

I-Mailbox

You have got an intelligent mailbox

SE 705 Human Computer Interaction Term Project

Spring 2008-2009 METU

Hasan Gündüz Aydın – 1164466

1. Introduction

Today, computers are becoming highly integrated into our daily lives. This fast is addressed as ubiquitous computing in technological terminology. They are everywhere and part of our daily tasks. They enhance the quality of living. I-Mailbox is one of the outcomes of this technology-driven interaction paradigm. It is a usual mailbox enhanced with technological features which ease our lives and enhance the quality of it. These features include finger-print controlled access, mail scanning, e-mail notification of received mail and e-mail warning of pending mail. In fact 'I' in the name stands for intelligent.

2. Motivation

Hard mail is still one of the most common means of communication despite the fact that on-line or e-communication surges day by day. So why not to make use of the high technology and take the hard mail features a bit ahead.

First of all, it likely that losing the key is the most common problem with mailboxes. Although there are more than one key for the mailbox, it is highly likely that all of them are missing or there is an emergency so we open mailbox by breaking the lock and then it is a useless mailbox (Figure-1). I-Mailbox has no key. Instead, for authenticated access it provides finger-print scanner and/or password protection via its num-pad.



Figure-1

Secondly, one has to check the mailbox regularly for new mail. Mostly users do not get the mail until it is piled since either they do not bother just for some mail or they forget about it. I-Mailbox has notification features for these issues. It scans the mail and e-mails the scans to registered users. It can also warn the users again by e-mail if mail is not taken for a period of time. E-mail feature can be seen as futuristic but it is not. Internet is becoming more and more common and an inevitable need such that cities are being covered by wireless broadband technology. This technology provides wireless internet over wide areas [1].

3. User Profiles

Mailboxes are used for postal services. Basically there is a provider of the service that is postman and a consumer of the service that is the owner or user of the mailbox in our case. User profiles will be examined based on this observation.

- Postmen as Service Provider

Postmen usually have certain paths or regions for delivery. They deliver the mail belong to the addresses on these paths. Most of the time there is mail needs to be delivered to each address. So they can only allocate a limited time for each address. The limitation on time is crucial for the service. The only problematic issue about the I-Mailbox for postmen can be the mail scanning feature. Scanning should not time consuming. However this cannot be a problem since scanner resolution will not be big for mail envelopes. A low resolution will be enough for scanner and the time to scan in this resolution will be short enough for an effective service.

- Owner of the Mailbox as Service Consumer

Households are the owners of the mailboxes. There are usually more than one key of the mailboxes, one for each member of household. However most of these keys are kept at home. Due to this fact usually mail is not taken regularly, it is taken when mailbox is full. Simplicity of I-Mailbox allows it to be used by each member of household; however its customization needs a literate adult following the instructions at the manual very carefully. The owner of the I-Mailbox should set a password and register the finger-prints of the potential users for access features. He should set the scanner parameters (resolution, white and black scanning, colour scanning) and wireless parameters (wireless account, pending mail time limit, e-mail addresses). Customization process does not deprecate the simplicity and functionality of the I-Mailbox. Once it is done carefully, no interference is needed later.

4. Design Guides

Mailboxes are one of the common simple, by their nature, but significantly effective tools. Idea is to provide one a private space for personal mail communication. Here keywords are private and communication. They are private for the owners. Unauthenticated access is not desirable. They are used to receive incoming mail and send mails, if postal service provides as in some countries postmen collect the sent mail.

As it is seen above mailboxes' functionality is crucial but if they were not so simple, they would have been replaced by something else. These two keywords, simplicity and functionality lead to following the design principles:

- Feedback

I-Mailbox interface differs from usual mailboxes with technological extensions. Interface should provide audio and visual feedback for the users from different technological background so that they can both be directed for the correct functionality and track their actions.

- Visibility and Mapping of Functionality

Mailbox is a simple tool, so does I-Mailbox. And this simplicity is caused by the a few effective functions which are apparent to the user. Scanner slot is for delivering mail. Num-Pad and finger-print scanner is for the user accessing and inputting. LED screen is for outputting information.

5. Prototype Design

I-Mailbox is nothing but a mailbox with a touch of technology. There are a few additions of technological parts such as small scanner, finger-print scanner, keypad, led screen, wireless module (Figure-2).



Figure-2

The following use cases of functions provided by I-Mailbox summarize the design.

- Use Case: Mail Delivery

Postmen push the envelope in from the slot. When scanner detects the envelope, it starts taking it in while scanning. Meanwhile both audio and visual feedback is provided about the ongoing scanning process (Figure-3).



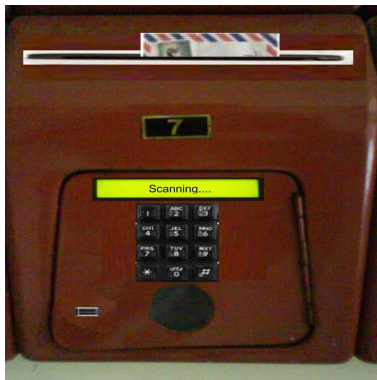
(a)



(b)



(c)



(d)



(e)

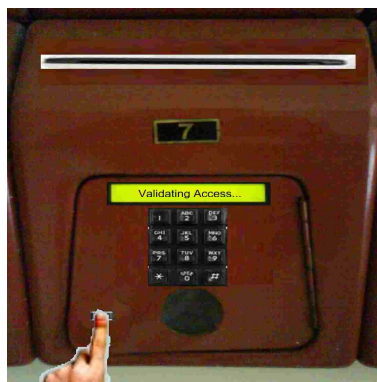
Figure-3

- Use Case: Accessing

Authenticated access can be done either by finger-print scanner (Figure-4) or password protection (Figure-5). User is provided feedback about the process.



(a)



(b)



(c)

Figure-4

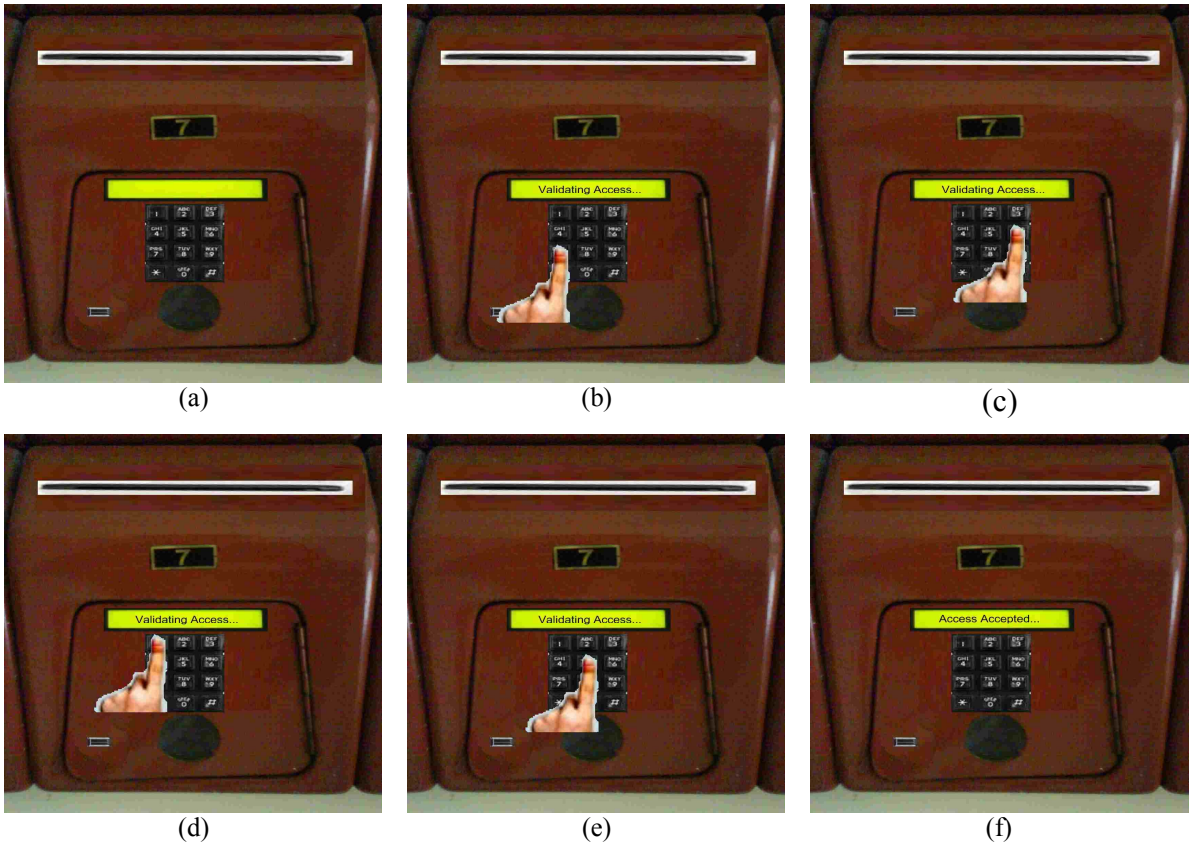


Figure-5

- Use Case: E-Mail Notification

When I-Mailbox is in stand-by mode, if there has been a mail delivery which has not been notified, it checks the wireless connection and prepares separate e-mails for each envelope and sends them to all of the registered e-mail accounts. The structure of the e-mails is simple but informative (Figure-6). I-Mailbox stores the scans so that it can warn the user periodically until the mail is taken.

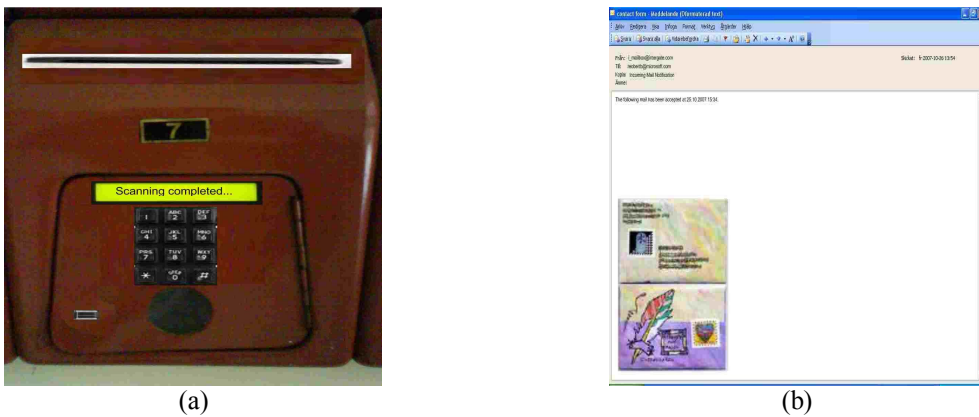


Figure-6

- Use Case: E-Mail Warning

When I-Mailbox is in stand-by mode, it checks if mail is taken on time or not. If mail is not taken for a pre-defined period of time, it prepares separate e-mails for

each envelope and sends them to all of the registered e-mail accounts. The structure of the e-mails is simple but informative (Figure-7). Since the scans are stored warnings can be sent periodically until the mail is taken.



Figure-7

6. User Evaluation

I-Mailbox is a mailbox with advanced technological features. Since the users have various technological backgrounds, each of these features should be demonstrated clearly. So storyboard prototyping methodology has been deployed. Namely, Springboard storyboard creator has been chosen for the case due to its effectiveness and availability as free-trial [2]. Each feature is depicted as a sequence. Each sequence depicts the interaction with the I-Mailbox for a specific feature using consecutive frames.

During evaluation, a short description of I-Mailbox and its features is provided. Then each feature is demonstrated using storyboard. At the end users are asked to fill in an evaluation form (Appendix A). The evaluation criteria are based on the usability and/or functionality of each feature and the I-Mailbox as a whole system. In the form first of all users are asked to grade the usability and/or functionality of each feature using a 5-level scale ranging from “Absolutely Disagree” to “Absolutely Agree”. Secondly, they are asked to provide any feedback about how it should be like for more usability and functionality.

Evaluation Group

I-Mailbox users may have various technological backgrounds so evaluation group content should reflect this diversity. Evaluation is done with a group of 7 participants. All of them are university graduates except one and they are familiar with recent technology. All except housewife regularly use e-mail. They all use their mailboxes actively, with

different habits and frequencies though. The following table depicts the professions and technology background of the users (Table-1)

Professions	Technology Background	E-Mail User
1 Instructional Technologist	Good	Yes
4 Computer Engineer	Very Good	Yes
1 Psychologist	Average	Yes
1 Housewife	Poor	No

Table-1

Evaluation Results

All participants have answered the usability and functionality questions and most of them have provided feedback. The ones who have not provided feedback mentioned their satisfaction about the features. The following table summarizes the answers to the usability and/or functionality questions which are graded using a 5-Level scale ranging from “Absolutely Disagree” to “Absolutely Agree” (Table-2).

Question	Answer(Number of Participants)
Usability of the mail delivery feature	Disagree(3) , Neutral(2) , Agree(1) , Absolutely Agree(1)
Usability of the accessing feature	Agree(5) , Absolutely Agree(2)
Functionality of the accessing feature	Neutral(1) , Agree(3) , Absolutely Agree(3)
Functionality of the e-mail notification feature	Absolutely Agree(7)
Functionality of the e-mail warning feature	Neutral(1) , Agree(3) , Absolutely Agree(3)
Usability of the I-Mailbox	Agree(6) , Absolutely Agree(1)
Functionality of the I-Mailbox	Agree(6) , Absolutely Agree(1)

Participants have also provided various feedback about the features based on their usage habits. The following table summarizes the feedbacks (Table-3).

Feature	Feedback
Mail Delivery Scan	<ul style="list-style-type: none"> • Time may be a constraint • Multi scan can be more helpful • If scanning is fast, no problematic • Happy to know that user will be informed
Accessing	<ul style="list-style-type: none"> • No key problem • Finger-print scanner is safe • Eye Retina Scanner is also an option

	<ul style="list-style-type: none"> • Sweating may affect the scanner
E-Mail Notification	<ul style="list-style-type: none"> • E-Mail is a good and common choice • SMS may be an option • E-mails may serve as a mail archive • Filtering notification may be useful
E-Mail Warning	<ul style="list-style-type: none"> • SMS may be an option • If user is not home, no need for a warning
I-Mailbox as a whole	<ul style="list-style-type: none"> • Good but MUST be cheap • What about magazines, they are big • Labels should be provided for visual feedback • Audio and visual feedback is a MUST • Unauthenticated access trials may be e-mailed • E-Mail queries may be useful for learning the current state • Chemical Warning: Anthrax,

Table-3

7. Evaluation Critique and Re-Design

Participants have provided various feedbacks. Some of them are useful and they can be added to I-Mailbox. However some are not related with the initial design principles of I-Mailbox. I-Mailbox should be a simple and effective tool. Adding more complex functionality would make I-Mailbox an intricate tool which will increase cost and in fact worsen both functionality and usability.

Mail Delivery: Due to the time constraints for postmen, I-Mailbox scanner is a fast low-resolution scanner. In fact speed, resolution and other parameters are configurable. Mail envelopes vary in size. Of course, I-Mailbox can not take in every kind. It can only take in envelopes under a certain type, however there may be different I-Mailbox types varying in size so that users can choose the one they needed.

Accessing: Finger-print scanning is a good natural mapping replacing keys. It can also be accompanied with password protection.

E-Mail Notification: E-mail is a very common tool for communication in the Internet world. Likewise cell phones are also part of modern life. And in fact cell phone networks are much more than common than broadband wireless networks. SMS notification can also be added to I-Mailbox. Categorization of mails and/or filtering notifications may

require more advanced capabilities which are against simplicity design principle. Instead, e-mail functionality can be used effectively for more customized usage. E-Mail querying with a well-defined interface can be integrated into I-Mailbox. Users can query the incoming mail by sending e-mail to I-Mailbox.

E-Mail Warning: SMS technology can easily be implemented likewise e-mail in I-Mailbox. Warning feature is easily configurable that is its functionality is on demand based.

I-Mailbox: I-Mailbox certainly enhances the quality of our daily life. However it is a simple tool and it is a certain fact that must be cheap. I-Mailbox may not be that much cheap due to the cost of today's technology. Though, considering the pace of the technological advancements especially nano-technology, it is highly likely that the cost of I-Mailbox -even with nano-sensors for chemical tests like anthrax- will be affordable soon. I-Mailbox user profile obviously covers a wide range of people with different ages and backgrounds. Therefore, audio and visual feedbacks are very crucial for the design. Feedbacks are provided for each feature as much as possible for the initial design. Instructive and informative labels can be added to design with a clear layout of controls. Similarly more instructive and informative messages can be provided via LED screen and they can be articulated for a better audio feedback.

8. Conclusion

I-Mailbox is a simple but effective daily life tool with advanced features. The idea is to combine traditional mailbox with technological features. Simplicity and functionality is keywords for the idea, however I-Mailbox may not be available for today due to relatively high cost. But it is highly likely to be part of our daily life soon considering the day-by-day advancements of technology.

References

- [1] Broadband Wireless Internet
http://www.bwif.org/broadband_wireless_internet.html
http://auth.nycwireless.net/hotspots_map.php
<http://www.wirelessderry.org/>
- [2] Springboard Storyboard Software, <http://6sys.com/Springboard/>

Appendix A

I-Mailbox Evaluation Form

1. Mail Delivery

- The mail delivery feature of I-Mailbox is easy to use for a postman.
Absolutely Disagree
Disagree
Neutral
Agree
Absolutely Agree
- Please comment on how mail delivery feature should be like to be more easy to use for a postman.

2. Accessing

- The accessing feature of I-Mailbox is easy to use for a user.
Absolutely Disagree
Disagree
Neutral
Agree
Absolutely Agree
- Please comment on how accessing feature should be like to be easy to use for a user.
- The accessing feature of I-Mailbox enhances the quality of daily life.
Absolutely Disagree
Disagree
Neutral
Agree
Absolutely Agree
- Please comment on how accessing feature should be like to enhance the quality of daily life.

3. E-Mail Notification

- The e-mail notification feature of I-Mailbox enhances the quality of daily life.
Absolutely Disagree
Disagree
Neutral
Agree
Absolutely Agree

- Please comment on how e-mail notification feature should be like to enhance the quality of daily life.

4. E-Mail Warning

- The e-mail warning feature of I-Mailbox enhances the quality of daily life.
 - Absolutely Disagree
 - Disagree
 - Neutral
 - Agree
 - Absolutely Agree
- Please comment on how e-mail warning feature should be like to enhance the quality of daily life.

5. I-Mailbox

- I-Mailbox using is easy to use for a user.
 - Absolutely Disagree
 - Disagree
 - Neutral
 - Agree
 - Absolutely Agree
- Please comment on how I-Mailbox should be like to be easy to use.
- I-Mailbox enhances the quality of daily life.
 - Absolutely Disagree
 - Disagree
 - Neutral
 - Agree
 - Absolutely Agree
- Please comment on how I-Mailbox should be like to enhance the quality of daily life.