Chapter 3

Requirements and its Analysis

3.1 Problem Definition

The process of locating and trying to reunite a lost item with its rightful owner is quite frustrating, tiresome and time-consuming. To overcome this, the lost and found application will be put to use. The users of the system mainly include students and the faculty, both of whom can report lost items and post, if they happen to lose an item. The system will revolutionize the process by simplifying and speeding up the process. The users can contact the owner of the item, keep track of the progress of their lost / reported item, view the lost items in an organized manner, etc. The administrator, for eg the lost and found department, would be the authority responsible for the application's management. The communication feature among two users of the application would be an important step in verifying the owner of the item. All these functionalities would allow a large number of students to connect and create a community, increasing the chances of locating an item effortlessly.

3.1.1 Sub-Systems

i. Login/Registration:

  a. The users would have to register for the first time.
  b. Once the users are registered successfully and authenticated, they can access the rest of the app.
  c. Once logged in, the users don't need to log in every time they wish to use the app, i.e they remain logged in unless they explicitly log out.

ii. Posting/Reporting a lost item:

  a. This sub-system is concerned with users being able to post or report a lost item by filling out and providing the item's description and the contact information along with the item's image as well.

iii. Item viewing:

  a. This sub-system displays all the lost items as well the reported items to the user in an organized manner.
  b. It filters the items according to various categories, date, etc.
  c. The uses can also view items that they have posted and also track its status.

iv. Profile management:

   a. The users can view their information and also edit their contact details.

v. Communication:

   a. The users, for e.g.: the owner of a lost item and its finder can communicate with each other through the in-app messaging.
   b. The users will be notified about important updates, matches or messages via in-app notifications and emails wherever necessary.

vi. Verification and matching:

   a. Once a new item is reported as lost, it is checked if any user has already found that item and the user will be alerted accordingly.
   b. If a user claims to be the owner of an item or claims to have possession of an item, they need to answer a few questions regarding the item in order to verify their ownership.

vii. Administration

   a. The admin can manage users, monitor reported/ lost items and answer queries.

viii.User Assistance

   a. This sub-system would allow the users to contact the administrator to overcome any difficulties or issues that they are encountering.

3.2 Requirement Specification

3.2.1 Requirement Gathering

The various ways to gather requirements are: -

1. **Survey/Questionnaire:**

   Questionnaires and surveys are basically a set of questions that are distributed among the stakeholders in order to get an understanding of the system. The questionnaires can be distributed to multiple stakeholders at the same time hence saving time and reducing the efforts required to gather requirements. One disadvantage of this method is the lack of flexibility to change the questions or add follow-up questions based on the response received.

2. **Interviews:**

   Interviews are usually conducted one-on-one. Interviews provide the flexibility of asking follow-up questions which can help gather more specific and detailed information. But the interviews can be time-consuming and the interviewee must have in-depth knowledge of the current system.

3. **Brainstorming:**

   In this method, the system is approached from every point of view and all the possible scenarios and their outcomes are thought of which include what-if scenarios and blue-sky ideas. The general idea is to break away from the existing convention and to figure out the various situations that take place in the systems to gather detailed requirements of the system. Role-play is an extension of brainstorming where various roles are enacted to replicate the situations and scenarios that take place which can help to develop a better understanding of the system.

4. **User Observation:**

   User Observation is one of the best to fully understand and discover how people and technology in the current system operate and behave. It gives us a realistic idea of how things actually work. It can be categorized into active and passive. Active observation takes place when the people being observed are questioned about the actions that they carry out to gain a better understanding of the process. Passive observations are better at getting feedback without any communication involved.

5. **Prototyping:**

   This method gives the users a chance to try out how their system would look and feel. This results in continuous feedback and based on the feedback, continuous changes and improvements are made, making it an iterative process. The prototypes are reverse engineered to discover the requirements along with the various other features and functionalities that would satisfy the stakeholders.

The Method I used and why?

I have used surveys /questionnaires to gather the requirements from the students of the college who constitute the majority of the user base. Apart from that brainstorming was used to figure out other possible scenarios and to think of their possible outcomes. I used Google forms to distribute the questionnaire. I also used interviews, asking questions about the current system in place and how things in the college operate. These interviews were answered by my guide and an administrative staff.

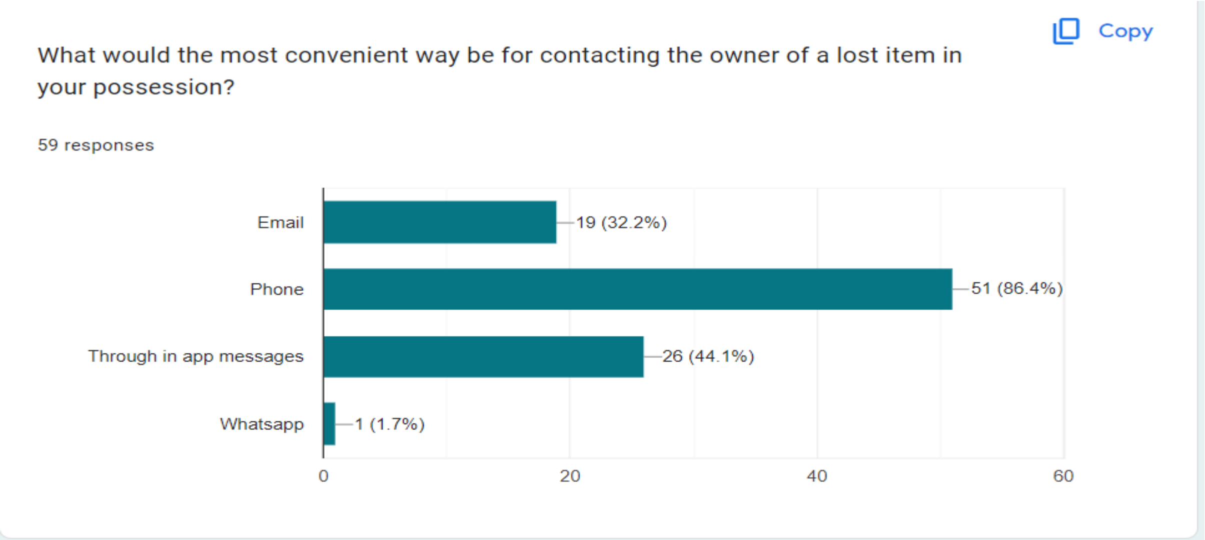
The interview questions included:

- How does the current lost and found department operate?
- Who can be the admin for the app?
- How AI can be integrated in the app?

The link for the google is as follows:
https://docs.google.com/forms/d/e/1FAIpQLSc6Pw-xDYexQH5Y9NslgVcCAO9crRhwNjof6EDWv-gym2JtuQ/viewform?usp=sf_link

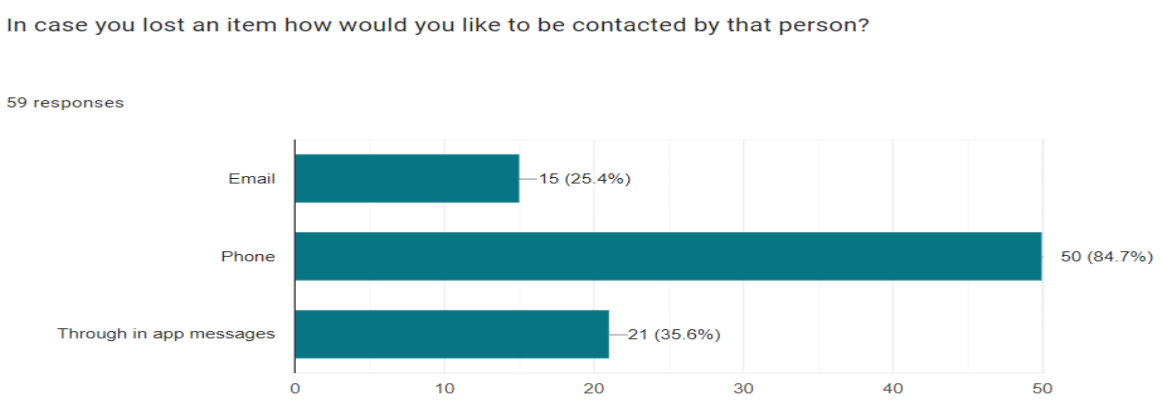
The link to the spreadsheet is as follows:
https://docs.google.com/spreadsheets/d/13A8RAn2stw_Lg6NtZAOh6Z26_QbrinDOh-Adczxg9gQ/edit?usp=sharing

The following are the results:



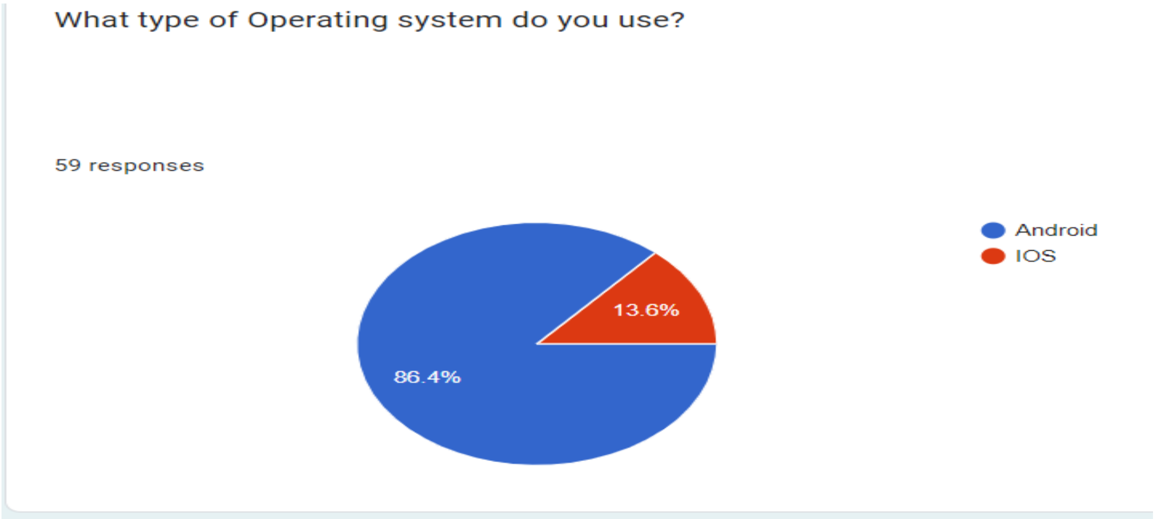
What would the most convenient way be for contacting the owner of a lost item in your possession?

59 responses



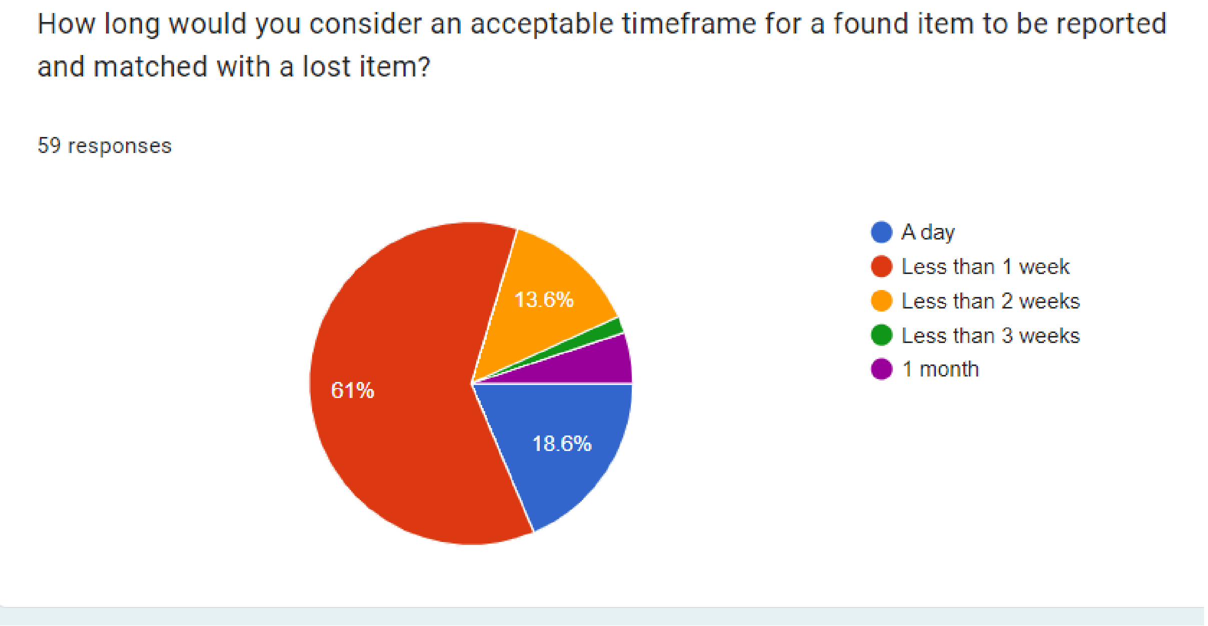
In case you lost an item how would you like to be contacted by that person?

59 responses



What type of Operating system do you use?

59 responses

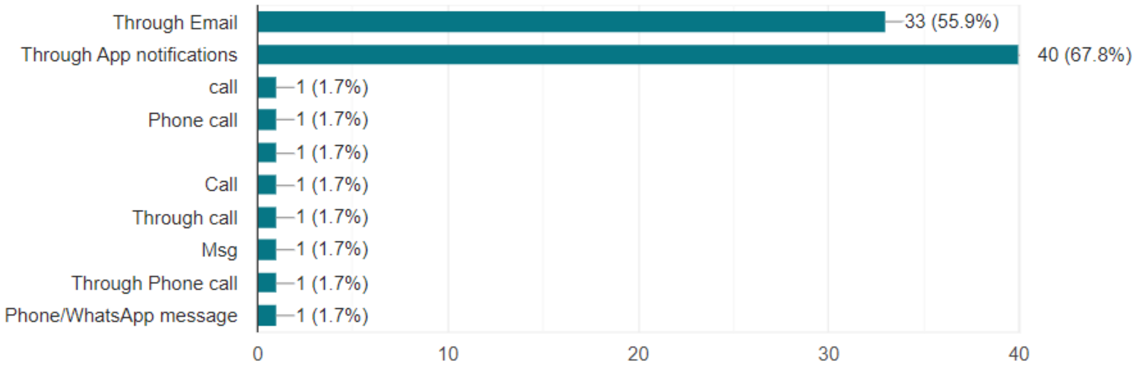


How long would you consider an acceptable timeframe for a found item to be reported and matched with a lost item?

59 responses

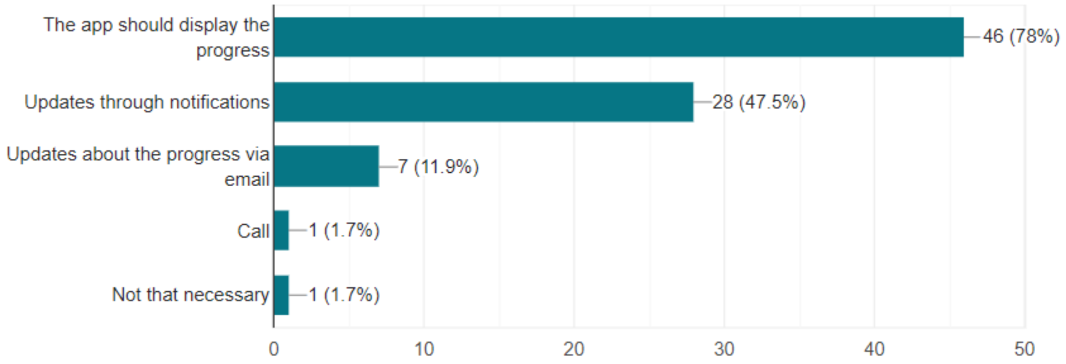
How would you like to be notified when someone finds a lost item that matches what you've lost?

59 responses



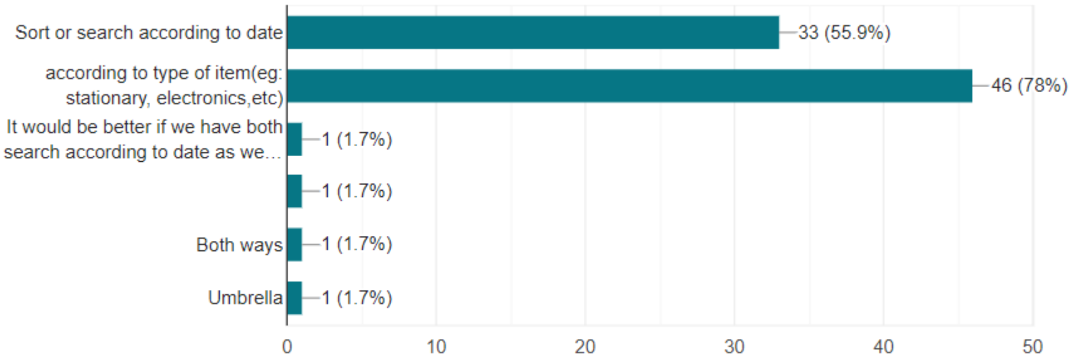
How would you like to track the progress of your lost or found item?

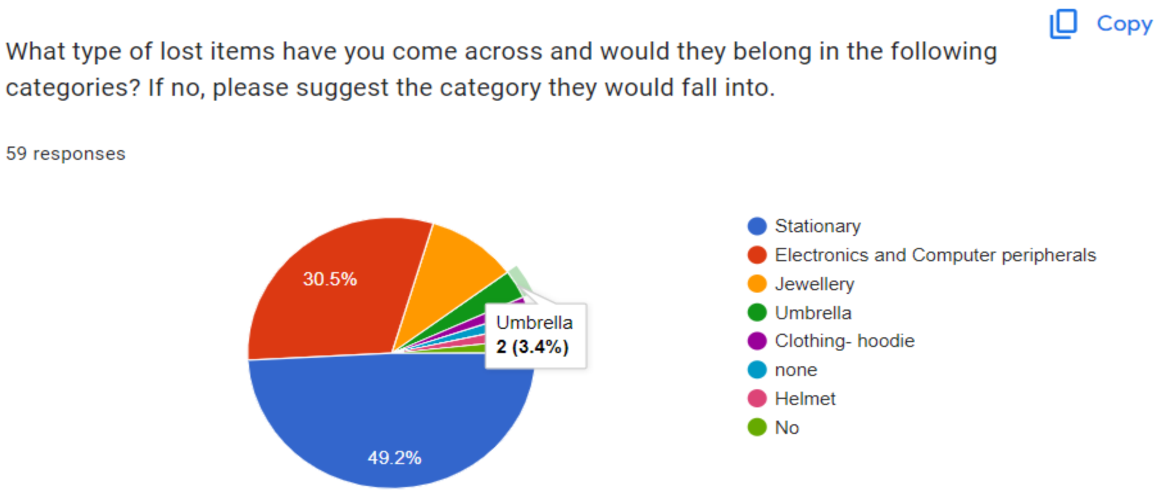
59 responses



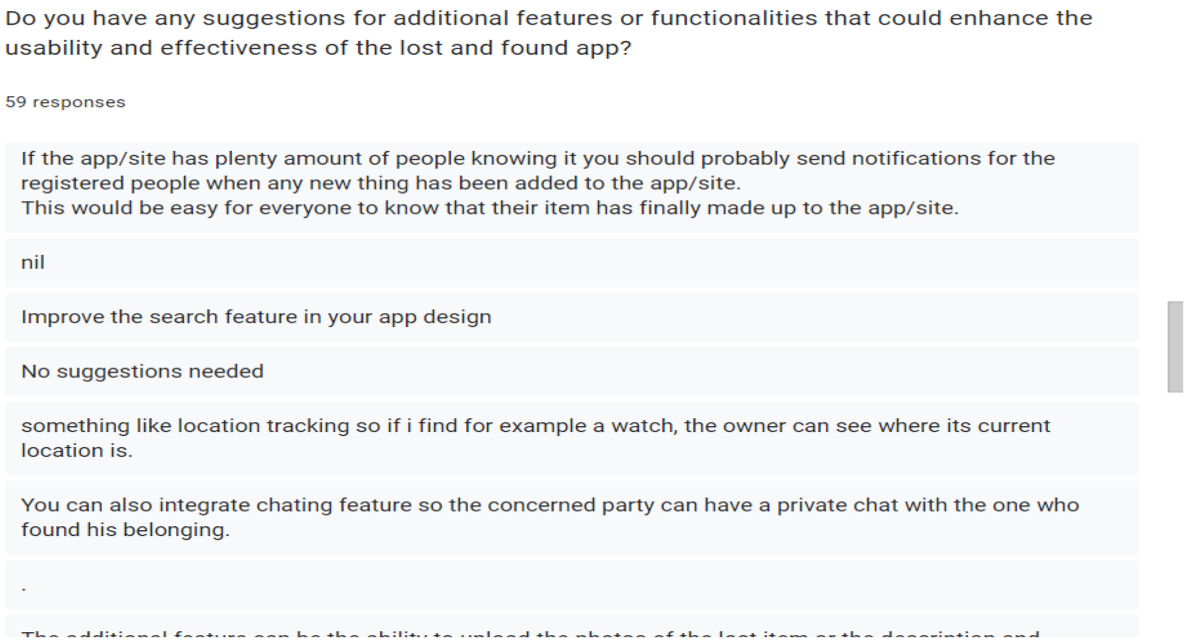
What specific criteria or filters you would like to have when searching or sorting the lost items?

59 responses




What type of lost items have you come across and would they belong in the following categories? If no, please suggest the category they would fall into.

59 responses


Do you have any suggestions for additional features or functionalities that could enhance the usability and effectiveness of the lost and found app?

59 responses

If the app/site has plenty amount of people knowing it you should probably send notifications for the registered people when any new thing has been added to the app/site.
This would be easy for everyone to know that their item has finally made up to the app/site.

nil

Improve the search feature in your app design

No suggestions needed

something like location tracking so if i find for example a watch, the owner can see where its current location is.

You can also integrate chating feature so the concerned party can have a private chat with the one who found his belonging.

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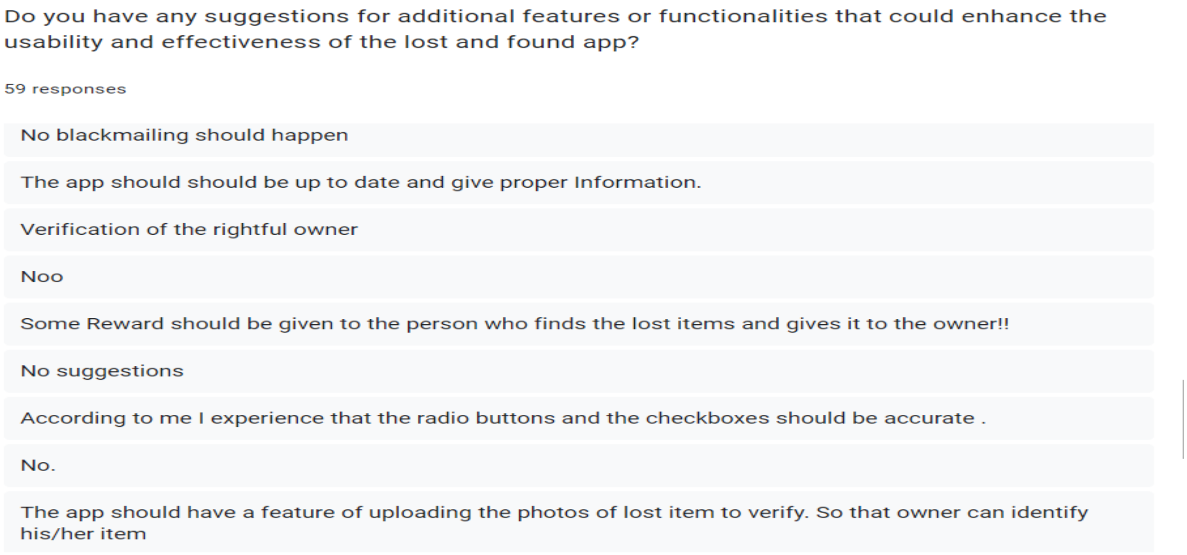
The additional feature can be the ability to upload the photos of the lost item or the description and


Do you have any suggestions for additional features or functionalities that could enhance the usability and effectiveness of the lost and found app?

59 responses

No blackmailing should happen

The app should should be up to date and give proper Information.

Verification of the rightful owner

Noo

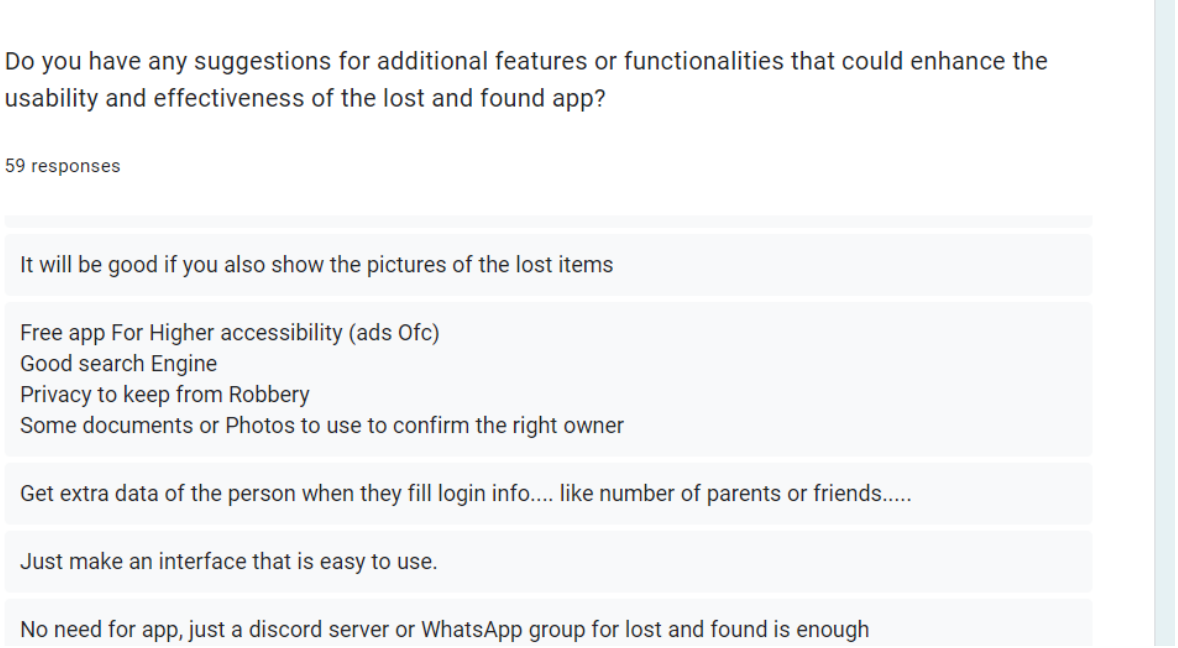
Some Reward should be given to the person who finds the lost items and gives it to the owner!!

No suggestions

According to me I experience that the radio buttons and the checkboxes should be accurate .

No.

The app should have a feature of uploading the photos of lost item to verify. So that owner can identify his/her item



Do you have any suggestions for additional features or functionalities that could enhance the usability and effectiveness of the lost and found app?

59 responses

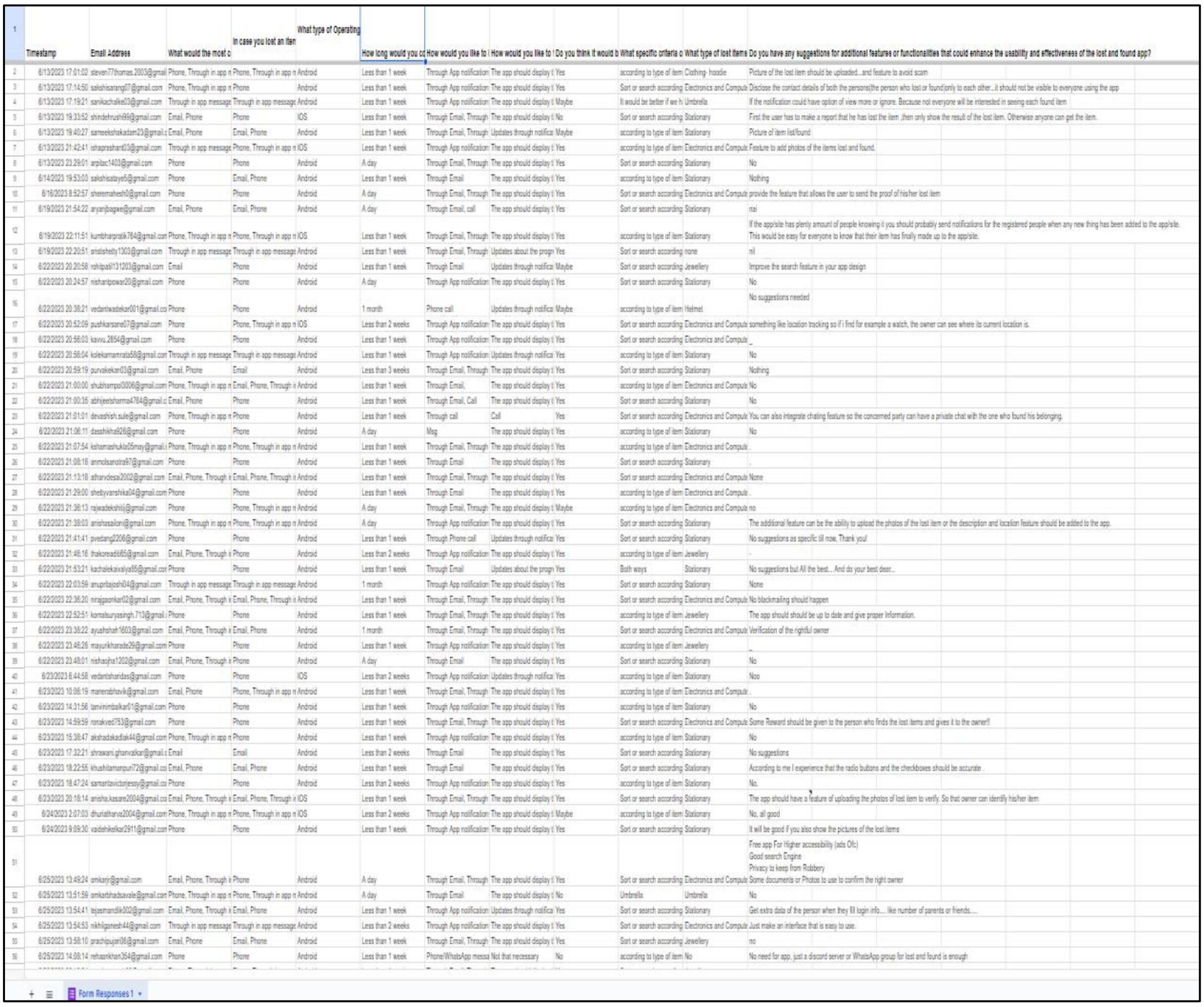
It will be good if you also show the pictures of the lost items

Free app For Higher accessibility (ads Ofc)
Good search Engine
Privacy to keep from Robbery
Some documents or Photos to use to confirm the right owner

Get extra data of the person when they fill login info.... like number of parents or friends.....

Just make an interface that is easy to use.

No need for app, just a discord server or WhatsApp group for lost and found is enough



1	Timestamp	Email Address	What would the most c	In case you lost an iten	What type of Operating	How long would you co	How would you like to	How would you like to	Do you think it would b	What specific criteria o	What type of lost items	Do you have any suggestions for additional features or functionalities that could enhance the usability and effectiveness of the lost and found app?
2	6/13/2023 17:01:02	steven77thomas.2003@gmail	Phone, Through in app n	Phone, Through in app n	Android	Less than 1 week	Through App notification	The app should display t	Yes	according to type of item	Clothing- hoodie	Picture of the lost item should be uploaded...and feature to avoid scam
3	6/13/2023 17:14:50	sakshisarang07@gmail.com	Phone, Through in app n	Phone	Android	Less than 1 week	Through App notification	The app should display t	Yes	Sort or search according	Electronics and Compute	Disclose the contact details of both the persons(the person who lost or found)only to each other...it should not be visible to everyone using the app
4	6/13/2023 17:19:21	sanikachalke03@gmail.com	Through in app message	Through in app message	Android	Less than 1 week	Through App notification	The app should display t	Maybe	It would be better if we h	Umbrella	If the notification could have option of view more or ignore. Because not everyone will be interested in seeing each found item
5	6/13/2023 19:33:52	shindehrushi99@gmail.com	Email, Phone	Phone	IOS	Less than 1 week	Through Email, Through	The app should display t	No	Sort or search according	Stationary	First the user has to make a report that he has lost the item ,then only show the result of the lost item. Otherwise anyone can get the item.
6	6/13/2023 19:40:27	sameekshakadam23@gmail.c	Email, Phone	Email, Phone	Android	Less than 1 week	Through Email, Through	Updates through notifica	Maybe	according to type of item	Stationary	Picture of item list/found
7	6/13/2023 21:42:41	ishaprashant03@gmail.com	Through in app message	Phone, Through in app n	IOS	Less than 1 week	Through App notification	The app should display t	Yes	according to type of item	Electronics and Compute	Feature to add photos of the items lost and found.
8	6/13/2023 23:29:01	arpitac1403@gmail.com	Phone	Phone	Android	A day	Through Email, Through	The app should display t	Yes	Sort or search according	Stationary	No
9	6/14/2023 19:53:03	sakshisatye5@gmail.com	Phone	Email, Phone	Android	Less than 1 week	Through Email	The app should display t	Yes	according to type of item	Stationary	Nothing
10	6/16/2023 8:52:57	sheremahesh0@gmail.com	Phone	Phone	Android	A day	Through Email, Through	The app should display t	Yes	Sort or search according	Electronics and Compute	provide the feature that allows the user to send the proof of his/her lost item
11	6/19/2023 21:54:22	aryanjbagwe@gmail.com	Email, Phone	Email, Phone	Android	A day	Through Email, call	The app should display t	Yes	Sort or search according	Stationary	nai
12	6/19/2023 22:11:51	kumbharpratik764@gmail.con	Phone, Through in app n	Phone, Through in app n	IOS	Less than 1 week	Through Email, Through	The app should display t	Yes	according to type of item	Stationary	If the app/site has plenty amount of people knowing it you should probably send notifications for the registered people when any new thing has been added to the app/site. This would be easy for everyone to know that their item has finally made up to the app/site.
13	6/19/2023 22:20:51	sristishetty1303@gmail.com	Through in app message	Through in app message	Android	Less than 1 week	Through Email, Through	Updates about the progr	Yes	Sort or search according	none	nil
14	6/22/2023 20:20:58	rohitpatil131203@gmail.com	Email	Phone	Android	Less than 1 week	Through Email	Updates through notifica	Maybe	Sort or search according	Jewellery	Improve the search feature in your app design
15	6/22/2023 20:24:57	nishantpowar20@gmail.com	Phone	Phone	Android	A day	Through App notification	The app should display t	Yes	Sort or search according	Stationary	No
16	6/22/2023 20:38:21	vedantwadekar001@gmail.co	Phone	Phone	Android	1 month	Phone call	Updates through notifica	Maybe	according to type of item	Helmet	No suggestions needed
17	6/22/2023 20:52:09	pushkarsane07@gmail.com	Phone	Phone, Through in app n	IOS	Less than 2 weeks	Through App notification	The app should display t	Yes	Sort or search according	Electronics and Compute	something like location tracking so if i find for example a watch, the owner can see where its current location is.
18	6/22/2023 20:56:03	kavvu.2854@gmail.com	Phone	Phone	Android	Less than 1 week	Through App notification	The app should display t	Yes	Sort or search according	Electronics and Compute	_
19	6/22/2023 20:56:04	kolekarnamrata58@gmail.con	Through in app message	Through in app message	Android	Less than 1 week	Through App notification	Updates through notifica	Yes	according to type of item	Stationary	No
20	6/22/2023 20:59:19	purvakekan03@gmail.com	Email, Phone	Email	Android	Less than 3 weeks	Through Email, Through	The app should display t	Yes	Sort or search according	Stationary	Nothing
21	6/22/2023 21:00:00	shubhampol0006@gmail.com	Phone, Through in app n	Email, Phone, Through i	Android	Less than 1 week	Through Email,	The app should display t	Yes	according to type of item	Electronics and Compute	No
22	6/22/2023 21:00:35	abhijeetsharma4784@gmail.c	Email, Phone	Phone	Android	Less than 1 week	Through Email, Call	The app should display t	Yes	Sort or search according	Stationary	No
23	6/22/2023 21:01:01	devashish.sule@gmail.com	Phone, Through in app n	Phone	Android	Less than 1 week	Through call	Call	Yes	Sort or search according	Electronics and Compute	You can also integrate chating feature so the concerned party can have a private chat with the one who found his belonging.
24	6/22/2023 21:06:11	dasshikha926@gmail.com	Phone	Phone	Android	A day	Msg	The app should display t	Yes	according to type of item	Stationary	No
25	6/22/2023 21:07:54	kshamashukla05may@gmail.	Phone, Through in app n	Phone, Through in app n	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	according to type of item	Electronics and Compute	.
26	6/22/2023 21:08:18	anmolsanotra97@gmail.com	Phone	Phone	Android	Less than 1 week	Through Email	The app should display t	Yes	Sort or search according	Stationary	.
27	6/22/2023 21:13:18	atharvdesai2002@gmail.com	Email, Phone, Through i	Email, Phone, Through i	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	Sort or search according	Electronics and Compute	None
28	6/22/2023 21:29:00	shettyvanshika04@gmail.com	Phone	Phone	Android	Less than 1 week	Through Email	The app should display t	Yes	according to type of item	Electronics and Compute	.
29	6/22/2023 21:36:13	rajwadekshitij@gmail.com	Phone	Phone, Through in app n	Android	A day	Through Email, Through	The app should display t	Maybe	according to type of item	Electronics and Compute	no
30	6/22/2023 21:38:03	anishasaloni@gmail.com	Phone, Through in app n	Phone, Through in app n	Android	A day	Through App notification	The app should display t	Yes	Sort or search according	Stationary	The additional feature can be the ability to upload the photos of the lost item or the description and location feature should be added to the app.
31	6/22/2023 21:41:41	pvedang2206@gmail.com	Phone	Phone	Android	Less than 1 week	Through Phone call	Updates through notifica	Yes	Sort or search according	Stationary	No suggestions as specific till now, Thank you!
32	6/22/2023 21:46:16	thakoreadi665@gmail.com	Email, Phone, Through i	Phone	Android	Less than 2 weeks	Through App notification	The app should display t	Yes	according to type of item	Jewellery	-
33	6/22/2023 21:53:21	kachalekaivalya85@gmail.cor	Phone	Phone	Android	Less than 1 week	Through Email	Updates about the progr	Yes	Both ways	Stationary	No suggestions but All the best... And do your best dear...
34	6/22/2023 22:03:59	anupritajoshi04@gmail.com	Through in app message	Through in app message	Android	1 month	Through App notification	The app should display t	Yes	Sort or search according	Stationary	None
35	6/22/2023 22:36:20	nirajgaonkar02@gmail.com	Email, Phone, Through i	Email, Phone, Through i	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	Sort or search according	Electronics and Compute	No blackmailing should happen
36	6/22/2023 22:52:51	komalsuryasingh.713@gmail.	Phone	Phone	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	according to type of item	Jewellery	The app should should be up to date and give proper Information.
37	6/22/2023 23:38:22	ayushshah1603@gmail.com	Email, Phone, Through i	Email, Phone	Android	1 month	Through Email, Through	The app should display t	Yes	Sort or search according	Electronics and Compute	Verification of the rightful owner
38	6/22/2023 23:46:26	mayurikharade29@gmail.com	Phone	Phone	Android	Less than 1 week	Through App notification	The app should display t	Yes	according to type of item	Jewellery	_
39	6/22/2023 23:48:01	nishasjha1202@gmail.com	Email, Phone, Through i	Phone	Android	A day	Through Email	The app should display t	Yes	Sort or search according	Stationary	No
40	6/23/2023 6:44:58	vedantsharidas@gmail.com	Phone	Phone	IOS	Less than 2 weeks	Through App notification	Updates through notifica	Yes	according to type of item	Stationary	Noo
41	6/23/2023 10:06:19	marenabhavik@gmail.com	Email, Phone	Phone, Through in app n	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	according to type of item	Electronics and Compute	.
42	6/23/2023 14:31:56	tanvinimbalkar01@gmail.com	Phone	Phone	Android	Less than 1 week	Through App notification	The app should display t	Yes	according to type of item	Stationary	No
43	6/23/2023 14:59:59	ronakved753@gmail.com	Phone	Phone	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	Sort or search according	Electronics and Compute	Some Reward should be given to the person who finds the lost items and gives it to the owner!!
44	6/23/2023 15:38:47	akshadakadlak44@gmail.com	Phone, Through in app n	Phone	Android	Less than 1 week	Through App notification	The app should display t	Yes	according to type of item	Stationary	No
45	6/23/2023 17:32:21	shrawani.ghanvatkar@gmail.c	Email	Email	Android	Less than 2 weeks	Through Email	The app should display t	Yes	Sort or search according	Stationary	No suggestions
46	6/23/2023 18:22:55	khushitamanpuri72@gmail.co	Email, Phone	Email, Phone	Android	Less than 1 week	Through Email	The app should display t	Yes	Sort or search according	Stationary	According to me I experience that the radio buttons and the checkboxes should be accurate .
47	6/23/2023 18:47:24	samantavictorjessy@gmail.co	Phone	Phone	Android	Less than 2 weeks	Through App notification	The app should display t	Yes	according to type of item	Stationary	No.
48	6/23/2023 20:18:14	anisha.kasare2004@gmail.co	Email, Phone, Through i	Email, Phone, Through i	IOS	Less than 1 week	Through Email, Through	The app should display t	Yes	Sort or search according	Stationary	The app should have a feature of uploading the photos of lost item to verify. So that owner can identify his/her item
49	6/24/2023 2:07:03	dhuriatharva2004@gmail.com	Phone, Through in app n	Phone, Through in app n	IOS	Less than 2 weeks	Through App notification	The app should display t	Maybe	according to type of item	Stationary	No, all good
50	6/24/2023 9:09:30	vaidehikelkar2911@gmail.com	Phone	Phone	Android	Less than 1 week	Through App notification	The app should display t	Yes	Sort or search according	Stationary	It will be good if you also show the pictures of the lost items
51	6/25/2023 13:49:24	omkaryr@gmail.com	Email, Phone, Through i	Phone	Android	A day	Through Email, Through	The app should display t	Yes	Sort or search according	Electronics and Compute	Free app For Higher accessibility (ads Ofc) Good search Engine Privacy to keep from Robbery Some documents or Photos to use to confirm the right owner
52	6/25/2023 13:51:59	omkarbhadsavale@gmail.com	Phone, Through in app n	Phone, Through in app n	Android	A day	Through Email	The app should display t	No	Umbrella	Umbrella	No
53	6/25/2023 13:54:41	tejasmandlik002@gmail.com	Email, Phone, Through i	Email, Phone	Android	Less than 1 week	Through App notification	Updates through notifica	Yes	Sort or search according	Stationary	Get extra data of the person when they fill login info.... like number of parents or friends.....
54	6/25/2023 13:54:53	nikhilganesh44@gmail.com	Through in app message	Through in app message	Android	Less than 2 weeks	Through App notification	The app should display t	Yes	Sort or search according	Electronics and Compute	Just make an interface that is easy to use.
55	6/25/2023 13:58:10	prachipujari06@gmail.com	Email, Phone	Email, Phone	Android	Less than 1 week	Through Email, Through	The app should display t	Yes	Sort or search according	Jewellery	no
56	6/25/2023 14:08:14	rehaankhan364@gmail.com	Phone	Phone	Android	Less than 1 week	Phone/WhatsApp messa	Not that necessary	No	according to type of item	No	No need for app, just a discord server or WhatsApp group for lost and found is enough

Figure 3.1 Requirement Gathering through Google forms

3.2.2 Requirement Analysis

All the requirements gathered are stated in simple English statements:

1. The users of the system should include the students who are currently pursuing 11th, 12th or a degree from the college or a faculty of the college. One user from the office would be the admin for the application.

2. User Registration
    a. The users if they are students should be able to register using their control id.
    b. Administrator would not need to register as they will be managed from the admin section
    c. The faculty members would have to register using their email which is unique and contains ‘@vazecollege.net’.
    d. The registration page should provide a way to distinguish between the student registration and faculty registration.
    e. The password should be minimum 8 characters containing at least one digit and one character.
    f. The username of the students would be optional and control id would be used to identify them uniquely, but email would be used as the username for the faculty.

3. User Login
    a. The user will have to enter their credentials like registered email or control id depending whether there are a faculty or a student respectively.
    b. The user should be displayed an appropriate message when the authentication fails.
    c. The user need not login every time they visit the app until they explicitly log out.
    d. The user should also have the option of “forget password”.

4. Posting/Reporting a lost Item
    a. When reporting a lost item, the users should be able to upload a photo of the same.
    b. The following details of the items should be collected: - date of loss, time of loss, location, unique identifiers like lost items name, description, color, category, etc.
    c. Category should include electronics, clothing, jewellery, stationary, riding gear and other.

5. Item viewing
    a. The items should be divided into two - items reported as lost and items reported as found.

   b. The item posts should be arranged from latest and recent posts to oldest posts.
   c. A lost item should remain in the list for a maximum period of one month.
   d. The user should be able to filter the items according to category, date, time and being able to search the item.
   e. The users should be able to see the items they have reported and also track its progress.

6. Communication
   a. The finder of an item or the owner of the item should be able to communicate through in-app messaging.
   b. Notifications should be sent to the users if an item of the same category is reported.
   c. The in-app messaging should only take place between the two users only when they are verified by answering the questions correctly and are the owner and the finder of the item.

7. Verification and matching
   a. When reporting an item as lost, the user posting it should also include a few security questions and answers. These questions will be asked to the user who claims to be the owner/ finder. Only after successful verification, the users should be able to chat.
   b. If an item being reported as found is already reported as a lost item, the owners should be notified about this match via in-app notifications and email.
   c. The details of the users are only revealed after verification.

8. Administration
   a. The admins can suspend, delete, add a user profile.
   b. The admins should be able to delete lost item postings.
   c. The admins should be able to add faculty that may not be able to register via the normal procedure.
   d. The admins should be able to update the status of the item saying that it is found or with the lost and found department.

9. Others
   a. After successfully verifying that the user is an owner/finder, the application should provide a way to owner and finder to call the next person directly from the app.
   b. For the faculty and students, emails will be verified via OTP sent to their entered emails.

3.2.2.1 Functional Requirements

1. **User registration**
   a. The students need to register using their control id and the faculty needs to register using their "@vazecollege.net" email id.
   b. The registration page should be separate for faculty and students.
   c. During registration, the password should be of minimum 8 characters in length containing at least one digit and one character.
   d. The username will be email.
   e. Every student and faculty should be only having one account
   f. The student or faculty should be actively be a part of the college.

2. **User Login**
   a. During login, the "forget password" option should be present.
   b. If authentication fails, the appropriate message needs to be displayed.
   c. The users need not log in every time they visit the app, until they explicitly log out.

3. **Posting/ reporting lost items**
   a. The users should be able to upload a photo of the lost item.
   b. The following details should be collected from the users when they are reporting a lost item: -
      i. Date
      ii. Time
      iii. Location
      iv. Description
      v. Unique identifiers like model number, etc
      vi. Category
   c. The user who is posting will also have to provide minimum 2 questions and answers which will be asked to the users during verification.
   d. The reported items should fall in these categories:
      i. Electronics
      ii. Stationary
      iii. Clothing and footwear
      iv. Jewelry
      v. Riding gear (Helmets)
      vi. Sports equipment

vii. Bags and backpacks

viii. Miscellaneous

e. Date range should be between one month from the current date of the current year.

4. Item Viewing

a. Items that are listed should be categorized into these items – ‘reported as lost’ and ‘reported as found’.

b. The reported items should be arranged in the descending order of their date posted i.e., the most recent ones appear first or on top.

c. A lost item remains in the list for a maximum of one month i.e., 30 days from the date it was posted.

d. The users should be able to filter the items according to the date of loss, posted date, location, category and also able to search a specific item.

e. The users should be able to delete and mark the lost item as ‘found’, for the items that they have reported.

f. The users should also be able to see the progress of their reported item.

g. The users should be able to update the status of their posts/ reports if the item was found.

h. They should be able to delete the report as well.

5. Communication

a. The owner and the finder of the item should be able to communicate via in-app messaging.

b. The users should receive push notifications when the status of their item is updated, a match is found, a new item in the same category is posted and other important updates.

c. The communication between the two users should take place after successful verification.

d. The contact details of the users should be revealed only after the successful verification.

e. The finder or owner should be able to call the other concerned user and faculty.

6. Verification and matching

a. The users should be notified when a match for their lost reported item is found via notification and email.

7. **Profile**
    a. For students and faculty, they should be able to edit their phone number.
    b. Users should be able to update their password.

8. **Administration**
    a. The admins should be able to suspend, delete or add a new user.
    b. The admins should be able to delete, and update the status of the reported item if the lost and found department handles the handing over of items to the owner.
    c. The admins should be from the lost and found department.
    d. The admins should be able to manage other admins and be able to add faculty that can't be registered through normal procedure.

9. **User Assistance**
    a. The users should be able to report any harmful, unethical activity to the admin via the email.
    b. The users should be able to contact the admin in case they need any help.

3.2.2.2 Non-Functional requirements

1. **Portability and Compatibility**

    The application would be compatible with older android versions starting from devices with Android Oreo. If the need arises, the app can be made compatible with version older than Android Oreo (Android 8).

2. **User friendliness (Usability)**

    The app would implement proper navigation to access various activities, The title of the activities would be self-explanatory and easily understandable to the user. The UI would be catchy, attractive and would use animation. The app would also contain a help section to assist the user in case of any difficulties.

3. **Security**

    The passwords stored in the database would be encrypted.

    In the application, the contact details of any user are only revealed when a successful verification takes place between two users by answering the questions related to the reported item.

4. **Maintainability**

   The application would be well-documented.

   The application code would contain consistent nomenclature for variables.

   The code would be readable and comments would be used to inform the reader about why that code was implemented.

3.2.2.3 System requirements

1. Login
   - **Function** – To authenticate the user and allow access to the rest of the application
   - **Description** – Authenticates the user.
   - **Inputs** – Password, control id, email
   - **Source** – The form with appropriate fields
   - **Outputs** – Message informing the user whether they are authenticated or not.
   - **Destination** – None
   - **Action** – The email and password provided by the user are matched with the respective fields from the database. A message is displayed based on the result of this match.
   - **Pre-condition** – User is not logged in.
   - **Post-Condition** – The login state in the local storage is changed to logged in. Device id is generated and stored in local storage along with the login state. Device id, device token is stored in database after successful login.
   - **Requires** – Internet Connection.

2. Registration
   - **Function** – To enable new users to register themselves
   - **Description** – Provides a form through which the details of the users are taken and upon successfully determining that the user fulfils the constraints, the details are stored and the user can log in.
   - **Inputs** – Password, control id, email
   - **Source** – The form with appropriate fields
   - **Outputs** – Message informing the user whether they are registered or not.

- **Destination** – Data is stored in the database.
- **Action** – Once the user fills up the required fields as per the constraints, the system checks whether the user has already registered. If the user is registering for the first time, their details are stored in the database. Appropriate message is displayed to the user.
- **Pre-condition** – User is not logged in.
- **Post-Condition** – The account status is set to ‘registered’ if successfully registered else it remains ‘not registered’.
- **Requires** – Internet Connection.

3. Report lost item
    - **Function** – To report an item that may be lost or found by the user.
    - **Description** – The details of the item are provided by the user which would be stored in database.
    - **Inputs** – Date of loss, time of loss, location, category, image(optional), item description, security question and answers.
    - **Source** – The form with appropriate fields
    - **Outputs** – Message informing the user whether the item was successfully reported or not.
    - **Destination** – Data is stored in the database.
    - **Action** – The item data filled by the user should match certain constraints. If they satisfy these constraints, then the data is stored. Appropriate message is displayed to the user.
    - **Pre-condition** – User should be logged in.
    - **Post-Condition** – ‘reported_as’ will be set to ‘lost’ or ‘found’ based on whether the item is reported as lost or found. The date when the item was reported is also stored. This data is assigned by the system and is the system’s server time when the item is reported.
    - **Requires** – Internet Connection.

4. Viewing reported items posted by user and manage it
    - **Function** – To enable the user to manage the items they have reported.
    - **Description** –The user can edit the item description and other details. They can also delete the reported items and also update the status of reported item. They can also just simply view the details of the item.

- **Inputs** – updated details when editing the item details. No inputs for deleting.
- **Source** – The form with appropriate fields. None for deleting.
- **Outputs** – Message informing the user whether the item was successfully updated /deleted or not. All items reported by the user.
- **Destination** – The activity responsible for displaying the items, data is updated in database.
- **Action** – When the user is editing the details of the reported item, the updated data should match certain constraints. If they satisfy the constraints, the data is updated in database.

  The user can also update the status of the reported item which is updated in database.

  The user can delete a reported item, which deletes the item from the database. The list of all the reported items is fetched from the database posted by user and displayed to the user with the items arranged in the descending order of their date reported.
- **Pre-condition** – User should be logged in.
- **Post-Condition** – None.
- **Requires** – Internet Connection. User's control id or email for displaying the items reported by them.

5. Viewing all reported items
    - **Function** – To display all the reported items to the user.
    - **Description** – All the reported items are displayed to the user after fetching from the database.
    - **Inputs** – None
    - **Source** – None
    - **Outputs** – All the reported items that were posted on or the previous days from the current date.
    - **Destination** – Activity meant to display all reported items.
    - **Action** – This system fetches all the reported items and sorts them and only displays the reported item that have been posted on the current date or the dates prior to the current date.
    - **Pre-condition** – User should be logged in.
    - **Post-Condition** – None
    - **Requires** – Internet Connection, Server's current date.

6. Notifying the users about important updates.
    - **Function** – The system should notify the users regarding important updates.
    - **Description** –The system sends notifications (push notifications) to the user when the status of their item is updated, a matching item to the lost item is found, a in-app message is received, etc.
    - **Inputs** – None
    - **Source** – None
    - **Outputs** – The notification with the appropriate message content.
    - **Destination** – The user's mobile device
    - **Action** –When the event that triggers a notification occurs, for instance when the status of the reported item changes, an in-app message is received sent by other user, a similar matching item is reported, etc. the notification is sent by the server to the respective devices using the push notification service.
    - **Pre-condition** – The user should be logged in.
    - **Post-Condition** – None
    - **Requires** – Internet Connection. Push notification service provider.

7. The system should sort and filter reported items as specified by the users.
    - **Function** – To sort and filter the reported items as specified by the users.
    - **Description** –Filters the reported items as per the filter options set by the user.
    - **Inputs** – Filter options based on which the reported items need to be filtered.
    - **Source** – Filter options selected by the users.
    - **Outputs** – Filtered list of reported items.
    - **Destination** – Activity(screen) meant to display the reported items.
    - **Action** – is fetched from the user and items reported with the location that matches the received location is displayed.

      If 'category' is selected as a filter, then the reported items belonging to that category are displayed.

      When multiple filters are selected, the reported items that match the filters provided are displayed.
    - **Pre-condition** – User should be logged in.

- **Post-Condition** – None.
- **Requires** – Internet Connection. List of reported items.

8. The system should provide the users a way to search reported items.
    - **Function** – To return a list of reported items that satisfy the search query.
    - **Description** – Filter the reported items that contain the name of the item as entered by the user.
    - **Inputs** – Name of item to look for.
    - **Source** – A field to take input (search query) from the user.
    - **Outputs** – The filtered list of reported items that contain the name of the item as entered by the user.
    - **Destination** – Activity meant to display the reported items.
    - **Action** – After receiving the name of reported item to look for, the system looks for the reported items that contain the name of item entered by the user. It displays all the reported items that contain the name of the item entered by the user.
    - **Pre-condition** – User should be logged in.
    - **Post-Condition** – None
    - **Requires** – Internet Connection, list of reported items.

9. The system should provide the users a way to communicate by exchanging messages with each other within the application.
    - **Function** – To send and receive in-app messages to and from other users.
    - **Description** – Sending and receiving messages from other users after successful verification that either user (owner or finder) has answered the verification questions correctly.
    - **Inputs** – The device tokens of the users, message body.
    - **Source** – Device token from database, input field for message body.
    - **Outputs** – None.
    - **Destination** – Message body is stored in database.
    - **Action** – The application would send the message body to the server. The server will also get the users device token from the database after determining the users which may be provided by the application. Then the server would make of these details to send the notification about the message and the message body is stored in database.

- **Pre-condition** – User should be logged in.
- **Post-Condition** – None.
- **Requires** – Internet Connection. Users should be verified after answering the verification questions. Both users should be registered.

10. The system should allow the owner and finder to place call/ contact each other via call directly from the application.
    - **Function** – To call the respective user.
    - **Description** – Calling the respective user without having to open the dialer app manually by clicking on a call icon present in the app.
    - **Inputs** – Phone number of the user to be contacted.
    - **Source** – The activity meant to display the user's detail who is to be contacted.
    - **Outputs** – None.
    - **Destination** – None.
    - **Action** – The application will use the default phone/call application to pace a phone call to the provided number. It starts an intent with the phone as its data.
    - **Pre-condition** –
    - **Post-Condition** – The user should be logged in.
    - **Requires** – Users should be registered, respective users should have answered the verification questions correctly.

11. The system should provide a way to verify whether the user is the rightful owner or claims to possess the correct item.
    - **Function** – To verify the users by asking them questions.
    - **Description** – The system would ask the users who claims to be the rightful owner or claims to be in possession of a reported item certain questions. Based on the answers to these questions, the users are verified.
    - **Inputs** – Answers to the questions.
    - **Source** – The form with appropriate fields.
    - **Outputs** – Message informing the user whether they are verified or otherwise.
    - **Destination** – None.

- **Action** – The answers provided by the user are checked with the answers present in the database. Based on the results of this check, a message is displayed.
- **Pre-condition** – User should be logged in.
- **Post-Condition** – The ‘verification status’ between the two users and for a particular item is changed to ‘verified’ or ‘not verified’ accordingly.
- **Requires** – Internet Connection. Question and answers stored in the database.

12. The system should allow the user to edit their contact information

- **Function** – To edit phone number and email.
- **Description** –Update the phone number and email.
- **Inputs** – Phone number, email
- **Source** – The form with appropriate fields
- **Outputs** – Message informing the user whether the details are updated or otherwise.
- **Destination** – Updated details are stored in database.
- **Action** – The received inputs are validated to match the general format of phone number and email. If email is to be updated, then it needs to be verified, by entering the OTP sent to the email address. Then the details are sent to the database to be updated and the appropriate message is displayed informing the user whether the updating was successful or not.
- **Pre-condition** – User should be logged in.
- **Post-Condition** – None.
- **Requires** – Internet Connection.

13. The system should be able to send OTP via email for email verification.

- **Function** – Sending email containing the generated OTP.
- **Description** – The OTP is generated and sent to the email address provided by SMTP.
- **Inputs** – Email address.
- **Source** – The form with appropriate fields
- **Outputs** – None.
- **Destination** – None.

- **Action** – The 6-digit OTP is generated and sent to the provided email address via SMTP. SMTP service used can be either Firebase SMTP or Java Mail API.
- **Pre-condition** – None.
- **Post-Condition** – None.
- **Requires** – Internet Connection.

14. The system should provide a help section which allows the user to contact the admin and raise their concern as well as view FAQs during signup.
    - **Function** – Contact the admin and view FAQs.
    - **Description** – Display the FAQ's and open the email application to contact the admin.
    - **Inputs** – None.
    - **Source** – None.
    - **Outputs** – List of FAQs.
    - **Destination** – The activity concerned with displaying the FAQs.
    - **Action** – The FAQs are fetched from the database and displayed to the users. When trying to contact the admin, the default email application is opened with the 'to:' field being set to the admin's email address.
    - **Pre-condition** – None.
    - **Post-Condition** – None.
    - **Requires** – Internet Connection.

15. The system should provide the user a way to delete their profile.
    - **Function** – To delete the user's profile.
    - **Description** – Delete the user's profile i.e details from the database permanently.
    - **Inputs** – Control id for students and email for faculty.
    - **Source** – Database.
    - **Outputs** – Message informing the user whether their profile is deleted or not.
    - **Destination** – Database.
    - **Action** – The user is deleted from the database using the control id or the email provided.
    - **Pre-condition** – User is logged in.
    - **Post-Condition** – User is logged out.

- **Requires** – Internet Connection.

16. The system should allow the users to log out
    - **Function** – To log out the user.
    - **Description** – The user logs out of the application.
    - **Inputs** – None.
    - **Source** – None.
    - **Outputs** – Message informing the user whether they are logged out or not.
    - **Destination** – None
    - **Action** – The user is directed to the login page.
      The device token is deleted from the database.
      Login state is changed to false.
    - **Pre-condition** – User is logged in.
    - **Post-Condition** – User is logged out.
      The login state is changed to ‘false’ in local storage.
      The stored username is set to ‘null’.
      Device details are deleted from database.
    - **Requires** – Internet Connection.

17. The system should provide the admin a way to manage reported items.
    - **Function** – To manage the reported items.
    - **Description** – Delete or update the progress of the reported item.
    - **Inputs** – The reported item, updated status of that item.
    - **Source** – The reported item is fetched from the database, the updated status is received from the application (activity).
    - **Outputs** – Message informing the admin whether the deleting or updating was successful or otherwise.
    - **Destination** – Data is deleted or updated in the database.
    - **Action** – When the reported item is requested to be deleted, the details of the item are deleted from the database and the appropriate message is displayed.

      When the status of the reported item is updated, the changes are reflected in the database and the appropriate message is displayed.
    - **Pre-condition** – The admin is logged in.
    - **Post-Condition** – None.

- **Requires** – Internet Connection.

18. The system should provide the admin a way to manage the users.
    - **Function** – To manage the users.
    - **Description** – The admin adds a news user, suspends, deletes a user.
    - **Inputs** – User's control id or email depending whether they are a student or faculty respectively, user's details.
    - **Source** – The control id or email is received from the application (activity). The details of the new user to be added is received from the form with the appropriate fields.
    - **Outputs** – Message informing the admin the result of the performed operation.
    - **Destination** – Database.
    - **Action** – When the admin adds the details of the new user, the details are checked with the database. If the user being added is a faculty, then the email given by the college is checked.

      If the user being added is a student, then the user's control id is checked. Based on the result, the appropriate message is displayed.

      When the user is being suspended, the account status of the user is updated to 'suspended'. The appropriate message is displayed to the admin based on the result of this operation.

      When a certain user is deleted, the details of the user are deleted from the database and appropriate message is displayed based on the result of this operation.
    - **Pre-condition** – The admin should be logged in.
    - **Post-Condition** – None.
    - **Requires** – Internet Connection.

19. The admin should be able to unsuspend the suspended users.
    - **Function** – To unsuspend the suspended users.
    - **Description** – The admin unsuspends the suspended users.
    - **Inputs** – User's control id or email depending whether they are a student or faculty respectively.
    - **Source** – The application provides the control id or email of the user depending whether they are a student or faculty respectively.

- **Outputs** – Message informing the admin the result of the performed operation.
- **Destination** – None.
- **Action** – The admin unsuspends the user from the application and the account status of the user changes to ‘registered’. Email of the same is also sent to the user.
- **Pre-condition** – The admin should be logged in.
- **Post-Condition** –Account status changes from ‘suspended’ too ‘registered’.
- **Requires** – Internet Connection. List of suspended users.

20. The reported items should be deleted after 30 days from the day they are posted.

- **Function** – To delete reported items from the system after 30 days from the day they are posted.
- **Description** – The reported items are deleted from the system if the progress status is anything apart from the processing values such as ‘verifying the owner and receiver’ or ‘waiting for confirmation from lost and found’.
- **Inputs** – List of all reported items.
- **Source** – Database.
- **Outputs** – The list of reported items after deleting the items that were posted 30 days before.
- **Destination** – Database.
- **Action** – The system finds the reported items that were posted 30 days from today and whose progress status isn’t under processing stages. It deletes the details of these reported items from the database.
- **Pre-condition** – Reported items should be present.
- **Post-Condition** –None.
- **Requires** – Internet Connection, List of reported items.

3.3 Planning and Scheduling

Task No.	Task Name	Start Date	End Date	Actual Start Date	Actual End Date
T1	Project Synopsis	01/04/23	11/04/23	10/04/23	17/04/23
T2	Project Approval	01/04/23	11/04/23	08/04/23	11/04/23
T3	Chapter-1: Introduction	17/04/23	19/04/23	18/04/23	19/04/23
T4	Chapter-2: Survey of Technology	20/04/23	26/04/23	24/04/23	26/06/23
T5	Chapter-3: Requirement Analysis 3.1 Problem Definition 3.2 Requirement Specification	30/04/23	19/06/23	19/06/23	11/07/23
T6	3.3 Gantt Chart	01/07/23	08/10/2023	06/10/2023	08/10/23
T7	Chapter-4: System Design 4.1 Business Rules 4.2 Module Diagram	08/08/23	14/08/23	11/08/23	21/08/23
T8	4.3 ER Diagram	10/07/23	21/07/23	17/07/23	01/08/23
T9	4.4 Schema Diagram	26/07/23	03/08/23	26/07/23	10/08/23
T10	4.5 Data Flow Diagram	10/08/23	29/08/23	12/08/23	08/09/23
T11	4.6 Class diagram	29/08/2023	07/09/2023	29/08/2023	25/09/2023
T12	4.7 Use Case Diagram and Scenarios	04/09/23	06/09/23	04/09/23	14/09/23
T13	4.8 Sequence Diagram 4.11 User Interface Diagram	14/09/23	25/09/23	14/09/23	25/09/23
T14	4.9 Activity Diagram	16/09/23	25/09/23	18/09/23	25/09/23
T15	4.10 State Diagram 4.12 Test Cases	03/10/23	04/10/23	04/10/23	07/10/23
T16	**Re-engineering** Chapter 1	1/11/23	3/11/23	1/11/23	4/11/23
T17	Chapter 2	4/11/23	5/11/23	5/11/23	6/11/23
T18	Chapter 3	5/11/23	6/11/23	6/11/23	8/11/23

T19	Chapter 4	6/11/23	10/11/23	8/11/23	16/12/23
T20	**Iteration 1** **Module 1:** **Login Module**	11/11/23	13/11/23	13/11/23	20/11/23
T21	Testing And Debugging Login Module	14/11/23	16/11/23	23/11/23	22/12/23
T22	**Module 2:** **Email Module**	17/11/23	18/11/23	26/11/23	27/11/23
T23	**Module 3: Registration Page**	19/11/23	22/11/23	18/11/23	21/11/23
T24	Testing And Debugging Registration Module	23/11/23	25/11/23	23/11/23	17/12/23
T25	Integrating and Testing Login and Registration Module	26/11/23	26/11/23	18/12/23	18/12/23
T26	**Module 4:** **Forgot Password**	27/11/23	29/11/23	18/11/23	22/11/23
T27	Testing and Debugging Forgot Password Module	30/11/23	30/11/23	22/11/23	23/11/23
T28	Integrating Module 4 and testing	1/12/23	1/12/23	23/11/23	23/12/23
T29	**Iteration 2** **Module 5:** **Item Viewing**	2/12/23	4/12/23	24/12/23	1/1/24
T30	Testing and Debugging Module 5	5/12/23	6/12/23	7/1/24	12/2/24
T31	**Module 6: Item Reporting**	7/12/23	9/12/23	14/2/24	16/2/24
T32	Testing and Debugging Module 6	10/12/23	11/12/23	17/2/24	20/2/24
T33	**Module 7: Item Matching**	12/12/23	14/12/23		
T34	Testing and Debugging Module 7	15/12/23	16/12/23		
T35	**Module 8: Item Management**	17/12/23	19/12/23	1/3/24	4/3/24
T36	Testing and Debugging Module 8	20/12/23	21/12/23	4/3/24	5/3/24
T37	**Module 9: Verification**	22/12/23	24/12/23		

T38	Testing and Debugging Module 9	25/12/23	26/12/23		
T39	Integrating and testing Modules 9	27/12/23	29/12/23		
T40	**Iteration 3 Module 10: In-App Messaging**	30/12/23	1/1/24	26/2/24	28/2/24
T41	Testing and Debugging Module 10	2/1/24	3/1/24	28/2/24	1/3/24
T42	Integrating Module5,6, 8,10	4/1/24	4/1/24	28/2/24	6/3/24
T43	**Module 11: Notification**	5/1/24	7/1/24		
T44	Testing and Debugging Module 11	8/1/24	9/1/24		
T45	Integrating Module 11	10/1/24	10/1/24		
T46	**Module 12: Profile Management**	11/1/24	13/1/24	20/2/24	23/2/24
T47	Testing and Debugging Module 12	14/1/24	15/1/24	24/2/24	26/2/24
T48	Integrating Module 12	16/1/24	16/1/24	26/2/24	28/2/24

Table 3.1 Task Table

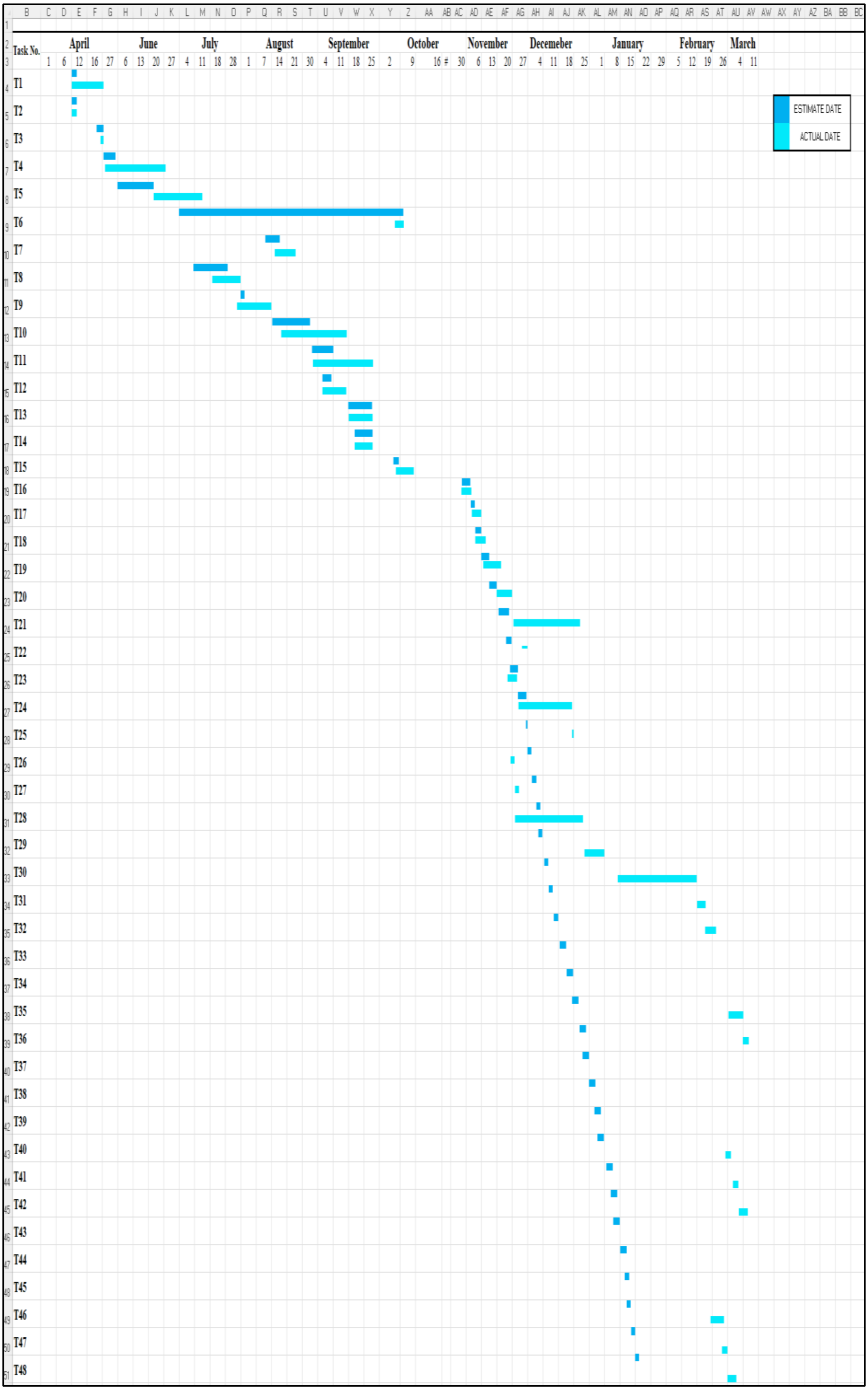


Figure 3.2 Gantt Chart