

The Analysis and Design of a Web-Based Social Network: Locate it! Project

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Abstract

Locating missing items is a challenging problem that people face frequently. This paper proposes a system that attempts to solve this problem by taking the advantage of the interactions among people in online social media. Locate it! Is an online social community for connecting individuals with lost items with people who found these items. The communication in this Arabic social network is based on the contribution of individuals in the Kingdom of Saudi Arabia. After reporting the lost/found items by the users, they can ask the system to retrieve matches from the database. As a result, this research study discusses the analysis and design of Locate it! System and concludes by summarizing the paper; future improvements are also discussed.

Keywords: Location management, Lost and Found, Localization, community-oriented system, Online Social Network, Web-based system.

1. Introduction

On a daily basis, people face the problem of misplacing their stuff which might be valuable or have a special meaning to them. Also, some items are irreplaceable and despite the fact the other items can be replaced, the users might have a limited time to find a replacement and they don't want to waste their time in searching for them. Another case is when a person loses an item that has very sensitive information and this loss might cause a considerable impact such as misplacing mobile device, identity cards, and passports. Technology has the opportunity to assist people in this problem. In recent years, several systems have been introduced to keep track of lost items and help people in finding them [e.g. 1, 2, 3, 5, 6, 7 and 8]. Approaches have varied from RFID tagging to community based systems which allow the work and cooperation between the members of the virtual community to facilitate the process of locating the missing objects through exploiting the capabilities of the Internet.

Moreover, anecdotal evidence from observations in public areas shows how individuals often seek the assistance of others by posting announcements such as the notes depicted in figure 1 for missing items. In this example, the signs were posted by the owners of lost items who offered incentives to encourage and elicit responses and assistance from the community. On the other hand, people always find lost things everywhere and they want to deliver them to their owners who they don't know.

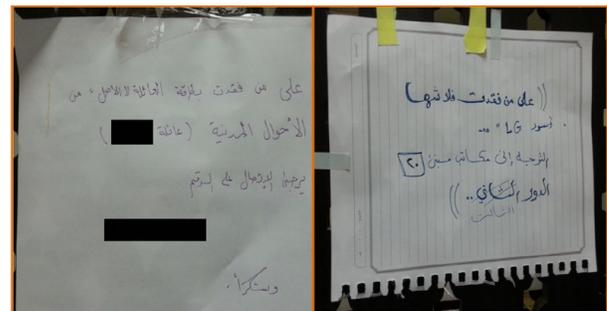


Fig. 1 Lost items announcements

From all the above, it is apparent that there is a lack of a system that support Arabic language and can do the job of locating missing items and return them back to their owners within the context of Saudi Arabia. We also have noticed the high level of participation and interactivity between the members of our society in social networks [4] like Twitter, Facebook, Instagram and how the people are willing to help each other through these networks. In addition, the growth rate of the social networks usage in Saudi Arabia is high. To take Twitter as an example and as reported by The Social Clinic consultancy website [9] "Arabic is the fastest growing language on Twitter" and "Saudi Arabia grew more than 3,000% from 2011 to 2012, and currently accounts to 50,000,000 tweets per month".

There exists inadequate support of Arabic-language based online communities dedicated to the lost and found dilemma. Therefore, designing a social network for the lost and found items in Saudi Arabia where people can interact with each other easily can leverage the usage and participation of the local community in social networks. This project will start to cover the lost/ found items in Riyadh and our future vision is to let it includes the entire Kingdom of Saudi Arabia after examining the behavior of the users and knowing how to make the appropriate improvements. The concept aims to automate the process of connecting the person who has lost something with the person who has found something in a cost-effective, enjoyable and simple way to help them in saving their time and effort.

This paper is structured as follows: Section II looks at the literature and describes the work related to locating the missing items and connecting the owners of lost items with individuals who have found these items. Section III discusses the analysis of the distributed questionnaire. The following section provides the basis that will be followed in the matching algorithm. Section V illustrates the diagrams that are used to model the system and Section VI gives two prototypes of the system's interface. We conclude in section VIII with a summary of what has been introduced in this research study along with the future work of the system.

2. Literature Review

In recent years, advances in technology in general, and social computing in particular, have led to proliferation in research examining how these networks can facilitate better communication amongst individuals [e.g.10]. In the context of the lost and found for personal possessions, there are few research studies which have been made for the purpose of locating missing objects, however; most of them were concerned with detecting the exact location of the missing object through using technologies such as Radio Frequency Identification (RFID) readers, ultrasonic position detection systems and sensors [5,6 and 7]. There are three examples of such research studies, first one is a support system for finding lost objects using spotlight [5] which were developed to locate the objects indoors using light notification technique. Another example was the system named: Where's My Stuff? [6] and was designed for helping visually impaired individuals to find their missing objects within a range of 30 meters through using Bluetooth-enabled tags which can be activated via an application installed on devices that have Bluetooth technology. The third one was mainly relying on a concept

common to our proposed idea in that it adopts a community-based reporting system to trace the lost/found items. On the other hand, it relies on using RFID readers which are embedded in mobile phones to scan objects' RFID tags and send the gathered data to the server-side software to find the objects' owners [8]. Furthermore, [7] provides a full analysis of the type of lost objects, places where they have found, persons who have lost them and the search strategies which were used based on distributed surveys. In addition, through our search for similar systems, three websites have been found which are developed to provide services similar to our proposed idea. These websites are: Lost my stuff [1], The Internet Lost and Found [2] and Mafgod [3][Figure 2]. As for the language of those websites, the first two websites are using the English language. However, the third one is an Arabic website and by comparing them to our system, we are planning to use the Arabic language as the main language and we are going to provide the option to use the English language if necessary. Moreover, Mafgod is dedicated to serve people who have lost or have found mobile phones only. In contrast, the Locate it! System is not limited in serving a small segment of the society; almost all kinds of items can be reported as lost or found without any limitations. Furthermore, Lost my stuff [1] website is designed to rely on volunteers who are registered on the website and have specified their locations. Thus, whenever an item is reported as lost, the system forwards the request to a volunteer who exists in a location near from where the item was lost to provide help in finding it. As a result, it doesn't use an algorithm to match items with each other and generate recommendations. Also, it doesn't have the functionality where anyone can report a found item. On the other hand, we are planning to implement a recommender system which is based on the comparison of the lost items versus the found items which are stored in the database and generate recommendations to assist the user in locating his/her items in a short time.



Fig. 2 The three websites

In addition, we can consider The Internet Lost and Found [3] website to be the most similar system to our system. This website and our system have a common functionality which is allowing the registration of places that are sometimes relevant to specific events. For example, registering conferences, seminars, workshops, restaurants, malls ... etc. Thus, you can think of our system as a big box which acts as a container of many small boxes.

As best of our knowledge and from the comprehensive research that has been done so far, there is a lack of an Arabic interactive system which serves people in recovering their belongings and the purpose of our system is to bridge this gap. Furthermore, to increase the user satisfaction and to simplify the process of locating the lost items, we will make our system available as a website and as a mobile application. We chose to implement two versions of the site, an online web based version and another mobile application because many of our target users are users of smart phones and it is more efficient in reporting an item as either lost or found to make the process of helping people in finding their items faster.

3. Survey

As a part of this study, a survey has been developed and it was intended to explore the requirements of our systems and to gain a sufficient understanding of the intended users' desires. This survey was created and distributed online. Our sample of respondents consists of 75 individuals recruited from a convenience sample; all of them were Saudi Arabian nationality. The survey was comprised of questions to explore patterns of user behavior and their

experiences in losing items and trying to relocate them. It also examined the demand of creating a social network for the purpose of letting people share their missing and found things.

The analysis of the survey shows that 89% of the respondents specified that they need an automated system to help them in locating their missing stuff and 78% stated that they have lost something in the past and they didn't find it yet. These results confirm our idea that there is a gap which needs to be filled. In addition, 16% of our sample participants said that they have made announcements about their lost stuff in the social networks. Although this ratio is quite small, it is acceptable due to privacy issues, since some people don't want to disclose such information to be available to the public in social networks because there is a possibility to be stolen by other persons whom might search for it and find it faster [Table 1]. Furthermore, the questionnaire has listed 19 item types and has asked the respondents to indicate the item types that have been missed before. The goal of this question is to pinpoint the item types that need to be existed in add lost/found item form (Section VI). The answers of this question show that 50% of the sample have lost their mobile phones before, 45% have lost their flash memories, 39% have lost their keys and a ring, 33% have lost a bracelet, 24% have lost a necklace, 23% have lost a wallet and a watch, 17% have lost a book, 15% have lost a notebook, 12% have lost a bag, 11% have lost their ID's and a hard disk, 8% have lost their iPods, 7% have lost their laptops and iPads, and 4% have lost their passports [Table 2]. Moreover, it is important to note that our system will have a service that allows the admin to add other item types depending on the users' needs.

Table 1: Survey's Yes/No questions

Question	Yes	No
Do you need an automated system to help you find your lost items?	67 respondents	8 respondents
Did you lose an item in and haven't find it yet?	59 respondents	16 respondents
Did you use social networks to announce for a lost item?	12 respondents	63 respondents

Table 2: Item types

<i>Item type</i>	<i># of respondents who have encountered this loss</i>
Passport	3
ID card	8
Mobile phone	37
Keys	29
Bag	9
Laptop	5
Wallet	17
Ring	30
Bracelet	25
Necklace	18
iPad	5
iPod	6
Tablet device	1
Watch	17
Game	8
Book	13
Notebook	11
Flash memory	34
Hard Disk	8

On the qualitative section of the survey, there is an area that allows respondents to write additional comments which might give the target users the chance to specify additional functionalities to be added to the system. Some of them want the system to employ multiple languages, other respondents indicated the need to provide a delivery service to deliver the located items to their homes, and others want the system to serve people with reading disabilities by pronouncing the words written in the user interface. Finally, some wrote that the fast response from the system is the most important service that leads to a successful project.

4. Matching Algorithm

As described in the previous sections, our project is mainly dealing with three types of stakeholders:

- 1- The person who has lost something.
- 2- The person who has found something.
- 3- A person from a venue side, who is responsible for keeping track of the lost and found items for a specific place such as restaurants and airports.

So it is clear that there is a matching involved in the process of pairing the lost item with the found one. As a result, this section describes how the Locate it! system will perform the matching process and the basis which we are going to follow in writing the source code. To make the

result of the matching process accurate and to increase the possibility of reaching the correct results, there are several characteristics of the lost/found items which were taken into consideration when implementing this project, these factors are:

- 1- The brand of the lost/found item.
- 2- The type of the lost/found item.
- 3- The place [City and street] where the item was lost or found.
- 4- The color of the lost/found item.
- 5- A photo of the lost/found item.
- 6- The material of the item, i.e. metal, leather,..
- 7- Additional specifications if there are marks which uniquely identify the lost/found item (if applicable).

After asking the user to provide the system with the required information of the lost/found item and storing them in the database of the system, the system is going to search about an item with similar characteristics by comparing the factors of the added item with the lost/found items which are stored in the database depending on its kind. For example, if the added item is lost, the system is going to search about a match in the found items database and vice versa. In addition, if the system finds one or several similar matches of a lost item, the system is going to present their photos to the person who found it. Therefore, if the founder confirms one of these pictures and finds that it is the same as what he has, the system will offer two choices for him. The first choice is to give him the contact information of the person who owns this object and they will contact each other either by phone or email to deliver the item. The second choice is to make our system as a broker between the two parties, and the system administrators will take the responsibility of delivering this item to his owner and we may deal with one or several shipping companies for this purpose.

5. System Models

As a part of the analysis and design phases of the system, it is essential to draw graphical representations to demonstrate the structure of the system. In this paper, DFD Context Diagram and Use Case Diagram have been chosen to represent the system. The following sub sections provide a high level modeling of our system and thus they represent the system as a set of functions, the input/output for each one and the actors involved.

5.1 DFD Context Diagram

The structural approach is followed to model Locate it! System because this system is better described by functions rather than classes. Thus, figure 3 conceptualizes the system by showing the entire system as a single process. Moreover, it represents the information exchange between the actors from the external environment and the system.

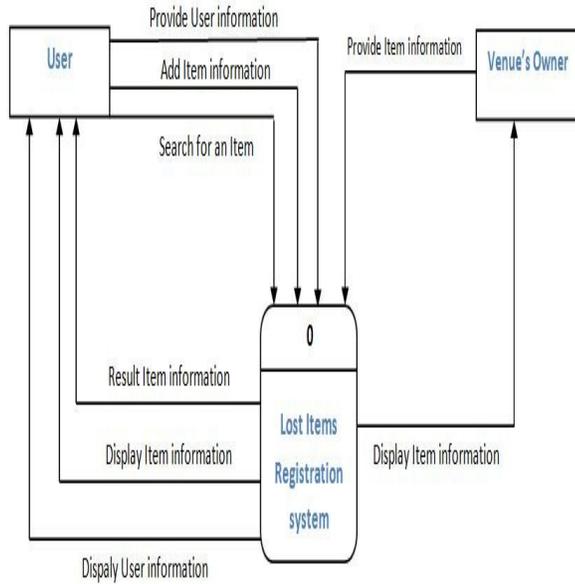


Fig. 3 DFD Context Diagram

5.2 Use Case Diagram

In order to clarify and organize the system's requirements by describing "who" can do "what" with the system, the Use Case Diagram is provided [figure 4]. This diagram shows the main system functions that can be done by each actor of the system. These actors are the Venue Owner, the User which can be the person who has lost or found an item and the last actor is the Administrator which is responsible for managing the system.

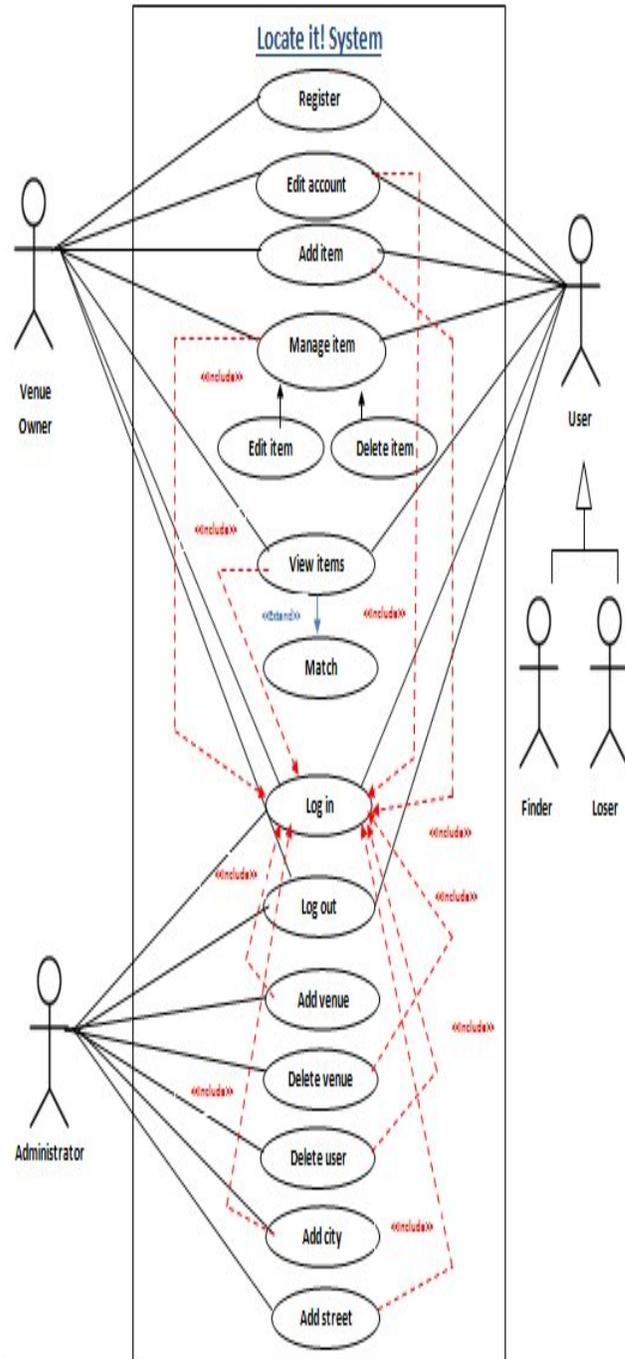


Fig. 4 Use Case Diagram

6. Prototype

A prototype for the Locate it! system has been developed. The prototype is comprised of two forms, one is the registration process form and the other one is for adding a lost/ found item.

6.1 Registration Form

In the below registration form the user has been asked to provide his personal information so the people won't have problems when trying to communicate with him.

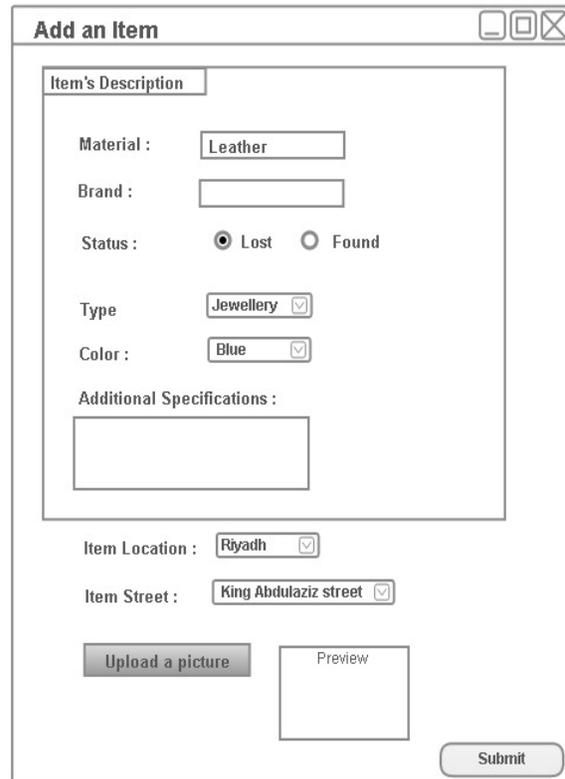


The screenshot shows a web browser window titled "Registration". The page content includes a welcome message: "Welcom To Missing stuff web site ... Please provide the following information so we can be able to communicate with you." Below this, there are several input fields: "First Name", "Last Name", "Email Address", "Mobile Number" (with an example "055xxxxxxx"), and "City" (with a dropdown menu showing "Riyadh"). A "Submit" button is located at the bottom right of the form.

Fig. 5 Registration form

6.2 Report Item as Lost/Found Form

In "add an item" form, the user is asked to provide different item's information and indicate the status of it whether it was lost or found, this is important to classify the item's situation when the user request for lost/found items. And thus, display it in an organized manner. In addition, the item's location and street were required to be filled by the user in order to organize the items based on their location. This will simplify the process when searching for a lost/found item which is located in specific place. Furthermore, the user has the ability to enter any additional information in the "additional specifications" text area and also can provide an image for the item by pressing the "upload a picture" button.



The screenshot shows a web browser window titled "Add an Item". The form is titled "Item's Description" and contains several fields: "Material" (text input with "Leather"), "Brand" (text input), "Status" (radio buttons for "Lost" and "Found", with "Lost" selected), "Type" (dropdown menu with "Jewellery"), "Color" (dropdown menu with "Blue"), and "Additional Specifications" (text area). Below these fields are "Item Location" (dropdown menu with "Riyadh") and "Item Street" (dropdown menu with "King Abdulaziz street"). At the bottom, there is an "Upload a picture" button, a "Preview" box, and a "Submit" button.

Fig. 6 Report an item as lost/ found form

7. Conclusion

By relying on the contribution of people in online social networks, the idea of this project has been proposed to help people in finding their missing objects by creating an Arabic online social community where people can easily report their lost and found items. Moreover, the ability of creating small virtual boxes for venues such as shops and seminars is supported by this system. This project will start to cover the areas in Riyadh and will expand to cover the Kingdom of Saudi Arabia. This paper introduces the analysis and design of this interactive environment. We have looked at the literature to find how the problem of locating missing items has been solved previously and compare our system's functionality with the existing systems. A survey has been collected from seventy five participants to explore their requirements and to know their experiences in missing their objects. In addition, the use case diagram and the context diagram have been mentioned in this paper to model the system and represent its functions and actors. Furthermore, two prototypes of the system have been provided which are the registration form and the report an item as lost or found form. The main purpose of this project is to take the advantage from the

dynamic data in social networking to create a community of people helping each other and collaborating for locating the objects in a secure and reliable way.

References

- [1] Lost my stuff, Place: [Online]. Available: <http://www.lostmystuff.net/index.php>, Year 2010.
- [2] The Internet Lost and Found, Place: [Online]. Available: <http://www.lostandfound.com/>, Year 2013.
- [3] R. Mohammed , Mafgod, Place: [Online]. Available: <http://www.mafgod.com/>, Year 2006.
- [4] D. M. Boyd and N. Ellison, "Social network sites: definition, history, and scholarship", *Engineering Management Review, IEEE* , Vol.38, No.3, Year 2010, pp. 16-31.
- [5] N. Toyohisa, K. Hideaki, and K. Susumu , "A support system for finding lost objects using spotlight", In *Proceedings of the 7th international conference on Human computer interaction with mobile devices & services (MobileHCI '05)*, Year 2005, pp. 321-322.
- [6] K. Julie , P. Shwetak , T. Arwa , G. Brian , W. Jennifer , and A. Gregory , "Where's my stuff?: design and evaluation of a mobile system for locating lost items for the visually impaired ", In *Proceedings of the 8th international ACM SIGACCESS conference on Computers and accessibility (Assets '06)*, Year 2006 , pp. 103-110.
- [7] Rodney E. Peters, Richard Pak, Gregory D. Abowd, Arthur D. Fisk and Wendy A. Rogers, "Finding Lost Objects: Informing the Design of Ubiquitous Computing for the Home".
- [8] G. Dominique , B. Oliver , and M. Florian , " Supporting a mobile lost and found community ", In *Proceedings of the 10th international conference on Human computer interaction with mobile devices and services (MobileHCI '08)*, Year 2008 , pp. 407-410.
- [9] The State of Social Media in Saudi Arabia, Place: [Online]. Available: <http://www.thesocialclinic.com/the-state-of-social-media-in-saudi-arabia-2012-2/> , Year 2012.
- [10] M. Marti and V. George , " I seek you: searching and matching individuals in social networks ", In *Proceedings of the eleventh international workshop on Web information and data management (WIDM '09)*, Year 2009 , pp. 67-75.

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