

# Mobile Computing: An Ubiquitous Approach of Social Marketing for Influential Social Contact Network

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**Abstract** - In today's time, use of social media defines an era where billions of users, everyday use the power of social media to get empowered. It has the capacity to impact our lives and has opened new opportunities and possibilities that were not possible. Social networks are fundamentally social tools in which people are constantly observing and growing their social network, most social network media depict growth using the degree of point definition, control, and independence. Centrality can also indicate which members are the most useful or well-connected and therefore the best information resources. This research targets the emerging area of group purchasing, social marketing and target advertising. Social marketing will enhance the market understanding by learning what people want and need rather than trying to persuade them to buy what they happen to be offering. The aim of this research is to investigate how the social marketing paradigm works, involve students in the research experiments to educate and train them regarding the latest technologies involved, and identify the approach to do it right. The proposed research successfully implemented an android app dubbed as iSONET (Influential social contact network) to conduct research experiments and interacted with targeted users. This app focuses on i) user's privacy related issues, ii) periodical data capturing and iii) user's localization. Couple of research methods are used in research experiments to conduct qualitative and quantitative data including i) I SONET app captures consistent data over time for 4 weeks and helps to build the dynamic datasets of social contact network ii) Conducted online Survey to gather quantitative data from SNS users.

**Keywords:** Social Network, Group behaviour, Mobile computing, Social marketing, Social network service

## I. INTRODUCTION

This research targets the emerging area of group purchasing, social awareness and target advertising. It focuses on social marketing which is the next big paradigm that is affecting and will affect our everyday lives. Social marketing is an integrated approach where consumers will receive offers, product promotions based on their social interaction with other people. Social marketing will enhance the market understanding by learning what people want and need rather than trying to persuade them to buy what they happen to be offering. Other researchers have cited new marketing models with the rise of social networking such as Tuangou refers to the phenomenon that a group of web users are organized using the internet and physically approach the retailers together to negotiate for a discount for a particular product or service by using their collective bargaining

power [1]. Another social network service (SNS)"Kakao talk", a smartphone application in South Korea which recommends friends to the user by their contact information in their social network [2], even the UK government has issued guidelines for involvement [3]. SNS (social network service) is a web-based individual centered service, platform, or site that focuses on building and reflecting social networks or social relations among people. It is pertinent to investigate the SNS structure characteristics and how these characteristics can affect the consumers' network involvement which may lead to increased purchase intention to the recommended deals by other friends through SNS [4]. So, Integration of SNS with marketing can increase the consumers' purchase intention and have positive effects on the online sellers.

This aim of this research is to investigate how the social marketing paradigm works, involve BU students in the research experiments to educate and train them regarding latest technologies involved, and identifying the approach to do it right. This research also gives high priority and investigates how to do all this while maintaining some user privacy. This is a very cutting edge and relevant research which will employ smartphone applications to conduct research experiments and interact with the targeted participants. The android app will be distributed to collect qualitative data and send offers to participants during experiments.

To achieve the research aim, important research objectives have been defined as following:

1. Develop a smartphone application to build contact network datasets and investigate social marketing approaches to infer social network structure, user's centrality etc.
2. To design research experiments to collect data from participants using the developed mobile application and use popular social networking application (WhatsApp).
3. To gather quantitative data through questionnaires with research participants, to analyze their using patterns and concern with social networking sites and enhance their understanding about social marketing.

In nutshell, the proposed research will produce social contact network data sets (others in existence the Cambridge, Info.Com, MIT and Nokia [5] via experiment which will contribute towards the originality of the research.

## II. DESIGN AND DEVELOPMENT OF SMARTPHONE APPLICATION- ISONET

The important objective for this research is to mimic a real-world interactive experiment using the smartphone application to develop participant’s data-sets while maintaining their privacy. Prototyping the research specification is the most appropriate way to test the feasibility of the approach [9]. This research developed influential **Social Contact-NETwork** (iiSONET), an ANDROID based application to experiment the proposed approach. This section gives overview of the iSONET app and explains three important aspects of it including i) user’s privacy, ii) periodical data capturing and iii) Bluetooth localization and use of GCM (Google cloud messaging) to issue voucher etc; A social contact network is the graph of relationships and active interactions within a group of individuals and plays a fundamental role as a medium for the spread of information, ideas, and influence among its members.

### A. User’s Privacy Using RSA Encryption

In this research, the android app used an RSA algorithm to encrypt the user’s information i.e. Student id to manage their privacy and keep them anonymous throughout the process. This information can only be decrypted by a person with private key.

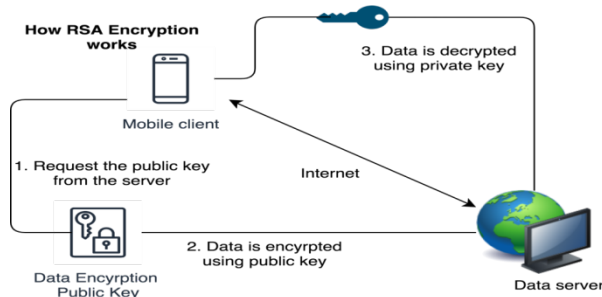


Fig.1 Overview of RSA Algorithm

With such an approach, there will be very less intrusion to user’s privacy compared to the current approach used by google, Facebook etc. The figure 1 explains how RSA encryption works. This research employs the asymmetric cryptographic RSA (Ron Rivest, Adi Shamir and Leonard Adleman) algorithm to encrypt and decrypt user data. Asymmetric means that there are two different keys: i) public key to encrypt the data and ii) private key to decrypt the data. RSA is an asymmetric algorithm to encrypt datasets for greater security and protection [7][8].

The figure 2 demonstrates, once a user enters their details, it will be encrypted in a form which will be impossible to reverse. It uses 128 bits RSA algorithm, which is a very reliable cryptography algorithm to conduct experiments without compromising user’s privacy. This encrypted code can only be decrypted by a person with a private key.



Fig.2 Implementation of Encryption of User Information

### B. Smartphone Data Collection Process

This research study focuses on collecting and developing datasets by keeping traces of all access Wi-Fi points passed by the participants and other network related information. Data is stored on a secure server.

The metadata gives some insight on a subset of information which will be stored in a data server. i) User and device ID - To create a unique id using random number generator and Bluetooth device id which is unique to each device. ii) Network ID connected to Wi-Fi Network., iii) Application scan all the available Wi-Fi networks. iv) Wi-Fi access point. v) Same Wi-Fi network can have many router access points with unique id. Vi) other connection Info, vii) Connection time.

The figure 3 demonstrates the flow of the data collection functionality which will scan all the Wi-Fi points and its network related information every minute throughout the day till the end of an experiment. Each day, it logs all the traces of Wi-Fi access points and compresses the file and sends it back to SOAP data server. This information will be used to infer the social network structure and understand its dynamic nature and user’s centrality. In brief, the data capturing process presents few pertinent points including i) assign a unique id to users in order to keep them anonymous ii) start/stop the data recording service from app UI iii) scan the available network (User will see many network with same name but different access points) and iv) send regular periodic updates to secure data server.

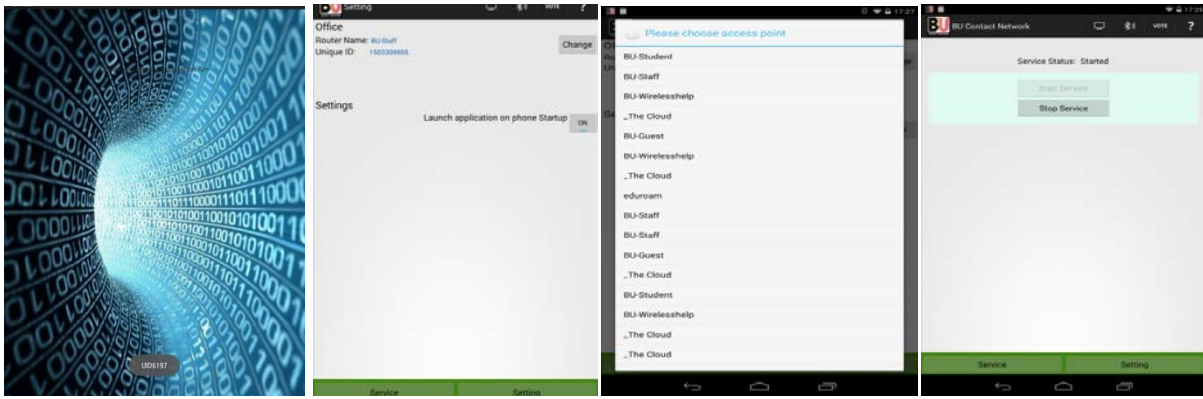


Fig.3Periodic Data Collection Service

### C. User Localization

Further to previous functionalities, the developed iSONET app records whenever more than one participant is in the same location. It does not log the location itself. It maps the user's close proximity with other users and automatically reports back to the server based on Bluetooth communication (refer to figure 4). The research requires this information to infer the social network of the group as a whole.



Fig.4 Users Localisation

In this research, authors have used two ways to infer the user localisation by mapping the Wi-Fi access points and Bluetooth communication.

1. Establish communication between two users by analysing collected data (comparing their WIFI access point id and time).
2. Scan Bluetooth adapters in close proximity connection to match with wanted Ids and report back to secure server.

In nutshell, the iSONET app assists to capture the consistent data over time for 4 weeks and helps to build the dynamic datasets of social contact networks (as explained in above

Sections) without compromising user's privacy and data security.

### III. DATA COLLECTION THROUGH SURVEY

The survey was sent by email and group messaging through other social media networks to a statistical sample of n=120 people. The findings presented here are based on an overall 43% return rate, about 52 respondents. The prior consent was taken from participants [10]. The answers were kept confidential and used for statistical purposes and released in aggregate form only. In order to get more appropriate data, we just focus on the people who had the SNS using experiences. Figure 5 presents the simple steps to conduct the survey.

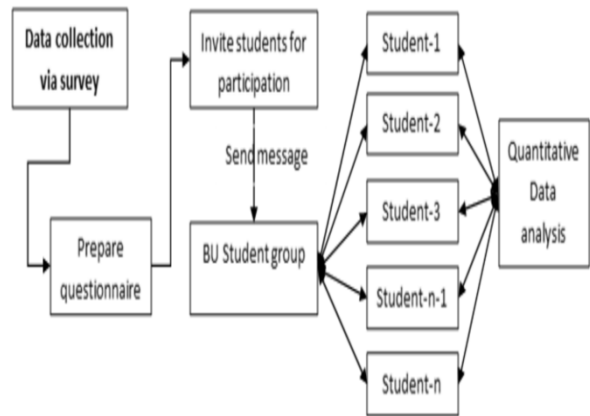


Fig.5 Data Collection Using Survey

Step by Step process:

1. Prepare a questionnaire guide for the survey.
  - 1.1 Design the questionnaire - compile the first set of questions.
  - 1.2 Run a pilot with academics and students.
  - 1.3 Revise the Questionnaire.

- 2 Send email to students and post messages to other Social network platforms for participation in the survey.
- 3 Record students' responses.
- 4 Quantify the collected survey data.

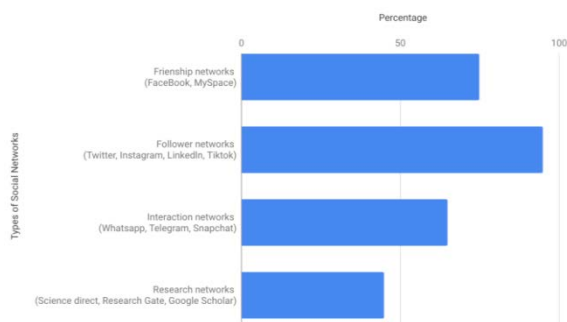


Fig.6 Types of Social Networks

The entire process took four weeks to complete the survey, collect and analyse the data. The social networks were divided into four categories i) Friendship networks, ii) Followers networks, iii) Interaction networks, and iv) Research networks [6]. Figure 6 presents, there were 75% respondents who were using friendship networks (Facebook, myspace) and 95% who were using followers networks (Twitter, LinkedIn, Instagram), then 65% were using interaction networks while 45% respondents were on research networks (Google scholar, Science direct, research gate) and almost 70% of them had more than 100 contacts in their social network. Among the respondents, 75% were postgraduate and 25% were undergraduate students. Also, there were 60% male and 40% female respondents who ranged in between 24-60 years age group. There are 90% respondents who are using Facebook and 100% who are using LinkedIn which are the most popular SNS and almost 70% of them had more than 100 contacts in their social network. Mobile SNS is very popular these days. 60% people are using WhatsApp which is a very popular mobile messenger with University students.

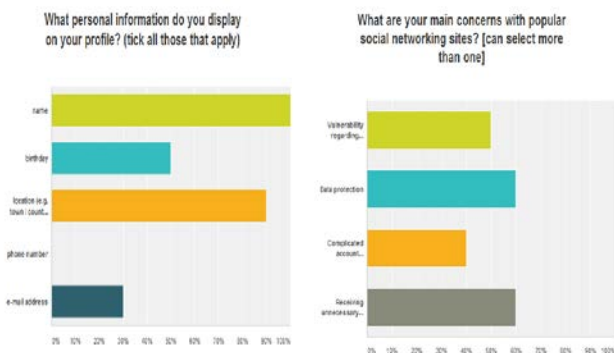


Fig.7 User's Information Sharing Concerns On SNS i) What Kind of Information Users Display On Their Profile ii) User's Main Concerns Regarding Such Information.

Figure 7 illustrates all the participants' shares their name, 90% their location, 50% shares their birthdays and about 30% shares their email id on social networking sites. However, nobody suggested sharing their phone number on SNS as it considers being highly intrusive. Sharing personal information on SNS makes users very vulnerable to cyber-attack. In another chart presented, 60% participants felt exposed to cyber-attack and 50% of them think their privacy is not being protected. About 60% participants also felt that there are many advertising intrusions and 40% complained about very complicated preference settings regarding sharing information on social networks. Such information assisted to identify some concerns and design more secured, anonymous and less intrusive applications.

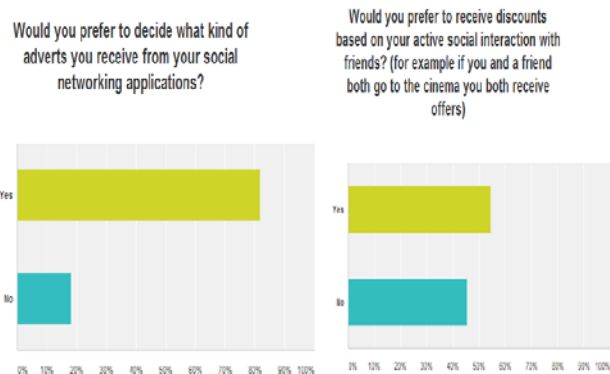


Fig.8 User's Preferences Regarding Social Marketing

In order to understand the social marketing concept where users would have more control regarding what kind of advert, when and how they prefer it etc. Figure 8 reveals almost 80% respondents preferred to decide what kind of product /offers they would like to receive. Another chart illustrates that almost 55% participants preferred to receive group discounts based on their active social interaction with their friends, family or work colleagues.

#### IV. CONCLUSION

Social networks are fundamentally social tools in which people are constantly monitoring and growing their social network, most social network media depict growth using the degree of point definition, control and independence. This research targets the emerging area of group purchasing, social marketing and target advertising. Social marketing will enhance the market understanding by learning what people want and need rather than trying to persuade them to buy what they happen to be offering. This aim of this research is to investigate how the social marketing paradigm works, involve BU students in the research experiments to educate and train them regarding latest technologies involved, and identifying the approach to do it right. The proposed research successfully implemented an android app dubbed as iSONET to conduct research experiments and interact with targeted participants. This app focuses on i) user's privacy related issues, ii) periodical data capturing and iii) user's localization. Various research methods are

used in research experiments to conduct qualitative and quantitative data including i) iSONET app captures consistent data over time for 4 weeks and helps to build the dynamic datasets of social contact network and ii) Conducted online Survey to gather quantitative data from SNS users. One of the critical challenges encountered during research was difficulty in finding suitable participants (user's with android OS mobile, interacting in a cluster etc) for this research. The research was conducted with a limited number of participants, it collected consistent and continuous data periodically using aforementioned methods to investigate the social marketing approach and infer dynamic social contact networks. However, the authors recommend collecting data from users in order to develop social network datasets and analyse it rigorously to infer dynamic contact networks for future research.

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