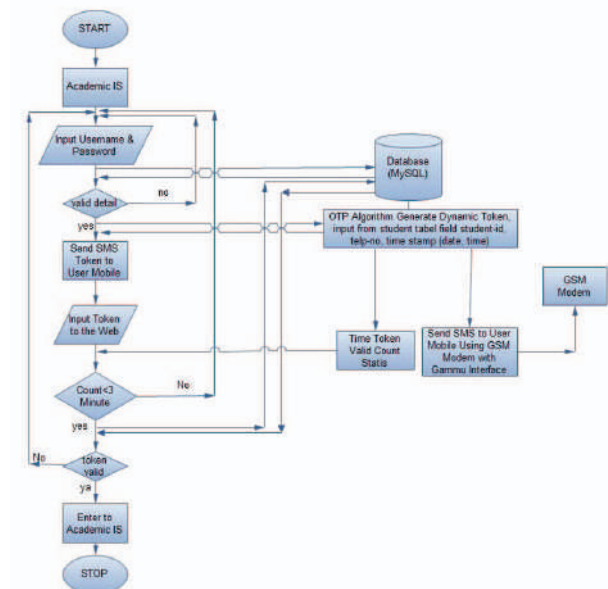

Fig. 3. Complete flowchart for Login Security with OTP

V. RESULT AND DISCUSSION

The experiment was done by running Cain and Abel tool. Cain and Abel (CA) is a password recovery tool for Microsoft Windows. It can recover many kinds of passwords using methods such as network packet sniffing, cracking various password hashes by using methods such as dictionary attacks, brute force and cryptanalysis attacks. We run this tool in the background, while running the system and users start to enter to the system.

While the user login to the system without extended security (OTP), CA records the username and password input by the user. CA tool record clearly the username=*0911071* and password=*password*, that can be seen in the figure 4.

The next experiment, the user enter the system by choosing the OTP activation. In this case, after the user enters the

username and password, the system verify the validity of the input. If the username and password is valid, the system send the OTP via SMS to the number previously registered to the system. Next the user key-in the OTP received from SMS to the system. The system gives an opportunity of 3 minutes to the user to enter the OTP. If the user does not enter the OTP in the time allowed, the system will reset, and back to the initial condition. The display of the system with OTP activation can be seen in Figure 5. Three minutes is sufficient for user to keyed-in the OTP since he/she receives the SMS text.
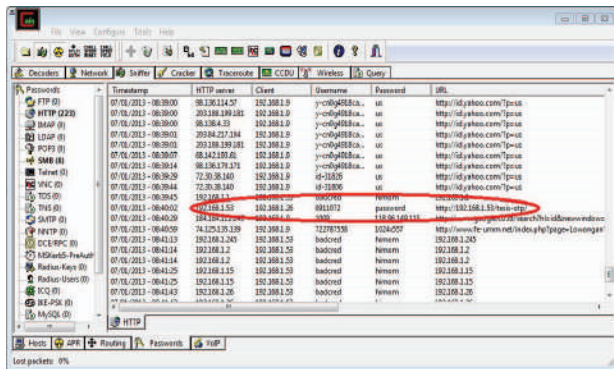

Fig. 4.   The Result of Cain and Abel while recording the login

Fig. 5.   the OTP Code Input Screen

The experiment to show the time needed by the system to create and deliver code is shown in the Table 1. This table shows that, among the phone cell operator used in this experiment, the average time to deliver the OTP to the user is not more than half a minute. It is reasonable if the delay time is set to 3 minutes. Since it is too shoot a time for hackers break the code and infiltrate to the system. Compared to the other applications for example Facebook and Google that use OTP to recover loss password, and verify the new user account, this time is short enough. The comparison can be seen in table 2. It can also be compared to the similar system developed by Rao dan Vedavathi [5] set up the delay time to 10 minutes.

TABLE I.   COMPARISON OTP DELIVER TIME AMONGS PHONECELL OPERATORS

No	times trial	average deliver time (s.ms)	Phone cell Operators
1	5	23.15	Telkomsel/As
2	5	25.80	Indosat/m3
3	5	16.52	Indosat/mentari
4	5	24.45	smartfren
5	5	24.08	Telkomsel/Simpati
6	5	19.98	XL

TABLE II.   COMPARISON OTP ACTIVE TIME AMONGS APPLICATION

No	Application	Number of code digit	OTP active time	OTP / Token functionality
1	OTP with MD5 Hash	6	3 min	User authentication to enter the system after username and password
2	Facebook.com	6	20 min	Username and password recovery. OTP sent via e-mail to reset password
3	Google.com	6	20 min	OTP sent via e-mail to verify new account

VI.   CONCLUSION

We have developed the login security system using OTP that is encrypted with MD5 Hash, and the OTP is sent automatically to the registered user phone cell number. The advantage of this system is the use of MD5 Hash to encrypt a set of Student ID, Phone Number, and Time stamp (date and hour of access). MD5 Hash creates results that never been the same with the previously generated OTP. Compared to the OTP generated with Pseudo Random Number Generator (PNRG) may create the same codes. With this condition, it is impossible for hacker to break the code and infiltrate to the system.

The time delay for active OTP is set up to 3 minutes. It is too short for hackers to possibly break the code. This setup time is also short enough compared to other applications, i.e. Facebook and Google that use 20 minutes to wait the user key in the OTP.

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