



LegIM

The Evolution of Instant Messengers

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1. Introduction

An instant messenger (IM) is an important collaborative tool both in the professional and personal environment. There are many IMs in this social media age with target communities exceeding billions of people. There is a lot of potential for IMs. From ICQ to AIM to Slack and WhatsApp, we have definitely come a long way. Instant Messengers took off in the 1990's and they have evolved in design and technology to remain up to date with the requirements of the users. Their evolution has changed the way people communicate. They weren't just used in business, but also to keep in touch with family and friends all over the globe. What used to be a costly long-distance call quickly became a few keystrokes nearly free of charge. With the advent of the smartphone, chat rooms and IM's have given way to multi-platform applications like Facebook Messenger, WhatsApp and Twitter as forms of Web 2.0 instant messengers. Through these apps we can broadcast our messages for everyone to see.

2. Motivation

Our primary question was: how did these IM programs and applications gain so much popularity that they became an integral part of our lives? Our study was focused on some of the current most famous and popular IMs. We decided on these IM's through the survey we conducted initially in the class. As the need for collaboration and communication increases, users require higher quality and more advanced features in IMs. Some of the traditional IMs survive and are still widely used. However, many of them do not meet the evolving requirements, and lose their market share. We wanted to find out what made these IMs popular. One of our secondary questions was whether the companies behind the IMs influence people in a good or bad way to make them popular, or if these IMs are popular because of their user interface and ease of use. Moreover, there are no instant messengers that possess all of the features required by some users in the current market. We wanted to find out what made each IM unique. Therefore, we think it is important and beneficial to research the features and designs that make an instant messenger useful and appealing to users. For the deliverables of the project, we researched the popular IMs that are currently in use and used the information we learned through our research to put forward a design guideline for a potential new IM.

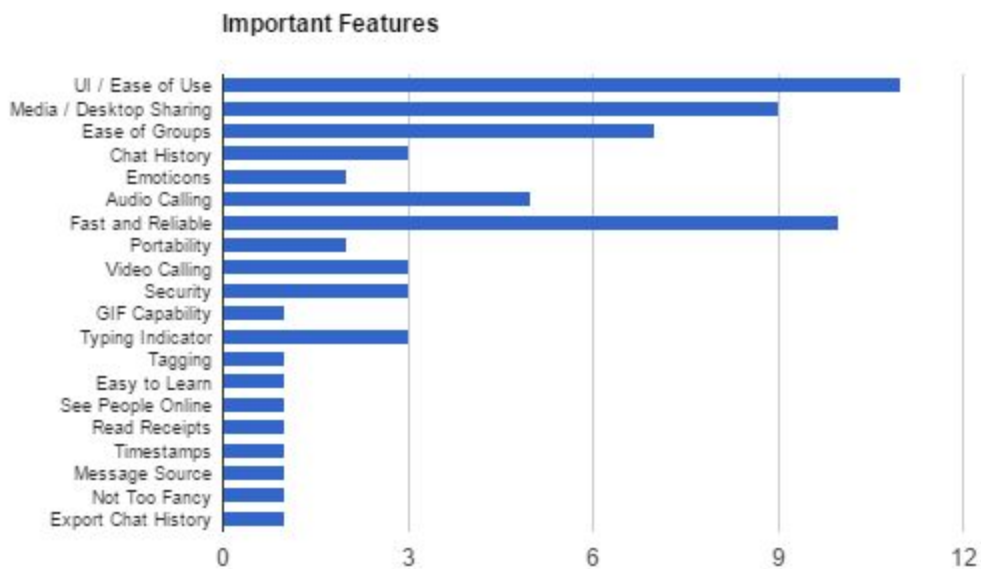
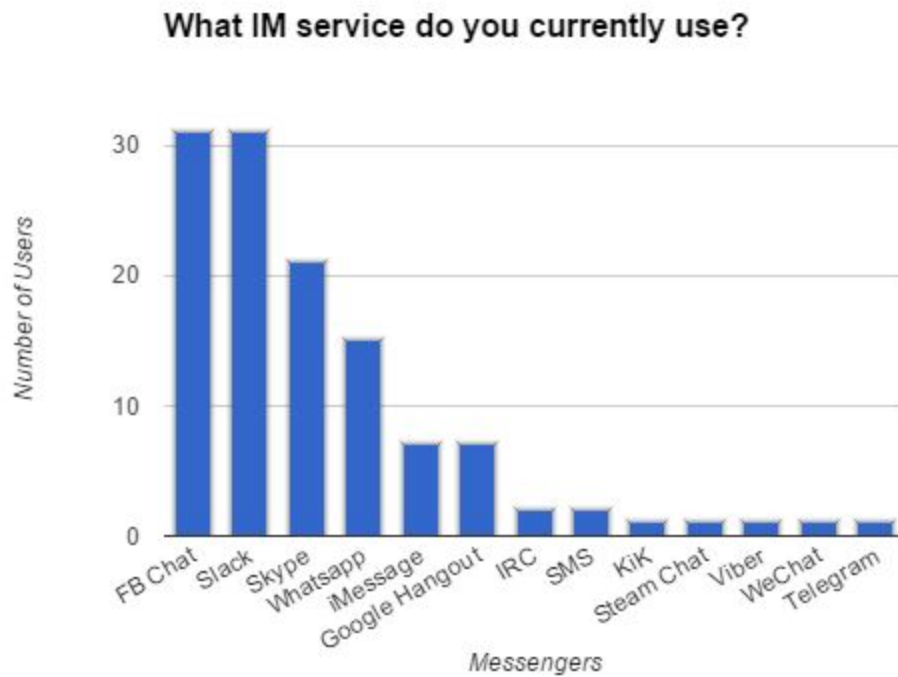
3. Methodology

In this project, we used a variety of methods to collect our data. This included a survey, a case study, and multiple reference reviews and controlled experiments. Our project contains 5 phases, and each of those phases uses differing methods.

Phase 1: Survey

In this phase, we wanted to collect data on which messengers are currently popular and what features are important to users. We did a survey in our CSCW class to collect the related data. Below are some charts showing our survey results for popular IMs and their features.

Note: The entire survey and its results can be found in the Appendix section.



Phase 2: Case Study

Based on this data, we selected 5 different IMs (Facebook Messenger, Whatsapp, WeChat, MSN Messenger, Skype) to focus our research on. Each one of us researched one IM using online articles and other resources (with references cited in each individual paper). We were mainly looking into their UI and important

features. All of the IMs, except MSN (due to discontinuation), were downloaded and tested by each of us. From these tests, we were able to provide detailed Use Cases in our reports. We conducted this user experiment on our own and gathered data for our reports.

Related Files (Available in LegIM Github repository) :

Report_On_WeChat_Messenger.pdf ,

Report_On_MSN_Messenger.pdf,

Report_On_FB_Messenger.pdf,

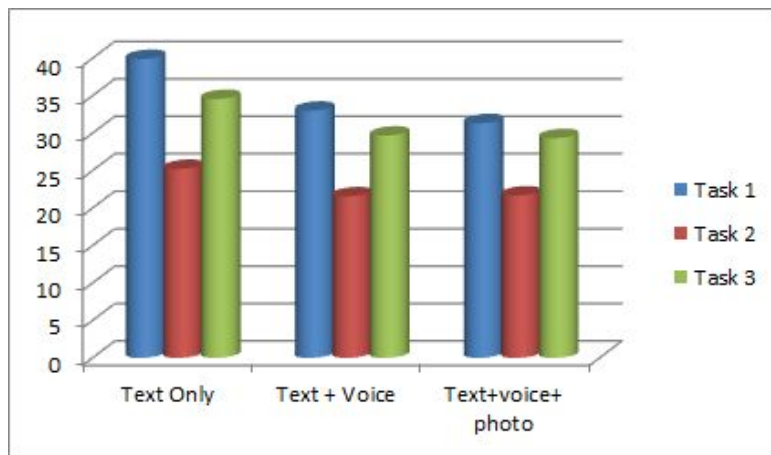
Report_On_Whatsapp.pdf

Phase 3: Controlled Experiments

This is an additional phase specifically for WeChat. In most messengers, there are three different types of correspondence: text, voice and image. We wanted to know how well these 3 types of messages perform in regards to efficiency of communication. In order to do this, we conducted a controlled experiment on WeChat users. We got them to finish 3 different tasks and find out which mix of the 3 types has the highest efficiency. We found that when they were allowed to use all 3 types of communication, voice messages were the most frequently used.

Related Report: WeChatExp.docx,

DataSet: WeChatNMessages.xlsx, WeChatTime.xlsx



Graph 3.3 Time to Finish 3 Tasks with Different Types of Messages in WeChat.

Phase 4: Prototype Design

In this phase, we came up with the features we wanted to include in our new IM, called LegIM. After deciding on the features, we made three separate low-fidelity paper-based designs so we could draw from multiple ideas for the final design. We then proceeded to create our higher fidelity UI in photoshop. The design is provided with additional details in Section 6 of this report. No user experimentation was done on our designs (it is the next step).

Phase 5: Reference Reviews

In this phase, we looked at some new technologies that could be used to provide a higher level of security for our IM. This will be necessary since our messenger is designed to be used in both social affairs as well as workplace collaboration. We researched papers and technical websites to learn more about Tor Network and TRC. These references are listed in the Reference section of this report and the detailed description and implementation of our IM is provided in Section 7 of this report.

4. Issues

We faced a few difficulties throughout our project, and were able to overcome them with group decisions and appropriate feedback.

The first difficulty we faced was while we were gathering results from our initial survey in class. We found out that we had a few open-ended questions in the survey that received various responses that were actually quite similar. For example, we had the open ended question, “What features would you add in an IM?” that produced the following responses:

- “ability to favorite messages in a chat ”
- “being able to highlight a particular message”
- “pin messages”

Here, all three of the responses indicate the same thing. To solve this issue, we recorded such responses in one category, which helped us narrow down and refine our result dataset. We took this approach due to limited time, as we had to move on with our research on individual IMs. We could have improved on our dataset by doing another survey with specific options (narrowed categories from the previous survey) for such questions instead of asking for an open-ended response.

We performed the survey in class and due to our mandatory usage of Slack, it generated a lot of response. However, we decided to exclude Slack as it was biased and we were already looking at 2 current IM services at that moment.

We decided to research on MOC to look at an IM that is popular for use in workplace areas. However, we could not find sufficient information on MOC as none of us had access to the software and barely little was found about its design guidelines. After feedback from our TA, we decided to replace our research on MOC with a different IM. Because of its popularity and availability of information, we chose Skype instead.

Another difficulty that all of our group members faced was trying to gather information about the technologies used behind the assigned messengers. Since the IMs chosen are all developed by some of the best, and largest, companies in the world, a lot of their back-end technology and code is unavailable to the general public. Although we were able to find some information, most of it was either very old or lacking in detail. This was a less serious problem, since we are mainly looking to design the UI component of the IM and not actually implement it. However, it did affect our individual reports. We could not provide the design implementation of each of the respective IMs. For our LegIM, we did research on TOR and wRTC and

applied them to our design. This let us introduce technologies that we had more knowledge and a stronger understanding of, rather than further looking for design guidelines for current and previous IMs.

While designing our IM, we were overwhelmed with the numbers of features to put into our UI. We made of the features of all the IMs we researched on and carefully picked the ones that would make our IM simple yet still functional and appealing. We chose to include text chatting, audio/video calling, groups, favorites, themes, connectivity to facebook, and chose to exclude features like wallet, whiteboard, games, activities, etc. These features could be added as updates to help us keep our IM fresh and current. We decided to use standard iOS icons where applicable to make the design more familiar and intuitive to the user.

According to our original timeline, we hoped to deliver a functional prototype for our IM LegIM. Due to extending our research into the IMs, we were only able to design the UI of the prototype but not make it a working one. This was also suggested by the TA. We prepared designs for an IM that either current IMs could adopt or developers could use to build a new IM in its entirety.

5. Analysis

	Noteworthy Features	Improved Features on our IM
WhatsApp	Themes: We can add pictures or themes to the background of WhatsApp Messenger making it more attractive.	We improved on this by making themes in our IM more specific. For example: Selecting themes like Kittens would rotate the pictures of kittens in the background and also added Facebook themes which is further explained in this report.
Skype	Group chat: Skype has a very robust group chat system. It has a high limit on users allowed in a group, and it is very easy to make groups. Users can edit both the title and image of the group to better signify what it represents.	We are including group chats with one additional distinction. Our IM will allow users to categorize group chats based on whether they are personal or for business.
WeChat	Wallet: WeChat signs contracts with banks to enable users to easily transfer money from their bank account to their WeChat account. Users can use money in WeChat to pay for different things and even transform large amount of money in business. [2] Voice-to-Text: When it is inconvenient for users to listen to voice messages, WeChat can convert them into text messages.	Wallet: After finishing the implementation of IM, we will try to discuss how we could cooperate with local banks to implement a wallet feature. Voice-to-text: We will borrow and use the Apple Vocal library for Siri as a database to convert voice messages to text messages.
Facebook Messenger	Tagging: While tagging is not present in Facebook Messenger, it is used heavily in the Facebook environment. Users can tag each other in photos and posts, just not within the	We took inspiration from the tagging features found in Facebook, Twitter, and Slack and integrated it into our IM to notify the user when they have been tagged.

	actual messenger application.	
MSN Messenger	<p>Video Calling: MSN was one of the first to provide webcam chatting and introduced a concept which is rapidly growing and makes long distance collaboration efficient^[15]</p> <p>Whiteboard: MSN let users collaborate through whiteboard by letting users draw/write/scribble/paint/colour on a plain window simultaneously.^[18]</p>	Video Calling is included in our IM with a layout compatible for iOS devices. It maintains a similar layout to the iOS phone call feature, which helps users familiarize with our UI,

Table 5.1: Features found in the IM's of interest, and what we did to improve or integrate them into our own IM

	WhatsApp	Skype	WeChat	Facebook Messenger	MSN Messenger
Synchronicity	Messaging (audio/video/image) is asynchronous. While voice calling is synchronous	Text chat is asynchronous. Voice and video chat is synchronous.	Text chat and voice message can be both asynchronous and synchronous. Video chat is only synchronous.	Main function (messaging) is asynchronous. Some features, such as voice and video calling are synchronous.	Chatting and File Sharing is asynchronous. Audio/Video Calling, Games and Activities work synchronously,
Physical Distribution	With 900 million users. They are located around the world, barring some countries where the software is banned	Usable anywhere in the world with an account and internet access.	Mainly different locations. Users seldom chat with WeChat when they can communicate face to face.	It is used worldwide, and users can interact at any time from any location with internet or cellular service.	Users can use MSN from anywhere and communicate over long distances with a valid account and internet access.
Scale	Minimum:2 Maximum: 100 in a single group. Voice call is limited to 2.	Minimum: 2 Maximum: 300 in a single group. Voice is 25, video is 10.	Minimum: 2 Maximum: 500 in a single group. Video call limited to 2.	Minimum: 2 Maximum: 150 in a single group. Voice and video call limited to 2.	Minimum: 2 Maximum: Up to N users in a single group. 2 max for webchat.
Number of Communities of Practice	Number of communities is denoted by N since the users are present worldwide. Social collaboration is the main purpose but it may vary.	N. Due to the freedom of the software, there isn't a limit to the number of CoP.	N. Users are from different backgrounds for different purposes. Therefore we cannot give a bound for the number of communities.	Groups or Teams can consist of any number (although limited to 150 / group) of users from any kind of specialty. This is why Facebook Messenger leans heavily towards N on this scale	MSN was used worldwide, and therefore the number of communities is N. Different Users collaborate in different ways, while using MSN as their communicatory platform.
Nascence	Updating frequently, the last major update gave rise to voice call feature in WhatsApp.	Developing. Skype is still being actively updated with new and improved features.	Developing. WeChat keeps releasing new versions with new features in order to improve and change the way users to communicate and collaborate.	Facebook Messenger has been updating with new features since its release. Notable additions it has seen since being introduced are stickers, gifs, and video calling.	MSN had various features, however it was easy to use them once the user was familiar. MSNs simplistic UI made operating it routine work.
Planned Permanence	Messages are archived in central whatsapp database for 30 days before they are deleted. The	Text chat is long term, all messages are stored in the cloud for 30 days	Short Term. A conversation on a certain topic, usually does not last for a long time.	Collaboration can be considered long term in Facebook Messenger. Messages are archived, and there is no limit on	Text Conversations are archived and stores. However, Calls and other activities cannot be stored. So, planned permanence

	smartphone itself can hold the message as long as the disk is not damaged or the data is not deleted.	and also archived locally. Voice and video are short term, no information from them is stored.		message space.	can be either short or long term.
Turnover	Even though the software is famous and has a customer base of 900 million users, the turnover is not that great. The profit itself is aimed at long term.	Fairly high. Groups are created and discarded very easily, but some groups can have a very low turnover.	High. In a conversation, it is very common for users to leave the conversation, spend some time on other affairs then come back to rejoin the conversation.	While ultimately it depends on the group and topic, turnover rate for a group discussion on Facebook Messenger is generally quite high as people can be added by any one of their contacts and can leave whenever they wish.	MSN was discontinued in 2014, and therefore its turnover is none as of now. It was high in the last decade when MSN was on the rise.

Table 5.2: Analysis of each instant messenger using the MoCA framework^[19]

6. Design

6.1 iOS Design Standards

Apple's design standards are constantly evolving to ensure the best user experience. One of the biggest design changes occurred during the jump from iOS 6 to iOS 7 where Apple scrapped its heavily beveled, gradient design in favor of a flat, simplistic one.



Figure 6.1: The difference between Apple's Calculator app on iOS 6 and iOS 7 respectively (left) and the Messages app (right).

As can be seen from the calculator app, the interface is very "heavy" on design elements. There is a large gap between buttons, effectively making the buttons smaller than they need to be and each button has a white gradient from the top to give them that "shine" that you see. While this does create a visual that represents real buttons, it sacrifices a lot of space and simplicity that its iOS 7 counterpart takes advantage of. Moving over to the Messages app, we see that it suffers the same "shine" effect on the text bubbles and other

elements, competing with the content itself (in this case, the text contained in the messages). The updated app shows a much more simplistic approach. At the top, you will notice that the border surrounding the buttons has been removed. Instead, colored text indicates there is some form of interactivity in the UI.

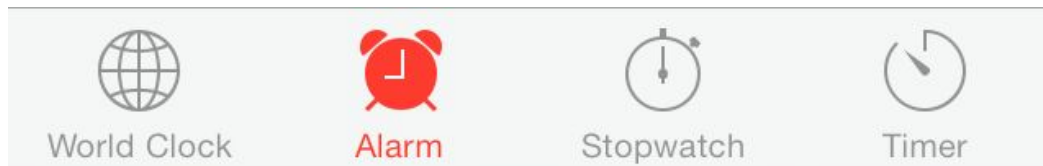


Figure 6.2: A common tab bar found at the bottom of a clock application

When it comes to menus, tab bars are a common tool for designers to use. Here, we can easily see the currently selected tab thanks to the use of a color-filled icon. The other tabs remain grey and use an outlined version of their respective icons. There is also a lack of borders between icons. The placement of the icons is intuitive enough that the user shouldn't need a border distinguishing where a button is no longer clickable, further reducing clutter.

6.2 Our Design

Note: We have a prototype that provides many more screens than the ones seen below located in the 'LegIM_Prototype.url' file

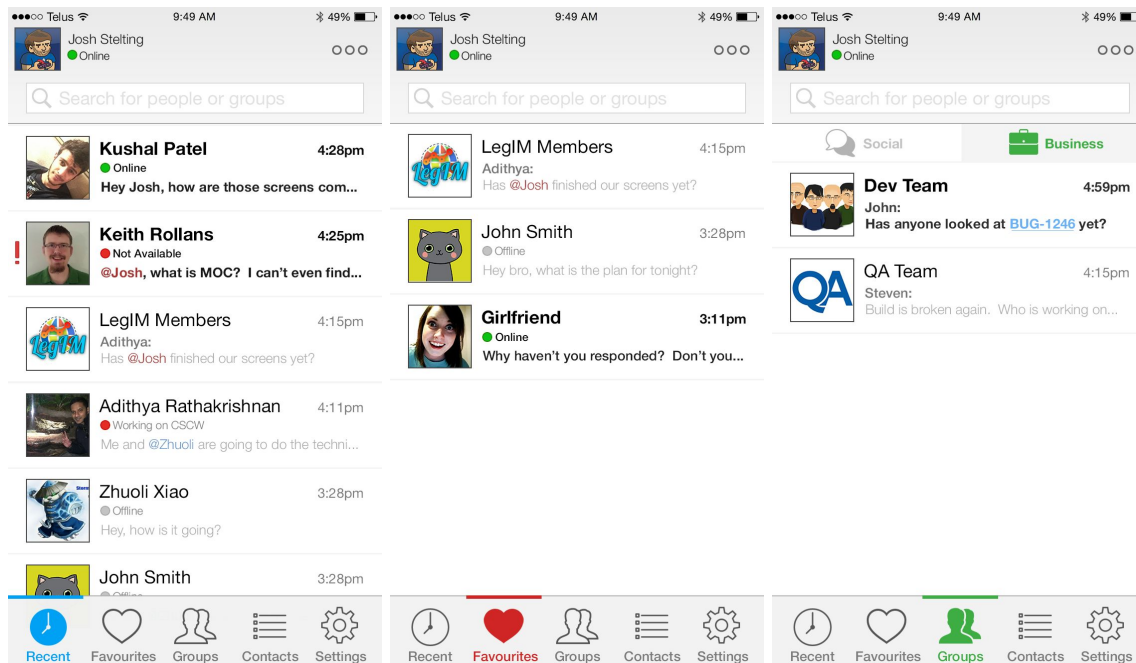


Figure 6.3: The LegIM app's various conversation categories.

Our prototype adheres to the iOS design standard to the best of its abilities while also taking from some of the most useful and innovative features of other IMs and implementing and improving them for the best user

experience possible. From the figure above, it can be seen how we took advantage of the tab bar design. A solid icon that is colored indicates the currently active tab. Some apps stress single color design, such as Facebook's blue accents throughout the app. We decided against this practice to make the icons more recognizable and add an extra layer of association with the tabs. While too many colors on a single view can cause clutter and confusion, our design avoids this by fading the icon out to grey when not selected so that the tab currently selected becomes the accent color of that view.

6.3 Features

6.3.1 Tagging

Tagging is a feature that will notify a user when they have been mentioned in a conversation that they are part of, even if the conversation itself is muted. For a user to be tagged, someone simply just need to prefix their name with "@". The tagged user will see a red exclamation mark appear beside a conversation that they have been tagged in and haven't opened yet.

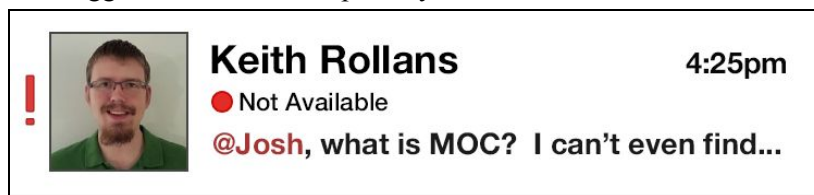


Figure 6.4: What a conversation looks like when the user has been tagged.

6.3.2 Themes

Themes provide a form of customization for the user. When chatting in a group or with an individual, a user can set a theme of their choosing. This applies a light background image to the conversation space. A user may even upload their own images for use. Facebook themes are something we have created to help stimulate conversation. If two users are logged in via Facebook, they can enable the "Facebook Themes" feature. This will search for facebook photos in which the two users are tagged in and apply them as a background image visible to both of them. Users can reminisce and reconnect with each other over the experience depicted in the photo.

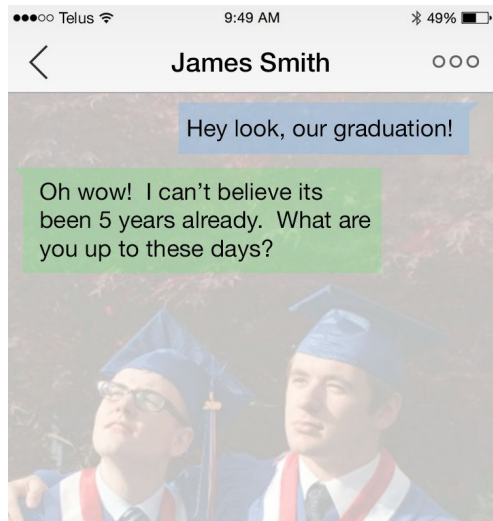


Figure 6.5: Two users are shown their high-school graduation this sparks a conversation between them

6.3.3 File Sharing

File sharing is a fairly straightforward concept, however one biggest problems faced within IM's is trying to find a file that was sent in the conversation weeks or months previous. While Facebook attempts to solve this problem by providing a list view of all the files sent in the conversation, there is still no way to organize them other than by most recent. We would like to implement a more organized approach to file sharing where the user can sort and search by filename for much easier file browsing.

6.3.4 Group Messaging

Group messaging works just as one might think it would. We would ensure that certain permissions are in place for certain users (Think admin roles that can remove for removing troublesome users and deleting spam messages). From a design standpoint, we wanted it to be clear who is saying what in the conversation, so each user is assigned a specific chat box color to help distinguish who says what. We also wanted a way to separate business conversation and social conversations. This opens up possibilities regarding higher security messaging (at the cost of speed) and custom notifications depending on whether it is a social or business group. See Figure 6.3 for a visual on the group conversations tab.

6.3.5 Favourites

Favourites allow users to easily mark important conversations or people to allow them to quickly find them under the "Favourites" tab. It works similar to how the recent conversations tab does, but only includes a subset of contacts of the user's choosing. See Figure 6.3 for a visualization.

6.3.6 Availability

Availability is a feature that doesn't make much of an appearance in some newer Instant Messengers, especially those on mobile devices. With availability options, we can link with calendar applications (similar to Skype for Business) to create custom messages when an event is occurring for a user. For example, they could be logged in but if they are in a meeting, they will display a red circle accompanied by "In a meeting". This feature is very useful in businesses.

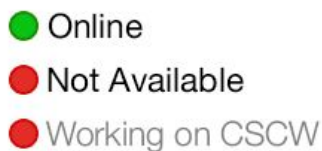


Figure 6.6: Various availability messages, including custom ones that can be set by the user

6.3.7 Voice & Video Calling

Voice and video calling is an important feature for any instant messenger and has almost become the standard for IMs. Our app would support the core features of video and voice calling. Conference calling would work similar to Google's Hangouts where sound recognition would bring up the person speaking at the moment, while others sit at the bottom of the screen as smaller screens.

6.3.8 Wallet

Wallet allows users to easily deposit money from bank account to messenger account, after which users can easily transport money as long as they input money amount and select friends from list. Moreover, wallet allow users to buy all kinds of tickets and pay bills via messengers.

7. Technologies

Currently there are more than 3.7 billion instant messenger users in the world ^[1]. They use IMs in daily affairs, as well as in their businesses. However, most instant messengers focus their communication protocols and technologies mainly on convenience and user interfaces rather than security. Some hackers can easily expose the vulnerabilities of IMs, perform attacks, and steal personal information and passwords from users. Our team plans to design and develop an instant messenger for workplace communication and collaboration and need to protect data of users against hackers. Therefore, we will embed security technology from TorChat Messenger into our software.

7.1 TorChat Messenger

TorChat Messenger is not an IM itself. Instead, it is an anti-censorship tool that imbedded into other IMs. The essential technology in TorChat Messenger is The Onion Network (TOR). With this technology, users can receive a hyper virtual IP which is hard to be tracked or monitor by third-party. It not only provides security and privacy to participants, but also enables users to bypass the banning of IM services within some countries. Moreover, to further increase the security, messages going through TOR network are safely encrypted and require the two involved parties to exchange a secret key when communicating.[6]

TorChat does not communicate via dark web, which is a collection of hidden websites and services. Instead it sends messages across a network of internet routers so their origin cannot be tracked. It reduces the cost of renting and setting up those services, and lowers the potential risk of receiving viruses or malware from the hidden websites. Any computers around the world can act as a node in the network and forward the packets.

7.1.1 Tor Network Principles

To join TOR network, users need to be TorChat buddies and authenticate themselves by proving that they are reachable through their .onion address. The TOR network calculates the outgoing address through a hidden service protocol and some algorithms to make sure they reach the correct counterpart.

After learning the destined address, users select the intermediate routers from a list based on their speeds and delays (routers are provided and authenticated by other TorChat buddies). After setting up the path, the TOR network will deliver packets through those routers one by one until all of the information reaches the final destination.

Path: User A-> R1->R2->R3->R4->R5->User B.

Each node only knows their next neighbor and previous neighbor. Ex. User A knows R1, R1 knows A and R2, R3 knows R2, R3..... Therefore, messages can reach User B successfully. When User B receives the message, he can return it without knowing User A's address, since B knows R5, R5 knows R4..... and R1 knows A. User B can use the same path until message reaches A.

If a third-party C interrupt between R3 and R4, he can only know the messages comes from R3 and needs to deliver to R4. He does not know where it is from originally, or where it should go in the end. Also, the message itself is encrypted. Therefore it is very difficult for C to monitor and perform an attack^[35].

7.1.2 Embedding TorChat

In our IM, we will apply the XMPP protocol, which is currently the most widely used protocol to transform data. XMPP protocol is a flexible and stable protocol that can be customized according to developers' and users' requirements. It is feasible to implement Tor Network embedded in our IM under XMPP.

Implementation of Tor Network: In our IM, users can choose between Social Mode and Business Mode. In social mode, Tor network will not be activated. We want our IM to run with a low cost and without a heavy burden on operators. Therefore, when a user goes into Business Mode and activates the Tor Network for the first time, we will require him or her to sign an agreement. This will allow us to contribute his or her IP as a router and save it into the RouterDB. Each time a user establishes a conversation in Business Mode, we will apply a built-in Shortest Path with Restriction Algorithm to calculate and set up the fastest and safest path for them.

Construction of Circuit: There are two types of cells (packets) in XMPP protocol: the control cells and the Relay cells. Control cell stores the commands such as padding, create and destroy, while relay cells contain additional headers storing information about payload encrypted in AES-128. Whenever we build up a path, the information containing the previous node and next node will be stored in relay cells. As the package is delivered down the path, this information will continually be renewed^[35]. When the whole conversation is finished, the destroy command in the relay cells will destroy the circuit, which will make it extremely difficult for hackers to track. In extreme cases, relay cells could be compromised by hackers. This could let them redirect and steal the packets by changing the next node address in the cells. To prevent these cases, we will encrypt all the address information in the relay cells using SHA-256 encryption.

7.2 SHA-256

SHA-256 is one of the newest and safest 256 bit cryptographic methods developed by the NSA. It contains a series of hash functions to encrypt text. A cryptographic hash is like a signature for a text or a data file. Then SHA-256 algorithm generates an almost-unique, fixed size 256-bit (32-byte) hash. This hash is a one way function; it cannot be decrypted back.^[2]

In our IM, we will install a hardware-based SHA-256 cryptographic unit in our main server. We will not only encrypt the contents in the messages with the SHA-256 unit, but also information stored in the relay cells. As a consequence, hackers will not be able to modify or tamper with the next node address in the relay cells headers to redirect the package. Even if they steal the package, they cannot decrypt it since the SHA-256 encryption is implemented in hardware unit rather than software.

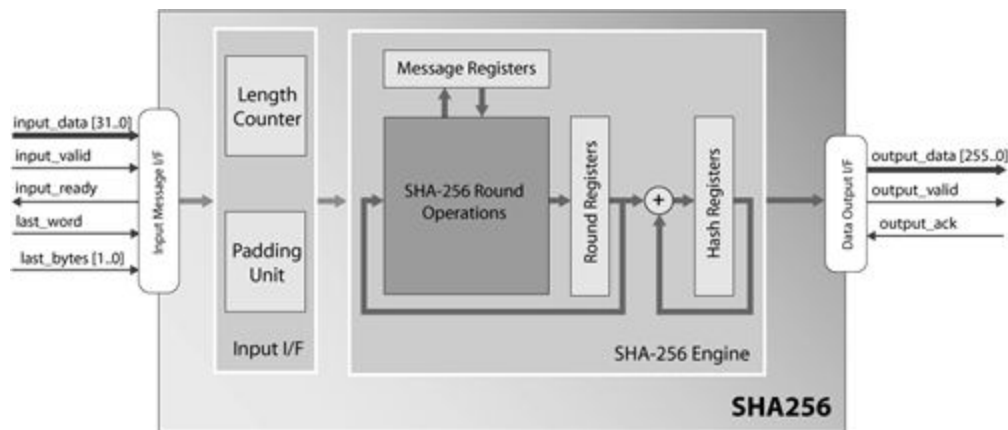


Figure 7.1: SHA-256 Cryptographic Unit

7.3 WebRTC

A p2p (peer to peer) plugin-free video/audio real time communication was a big challenge until a few years ago. With the introduction of WebRTC, everything changed. WebRTC offered a unique functionality, because it was open source, plugin-free, and had its technology built into browsers. According to Wikipedia, “Web Real-Time communication is an API definition drafted by the world wide web consortium that supports browser-to-browser applications for voice calling, video chat and P2P file sharing without the need of either internal or external plugins.” [27]

7.3.1 Technical details:

Browsers supported: Mozilla Firefox, Google Chrome, and Opera.

WebRTC implements three main APIs [27]:

- getUserMedia: to acquire user permission for accessing peripherals^[28].
- RTCPeerConnection: to set up an audio/video connection between users^[28].
- RTCDataChannel: to let p2p sharing occur^[28]

We can also use a Multipoint Control Unit, which is a server that handles large numbers of participants, to do selective stream forwarding and mixing or recording of audio and video. Also, gateway servers can enable a WebRTC app running on a browser to interact with devices such as telephones and other VOIP systems.^[28] There is also a framework for disaster communications that has been proposed which could enable communication between feature phones and computers using WebRTC. This potential framework could also allow for telephone communications without a mobile carrier.

7.3.2 Security:

WebRTC implementations use secure protocols such as DTLS and SRTP. Encryption is present in all aspects of WebRTC components. These components do not require separate installation and are updated whenever the browser is updated. Camera and Microphone access must be granted with explicit user permission, as seen in the basic UI.

All the above mentioned APIs are available in the latest version of Chrome, Opera and Firefox

7.3.3 Advantages:

The thing to note is that many web services already use RTC, but they all need downloads, native apps or plugins like Skype, Facebook and Hangouts. Downloading, installing and updating plugins can be complex, error prone and annoying. Also, plugins can be difficult to deploy, debug, troubleshoot, test and maintain. This process is an unnecessary hassle, and WebRTC can get rid of this hassle through having a very simple API. Additionally, WebRTC has low cost, high quality audio and video communication, as well as easy transmission of P2P data.

8. Future Plans

We have provided a UI design and technologies guideline to be implemented in LegIM application. The next step would be to build a functional high-fidelity prototype of our design, and use it to conduct user experiments. This will provide the feedback needed to improve our designs, and help us to design an even more user friendly UI and secure IM. This will also serve as a basis to get user input on what additional new features should be added. The most important thing to be aware of is the ever changing requirements of the users as a result of the development and introduction of new technologies.

The prototype we have provided for our design is based on the iOS format. In the future, we would also like to develop and design UIs for Windows, Mac and Android. Along with each these, we will need to do research on implementing this type of application efficiently in each OS. This may take place in the immediate future.

9. Conclusion

What makes an IM so popular? From our research, we found that the most important factors contributing to the success of an IM are an attractive and easy to use interface, and consistent evolution in order to meet the requirements of users. The results of our survey indicated that users prefer IMs that their friends and colleagues are using. They constantly want to stay in touch with each other, as well as stay up to date with new technologies. A good IM is one that is easy to use, which our design accomplishes by using icons that users are already familiar with. Because they are able to easily recall the function of these buttons from memory, they will be able to operate LegIM with little effort.

A popular IM is the one that offers new features and attracts its audience. Instant Messengers are something that can easily be made, but their success depends largely on how popular they can get. Users find themselves easily bored of IMs if they are not constantly updated or if they do not provide something new. Such was the case for MSN, who quickly saw a decrease in their users once IMs started growing and providing services on mobile devices as well. MSN provided design standards for an IM that some services still use today. Microsoft discontinued MSN after acquiring Skype^[17], which provided video calling services and gained popularity for its undisrupted service.

Do companies influence the popularity of these IMs? Yes, this is true as we have seen in the past decade. Microsoft influenced MSN, Google influenced their own IMs (Wave, Hangouts), and in today's market, Facebook dominates by providing social networking to billions of people worldwide. Almost all of the current IMs offer connectivity to Facebook, which can help boost an IMs popularity. Whatsapp offers this service as well and can easily be considered one of the most popular IMs right now ^[17].

We have researched 5 different Messengers collectively and gained an in-depth insight into their designs and technologies. We have learned throughout the project how to conduct research and apply it to our own product. We learned about the problems faced and how to tackle them with appropriate help and feedback. We learned to manage our project better as we progressed further and were able to pace ourselves according to our milestones more effectively over time.

After researching the IMs, we applied our understanding of their UIs and features to provide design and technical guidelines for a brand new IM. The key reason for this research is to provide users with an IM that offers a collection of new and recycled features from different IMs in a single application. From our survey, it was found that the common reason users switch to a different IM is because their friends are using it, or their current IM is discontinued or not receiving enough updates. Any IM that can offer text chatting and audio/video calling (basic features in today's IMs) needs more appealing and unique features to attract a vast user base. Our design provides these basic features along with some additional ones. We also have plans for more features to add in the future to help keep our IM fresh after launch.

Our research helps the community in various ways. We could not find any resources online that offered a comparison of the various IM services, and this makes our project more meaningful. Students can use our research to conduct further in depth research on a particular IM, or even all 5 of them. The design and Technical guidelines that we provided can save developers time by speeding up their design process. Current IM developers can use this research as a feedback on what features to add, and to not add. They can look at our method of recycling features and follow suit with their own IMs, although this seems to be the most common approach. Our reports can help collaborators choose what IM they would like to use, as we provide a good comparison and analysis of each of them.

As a group, we have learned the importance of collaboration throughout the term, and how we have made decisions as a group considering various options available to us. We have used Slack, Google Drive and Facebook to collaborate, and realized just how much IMs help when working as a group. Their asynchronous nature allowed us to work on our project at our own times and still communicate effectively. This only

solidified our desire to look into such messengers and allowed us to provide a better option that could make collaboration even more effective and efficient.

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Appendix

A1: Survey

Instant Messenger Survey

The purpose of this research project is to record data about different IM services and the reason for their usage, and as why people have to switch IM's over time. This is a research project being conducted by Team LegIM at University of Victoria.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. If you decide not to participate in this study or if you withdraw from participating at any time, you will not be penalized.

The procedure involves filling a survey that will take approximately 10 minutes. Your responses will be confidential and we do not collect identifying information such as your name, email address or IP address. The survey questions will be about IM's used and reasons for switching from previous IM's.

We will do our best to keep your information confidential. All data is stored in a password protected electronic format. To help protect your confidentiality, the surveys will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only.

1. What current Instant Messaging Service(s) do you use?

☐ Facebook Messenger

☐ Google Hangouts

☐ Apple Messages

☐ Skype

☐ WhatsApp

☐ Slack

Other (please specify)

2. What IM Services have you used in the past?

3. Why did you switch from your previous IM to your current one?

4. What features do you believe are important in an IM service?

5. What features do you think are useless in *your current* IM service

6. What features would you add to your current IM service?

7. How many friends do you talk to using your IM service?

- ☐ 1-5
- ☐ 6-10
- ☐ 10-20
- ☐ 21-50
- ☐ 50+

8. In your opinion, what is the importance of the following features in Instant Messengers?

Most Important

Important

Least Important

User Interface

☐☐☐

Portability

(available on laptop
and mobile
devices)

☐☐☐

Additional

Features (Group
chats, emoticons,
stickers, etc..)

☐☐☐

A2: Survey Results

What current IM services do you use?	
<i>options</i>	<i>count</i>
FB Chat	31
Google Hangout	7
Apple Messages	7
Skype	21
Whatsapp	15
Slack	31
IRC	2
KiK	1
Steam Chat	1
Viber	1
SMS	2
WeChat	1
Telegram	1

What IM services used in the past?	
<i>options</i>	<i>count</i>
SMS	4
Yahoo Messenger	7
Viber	2
Whatsapp	1
MSN messenger	23
ICQ	4
IRC	4
Skype	4
AIM	1
WeChat	1

KiK	1
Apple Messages	1
IBM Sametime	1

Why did you switch?	
<i>options</i>	<i>count</i>
Friends stopped using it	11
Discontinuation	7
new better IM available	13
more connections made due to new app	3
stopped receiving updates/became stale	5
video quality	2
popularity	7
moved to modern mobile tools	3
no support for other platforms (mobile)	1
moving to new country where people dont use it	1
requirement for school	3
too many services	1

Important features	
<i>options</i>	<i>count</i>
UI / ease of use	11
media sharing(inc desktop)	9
ease of groups	7
threaded discussion/chat history	3
emoticons	2
audio calling/voice notes	5
fast/reliable messaging	10
portability	2
video calling	3
message encryption / security	3
gif capability	1
ability to see someone type	3
tagging (to notify)	1

easy to learn	1
see people online	1
Read receipts	1
timestamps	1
showing source of message	1
not too fancy	1
export chat history	1

Useless features	
<i>options</i>	<i>count</i>
Emoticons	6
share location	1
stickers	6
Read receipts	3
spelling	1
high bandwidth requirement	1
pay to use	1
voice recordings	1
games	1
ads during voice calls	2
ability to see someone type	1
favouriting messages	1
calling landlines	1

Fetures you would add	
<i>options</i>	<i>count</i>
Satisfied with current features	3
share contacts	1
ability to favorite people/groups	1
voice chats	1
video message	2
integration with more services (google,dropbox)	1
lower bandwidth	2

encryption	1
p2p	1
gif capability	1
simplicity	1
highlight important messages within chat/thread	1
send/receive large files	1
file administration	1
Read receipts	1
multiple desktop sharing	1
default push-to-talk	1
titty emoticon / more emoticons	2
remove / delete messages	1
no ads	1

How many friends to talk to via IM	
<i>options</i>	<i>count</i>
1 to 5	3
6 to 10	7
11 to 20	15
21 to 50	6
50+	6

Importance of the following features			
<i>options</i>	<i>Most Important</i>	<i>Important</i>	<i>Least Important</i>
UI	20	15	3
Portability	19	14	4
Additional Features	9	17	12