Final Project

Project Title: Med Reminder Smart Watch

Team Name: Group 6

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Introduction:

Problem statement

The more accomplished we try to be, the more busy we are and everything else takes a second priority than reaching our goals. One such part of our hectic lives which gets hit is health and our forgetfulness of having to take medicines. It has become quite the fashion that everyone we know middle aged are on some kind of mediation. When we started our process of need finding, we realized that we always hear from someone we know that they missed to take a medicine course sometime and implications of which were quite drastic. We gathered feedback and data from many such people to understand if an application which would remind them to take the medicine course would be helpful, if existed, what improvements do they require from such an application. Based on the gathered information we came to an understanding that such an application was much needed for middle aged people to lead smoother life amidst all the busy schedule. There are many such medicine reminder apps existing today. But, one which would notify the medicine user and also of the family members to make sure the medicine user takes the course is needed.

Design Goals Addressed:

1) Add a new medication information.
2) Specify dosage and interval of the medication to be taken.
3) Calendars to keep track of previous medication.
4) Adding family/friends to help the user remind the medication.
5) To be able to set up timed alerts.

Usability goals:

1. Efficiency:

The filters provided helps user to efficiently browse through the application and as the application hardly consumes any storage, it's swifter to browse.

2. Simplicity:

As the design uses different neutral colors for different functions, it's simpler to remember for everyone and as this application focuses on elderly age group, the design is highly simplified.

3. Accessibility:

Every function is clearly located, colored differently and with the help of filters, accessing this application is very easy.

4. Effectiveness:

As all the family members are connected, it's highly unlikely that user will forget to take his medication on time, making this application really effective.

5. Satisfaction:
Since all the functions and methods are simplified, effective, making it user friendly adds to the user satisfaction.

Design description and design rationale:

To calculate the effectiveness of the design changes, there is a need to prototype the changed interface. This prototyping tool is used by the design team to deploy in a real world environment to get feedback from the current user base or from a set of participants who are involved in the design process. The most important aspect here is that the user must be given an interface which they are familiar with and provides extensive interaction.
Prototyping tool : With the above constraints in mind, the prototyping tool “Proto.io” has been selected as the prototyping tool to prototype the design changes considered as part of this phase of the project.
Many factors have influenced the decision to follow a certain design or a new layout for an application. The design factors were of the utmost priority while coming up with the new and improved UI. The changes that this project proposes are backed up with the following rationale
Existing Design

The existing home screen has all the details like pill edits, adding pills, reminder addition, profile updates in the same screen. There is no option to check calendar notifications or missed medications.

New Design:

● Streamlined and minimalistic UI. Providing ease of usability and readability

● Categorization of information for ease of user for the user

● Improved and simplified navigation from any screen in the application

● Organized tabs for pills, calendar, reminders option and profile.

● Task assigned to the logged in user are enlisted in the home screen.

● Signifiers added to group contents.

I. Design Descriptions corresponding to the new Design:

● The cluttered UI has been changed to a more streamlined and minimalistic UI

● Information has been categorized and grouped under different tabs for easy navigation

● The font size for screen information display has been increased for improved readability

● The contents are analyzed, prioritized and categorized into content groups. The content groups are added to appropriate tabs.

● Signifiers like background colors are provided for the users to easily identify similar contents.

1) a. Design Goal Addressed:
● Add a new medication information.
b. Rationale
● Discoverability of the application is improved
c. Existing Design:
● The existing design doesn't have a specific button to do this directly.
d. New Design:
● Makes it easier for the user to locate the function and add new medications and alarms to notify the intakes.

2) a. Design Goal Addressed:
● Specify dosage and interval of the medication to be taken.
b. Rationale
● Allows the users to share the information effectively
c. Existing Design:
● The existing design doesn't have active notification methods.
d. New Design:
●Alarms and popup notification on the device alerting the user it's time for medicine intake.

3) a. Design Goal Addressed:
● Calendars to keep track of previous medication.
b. Rationale
● Allows the users to record missed information
c. Existing Design:
● The existing design doesn't have database to remind user of missed medications.

d. New Design:

●Calendar has missed medication reminder to alert the user.

4) a. Design Goal Addressed:

● Adding family/friends to help the user remind the medication.

b. Rationale

● Allows the users to keep track of family members health along with its own.

c. Existing Design:

● The existing design doesn't have database to save details of family members.

d. New Design:

●Add family member details option helps user keep track of everyone simultaneously.

5) a. Design Goal Addressed:

● To be able to set up timed alerts.

b. Rationale

● Allows the users to be notified timely.

c. Existing Design:

● The existing design doesn’t have alert systems.

d. New Design:
●Add alarm time to be notify using pop ups that'll remind user to take medicine.

HEURISTIC ANALYSIS

Discount Evaluation:

The purpose of the discount Evaluation was to advance our design by focusing on Nielsen's heuristic rules. The heuristic evaluations was done a team "Jedi" that gave valuable feedback that helped us to improve upon our design in terms of usability. We followed the discount Evaluation technique so that we could get the crisp and clear idea about the possible amendments that we might have to venture in.

We were tasked with completing our heuristic evaluations with another group during class. We only received few comments regarding our prototype at the time. The feedback in General was very positive; however you can see the recommendations we were given in the tabular structure. Following metrics was used for the rating system (severity) for each heuristic test:

0 – not a usability problem
1 – cosmetic problem
2 – minor usability problem
3 – major usability problem; important to fix
4 – usability catastrophe; must fix

METHODOLOGY
Evaluating team:
Guide : 1
Speed Evaluator : 1
Accuracy Evaluator : 1
Completeness Evaluator : 1
Learnability Evaluator : 1

Participants:
Existing Medicine Reminder users : 8
New users of Medicine Reminder : 9
Date(Participant experiment study) : 20thNov 2017 - 26thNov 2017
Total number of task participants : 15
Number of male participants aged from 20-30 : 5
Number of female participants aged from 20-30 : 4
Number of male participants aged from 30-50 : 2
Number of female participants aged from 30-50 : 2
Number of male participants aged from 60-70 : 1
Number of female participants aged from 60-70 : 1

Graduate Students	Retired members	Working professionals	Home makers
5	3	3	2

No	**ISSUE**	**SEVERITY**
1	New interface has a small learning curve for existing users	2
2	Back button is not consistent.	1
3	Button sizes are not consistent.	1
4	Profile icon colour and size inconsistent	1
5	The size of the icons is not consistent in the navbar in certain screens	1

We also evaluated the new design using Jakob Neilson’s Heuristic analysis:

- **Visibility of system status:** Yes, it shows the user with information regarding the current activity . The system also is quick and provides a fast and timely response all of which is under a reasonable time limit.

- **Match between system and the real world:** The system follows the native English language.. The system also follows concepts familiar to the users such as metaphors and icons that are used frequently in other applications.

- **User Control and freedom:** The application provides user control and freedom only to a certain level. The application does not restrict the user but confines the user to certain boundaries which is capable by it

- **Consistency and Standards:** No, there are some screens in the application when the user may be confused on what the consistency of the button size and the location.

- **Error Prevention:** Yes, the application uses validation and also gives information on how to use the interactive elements helping the user to prevent mistakes and other human errors at certain screens like creating/ editing profiles and setting reminders which have alert and buttons to avoid errors.

- **Recognition rather than recall:** Yes, the application reduces the user's memory load by using signifiers and metaphors for various tasks. There are very clear and easily understandable instruction that make the application very easy to use and improves learnability. There is home button on every page to make sure user can reach home button without having to remember the path.

- **Flexibility and efficiency of use:** Yes, the application allows user to schedule redundant activities with reminders and scheduler.

- **Aesthetic and minimalistic design:** No, there is no redundant or irrelevant information that is conveyed in any of the screens. Yes, the interface is very minimal and easy to understand. The design layout helps the user understand the system very clearly and very easily. No, the Interface is not cluttered and the font sizing and the spacing between the tablets helps the user to identify and locate the information he/she is looking for easily

- **Help users recognize, diagnose and recover from errors:** No, the system provides no information on how the errors are handled in the system. There are no error scenarios that are shown in the prototype.

- **Help and Documentation:** No, there is no user manual that is currently available for the user to get started with the application. However, the tasks and activities in the application are very easy to be carried out in the prototype without much help or referring documentation

USABILITY STUDY:

The more accomplished we try to be, the more busy we are and everything else takes a second priority than reaching our goals. One such part of our hectic lives which gets hit is health and our forgetfulness of having to take medicines. It has become quite the fashion that everyone we know middle aged are on some kind of mediation. When we started our process of need finding, we realized that we always hear from someone we know that they missed to take a medicine course sometime and implications of which were quite drastic. We gathered feedback and data from many such people to understand if an application which would remind them to take the medicine course would be helpful, if existed, what improvements do they require from such an application. Based on the gathered information we came to an understanding that such an application was much needed for middle aged people to lead smoother life amidst all the busy schedule. There are many such medicine reminder apps existing today. But, one which would notify the medicine user and also one of the family member to make sure the medicine user takes the course is needed.

USABILITY TEST

A usability test is intended to determine the extent an interface facilitates a user's ability to complete routine tasks. Typically, the test is conducted with a group of potential users either in a usability lab, remotely (using e-meeting software and telephone connection), or on-site with portable equipment. Users are asked to complete a series of routine tasks. Sessions are recorded and analyzed to identify potential areas for improvement to the web site.

The usability testing was carried out with a range of users with an age ranging from 18 to 70. Some of the users were familiar with the Medicine Reminder application and was given the new and improved user-interface for testing while other users were first given the existing Medicine Reminder application and then the new prototype application. The platform used for this as a smart watch. There were two examiners with one of them explaining the application and the goal of the study to the user and the other examiner taking notes about the users' feedback of the product and noting the way the user was interacting with the application. The sessions captured each participant's choices, task completion rates, comments, feedback, satisfaction ratings, and questions.

Steps in which the usability tests and evaluations were performed:
Step1: The evaluating team prepared the tasks for performing the usability testing.

Step2: The participants were selected in two categories. First time users and the existing users (from the focus group)

Step3: Participants were guided by guide to perform two types of tasks like tasks within subject and tasks between subjects.

Step4: The other evaluators recorded the data in various usability dimensions, when the users were performing the task.

Step5: After each task, the guide asked the participant to rate the existing and the prototype interface on a 5-point Likert Scale with measures ranging from Strongly Disagree to Strongly Agree.

The questions include,
How easy it was to find the information from the home screen.
Accurateness of predicting which section of the application contained the information.

Step6: After the last task was completed, the guide asked the participant to rate the website overall by using a 5-point Likert scale (Strongly Disagree to Strongly Agree) for eight subjective measures including:
Ease of use

Learnability: how quickly can a novice user learn the application and start using it without documentation or instructions.
Information facilitation: how quickly participant could find information they are looking for
Look & feel appeal: How visually appealing is the application
Content organization and categorization

Step7: In addition, the guide asked the participants the following overall application questions:
What the participant liked most.
What the participant liked least.
Recommendations for improvement.
Any functionality that would make them use it more often
What would make them stay away from using the application

Evaluation Tasks/Scenarios
Test participants attempted completion of the following tasks which were categorized into tasks within subject and between subjects.
Within subjects:

The participants were asked to perform the following tasks in the fully developed prototype:
● Add Reminder.
● Add new Medicine
Between subjects:
The participants were asked to perform the following tasks in both prototype and the existing application:

Tasks Description
Task1 Add a new user
Task2 Edit details of the user.
Task3 Add new Medicine & Alarm.
Task4 Add missed medication details on calendar
Task5 Add doctor appointment reminders
Task6 Set alarm
Task7 Add reminder details

Results
Task Completion Success Rate for Between the subjects category:

Recordings on Existing application :

Observations:
80% participants successfully completed Task 5,6,7
47% could complete Task 2 others were not able to
(80%) completed Task 3.
Approximately half (93%) of participants could complete Task 4
All participants successfully completed Task 5, Task6 & Task7

Recordings on prototype:

Observations:
100% participants successfully completed Task 1
70% could complete Task 2 others were not able to
(75%) completed Task 3.
Approximately half (93%) of participants could complete Task 4
All participants successfully completed Task 5, Task6 & Task7

Results

Task Completion Success Rate for within the subject category:

Observations:
Both new and existing users were able to perform both the tasks

Task Ratings
After the completion of each task, participants rated the ease or difficulty of completing the task for three factors:
● It was easy to find my way to this information from the home screen.
● As I was searching for this information, I could keep track of where I was in the application.
● I could accurately predict which section of the application contained this information.
The 5-point rating scale ranged from 1 (Strongly disagree) to 5 (Strongly agree). Agree ratings are the agree and strongly agree ratings combined with a mean agreement ratings of > 4.0 considered as the user agrees that the information was easy to find, that they could keep track of their location and predict the section to find the information.

Ease in Finding Information
Prototype:
Mean agreement rating : 4.8
% of successful completion of finding tasks(last 5) : 100%
Existing Application:
Mean agreement rating : 4.0
% of successful completion of finding tasks(last 5) : 90%

Keeping Track of Location in Application
Prototype:
Mean agreement rating : 4.7
% of successful completion of adding a task : 100%
Existing Application:
Mean agreement rating : 4.2
% of successful completion of adding a task : 80%

Predicting Information Section
Prototype:
Mean agreement rating : 4.8
% of successful completion of adding a pic(task2) : 93%
Existing Application:
Mean agreement rating : 2.3
% of successful completion of adding a pic(task2) : 47%

Existing application

Task #	Task	EaseFinding Info	Location in application	Prediction Section	Overall
Task1	Add a new user	4	4.3	4.5	4.5
Task2	Edit details of the user.	4	4.3	4.5	4.5
Task3	Add new Medicine & Alarm.	3.8	4	4.2	4.2
Task4	Add missed medication details on calendar	3	3	3	3
Task5	Add doctor appointment reminders	4	4.3	4.6	4.6
Task6	Set alarm	4	4.6	4.5	4.6
Task7	Add reminder details	4	4.6	4.5	4.6

Observation : Users were able to perform all the tasks well in time. Except for task 4 which is Add missed medication details on calendar where they faltered to find the button and understand the functionality of the screen for adding details on calendar.

Prototype

Task #	Task	EaseFinding Info	Location in application	Prediction Section	Overall
Task1	Add a new user	4.6	4.6	4.7	4.7
Task2	Edit details of the user.	4.6	4.6	4.7	4.6

Task3	Add new Medicine & Alarm.	4.5	4	4.5	4.5
Task4	Add missed medication details on calendar	4.7	4.7	4.7	4.7
Task5	Add doctor appointment reminders	4	4.3	4.6	4.5
Task6	Set alarm	5	5	5	5
Task7	Add reminder details	4	4.3	4.3	4.3

Observations :

Users were able to perform all the tasks well in time. Except for task 7 which is
Add reminder details where they faltered to find the button and understand the functionality of the screen for adding details on reminder a little than other screens. Though it was not severe and users were at loss, they were able to complete the task. This we believe is an issue with understanding the functionality/ some hands on the application.

Time on Task

The speed evaluator recorded the time on task for each participant. Some tasks were inherently more difficult to complete than others and is reflected by the average time on task.

Existing application

Task #	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14	p15	Avg
Task1	6	7	7	10	6	7	8	9	10	7	6	8	8	9	10	10
Task2	15	20	30	35	36	36	35	36	30	36	31	32	36	35	36	36
Task3	35	36	35	39	40	46	25	29	39	40	39	45	39	39	32	32

Task4	15	40	25	30	35	25	30	27	26	35	40	22	32	32	25	39
Task5	30	30	15	20	26	28	29	35	26	27	29	25	27	29	30	30
Task6	15	14	20	20	20	15	16	10	12	17	19	20	15	14	20	20
Task7	15	14	20	20	20	15	16	10	12	15	15	15	15	14	20	15

Observations :

Users were able to perform all the tasks well in time. Except for task 4 which is Add missed medication details on calendar where they faltered to find the button and understand the functionality of the screen for adding details on calendar.

Prototype:

Task #	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10	p11	p12	p13	p14	p15	Avg
Task1	6	7	7	10	6	7	8	9	10	12	12	12	8	9	10	12
Task2	15	14	20	20	20	15	16	10	12	17	19	20	15	14	20	20
Task3	15	14	18	20	18	15	16	18	12	17	19	20	15	14	20	18
Task4	15	15	14	13	14	20	15	16	10	12	17	12	20	15	14	15
Task5	30	30	15	13	14	20	15	16	10	12	17	12	20	15	14	17
Task6	15	14	20	20	20	15	16	10	12	17	19	20	15	14	20	17
Task7	15	14	13	14	20	15	13	10	12	13	14	20	15	13	20	22

Observations :

Users were able to perform all the tasks well in time. Except for task 7 which is Add reminder details where they faltered to find the button and understand the functionality of the screen for adding details on reminder a little than other screens. Though it was not severe and users were

at loss, they were able to complete the task. This we believe is an issue with understanding the functionality/ some hands on the application.

Errors:

- **Errors were recorded while the tasks were being executed.**
- **The errors recorded were mostly slips.**

Existing Application:

Tasks	Steps for task completion	Time on Task	Satisfaction	Error
1	2	10	4.5	0
2	7	36	4.5	0
3	6	32	4.2	1
4	5	39	3	1
5	4	30	4.6	0
6	2	20	4.6	0
7	2	15	4.6	0

Observations :

Users were able to perform all the tasks well in time. Except for task 4 which is Add missed medication details on calendar. The time taken by the task 4 and satisfaction results made us understand that we could make a better effort to create a this in our prototype

Prototype:

Tasks	Steps for task completion	Time on Task	Satisfaction	Error
1	2	12	4.7	0
2	5	20	4.6	0
3	6	18	4.5	0
4	4	15	4.7	0
5	4	17	4.5	0

6	1	20	5	0
7	2	20	4.3	0

Observations :

Users were able to perform all the tasks well in time. Except for task 7 which is Add reminder details. Though it was not a great amount of time taken to identify and perform this task. It was comparatively lower than the others also the satisfactory rating are also equally decent enough to say we have had not severe problems.

Overall Metrics:
Participants rated the application prototype after successful completion of all the tasks on the following measures.

- User friendly
- Could be used by wide range of audience
- Can use the application frequently
- Calendar allowed them to track when they missed the pill
- The features were easy to navigate and self explanatory
- Task functions were grouped well.
- Could track their family member's medicines.

Existing Application:

Usability measures	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Rating	Percentage
User Friendly		4	1	10		3.8	67%
Accepted for wide range of audience usage			8	7		3.7	67%
Can use the application frequently		5		10		3.5	67%
Able to track the missed pills on calendar			7	4	4	4.2	53%
Ease of navigation	3	6	2	4		3.6	27%

Grouping of functions based on its task		4	3	8		4	53%
Adding the details of family members		6		7	3	3.8	67%

Prototype:

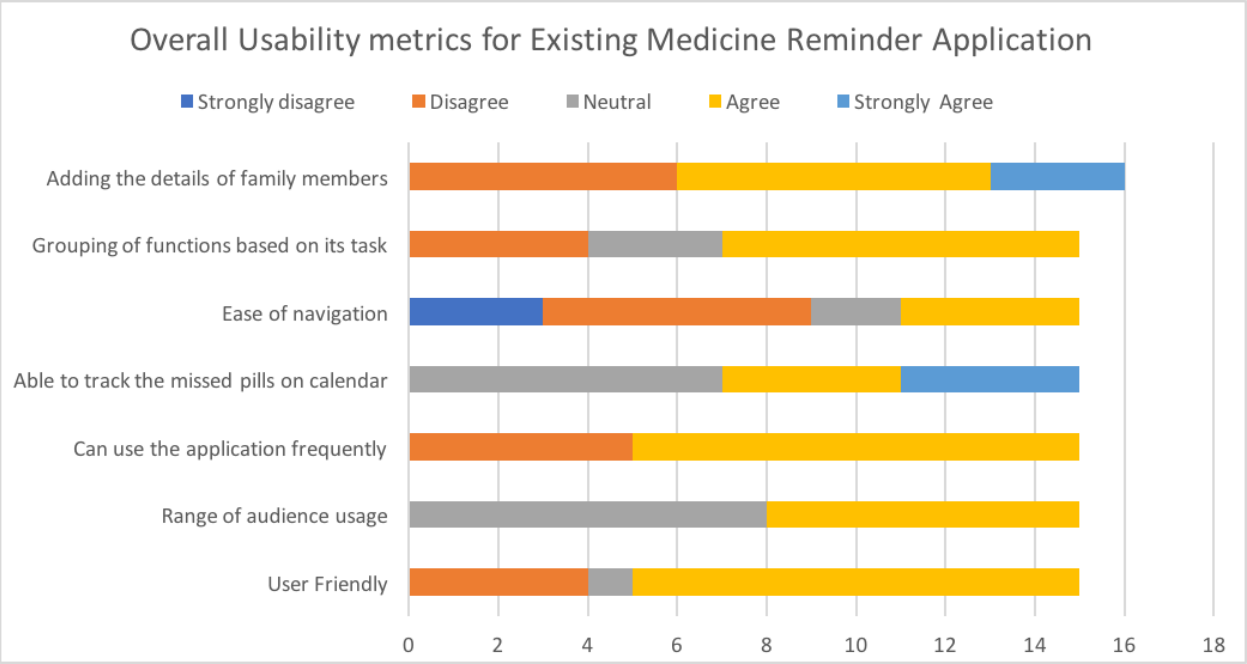
Usability measures	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Mean Rating	Percentage
User Friendly		2	1	7	5	4.2	80%
Accepted for wide range of audience usage			8	7		3.7	75%
Can use the application frequently			2	11	2	4.3	87%
Able to track the missed pills on calendar		2	1	9	3	4	80%
Ease of navigation		3		11	1	4	80%
Grouping of functions based on its task			8	7		3.9	60%
Adding the details of family members		2	2	8	3	4.3	73%

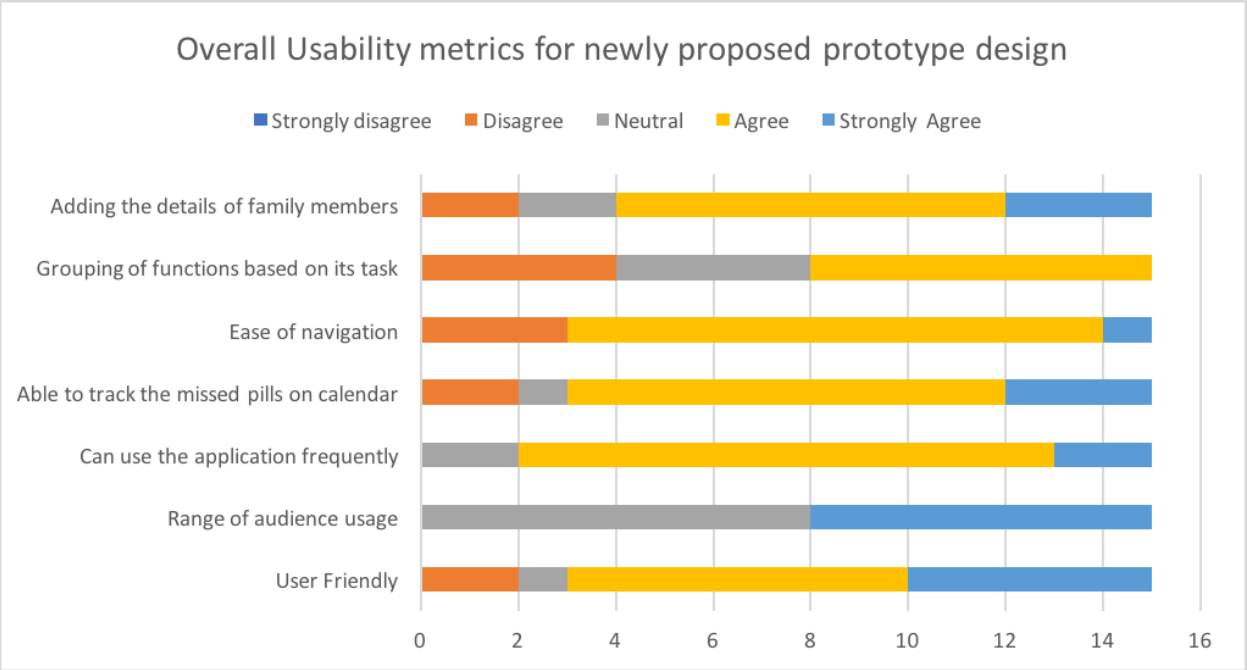
Observation:

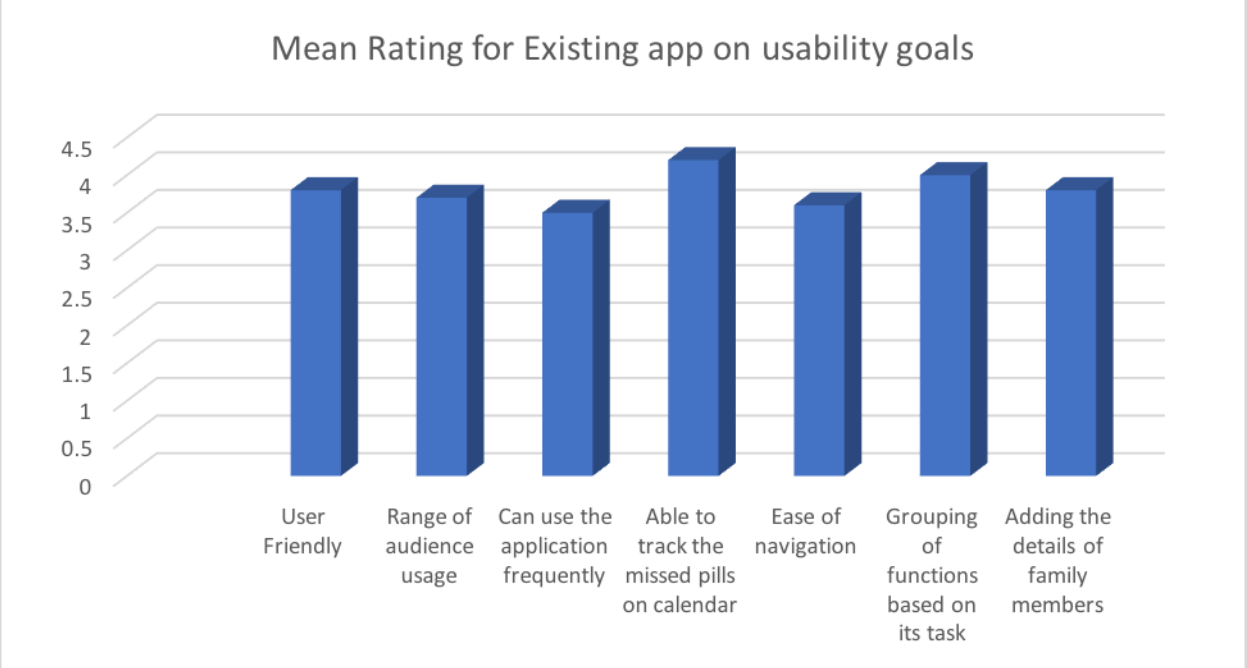
- The prototype was easy to use for almost everyone.
- Most of the audience also accepted that the application can be used by wide range of audience
- The feature of calendar and missed pill options was found very satisfying as they could track the lost dosages.
- The prototype had good navigation options and self explanatory and they were able to figure out things and use the prototype at a faster pace.

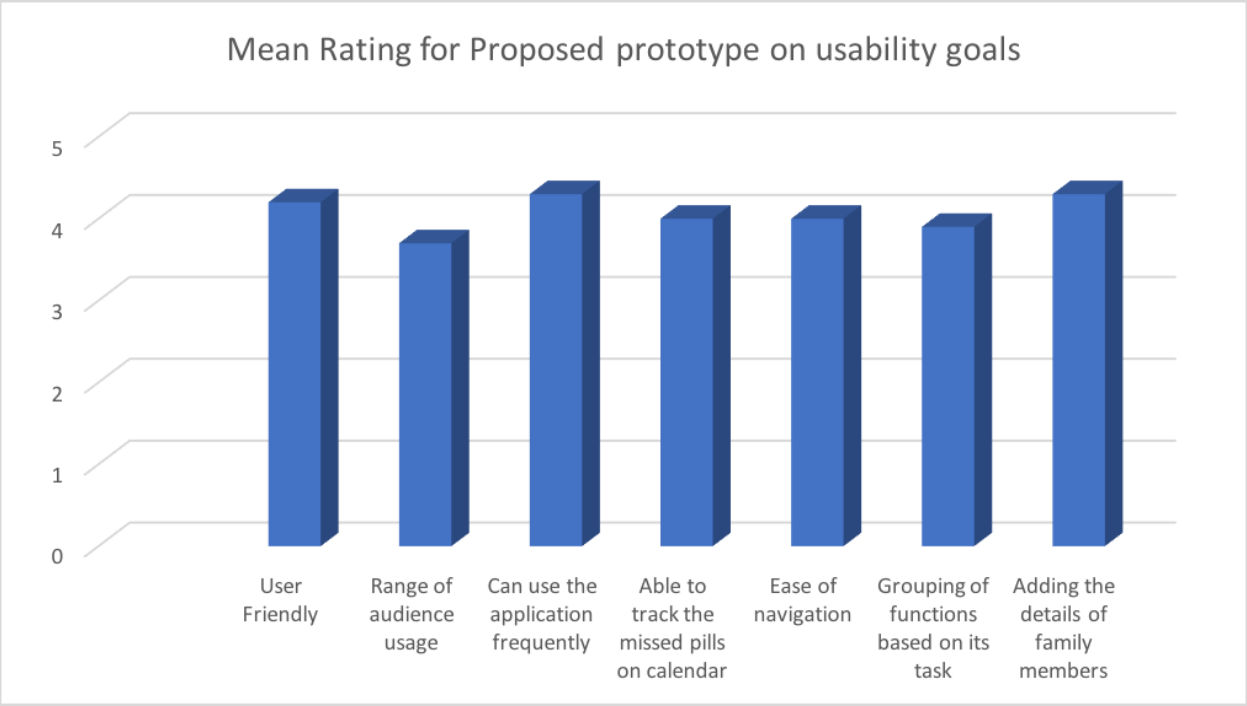
- The separation of tasks based on features was liked by them as it allowed them to figure out where to go for their assigned task.

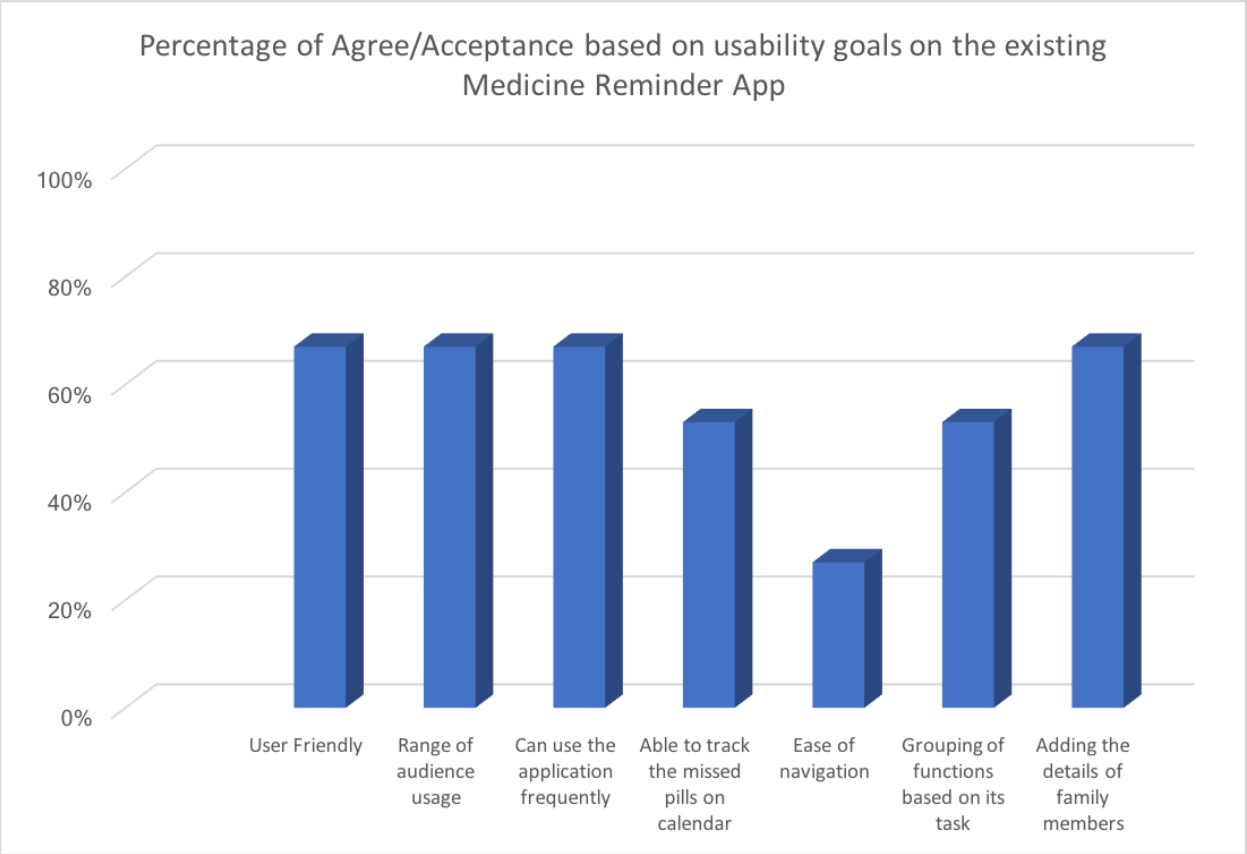
Graphs depicting the data collected from the usability experiment

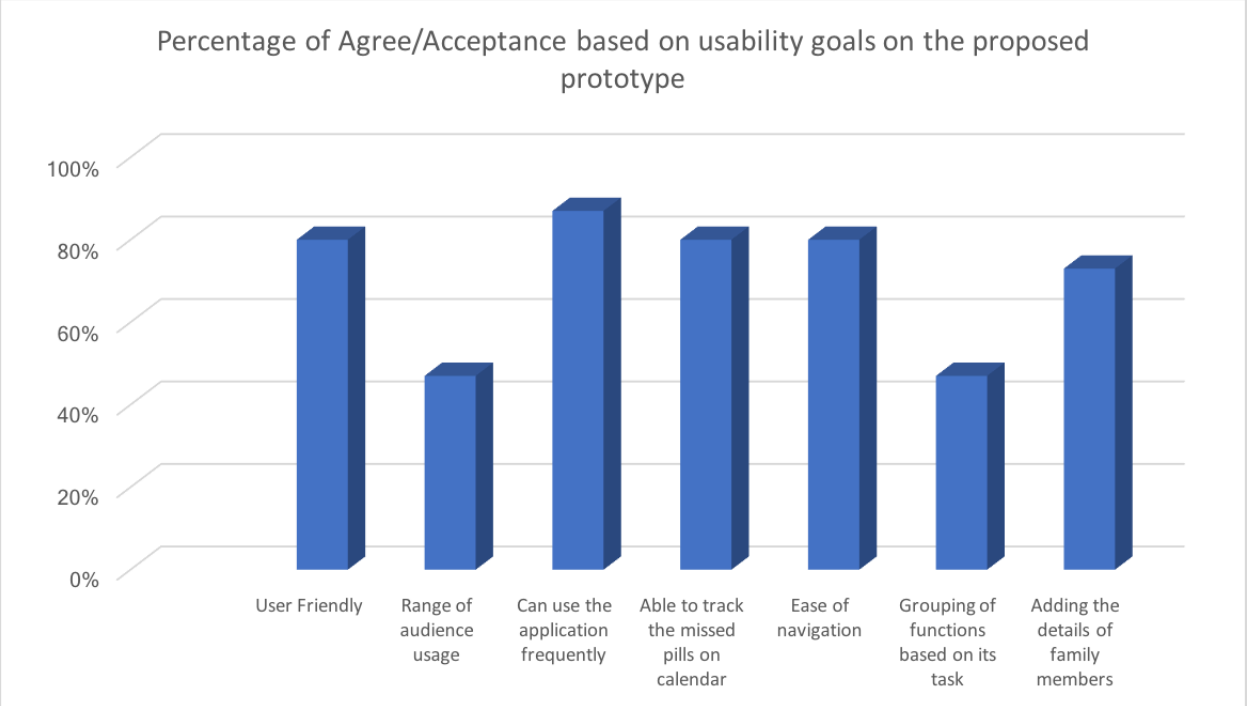



Overall Usability metrics for newly proposed prototype design
Strongly disagree
Disagree
Neutral
Agree
Strongly Agree
Adding the details of family members
Grouping of functions based on its task
Ease of navigation
Able to track the missed pills on calendar
Can use the application frequently
Range of audience usage
User Friendly
0
2
4
6
8
10
12
14
16


Mean Rating for Existing app on usability goals
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
User Friendly
Range of audience usage
Can use the application frequently
Able to track the missed pills on calendar
Ease of navigation
Grouping of functions based on its task
Adding the details of family members


Mean Rating for Proposed prototype on usability goals
5
4
3
2
1
0
User Friendly
Range of audience usage
Can use the application frequently
Able to track the missed pills on calendar
Ease of navigation
Grouping of functions based on its task
Adding the details of family members


Percentage of Agree/Acceptance based on usability goals on the existing Medicine Reminder App
100%
80%
60%
40%
20%
0%
User Friendly
Range of audience usage
Can use the application frequently
Able to track the missed pills on calendar
Ease of navigation
Grouping of functions based on its task
Adding the details of family members


Percentage of Agree/Acceptance based on usability goals on the proposed prototype
100%
80%
60%
40%
20%
0%
User Friendly
Range of audience usage
Can use the application frequently
Able to track the missed pills on calendar
Ease of navigation
Grouping of functions based on its task
Adding the details of family members

OBSERVATION & FEEDBACK

The feedback and comments from the users have been categorized as follows:

Likes, Dislikes, Participants Recommendations

After the completion of the tasks that are provided to the participants, they provided feedback of what they liked most and least about the application to improve it further.

Liked Most

The comments that participants made when asked about what they liked the most are:

- Users being able to track the medication history using calendar feature
- Ease of Navigation

Participant Recommendations

The comments that participants made when asked about what recommendations can be made:

SNo	Recommendation	Priority
1	Instead of typing the time manually at which the user should be reminded, a scroll through time can be implemented	Low Priority
2	Can use filters to filter reminders	Low Priority
3	Aesthetics can be improved	Low Priority
4	Search functionality can be implemented	Low Priority

INFERENCE

The participants representing the focus groups identified the new proposed design to be:

- Easy to Use
- Good aesthetics
- Additional frequently used functionalities
- Alerting the user when deleting pill information or reminder
- Ability to login by using other applications like Facebook, google+ instead of creating an account manually

FUTURE GOALS :

In this project, we have taken our initial steps, along the path in making sure that people can find what they need and when they need through need finding exercises. When we were laying out groundwork for our project, we had a broader understanding of what we were trying to accomplish, but we picked up our speed and understanding with persistent effort. Through our research, we have identified that our project will help users . Continuous efforts to make sure that design is not only picturesque and effective but also justifies the design goal led us to frequently seek feedbacks and change the design back and forth. The design is simple yet sophisticated and has completely been in line with our design goals as suggested above.

In future we could make this design more interactive and we could try to automatically set up doctor appointments periodically.

From the design and usability goals, we could try to make the screen for adding the remainder better so that user is able to understand the functionality well.