Enhancing Privacy of Contents in Social Networking Sites (SNS)

Abhilasha Singh Rathor
Mtech Scholar
Uttarakhand Technical University
E-mail: abhilasha.rathor@gmail.com

ABSTRACT

Social networking sites are very useful in sharing information, making friends and keeping in touch with old friends. It is an online service, platform, or site that focuses on facilitating the building of social networks and social elation among peoples for sharing interests, activities, backgrounds, or real-life connections. But with the increasing demand of social networking sites (SNS) privacy and security concern have also increased.

The focus of our study is to measure the amount of Privacy in SNS, and based on these current techniques and attack strategies I propose a model designed in PHP to handle the privacy and security issues of SNS's.

Social Networking Sites (SNS) are being used for over a decade, and has exponentially grown in popularity in the recent few years. They are web based services that allow individuals to: (a) make a public or semipublic profile (b) share contents with many users (c) view and traverse other user list. SNS allow users to connect, share information and other comments, chat, play games, and even add comments.

I propose a policy based infrastructure, with the help of a SNS designed in PHP, that allows:

1. Users to express their privacy preferences with respect to who can access their data and for what purpose.
2. Data provider support to enforce user privacy preferences, and supporting additional access models.
3. Handling privacy issues and access of data in SNS.

1.Introduction

Content sharing services have made social networking sites immensely popular. Users view their profiles on social networking sites as a form of self-expression, but these profiles also have commercial value. To allay fears of privacy violations, social networking sites provide users with access control settings to place restrictions on who may view their personal information.

Also it is possible to consider the fact that the web applications are built for various purposes. Or instance we have researchers web application, social networking web application, e-mail application, ecommerce application etc. Each web application is built with different requirements for performance, security mechanisms, internationalization and scalability to serve its customers.

A. Need For Social Networking

In 21st century, people are preoccupied with their busy wok life that they do not have time to spare for their near and dear ones. However social networking has given them platform to stay in touch with their near and dear ones.

Social networking is one of the major technological phenomenons of the Web, with hundreds of millions of attached users. Social network enables a form of self expression for the users and help them to socialize and share contents with others. Social networking sites are very useful in sharing information, making friends and keeping in touch with old friends. But with the increasing demand of social networking sites privacy concern is also increased.

With SNS, users engage with each other for various purposes, including business, entertainment and knowledge sharing. The commercial success of SNS depends on the number of users it attract, and by encouraging users to add more users to their network and to share data with others in SNS.

SNS have become very popular since they have many attracting features for the users. Most social networking websites allow member to design their own profiles so that they can design their profile page in order to express themselves and to reflect their personality. Users can customize the profile layout, add applications and can upload photos and other type of information.

Social networking sites are web based services that allow individual to [14]:

1. Construct a public or semi-public profile within a bounded system.
2. Articulate a list of other users with whom they share a connection.
3. View and traverse their list of connections and those made by others within the system.

B. Need For Privacy

Since SNS are widely in demand of current scenarios, the risk of their usage has also increased. Due to the lack of awareness among user and presence of less privacy protection tools, huge amount of user's data, including user's personal information, pictures and videos, is at risk. They can be used by strangers, recruiters and even the public at large, in any way in which they want.

Content sharing is one of the main features of SNSs, but they do not provide any mechanism for collective enforcement of privacy policies on shared data.

Privacy expectations in social networks are based on relationships. Typical social networks support friends and networks with privileged access.

Past work demonstrates that users have strong expectations for privacy on social networking sites.

In order to help users protect their personal data, the SNSs architecture adopts a simple user centric policy management approach, where a privacy aware user is able to specify a policy that manages access to their posted profile objects.

Due to lack of user awareness and proper privacy protection tools, huge quantities of user data, including personal information, pictures and videos are quickly falling into hands of authorities, strangers, recruiters and the public at large [9].

2. Motivation

SNS are one of the most browsed categories of websites in today's scenarios. They facilitate the building of social network for users who wants to share interest, activities, background, or real-life connections. While some SNS may require specific protocols to allow interaction among members, other SNS allow open interaction among all site members. But user should always be informed of the information security threats they are being exposed to including the loss of private and personal information [14].

Trust is a critical factor in sharing and creating information among communities within physical and virtual contexts. Some people argue with the fact that privacy in Social Networking Sites is not expected, as user tends to promote themselves in public, other suggests that privacy in Social Networking Sites must be taken into account, because user's personal and private information can be sold to third parties without prior or proper permission.

A Social Relationship Model can improve SNS privacy and security in multiple ways [4] :

1. We share different information with our friends and colleagues. A confusion of relationship types may cause embarrassment; therefore all social relationships should be clearly articulated and treated accordingly in making privacy decisions.

2. Trust relationships are the core information on which all security mechanism is based. By their very nature, trust relationships among users are not equal. Traditional privacy policies based on binary trust relationships ignore the existing strength differences and treat them as equal. Therefore they cannot provide fine-grain access control and may lead to privacy breaches.

3. Interaction intensity can be used as a proxy for relationship quality for the purpose of making privacy decisions. If a pair of users does not interact often, they only want to reveal a limited amount of information to each other. The measurement of interaction intensity also introduces a way to characterize network dynamics.

The tradeoff between accuracy and complexity in describing social relationships must be taken into account. Inaccurate and ambiguous description will introduce security vulnerabilities.

3.Proposed Policies

The privacy tools in SNS are not flexible enough to protect user data. Most popular SNS, Facebook provide very detailed privacy setting, but current Facebook's privacy interface is too complex to understand by most normal users. Our target is Privacy settings to be simple, even understandable by the normal users.

Here we propose some privacy policies that serve as a resolution for the privacy issues identified in previous section. These policies when implemented can enhance as well as complement the privacy framework of existing SNS's.

Policy Number 1 (*Name Privacy Policy*):- User's full name should not be disclosed to visitors on SNS. Instead of user's full name visitors of SNS should be able to see his title name. When they become Close Friends, Friends or Known they can see both users' full name and user's title name.

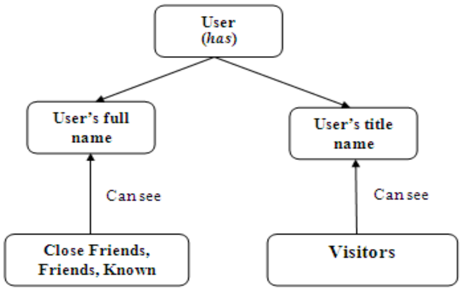


Fig.1. Name Privacy Policy

Reason: Named privacy policy is needed to hide user's full name from unknown users, so that user's identity is hidden from unknown users. This is needed because user's identity anonymity is one of the main demands. We cannot hide user's full name in SNS, but we can maintain user's identity anonymity by hiding user's last name from unknown users.

Policy Number 2 (*Wall Content Privacy Policy*):- User can customize his wall contents; he can make it as private, protected and public , so that private data is not visible to anyone except him, protected data is visible to Close Friends and Friends, and public data is visible to Known and Visitors.

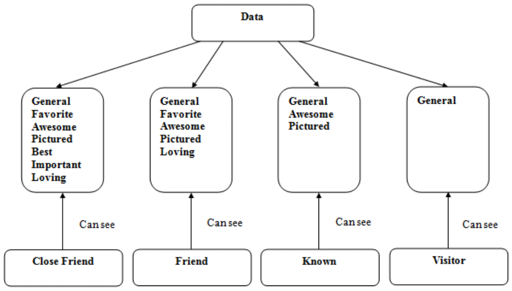


Fig 2. Wall Content Privacy Policy

Reason: Other SNS do not provide this feature of customizing the wall contents so that they are visible to specific group of users, not to all users. This is one of the main features so as to provide privacy to specific data.

Policy Number 3 (*Comments Privacy Policy*):- Option to customize the visibility of comments on post.

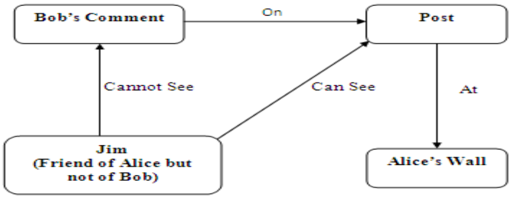


Fig 3. Comments Privacy Policy

Reason: The friends who are not friends with each other should not be able to view each other's comments on the post updated by their common friends, so that privacy of user is maintained. Bob does not want anyone beside his friend (Alice) to know anything about him. But when Alice friend (Jim) visits his profile he can easily discover Bob's name on Alice's friend list, he can also se all interactions between Bob and Alice. So to prevent this, I propose this policy.

Policy Number 4 (*Wall Filtering Policy*):- To filter and screen the contents being posted on user's wall, so that integrity of user's data is being maintained and to customize which user can post on a user's wall . It is a very useful requirement of user in current environment. It is double standard privacy policy, firstly only Close Friends and Friends can post on user's wall and secondly user can apply filtering option to those contents also.

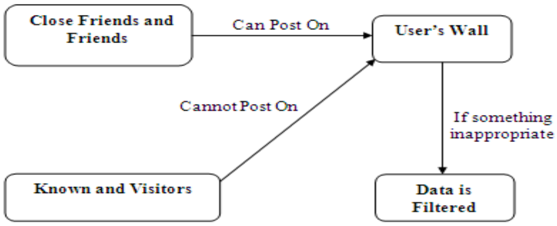


Fig 4.Wall Filtering Policy

Reason: When user accepts a person as friend he is allowed to post anything on user's wall. There may be some friends who may not be so much trusted. There may be occasions when they may post something which may be inappropriate, absurd, abusive or even obscene. There may be some people who can post inappropriate content on a user's profile, which needs to be controlled.

Policy Number 5 (*Pop up Box Policy*):- The most important problem is that SNS do not inform the user about the danger of disclosing theprivate information. We propose to have popup box to inform user about privacy risk whenever there is danger to their privacy.

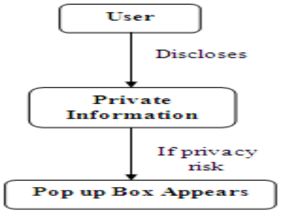


Fig 5.Pop up Box Policy

Reason: So that common users should be informed of dangers involved in using SNS very easily and efficiently. Whenever user's data is at risk a Pop Box should appear so that user should be informed of the privacy risk, and he can stop his private information from being disclosed.

Policy Number 6 (*Third Party Warning Policy*):- When we access some applications that needs user to enter his E-mail address, then user should be made aware of the risk of giving his email id. The warning/notification should come before proceeding forward so that if user wants to proceed he can say Yes otherwise No.

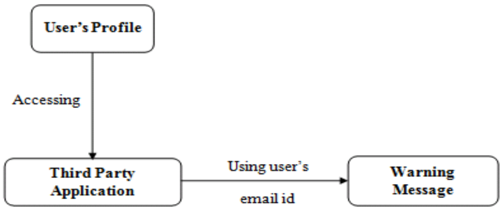


Fig 6. Third Party Warning Policy

Reason: - When third party applications require user's email id, it becomes difficult to know that any application is using which part of our data and users blindly allow access to these applications. As a result our private information may get disclosed, and van be used wrongly. Many business organizations use email id's to send advertisements and increase the productivity of their business.

4.Implementation

To implement the policy proposed, we proposed a frame work in php and our implementation shows whether the given policies are applicable on a social networking site or not. We have shown implementation of first four policies.

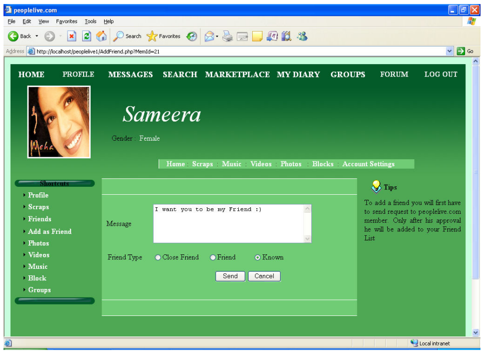
While adding user as friend we have three categories

a) Close Friend

b) Friend

c) Known.

By default Known will be selected, since we aim at making all the privacy settings as private by default. Our privacy level will depend on the type of friendship level between the two users. With *Close Friends* we share almost each and every information. They are the best friends of the user's real life. While *Friends* are people who are user's family members, relatives or friends in real life. We share most but not all information with them. *Known* are the people about whom the user knows a little. They can be people known online or met once or twice. While *Visitors* are the user's who are not in our friend list but visit the user profile to know about him.


peoplelive.com
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost/peoplelive1/AddFriend.php?MemId=21 Go
HOME PROFILE MESSAGES SEARCH MARKETPLACE MY DIARY GROUPS FORUM LOG OUT
Home : Scraps : Music : Videos : Photos : Blocks : Account Settings
Shortcuts
Profile
Scraps
Friends
Add as Friend
Photos
Videos
Music
Block
Groups
Send
Cancel
Local intranet

Sameera

Gender : Female

Message: I want you to be my Friend :)

Friend Type ○ Close Friend ○ Friend ● Known

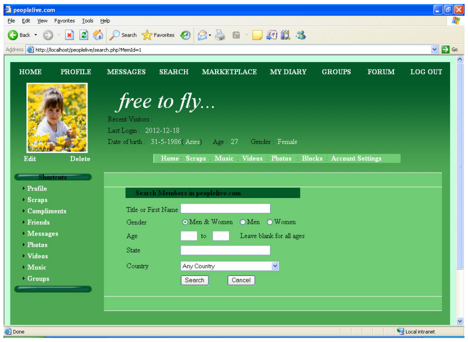
Tips

To add a friend you will first have to send request to peoplelive.com member. Only after his approval he will be added to your Friend List

Fig 7. Level of Friendship

A. Policy Number 1 (Name Privacy Policy)

In implementing Name Privacy Policy, we make user full name hidden to the visitors, while visiting a profile or searching a member, user will only be able to see his first name and title name inspite of his full name. While searching for a member in peoplelive.com, user needs to make the searches with title or first name of the user inspite of his full name. So to search a friend user need to know his title or first name. When a search is made then the full name of only those members appears who are in user's friend list, for all the other members only first name appears along with "Add Friend" link.


peoplelive.com
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost/peoplelive/search.php?MemId=1 Go
HOME PROFILE MESSAGES SEARCH MARKETPLACE MY DIARY GROUPS FORUM LOG OUT
Edit Delete
Home : Scraps : Music : Videos : Photos : Blocks : Account Settings
Shortcuts
Profile
Scraps
Compliments
Friends
Messages
Photos
Videos
Music
Groups
Search
Cancel
Done
Local intranet

free to fly...

Recent Visitors :

Last Login : 2012-12-18

Date of birth : 31-5-1986(Aries) Age : 27 Gender : Female

Search Members in peoplelive.com

Title or First Name

Gender ● Men & Women ○ Men ○ Women

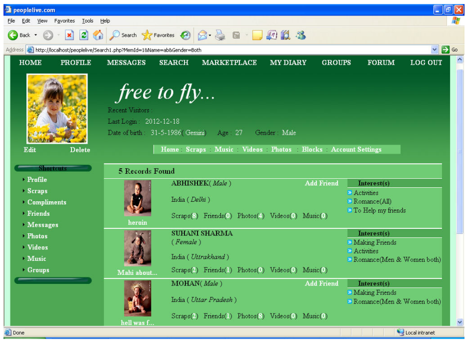
Age to Leave blank for all ages

State

Country Any Country

Fig 8. Search done with Title and First Name Only

When the users are searched then the users who are in friend list their Full Name appears and users who are not in friend list their only First Name appears. A user can see Full Name of particular user only when he is in the friend list of user. Named privacy policy is needed to hide user's full name from unknown users, so that user's identity is hidden from unknown users. This is needed because user's identity anonymity is one of the main demands. We cannot hide user's full name in SNS, but we can maintain user's identity anonymity by hiding user's last name from unknown users.


peoplelive.com
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost/peoplelive/Search1.php?MemId=1&Name=ab&Gender=Both Go
HOME PROFILE MESSAGES SEARCH MARKETPLACE MY DIARY GROUPS FORUM LOG OUT
Edit Delete
Home : Scraps : Music : Videos : Photos : Blocks : Account Settings
Shortcuts
Profile
Scraps
Compliments
Friends
Messages
Photos
Videos
Music
Groups
Done
Local intranet

free to fly...

Recent Visitors :

Last Login : 2012-12-18

Date of birth : 31-5-1986(Gemini) Age : 27 Gender : Male

5 Records Found

heroin — ABHISHEK(*Male*) Add Friend
India (*Delhi*)
Scraps(8) Friends(0) Photos(4) Videos(0) Music(0)
Interest(s): Activities; Romance(All); To Help my friends

Mahi about... — SUHANI SHARMA (*Female*)
India (*Uttrakhand*)
Scraps(2) Friends(1) Photos(0) Videos(0) Music(0)
Interest(s): Making Friends; Activities; Romance(Men & Women both)

hell was f... — MOHAN(*Male*) Add Friend
India (*Uttar Pradesh*)
Scraps(2) Friends(1) Photos(8) Videos(0) Music(0)
Interest(s): Making Friends; Romance(Men & Women both)

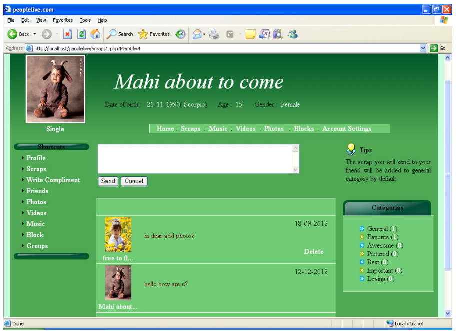
Fig 9. After Search, Full Name appears only of those who are in user's friend list

B. Policy Number 2 (Wall Content Privacy Policy)

Wall content privacy is to maintain a level of privacy for a specific user, depending on the level of friendship between the users. Mainly we are showing this concepts with the help of scraps been posted on users wall. User can maintain the different categories of scraps, such as:

- General
- Favorite
- Private
- Awesome
- Pictured
- Best
- Important
- Loving

More ever depending on the level of friendship, different users will have different access level to different categories of scraps.


peoplelive.com
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost/peoplelive/Scraps1.php?MemId=4 Go
Single
Home : Scraps : Music : Videos : Photos : Blocks : Account Settings
Shortcuts
Profile
Scraps
Write Compliment
Friends
Photos
Videos
Music
Block
Groups
Send
Cancel
Delete
Done
Local intranet

Mahi about to come

Date of birth : 21-11-1990(Scorpio) Age : 15 Gender : Female

Tips

The scrap you will send to your friend will be added to general category by default.

free to fl... — 18-09-2012 — hi dear add photos

Mahi about... — 12-12-2012 — hello how are u?

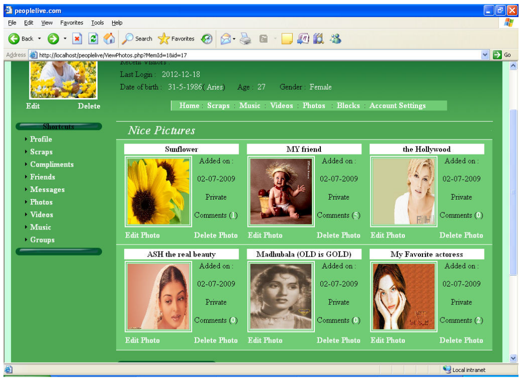
Categories

General (1)
Favorite (1)
Awesome (0)
Pictured (0)
Best (0)
Important (0)
Loving (0)

Fig 10. Categories shown when user is added as Close Friend

C.Policy Number 3 (Comments Privacy Policy)

Comment Privacy Policy is needed to hide the identity of user from unknown users. A user will be able to see comments of only those users who are in his friend list. That means the comments of only common users will only be seen, rest all comments will be hidden.



http://localhost/peoplelive/ViewPhotos.php?MemId=1&id=17

Last Login : 2012-12-18

Date of birth : 31-5-1986(Aries) Age : 27 Gender : Female

Nice Pictures

Sunflower — Added on : 02-07-2009 Private Comments (1)

MY friend — Added on : 02-07-2009 Private Comments (5)

the Hollywood — Added on : 02-07-2009 Private Comments (0)

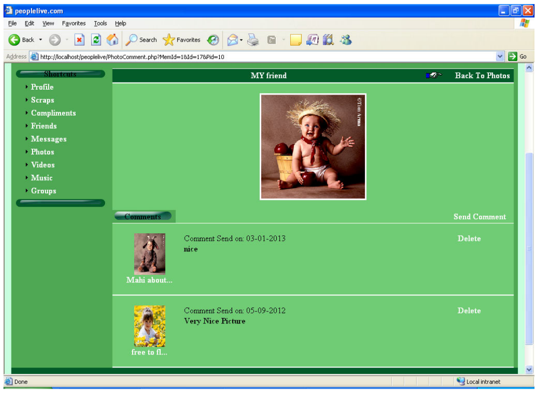
ASH the real beauty — Added on : 02-07-2009 Private Comments (0)

Madhubala (OLD is GOLD) — Added on : 02-07-2009 Private Comments (0)

My Favorite actoress — Added on : 02-07-2009 Private Comments (2)

Fig 11. Total Number of Comments Show (5)

For e.g. in Fig 11, we see that a particular picture, “MY Friend” shows 5 comments in total, but when we will open it than only 2 comments will appear, which shows that rest 3 comments are hidden as then are send by users who are not in user friend list.



http://localhost/peoplelive/PhotoComment.php?MemId=1&Id=17&Pid=10

MY friend

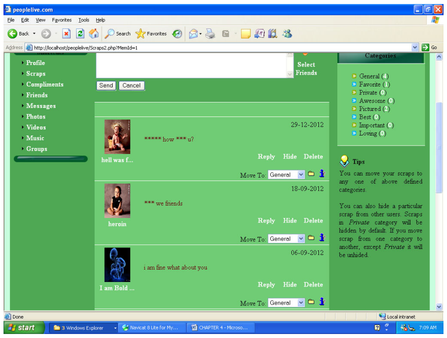
Mahi about... — Comment Send on: 03-01-2013
nice

free to fl... — Comment Send on: 05-09-2012
Very Nice Picture

Fig 12. Total Comments Appeared (2)

D.Policy Number 4 (Wall Filtering Policy)

Wall Filtering Policy is needed to hide the user specified contents from the other users. When user accepts a person as friend he is allowed to post anything on user’s wall. There may be some friends who may not be so much trusted. There may be occasions when they may post something which may be inappropriate, absurd, abusive or even obscene. There may be some people who can post inappropriate content on a user’s profile, which needs to be controlled. So in this a database is created which protects user data and shown by asterisk (*) on users wall.



http://localhost/peoplelive/Scraps2.php?MemId=1

hell was f... — 29-12-2012
***** how *** u?
Move To: General

heroin — 18-09-2012
*** we friends
Move To: General

I am Bold ... — 06-09-2012
i am fine what about you
Move To: General

General (4)
Favorite (1)
Private (0)
Awesome (0)
Pictured (2)
Best (0)
Important (0)
Loving (0)

You can move your scraps to any one of above defined categories.

You can also hide a particular scrap from other users. Scraps in *Private* category will be hidden by default. If you move scrap from one category to another, except *Private* it will be unhided.

Fig 13. Filtered Content Appears In Asterisk (*)

5.Conclusion and Future Work:

This is a relatively new field and there is a tremendous potential for future research because of the recent increase in the number of users in SNSs. In this work we examined the existing privacy policies of some of the most common Social Networking Sites like Facebook, MySpace, and LinkedIn etc. While studying about the privacy policies we tried to keep in mind the requirements of Social Networking Sites users.

We studied the existing privacy policies and flaws in them for different Social Networking Sites. Keeping in mind the weakness of existing policies we suggested certain modifications in them.

In support to our proposed policies and to test their implementation feasibility, we have tried and implemented 4 of our policies. For this we designed our SNS in php which has the primary features of any Social Networking Site like Facebook. Then we implemented few of the proposed policies on it.

In future, we intend to extend our privacy policies that offer an easy and flexible way to user so that they can communicate with each other and the third party application without revealing much about them. We also aim at proposing a Privacy Policies Framework, which can easily be integrated with the existing one or even can be replaced.

REFERENCES

1. Vorakulpipat, C.; Marks, A.; Rezgui, Y.; Siwamogsatham, S.; , "Security and privacy issues in Social Networking sites from user's viewpoint," *Technology Management in the Energy Smart World (PICMET), 2011 Proceedings of PICMET '11:* , vol., no., pp.1-4, July 31 2011-Aug. 4 2011
2. Joshi, P.; Kuo, C.-C.J.; , "Security and privacy in online social networks: A survey," *Multimedia and Expo (ICME), 2011 IEEE International Conference on* , vol., no., pp.1-6, 11-15 July 2011
3. SeyedHossein Mohtasebi and Ali Dehghantanha, "A Mitigation Approach to the and Malware Threats of Social Network Services ," *Multimedia Information Networking and Security, 2009. MINES '09. International Conference*, vol.1, no., pp.448-459, 2011
4. Chi Zhang; Jinyuan Sun; Xiaoyan Zhu; Yuguang Fang; , "Privacy and security for online social networks: challenges and opportunities," *Network, IEEE* , vol.24, no.4, pp.13-18, July-August 2010
5. Jason Bau, Elie Bursztein, Divij Gupta, John Mitchell, " State of the Art: Automated Black-Box Web Application Vulnerability Testing", *IEEE Symposium on Security and Privacy*, 2010, 1081-6011
6. Anna C.Squicciarini, Mohamed Shehab, Joshua Wede, "Privacy policies for shared

content in social network sites ", *The VLDB Journal(2010)* 19:777-796,DOI 10.1007/s00778-010-0193-7

7. Debatin, B. et al., 2009. Facebook and Online Privacy: Attitudes, Behaviors, and Unintended Consequences. *Journal of Computer-Mediated Communication*, 15(1), 83–108.
8. Ai Ho; Maiga, A.; Aimeur, E.; , "Privacy protection issues in social networking sites," *Computer Systems and Applications, 2009. AICCSA 2009. IEEE/ACS International Conference on* , vol., no., pp.271-278, 10-13 May 2009
9. Aimeur, E.; Gambs, S.; Ai Ho; , "UPP: User Privacy Policy for Social Networking Sites," *Internet and Web Applications and Services, 2009. ICIW '09. Fourth International Conference on* , vol., no., pp.267-272, 24-28 May 2009
10. X
i Chen; Shuo Shi; , "A Literature Review of Privacy Research on Social Network Sites," *Multimedia Information Networking and Security, 2009. MINES '09. International Conference on* , vol.1, no., pp.93-97, 18-20 Nov. 2009.
11. C
utillo, L.A., Molva, R., Strufe, T., "Privacy preserving social networking through decentralization, Wireless On-Demand Network Systems and Services", In: WONS 2009: *Sixth International Conference*, pp. 145-152 (2009).
12. Dwyer, C., Hiltz, S. R., & Passerini, K. (2007). Trust and privacy concern within social networking sites: A comparison of Facebook and MySpace. *Proceedings of AMCIS 2007, Keystone*, CO. Retrieved September 21, 2007
13. Sophos security threat report 2011 (2011) *https://secure.sophos.com/securitywhitepapers/sophos-security-threat-report-2011-wpna*
14. DotRights Social Networking Page, *www.dotights.og/social-netwoking*