

Research on digital mobile platform for rural areas and usage of mobile phones in an urban household scenario

As a research intern at
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Summer Internship Project Report

PROJECT 1

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19th June 2014

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Pooja Masurkar** pursuing Master of Design (Visual Communication) from Industrial Design Center, Indian Institute of Technology Bombay, Powai has contributed to the project "**Research on digital mobile platform for rural areas and usage of mobile phones in an urban household scenario**" of TCS Innovation Labs – Mumbai.

Pooja interned full time (45 hours a week) for a month between **20 May 2014** and **19 June 2014** under the supervision of **Pankaj Dake** at **TCS Innovation Labs - Mumbai**.

The entire work carried out by Pooja during her internship and the intellectual property generated thereof is owned by Tata Consultancy Services Limited.


19-06-14

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1. TOPIC

- I) Investigating the various problems faced by people living in rural and urban areas with respect to using technology for their communication needs.
- II) Studying the 'GappaGoshtiTM' mobile application and designing a method to transfer money(mobile payment) through the same.

ABSTRACT

This project would help getting technology to the reach of rural people and help in uplifting their economy. It would further help in bridging the rural urban divide by enabling self sustainable rural development by catering to their communication needs.

This report is a documentation of the research and study on the existing mobile digital application - 'Gappagoshti' for rural areas. Problems and solutions for the same have been reported after studying the given screenshots and mock file of the mobile application.

Another aspect covered in this report is the study and research on mobile phone utility in an urban household scenario. The problems regarding the same have been reported after surveys and experiments. After analysing the collected data and studying the urban phone usage scenario, solutions and scope for improvement have been suggested for the same. The interface design with information structure and visual design for mobile banking has also been designed as part of the project.

2. OBJECTIVE

Objective:

1. Enabling application of technology in rural areas for fulfilling their communication needs.
 2. To study problems faced by users of rural and urban areas with respect to using technology for their communication needs.
- Objective of work assigned by TCS in the 'Gappagoshti Application':
1. Getting the experience of the rural world on a digital platform.
 2. To study the the existing model of the digital platform for rural areas.
 3. Research problems regarding the same.
 4. Understand the rural scenario for further problems and insights to improve the existing digital model.

OBJECTIVE AS GIVEN BY TCS

To understand/research/investigate the issues in an interface which spans voice (voice user interface) and data/mobile (smartphones, feature phones) across different socio-economic audiences.
ex. in an urban household where youngsters use a smartphone, parents use a feature phone and the house help uses a no-frills (voice only) phone; identify/investigate issues pertaining to people/ audiences/customers when the conversation jumps/span voice and data.

- literature study /survey
- design experiment
- qualitative analysis - includes user studies
- design interventions/creation/synthesis
- conclusion
- future work
- references

3. POINT OF VIEW

Application of technology in rural areas will help in educating rural people, enable development of self sustainable and self reliant rural models which will further help in bridging the rural urban divide.

After understanding the scenario, problems and restrictions posed in rural areas in context of the social, cultural and economic background, the goal is to apply technology to ease and compliment their daily livelihood and social activities through a digital platform that will improve their efficiency and lead to better productivity.

In the urban household scenario the goal is to understand the problems faced by users with their mobile phones, data connection, frequently used features and voice recognition feature.

4. ANALYSIS OF EXISTING DIGITAL MODEL

4.1 Features

Functions

Digital platform for people in rural areas assisting them for better productivity and efficiency in their day to day activities.

Target audience

1. Mainly farmers.
2. Includes local business men and other rural professionals such as money lenders, bankers, etc.

Usage

1. Mainly used for receiving and making phonecalls.
2. Knowing updates about latest developments in farming through voice messages, video posts, images and news updates.
3. Sending text mesages to individuals and groups.
4. Sending voicecalls to individuals and groups.
5. Sending videos to individuals and groups.

Cost

1. Free for farmers.
2. Funded by business models.

Digital Platform

1. Android (Smartphones and touch enabled devices).
2. JAVA ME (Keypad and Feature phones).
3. BREW
4. SMS
5. IVR (Local Language)

Software

1. J2E
2. REST
3. Linux based Cloud platform

4. Facade
5. Proxy delegation
6. IVR Cloud

Languages to be used

1. Application would be in various local languages. Eg. Marathi, Hindi, Kannada, Oriya, Bengali, etc.
2. Various scripts for different languages and regions eg. Devnagari, Kannada, etc.
3. Various dialects for IVR

Technology

1. 3G
2. Smart http
3. GPS co-ordinates for detecting location of user.
4. Assisted GPS, US GPS Satellites.
5. Mobile tower information used to know the approximate location of user to update and synchronise his news and give him region customised information.
6. Text input through speech recognition and tags.

Other Salient features of the digital application

1. No controller of groups.
2. Application complimentary to social structure.
3. Text added via tags and voice recognition features.
4. Notifications on SMS can be opened through internet access by clicking on the links.
5. Villages in close vicinities linked.
6. Customised welcome page according to user's personal detail eg.name

4.2 Constraints

1. To minimise costs as the application should be affordable to the masses.
2. Lack of high speed connectivity in rural areas.
3. Different phone and hardware models right from basic handsets to advanced smartphones.
4. Different screen sizes.
5. Different technological features for different phones.
Eg. GPS enabled phones;
Non GPS enabled phones;
3G enabled phones;
Non 3G enabled phones;
No internet access phones.

4.3 Information design/structure and architectural problems

1. When person's name is clicked, the person's profile page should appear along with his recent activities such as video posts, audio recordings, images.
2. The application is suited and compatible with smart phones with touch screen and keypads.
3. Calendar not included.
4. Timeline not included.

Existing Information flow for the application - Gappagoshti	
Title page → Name of the Application-Gappagoshti	
Welcome page → Name of the User	
Home page → Screen - Names of the farmers , posted images, videos, audios; icons, time → Tabs - Options → Channels → Weather → Screen - Rain ↓ Temperature ↓ Cloud	
News → Screen - Headlines - Agrowon → Tabs - Change Newspaper → E-Sakaal Lokmat Maharashtra Times	
Yellow Pages → Screen - Bank info Local Train Time Table State Transport Time Table Express Train Time table	
Dnyankosh → Screen - Rice Plantation SRT Technique Banana Plant farming Rice for changing weather Agricultural Tourism Pest Control for Mango plant	
My Groups → Screen - SRT - Posts → Screen - Shows all SRT Rice - Posts → Screen - Shows all Rice → Tabs - Members → Screen - Names of Members → Joined → Screen - Name of Member → Tabs - Remind → A reminder has been sent - OK (Pop up dialouge) Remove Back Not Joined → Screen - Name of Member → Tabs - Remove Member Back → Option - Add Members → Screen - Names of Members (from phonebook with check boxes) → Tabs - Send Invitation	
Search Post → Screen - Names of Members → About - SRT → Posts about his activities Rice Onion Mango Pest Control General → Tabs - Back	
Customize → Screen - Customize Home Page SRT Group Weather Search Post News → Tabs - Save Back	
Help and Support Page → Screen- Help and Support Page → Tabs - Back	
→ New Post → Voice → Screen - Maximum record time shown (2 mins) → Tab - Start Recording → Screen - Voice Recorder gets activated - Remaining time shown Tab - Stop Recording → Screen - Recorded picture shown Tab - Tag → Screen - About text screen; Tag separated by coma text screen → Tab - Send → Screen - Sent; Automatic Revert to Home screen Send → Screen - Sent ; Automatic Revert to Home screen Back → Screen - Automatic Revert to Home screen	
Video → Screen - Maximum video time shown (2 mins) → Tab - Start Recording → Screen - Video Camera gets activated - Remaining time shown → Tab - Stop Recording → Screen - Recorded picture shown Tab - Tag → Screen - About text screen; Tag separated by coma text screen → Tab - Send → Screen - Sent; Automatic Revert to Home screen Send → Screen - Sent ; Automatic Revert to Home screen Back → Screen - Automatic Revert to Home screen	
Image → Screen - Camera screen is activated → Screen - Captured picture shown → Tab - Capture Tab - Tag → Screen - About text screen; Tag separated by coma text screen → Tab - Send → Screen - Sent; Automatic Revert to Home screen Send → Screen - Sent ; Automatic Revert to Home screen Back → Screen - Automatic Revert to Home screen	
Text → Screen - Text Screen to type is activated → Tab - Send → Screen - Sent ; Automatic Revert to Home screen	
→ Exit → Screen - Do you want to exit? (pop up) → Buttons - Yes → Exit → Return to Home screen	

Problems	Solutions
Yellow pages would be inappropriate as it is a brand name	Could be tagged as 'Directory'
Complicated structure - Several clicks involved	Possibility of icon based or visual graphics to add members and delete members.
At present it is sorted farmer wise (restricted to one sorting only)	Could have several sort options. One option could be sort member wise, other groups could be according to crop, seed, etc.
Options not defined according to a fixed standard	Options could be defined by classifying groups, notifications, updates and recent activities.
Not elaborated	Could have search box with voice search and query could be searched through word tags

4.4 Visual Design Problems

Grids and alignment

1. Grids and alignment problems.

Space optimisation problems

1. Space optimisation problem when recording video.
 2. Placement of the photo of the person and video.
- Video is not optimised to best viewing space.

Ambiguity in date and time

1. Date and month order changed. In Indian rural context it would be dd/mm/yy. But in existing platform the format is yyyy/mm/dd.

Size limit for group names

Provision for adjusting size limit of group names or else name size could exceed allotted space. (Automatic resizing limit should be set)

Current screenshots do not give clear visual idea.

1. The current screenshots give only an informative idea. This structure could be only used for basic phones. Eg. Latitude and Longitude positions; Date and time.
2. For smartphones, the information can be translated visually. Eg. Thumbnails of videos and the position can be geo tagged and shown accurately on a map.

Visual order and visual hierarchy problem

1. In the 'Download' screenshot, 'To cancel press back button' is not aligned. Should be shown after the message.
 2. More space between date and time
 3. Latitude and Longitude could be less dominant than numbers.
- Hence the words 'latitude' and 'longitude' could be in regular and the numbers in bold.

Use of modular grid for navigation

Can include thumbnails of video clips for navigation.

Icons and thumbnails

Icons and thumbnails could be added instead of written list in Dnyan Kosh since the application users would also include farmers and villagers who cannot read.

2. Realistic icons could be used instead of simplistic graphics since they become difficult to interpret.

Identity of user

1. Photo of the person could be made mandatory. For eg. mandatory step during initial set up since this could help farmers who cannot read as well as reduce the reading time and make the application visual based.

Visual design under different viewing conditions

1. Maximum utilisation of the application would be under sunlight (since the farmer would be on field).
- Hence usability test would have to be carried out to understand which screen background colour (black or white) and which font colour would be most clear and visually optimised for best reading conditions under sunlight.

Map showing location

1. Latitude and longitude shown in numerical format, but not shown visually on a map.
2. Maps not included.
3. Navigation not included.

Typography and typesetting

1. There should be space after day in date format eg. Tue, 12 July 2011.
2. Devnagari script Jodakshar error. Eg. In the word 'Sound Clips'.

Placement of text

During play back text gets placed on the recorded

video playback screen. Eg. For more options press menu button.

Table for Bus timings

Table needs to be displayed systematically sorted place wise or time wise according to user's preference.



Existing Interface



Modified Interface



Existing Interface



Modified Interface



Existing Interface



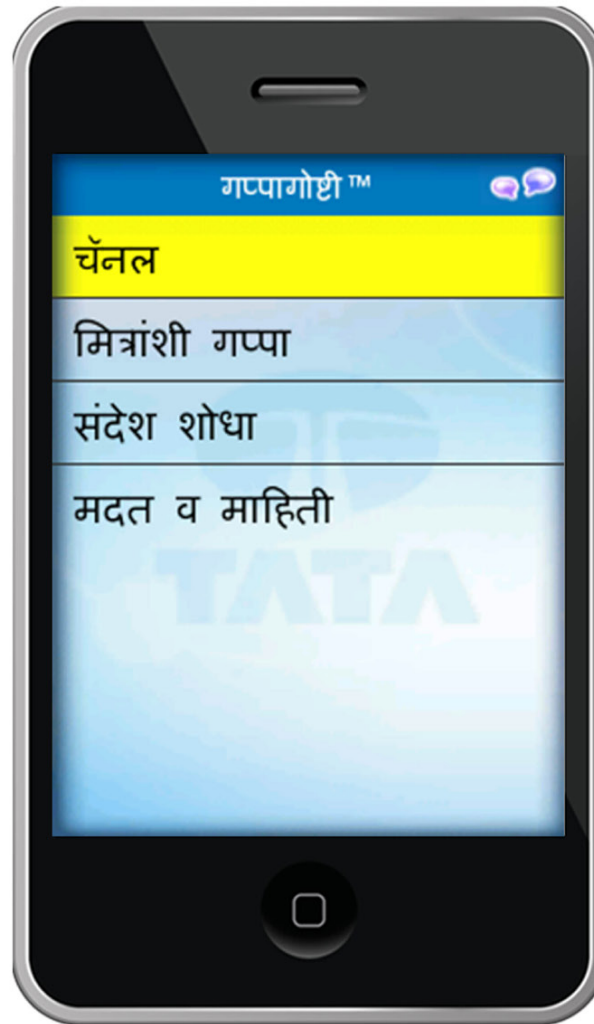
Modified Interface



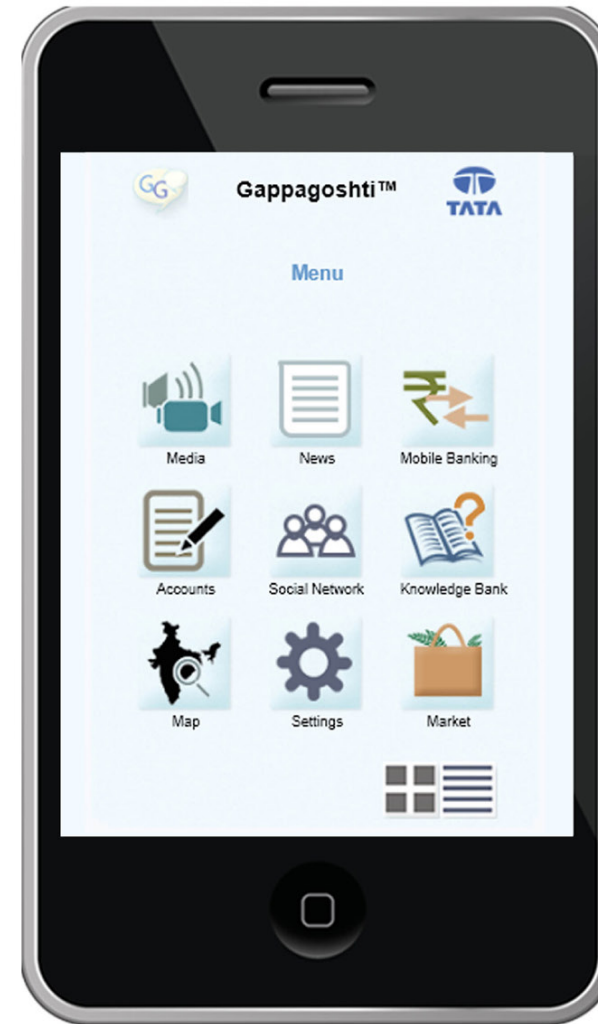
Existing Interface



Modified Interface



Existing Interface



Modified Interface

Navigation through icons on a modular grid

4.5 Product Design Problems

1. Different types of phones and handsets would be used.
2. The current application cannot be used for basic handsets for viewing high quality video recordings.

5. UNDERSTANDING VARIOUS SCENARIOS UNIDENTIFIED NEEDS

Rural Scenario

1. Online digital money transactions. The farmer should be able to view and maintain his cash flow statement, current account and savings account through his digital device. It could be constantly updated.

2. Notifications for reminders regarding important events updated automatically through news updates and group updates.
Eg. a person in a group can update an event and the user can be prompted to add that event to his calendar.

3. Record of agricultural activities in the form of timeline.

4. Online medical record of every person. Getting health and medical facility services online through the application. Eg. Vaccination reminders, annual health checkup reminder, reminder for medications, etc.

5. Notifications for sending messages to family members on field.

6. Students : Needs - Education purposes. (School/Education Institute Links could be incorporated in the App.)

E book downloads.

E portal or forum where notices, announcements and results could be posted.

An email platform could be incorporated to receive e-mails from the educational institute.

Educational Channel with videos. (Would help in situations where students are unable to access a school.)

7. Family members staying at home: Needs - Timings of water supply

from the local Municipal corporation so that they can get updates if there is no water supply or water shortage on a particular day. (For cooking and agricultural purposes.)

8. Farmers and family members on field. For the purpose of agriculture and farming they would need to know the timings of electricity supply and water supply.

Farmers would also have a requirement of maintaining their cash flow, current account and savings account.

9. Radio link for live updates and news related to agriculture.

Saguna Rice Farm



Saguna Rice Technique being used for cultivation on the farm



Saguna Rice Technique being used for cultivation on the farm



Banana Field



Vegetable farming



Fish farming



Mango farming



6. GRAPHIC USER INTERFACE

Procedure for creating graphics as followed at the place of internship:

1. Creation of low fidelity prototypes and mockups using wireframing software such as Balsamiq. At this stage user testing is done to assure that the call flow of the application works according to user's needs and ease. After 2 to 3 iterations and changes in the basic mock-up, the final call flow is finalised.
2. At this stage high fidelity prototype of the application is created. The pixel perfect graphic look is finalised at this stage with no further iterations or changes.

Technical Specifications of the graphics:

1. Graphic files saved in png format.
2. Graphics are initially created in the vector format but later converted to bitmap/raster graphics for final use.
3. The same screenshots are created for various screen sizes for different devices and saved in optimised file format for web viewing and mobile use such that minimum data is required to be downloaded thus decreasing data connection usage.

7. USER STUDY AND USABILITY EVALUATION

User study methods used in this research project:-

1. Users or participants were interviewed under constant factors. Observations were made based on their reactions to tasks and questions.
2. After several observations, tests, surveys and interviews and completion of tasks by users, analysis was carried out and problems faced by users was understood to decide about the modifications and improvement. the final solution was suggested after this procedure.

8. RESEARCH METHODS USED

Research Methods

1. Literature Review

- Website references
- Books

2. Primary Research

- Interviews
- Mapping/ structuring existing data
- Questionnaire - Survey Forms – Quantitative and Qualitative Research
- Task Analysis - Quantitative and Qualitative Research

3. Secondary Research

- Reading about existing problems by users on online forums.
- Technology review of latest phone technology.

9. GIVEN PROBLEM SCENARIO

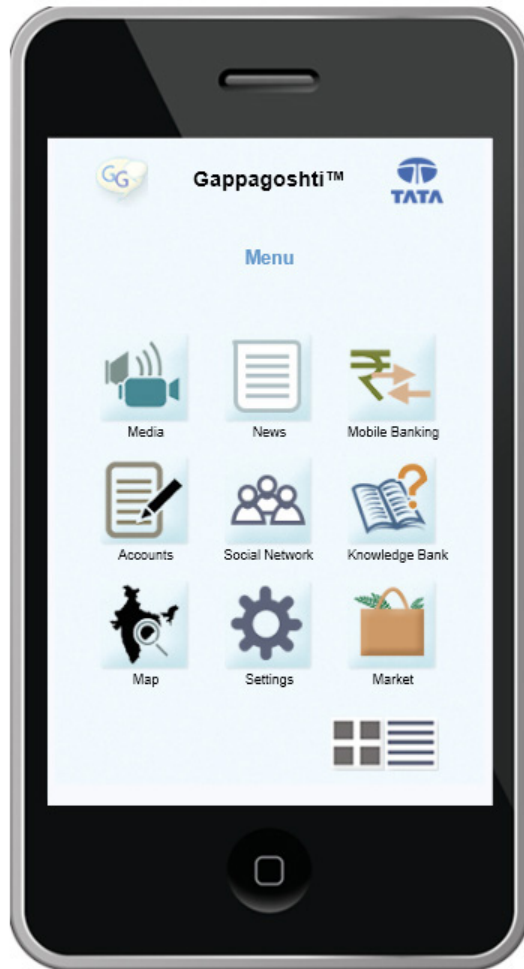
To facilitate an online money transaction from one person to another person.

Constraints:

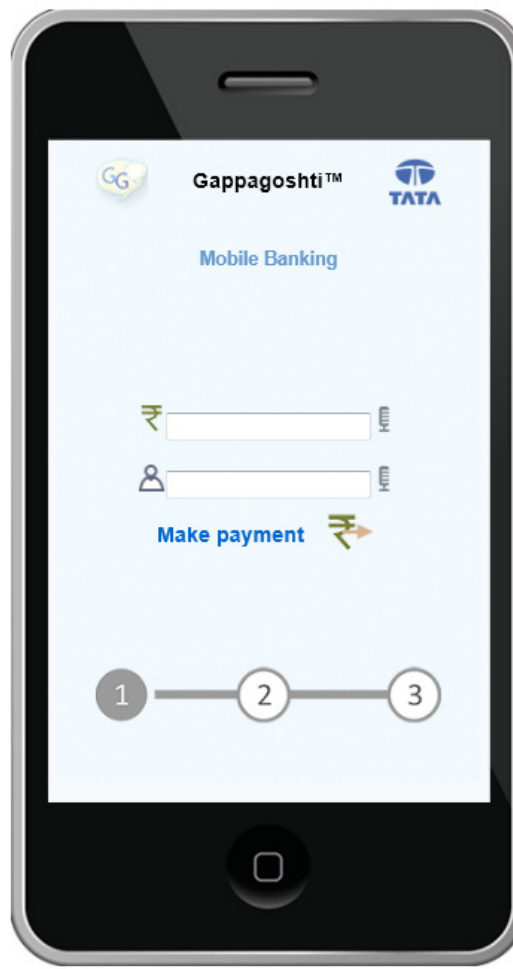
1. Villager is illiterate, hence, cannot read or write.
2. Villager is not tech savvy and cannot use advanced features.

Design solution:

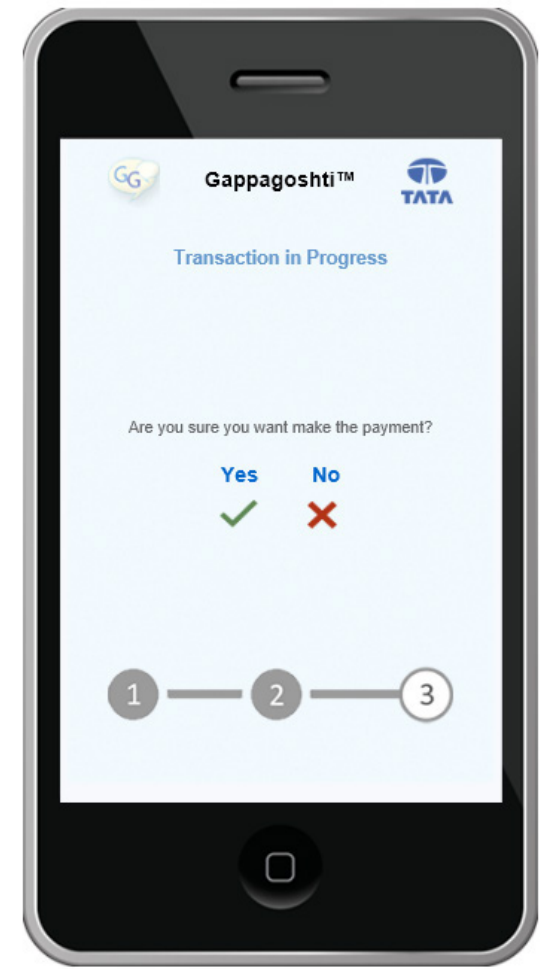
1. Easy to use interface.
2. Visual based interface having icons since villager cannot read. Hence, he can visually recognise the features rather than reading text.
3. Audio recognition feature since villager cannot type text.



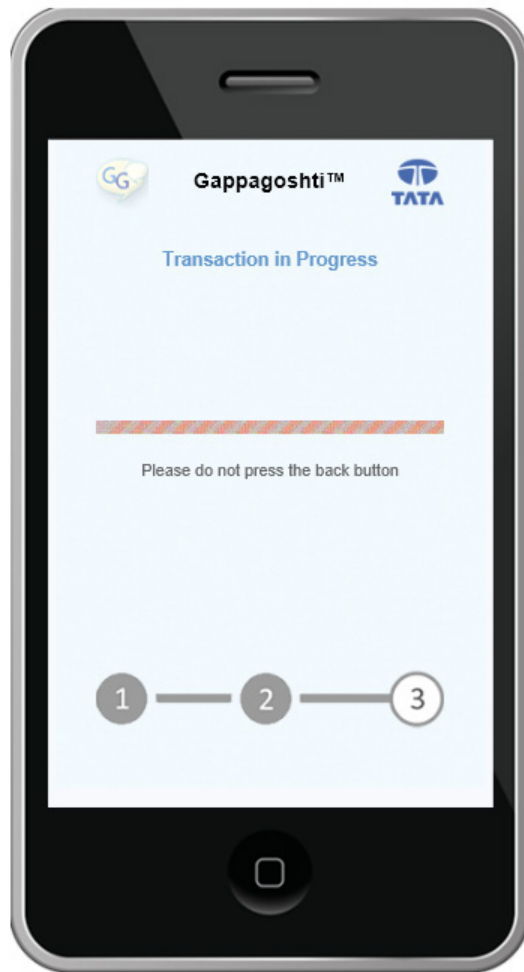
Step 1



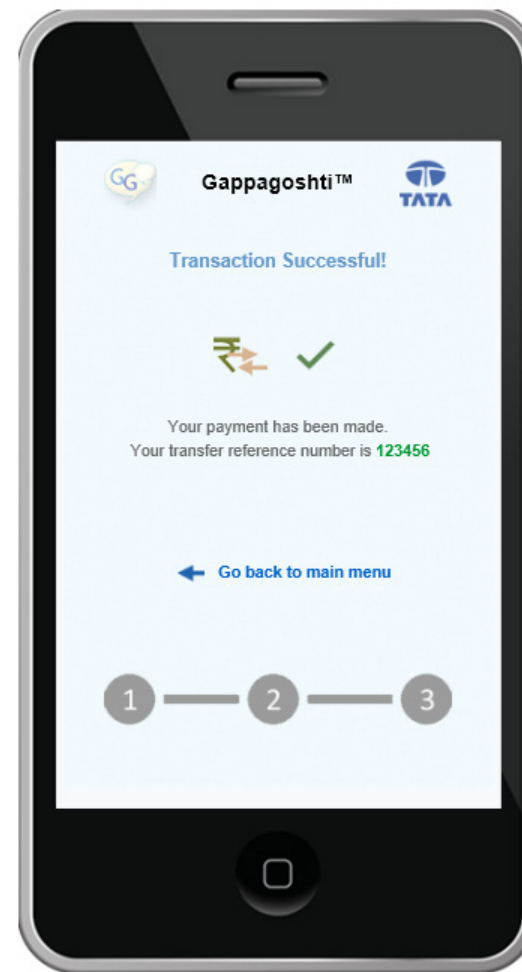
Step 2



Step 3



Step 4



Step 5

10. SCOPE FOR IMPROVEMENT AND MODIFICATION

1. The download time for the application can be reduced by optimising file size of pages and by minimising retrieval of information from the servers.
2. Adding features that will facilitate online monetary transactions through e-banking services.
3. Notifications about new schemes, benefits, facilities, discounts and incentives for farmers and businessmen.
4. Co-ordinated network between mobile and municipal corporation, electricity board and government health sectors in order to provide notifications to the rural user about timings of water supply, electricity supply and reminders/ announcements about health checkups/ vaccinations.

11. TCS OBJECTIVE

To understand/research/investigate the issues in an interface which spans voice (voice user interface) and data/mobile (smartphones, feature phones) across different socio-economic audiences.

ex. in an urban household where youngsters use a smartphone, parents use a feature phone and the house help uses a no-frills (voice only) phone; identify/investigate issues pertaining to people/ audiences/customers when the conversation jumps/span voice and data.

- literature study /survey
- design experiment
- qualitative analysis - includes user studies
- design interventions/creation/synthesis
- conclusion
- future work
- references

11.1 Literature Survey

The greatest challenge for app developers today is to create applications that are portable across several devices and platforms. The difficulties while designing a user interface for different devices are that the technical requirements are distinct for diverse devices eg a touch screen phone and a non touch screen phone(with keypad). In addition to this challenge the developer has to also comply to the requirement of making the interface portable across multiple platforms. While developing the applications for various devices and platforms the primary goal is to maintain a high quality of user experience for the end-user so that he can access the application easily.

Two approaches while designing application across various devices are as follows:-

i) Device centric approach -

1. Mobile application is developed according to the device functionality.
2. Advantage- User experience is maintained for one device.
3. Disadvantage- Multiple applications need to be designed for different devices and requirements hence cost would be high.

ii) Application-centric approach -

1. The application is developed such that the same application look is maintained across various devices.
2. Advantage - the same user experience can be achieved over various devices.
3. Disadvantage - User experience would not remain consistent with user's device interface.

Ideal scenario: A global experience for the app should be strived for rather than investing and creating apps which fulfill short term requirements. Eg. The layout of the mobile applications should be such that they are optimised for all types of screens and devices.

Important things to be noted while creating applications:-

1. Scalable user interface which does create problems when deployed over multiple platforms. Scalability in resolution and orientation must be ensured so the application functions effectively.
2. Understanding the target audience and accordingly creating apps for those platforms.
3. Applications for feature phones can be developed more easily since it does not work on an operating system and has limited features.
4. Few important factors to be considered while considering the user experience:

i) The hardware: The first important thing related to user experience relates to direct interaction with the phone and the important aspects that need to be considered are

- capacitive or resistive touchscreen
- screen sizes

240px x 320px

320px x 480px

480px x 720px

480px x 800px

640px x 960px

- pixel density of screen
- resolution of screen

- battery life of device

- device's support for different data connectivity eg. bluetooth, data tethering, WIFI hotspot

- RAM of the device

- Processor of the device

ii) Operating system of the devices-

Android, Apple iOS, Symbian, Windows 8, Blackberry OS

iii) Mobile Web App and Native mobile App.

Interaction Design approach

The term interaction design is an umbrella term which comprises of several aspects of interaction design such as usability, interface design, web design, software engineering, web design, user experience design and interaction system design. The process of interaction design centers around user experience. Interaction design forms a basis to designing computer based systems for people, which involves several academic disciplines, fields and design practices such as ergonomics, human computer interaction, information systems, industrial design, graphic design, psychology, social sciences, etc. People from several varied disciplines are involved in interaction design since they can bring their expertise and knowledge about their fields to improve the user experience for the user of the product. Various usability goals and design principles need to be considered while designing for the user. User studies play a major role in understanding the problems of the user. It comprises of questionnaires, survey and interviews. The main goals are efficiency, effectiveness, safety and usability for the end user. User data collection and analysis will further help bring forth previously undetected problems and existing problems. After this step the design is altered by modifying existing design, improving existing design or eliminating certain features. User feedback is obtained after the design has been modified and tested. Accordingly further changes are made with the goal being to satisfy the end user.

11.2 DESIGN EXPERIMENT

Experiment 1:

Aim: To study the problems faced by users while completing a task using different phones.

Task: Make a phone call to another person

Method of Experiment: Using existing phone interface

Observation:

Sr. No.	Participant	Age Group	Type of phone	Time taken to make phone call	Task completion status	Method of completing task	Problems faced by user	Observation
1	Participant 1	40yrs - 60yrs	Smartphone - Touchscreen phone	26 seconds	Yes	using call history	Targeted action was not being carried out easily due to problem with the screen.	Screen was not target sensitive and responsive.
2	Participant 2	40yrs - 60yrs	Smartphone - Keypad phone	20 seconds	Yes	using phonebook	Scrolling difficulty, had to navigate with buttons	Difficulty scrolling
3	Participant 3	15yrs - 25yrs	Smartphone - Touch screen phone	19 seconds	Yes	using number dial	No problem	No problem
4	Participant 4	15yrs - 25yrs	Smartphone -Touch screen phone	4 seconds	Yes	using speed dial	No problem	No problem
5	Participant 5	30yrs - 40 yrs	Basic handset	42 seconds	Yes	using phonebook	Difficulty reading	Difficulty reading hence had to rely on count and script as visual cue.

Inference: i) People with touch phones could complete the task more quickly than people with keypads and basic handsets.

ii) It was difficult for an illiterate person to access the phonebook.

iii) Resistive touch screens were not very responsive.

Conclusion: Problems while making a phonecall were recorded most-

ly with keypad and basic handset phones.

Solution: Capacitive touchscreens could be used by users than resistive touch screens

Experiment 2:

Aim: To study problems faced by users while using voice service offered by the phone.

Task: Use voice interactive service

Method of Experiment: Using existing phone interface

Observation:

Sr. No.	Participant	Age Group	Type of phone	Phone operating system(OS)	Availability of the feature on the phone	Task completion status	Method of completing task	Problems faced by user	Observation
1	Participant 1	40yrs - 60yrs	Smartphone - Touchscreen phone	Android 4.0	Yes	No	i) Used WIFI	i) User had to repeat the word and speak loudly.	After 2 failed attempts at using the voice feature, user typed the words
2	Participant 2	40yrs - 60yrs	Smartphone - Keypad phone	Android 4.0	Yes	No	i) Used Phone data connection	i) User had to repeat the word and speak loudly.	After 3 failed attempts at using the voice feature, user typed the words.
3	Participant 3	15yrs - 25yrs	Smartphone - touch screen phone	Android 4.2	Yes	Yes	i) Used WIFI	i) User had to repeat the word and speak loudly.ii) Could not access the internet to use WIFI.	After 1 failed attempt at using the voice feature, the word was recognised.
4	Participant 4	15yrs - 25yrs	Smartphone - touch screen phone	Android 4.2	Yes	Yes	i) Used Phone data connection	i) User had to repeat the word and speak loudly.	After 2 failed attempt at using the voice feature, the word was recognised.
5	Participant 5	30yrs - 40 yrs	Basic handset		Not Applicable	Not Applicable	Not Applicable	Not applicable	Not applicable

Inference: i) Voice features of none of the phones were accurate.
ii) The feature could be used successfully only after 2 or more attempts.
iii) Data connectivity is required at all times to process the voice, otherwise the feature cannot be used.

Conclusion: People preferred typing than using the voice recognition feature.

Solution: i) If voice feature has to be used, the technology used should be able to recognise normal voice accurately.
ii) The voice feature would be helpful to people who cannot read.

Experiment 3:

Aim: To study problems faced by users while using data service offered by the mobile network operator.

Task: Use web browser on a mobile phone to book a ticket.

Method of Experiment: Using existing phone interface

Observation:

Sr. No.	Participant	Age Group	Type of phone	Phone operating system(OS)	Availability of the feature on the phone	Task completion status	Method of completing task	Problems faced by user	Observation
1	Participant 1	40yrs - 60yrs	Smartphone - Touchscreen phone	Android 4.0	Yes	No	i) Used WIFI	i) User had to repeat the word and speak loudly.	After 2 failed attempts at using the voice feature, user typed the words
2	Participant 2	40yrs - 60yrs	Smartphone - Keypad phone	Android 4.0	Yes	No	i) Used Phone data connection	i) User had to repeat the word and speak loudly.	After 3 failed attempts at using the voice feature, user typed the words.
3	Participant 3	15yrs - 25yrs	Smartphone - touch screen phone	Android 4.2	Yes	Yes	i) Used WIFI	i) User had to repeat the word and speak loudly.ii) Could not access the internet to use WIFI.	After 1 failed attempt at using the voice feature, the word was recognised.
4	Participant 4	15yrs - 25yrs	Smartphone - touch screen phone	Android 4.2	Yes	Yes	i) Used Phone data connection	i) User had to repeat the word and speak loudly.	After 2 failed attempt at using the voice feature, the word was recognised.
5	Participant 5	30yrs - 40 yrs	Basic handset		Not Applicable	Not Applicable	Not Applicable	Not applicable	Not applicable

Inference: i) The task could be completed only with 3G connection.
ii) Mobile network connection is not as reliable as WIFI or cable network connection.
iii) Can be used in emergency or while on the go.

Conclusion: i) Mobile network connection is not reliable.
ii) It was observed that there is poor data connectivity urban areas.

Solution: WIFI connectivity is more efficient than data connection available on the phone, as phone data connection is poor.

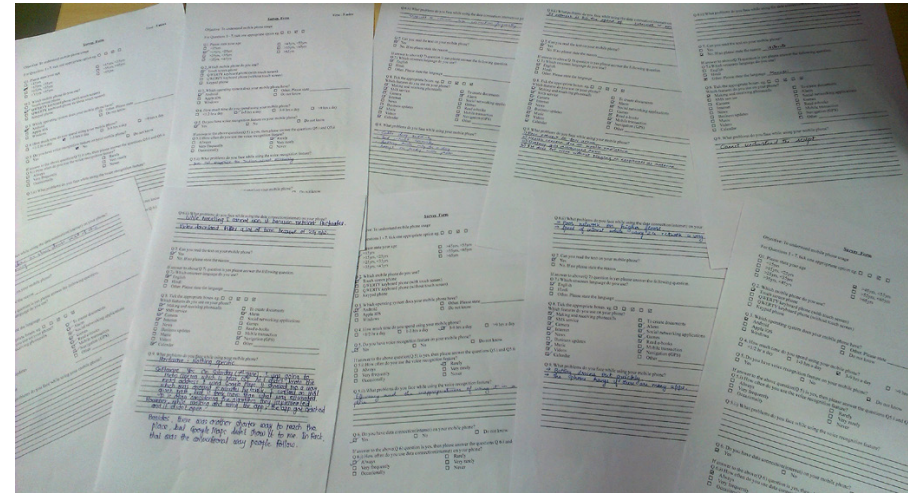
11.3 Qualitative Analysis

To study the urban household scenario:-

Aim: To study the following about urban mobile phone users:-

- 1) To know the number of people using the various types of phones of various age groups
- 2) To know which operating systems are used by people
- 3) To analyse frequency of use of a mobile phone
- 4) To understand the usage of voice recognition feature
- 5) Frequency of usage of voice recognition feature
- 6) To understand the problems faced by users while voice recognition feature on the phone
- 7) To understand the usage of data connection(internet) feature.
- 8) Frequency of usage of data connection(internet) feature on the phone.
- 9) To understand the problems faced by users while using data connection(internet) on the phone.
- 10) To know how many users can read text on their phone.
- 11) To know which interface language is used by the users.
- 12) To know the degree of understanding the users have about technology on their phone.
- 13) To understand the problems faced by users while using a phone.

Interviews, questionnaire and survey



Questions asked to 10 urban mobile phone users:

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|---|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☐ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☐ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|------------------------------------|--|
| ☐ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☐ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☐ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

Q 6. Do you have data connection(internet) on your mobile phone?

- ☐ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

Q 7. Can you read the text on your phone?

- ☐ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which interface language do you use?

- ☐ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|--|---|
| ☐ Making and receiving phonecalls | ☐ To create documents |
| ☐ SMS service | ☐ Alarm |
| ☐ Camera | ☐ Social networking applications |
| ☐ Internet | ☐ Games |
| ☐ News | ☐ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☐ Music | ☐ Navigation (GPS) |
| ☐ Videos | ☐ Other _____ |
| ☐ Calendar | _____ |

Q 9. What problems do you face while using the phone?

No. of participants	Range of Age	Type of phone	Functions used for	Problems faced by user
2	40yr -60yrs	Smart phone/ Keypad phone	To make and receive phone calls, listen to music, use applications, to set reminders, to set alarms, to set calendar records, make notes, use the camera	Battery gets drained after excessive usage, phone functions take time to load if there is data stored in the memory reaching maximum capacity.
2	15yrs -20yrs	Smart phone	To make and receive phone calls, to watch movies, listen to music, use internet, use applications, to set reminders, to set alarms, to set calendar records, make notes, use the camera	Battery gets drained after excessive usage, phone functions take time to load if there is data stored in the memory reaching maximum capacity.
1	30yrs-50yrs	Basic Keypad phone	To make and receive phonecalls	Difficulty reading names and accessing phonebook.

11.4 DESIGN INTERVENTION

Based on the research the following problems were identified and solutions suggested.

1. Problem: Battery draining quickly due to over usage of applications.

Solution: Using phone on power saving mode and closing background applications.

2. Problem: Network problem indoors where walls act as barriers and on higher floors.

Solution: To switch to better mobile network service providers and to move to an open area for better network reception.

3. Problem: People with hearing impairment cannot hear with the normal hearing aid in their ear.

Solution: Devising mobile phone features that will help people with hearing disabilities.

4. Problem: Mobile radiation health concern.

Solution: The health concern regarding mobile radiation can be eliminated by following safety rules to avoid radiation hazards.

5. Problem: Language cannot be understood by illiterate users.

Solution: Audio recognition and visual menus need to be incorporated.

6. Problem: Non sensitive touch screen phones

Solution: Use of capacitive touch screen.

7. Problem: Unable to view phone under daylight conditions

Solution: Using Super AMOLED Screens since they are brighter than the regular screens since it uses one less layer than regular AMOLED display.

11.5 CONCLUSION

Based on the research the following conclusion can be made about phone users in a urban household scenario:

1. The priority and need of a user irrespective of age groups remains clear, easy and economically viable communication through a phone.

2. The secondary wants of a user from a phone vary with age, income level and psychology of user.

3. The level of technology savviness of users varies with youngsters being most tech savvy to members of older age groups being least tech savvy.

4. There are some people who cannot use the phone normally due to impairments such as hearing impairment or visual impairment.

11.6 FUTURE WORK

Scope for phone development modifications in future:

1. Online market feature to sell farming produce Including a online market feature that will help the farmer to directly connect with the consumers

2. Creating a simple user interface

Creating phones that have least complicated menu structure for ease of access.

3. Voice based and audio recognition phones: Voice based and audio recognition phones that process voice input from user to perform phone actions.

4. Standardising user interface

Standardising the user interface which can be used across phones irrespective of operating systems and mobile phone models so that ambiguity and confusion about visual cues is greatly reduced. This will not only eliminate time taken to learn the new interfaces but also increase the quality of user experience and reduce problems regarding creating different interface designs for different phones.

Future Work - Implementation of high speed internet in remote areas

One of the most crucial aspects of seeing the implementation of the digital mobile platform is access of high speed network in rural areas which is not available as of now.

12. IMPACT OF ENABLING TECHNOLOGY REACH RURAL PEOPLE

1. Empowering rural people

This project would empower rural people due to the practical application of technology in their daily life. eg. SRT, and the digital mobile application.

2. Upliftment of rural economy

The implementation of the technological advancements in the practical application

3. Development of a self reliant rural model

It would help people in rural areas live a self-reliant and sustainable life by empowering them with the required latest information regarding technological breakthrough in agriculture and business, and their communication needs.

4. Self sustainable rural model

It would help the rural community to develop a self sustainable model within their village without migrating to the urban areas for better facilities.

5. Application of technology would help in dissolving the urban rural divide

When self sustainable rural models would be created it would help in bridging the economic gap between the rural and urban areas.

6. High quality of education in rural areas

Empowering rural areas with the latest technology will also enable them to get educated through new e-learning techniques which will help them become independent educated citizens with high quality of education.

7. Eliminating middlemen from the selling and distribution process

It would enable farmers to maximise their profits efficiently by eliminating middlemen and brokerage charges in the selling and distribution of their farming produce. Technology would help the farmers to directly connect with the consumers.

8. Would encourage urban people to migrate to rural areas

When rural areas become equipped with the latest technology and self-reliant resources, urban people would be encouraged to migrate to rural areas, hence further helping eliminate the rural-urban divide.

9. Increasing productivity of farmers - With technology reaching rural masses, farmers would be able to maximise their output through use of latest weather information systems, agricultural seeds, ploughing techniques, etc.

13. CONCLUSION

Based on the study, it can be concluded that technology can help people from different demographic, geographic and psychographic backgrounds to improve their productivity in various tasks. The main tasks that technology can help in accomplishing are:

1. Communication needs.
2. Receiving and disseminating information
3. Education purposes.
4. Bridging the urban-rural divide in India

Future Work

One of the most crucial aspects of seeing the implementation of the digital mobile platform is access of high-speed network in rural areas, which is not available as of now.

After having studied the urban scenario and the rural scenario in which mobiles are used, a conclusion can be made as follows:

Urban Scenario:

1. People have better data connectivity and hence can access advanced features that a mobile platform provides.
2. People spend more time on their mobile phones.
3. Greater awareness about latest features and technology. People are tech-savvy.
4. Greater use of high-end phones since they belong to the greater income-earning segment.
5. Greater use of data connectivity.

Rural Scenario:

1. Majority of the population uses basic phones.
2. Non-tech-savvy users.
3. Lesser time is spent on their cell phones.
3. Priority is to make and receive phone calls.
4. Data connection is used occasionally since connectivity is poor.

14. ACKNOWLEDGEMENT

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16. SURVEY FORMS

Survey Form Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

☐ <15yrs	☐ >45yrs, <55yrs
☒ >15yrs, <25yrs	☐ >55yrs, <65yrs
☐ >25yrs, <35yrs	☐ >65yrs
☐ >35yrs, <45yrs	

Q 2. Which mobile phone do you use?

☒ Touch screen phone

☐ QWERTY keyboard phone (with touch screen)

☐ QWERTY keyboard phone (without touch screen)

☒ Keypad phone

Q 3. Which operating system does your mobile phone have?

☐ Android	☐ Other. Please state <u>Symbian</u>
☒ Apple iOS	☐ Do not know
☐ Windows	

Q 4. How much time do you spend using your mobile phone?

☒ <1/2 hr a day ☐ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

☒ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

☐ Always	☐ Rarely
☐ Very frequently	☐ Very rarely
☐ Occasionally	☒ Never

Q 5.ii) What problems do you face while using the voice recognition feature?

Because of weak network connectivity and slow data transfer rate, SIP doesn't recognize anything and I get error message as I should try using SIP after some time.

Besides, it recognizes my voice correctly only when there is no ambient noise.

Q 6. Do you have data connection(internet) on your mobile phone?

☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

☐ Always	☐ Rarely
☒ Very frequently	☐ Very rarely
☐ Occasionally	☐ Never

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?
While travelling I cannot use it because network fluctuates.

Video download takes a lot of time because of 2G n/w.

Q 7. Can you read the text on your mobile phone?

☒ Yes

☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

☒ English

☐ Hindi

☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

☒ Making and receiving phonecalls

☒ SMS service

☒ Camera

☒ Internet

☐ News

☐ Business updates

☐ Music

☐ Videos

☒ Calendar

☐ To create documents

☒ Alarm

☐ Social networking applications

☐ Games

☐ Read e-books

☐ Mobile transaction

☒ Navigation (GPS)

☐ Other _____

Q 9. What problems do you face while using your mobile phone?

Hardware : Nothing specific

Software : Yes. On Saturday (7th June), I was going to Metro Cinema which is near CST. As I didn't know the exact address I used Google Maps. It showed me a way which was around 15 minutes by walk. I walked on that given path, but it took more than what was estimated. It is okay considering the algorithm they implemented. However, while walking and using the app, the app got crashed and it didn't open.

Besides, there was another shorter way to reach the place, but Google Maps didn't show it to me. In fact, that was the conventional way people follow.

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

☐ <15yrs

☒ >15yrs, <25yrs

☐ >25yrs, <35yrs

☐ >35yrs, <45yrs

☐ >45yrs, <55yrs

☐ >55yrs, <65yrs

☐ >65yrs

Q 2. Which mobile phone do you use?

☒ Touch screen phone

☐ QWERTY keyboard phone (with touch screen)

☐ QWERTY keyboard phone (without touch screen)

☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

☒ Android

☐ Apple iOS

☐ Windows

☐ Other. Please state _____

☐ Do not know

Q 4. How much time do you spend using your mobile phone?

☒ <1/2 hr a day

☐ 1-3 hrs a day

☐ 3-9 hrs a day

☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

☒ Yes

☐ No

☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

☐ Always

☐ Very frequently

☐ Occasionally

☒ Rarely

☐ Very rarely

☐ Never

Q 5.ii) What problems do you face while using the voice recognition feature?

i) The spoken words are mistyped

ii) Need to keep repeating the words loudly and clearly so that it is recognised properly.

iii) This feature cannot be used in a public place as it makes the user of this feature appear as if he is talking to oneself.

Q 6. Do you have data connection(internet) on your mobile phone?

☒ Yes

☐ No

☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

☒ Always

☐ Very frequently

☐ Occasionally

☐ Rarely

☐ Very rarely

☐ Never

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|--|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☒ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☒ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|---|--|
| ☒ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☐ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☒ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

No problems

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☒ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

If network is 2G, the speed of internet is very slow.

Q 7. Can you read the text on your mobile phone?

- ☒ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

- ☒ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|--|
| ☒ Making and receiving phonecalls | ☐ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☒ Social networking applications |
| ☒ Internet | ☐ Games |
| ☒ News | ☒ Read e-books |
| ☐ Business updates | ☒ Mobile transaction |
| ☒ Music | ☒ Navigation (GPS) |
| ☒ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

- i) Poor network in few areas
 ii) Health concern due to mobile radiation
 iii) Battery gets discharged soon
 iv) FM does not work without plugging in earphones as antenna.

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|---|--|
| ☐ <15yrs | ☒ >45yrs, <55yrs |
| ☐ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☒ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|---|--|
| ☒ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☐ 1-3 hrs a day ☒ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☐ Yes ☐ No ☒ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☒ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

Q 7. Can you read the text on your mobile phone?

- ☒ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

- ☒ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|--|
| ☒ Making and receiving phonecalls | ☐ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☒ Social networking applications |
| ☒ Internet | ☒ Games |
| ☒ News | ☒ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☒ Music | ☒ Navigation (GPS) |
| ☒ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|--|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☒ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☒ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|---|--|
| ☒ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☒ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--|
| ☐ Always | ☒ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

→ Does not recognise the words accurately.
→ I would prefer typing rather than the voice recognition feature as it is time consuming.

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|---|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☒ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

→ Poor network on higher floors.
→ Speed of internet while using 2G network is very slow

Q 7. Can you read the text on your mobile phone?

- ☒ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

- ☒ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|--|
| ☒ Making and receiving phonecalls | ☐ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☒ Social networking applications |
| ☒ Internet | ☒ Games |
| ☒ News | ☒ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☒ Music | ☒ Navigation (GPS) |
| ☒ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

→ Battery drains out quickly.
→ The phone hangs if there are many apps.

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|--|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☒ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☒ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|---|--|
| ☒ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☐ 1-3 hrs a day ☒ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--|
| ☐ Always | ☒ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

Efficiency and the inappropriateness of using it in a public place

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☒ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

None

Q 7. Can you read the text on your mobile phone?

- ☒ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

- ☒ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|--|
| ☒ Making and receiving phonecalls | ☒ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☒ Social networking applications |
| ☒ Internet | ☒ Games |
| ☒ News | ☒ Read e-books |
| ☐ Business updates | ☒ Mobile transaction |
| ☒ Music | ☒ Navigation (GPS) |
| ☒ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

low battery life, strain on eyes

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|--|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☐ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☒ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☐ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☒ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|------------------------------------|--|
| ☐ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☒ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☒ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☐ Yes ☐ No ☒ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

Q 6. Do you have data connection(internet) on your mobile phone?

- ☐ Yes ☐ No ☒ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

Q 7. Can you read the text on your mobile phone?

- ☐ Yes
☒ No. If no please state the reason illiterate

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i) Which onscreen language do you use?

- ☐ English
☐ Hindi
☒ Other. Please state the language Marathi

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|---|
| ☒ Making and receiving phonecalls | ☐ To create documents |
| ☐ SMS service | ☐ Alarm |
| ☐ Camera | ☐ Social networking applications |
| ☐ Internet | ☐ Games |
| ☐ News | ☐ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☐ Music | ☐ Navigation (GPS) |
| ☐ Videos | ☐ Other _____ |
| ☐ Calendar | |

Q 9. What problems do you face while using your mobile phone?

Cannot understand the script

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|---|--|
| ☐ <15yrs | ☒ >45yrs, <55yrs |
| ☐ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☒ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|---|--|
| ☒ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☒ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|---|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☒ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

NEVER USED

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☒ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

Difficult to connect, lose connection frequently, rely on wi-fi mostly

Q 7. Can you read the text on your mobile phone?

- ☒ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i) Which onscreen language do you use?

- ☒ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|---|
| ☒ Making and receiving phonecalls | ☐ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☐ Social networking applications |
| ☒ Internet | ☐ Games |
| ☐ News | ☐ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☒ Music | ☒ Navigation (GPS) |
| ☐ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

- Calls drop suddenly
- Bad internet connectivity
- Battery lasts only for a day
- hangs on load; more photos

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|--|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☒ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☐ Touch screen phone
- ☒ QWERTY keyboard phone (with touch screen)
- ☐ QWERTY keyboard phone (without touch screen)
- ☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- ☒ Android ☐ Other. Please state _____
- ☐ Apple iOS ☐ Do not know
- ☐ Windows

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☒ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☐ Yes ☒ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☐ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☒ Occasionally | ☐ Never |

with Q 6.ii) What problems do you face while using the data connection(internet) on your phone?
many, Net is slow. Due to a small display screen, using the internet for reading / looking things is a problem.

Q 7. Can you read the text on your mobile phone?

- ☒ Yes *→ but very small*
- ☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

- ☒ English
- ☐ Hindi
- ☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|--|
| ☒ Making and receiving phonecalls | ☐ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☒ Social networking applications |
| ☒ Internet | ☒ Games |
| ☐ News | ☐ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☒ Music | ☐ Navigation (GPS) |
| ☐ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

Android on my phone is outdated, and probably there's no scope of upgrading. Internal memory is very low. Many apps get stored in the internal memory and can't be shifted to the SD card. ∴ After a limit, apps can't be installed.

Survey Form

Time : 5 mins

Objective: To understand mobile phone usage

For Questions 1 - 7, tick one appropriate option eg. ☐ ☐ ☒ ☐

Q1. Please state your age

- | | |
|--|---|
| ☐ <15yrs | ☐ >45yrs, <55yrs |
| ☒ >15yrs, <25yrs | ☐ >55yrs, <65yrs |
| ☐ >25yrs, <35yrs | ☐ >65yrs |
| ☐ >35yrs, <45yrs | |

Q 2. Which mobile phone do you use?

- ☒ Touch screen phone
☐ QWERTY keyboard phone (with touch screen)
☐ QWERTY keyboard phone (without touch screen)
☐ Keypad phone

Q 3. Which operating system does your mobile phone have?

- | | |
|---|--|
| ☒ Android | ☐ Other. Please state _____ |
| ☐ Apple iOS | ☐ Do not know |
| ☐ Windows | |

Q 4. How much time do you spend using your mobile phone?

- ☐ <1/2 hr a day ☒ 1-3 hrs a day ☐ 3-9 hrs a day ☐ >9 hrs a day

Q 5. Do you have voice recognition feature on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above question(Q 5) is yes, then please answer the questions Q5.i and Q5.ii

Q 5.i) How often do you use the voice recognition feature?

- | | |
|--|--|
| ☐ Always | ☒ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 5.ii) What problems do you face while using the voice recognition feature?

Does not recognise the Indian accent accurately

Q 6. Do you have data connection(internet) on your mobile phone?

- ☒ Yes ☐ No ☐ Do not know

If answer to the above(Q 6) question is yes, then please answer the questions Q 6.i and Q6.ii

Q 6.i) How often do you use data connection(internet) on your phone?

- | | |
|--|--------------------------------------|
| ☒ Always | ☐ Rarely |
| ☐ Very frequently | ☐ Very rarely |
| ☐ Occasionally | ☐ Never |

Q 6.ii) What problems do you face while using the data connection(internet) on your phone?

None

Q 7. Can you read the text on your mobile phone?

- ☒ Yes
☐ No. If no please state the reason _____

If answer to above(Q 7) question is yes please answer the following question.

Q 7.i Which onscreen language do you use?

- ☒ English
☐ Hindi
☐ Other. Please state the language _____

Q 8. Tick the appropriate boxes. eg. ☐ ☐ ☒ ☐ ☒

Which features do you use on your phone?

- | | |
|---|--|
| ☒ Making and receiving phonecalls | ☒ To create documents |
| ☒ SMS service | ☒ Alarm |
| ☒ Camera | ☒ Social networking applications |
| ☒ Internet | ☒ Games |
| ☐ News | ☒ Read e-books |
| ☐ Business updates | ☐ Mobile transaction |
| ☒ Music | ☐ Navigation (GPS) |
| ☒ Videos | ☐ Other _____ |
| ☒ Calendar | |

Q 9. What problems do you face while using your mobile phone?

Touch is sometimes not responsive
Problems with the headphone jack as it does not support a lot of earphones
WiFi signals are not detected accurately.

17. LOG BOOK

Internship at TCS Innovation Lab - Mum-bai, Yantra Park, Thane.

20th May - 19th June

20th May, 2013 | Tuesday | Day 1

Briefing about Mobile Application for rural areas.

21st May, 2013 | Wednesday | Day 2

- 1) Started designing table of existing work flow and information structure of mobile application. (InDesign and PDF file)
- 2) Started documenting notes on problems regarding visual design and information structure/work flow of mobile application. (InDesign and PDF file)

22nd May, 2014 | Thursday | Day 3

1. Completed visual table showing existing information structure/flow for Mobile Application. Problems and solutions listed for the same. (Indesign and PDF file)
2. Mobile Application Report - Notes file created to document visual design, information structure/flow and other problems and solutions. (Indesign and PDF file)

23rd May, 2014 | Friday | Day 4

1. Continued documenting objective, point of view, constraints, features of existing digital application, various design problems regarding visual design, information design, product design, understanding various scenarios and technical requirements for the mobile application. (InDesign and PDF file)
2. Started with visual design for the various screen sizes. (PSD files)

26th May, 2014 | Monday | Day 5

1. Continued documenting problems regarding mobile interface,

visual design, information design, information flow, etc.(html file and txt file)

2. Technical aspects of visual design in the mobile application. Eg. To be saved as different types of files, graphic files for various screens and devices, icons file types, sizes, etc.

Link*

27th May, 2014 | Tuesday | Day 6

1. Set the navigation order for the mobile application according to the given screenshots.

Link*

2. Continued documenting report on mobile application. Points added: Typesetting changes, placement of text, table for bus timings, unidentified needs from rural perspective and household perspective; procedure for creating graphics and technical specifications for the same.

Link*

28th May, 2014 | Wednesday | Day 7

1. Read the document: Link*
2. Documented report and analysis on digital mobile application for a rural platform as html hyperlinked pages. Point added - User Studies and Usability Evaluation.

Link*

29th May, 2014 | Thursday | Day 8

1. Documented in the report:
i) Scope for improvement and modification, ii) Given problem - It's constraints and design solution

Link*

2. New application design for money transaction - Created files in Indesign and Illustrator

Link*

30th May, 2014 | Friday | Day 9

1. Designed Mobile Application information structure and visual design for mobile transaction scenario.
 2. Coded the Mobile Application prototype for mobile transaction.
- Link*

2nd June, 2014 | Monday | Day 10

Continued documenting the report:-

1. Literature Survey reading
2. Qualitative Analysis

Link*

3rd June, 2014 | Tuesday | Day 11

1. Continued documenting the report:

- i. Design Experiment
 - ii. Qualitative Analysis (Questionnaire)
2. Referred to 'Handbook of Marketing Research'

Link*

4th June, 2014 | Wednesday | Day 12

Continued documenting the report:

1. Qualitative Analysis - Completed the survey form questionnaire

Link*

Link*

2. Design Experiment - Created 3 experiment tables

Link*

5th June, 2014 | Thursday | Day 13

1. Literature review - Read books on interaction design
2. Continued documenting the report
- Literature survey

Link*

6th June, 2014 | Friday | Day 14

Continued documenting the report:

1. Research methods

2. Design problems and intervention
3. Future Work
4. Conclusion

Link*

9th June, 2014 | Monday | Day 15

Designed money transaction user interface:

1. Visual design
2. Screenshots in sequence

Link*

10th June, 2014 | Tuesday | Day 16

Designed the mobile banking user interface:

1. Coded the mobile application screenshots
2. Visual design

Link*

11th June, 2014 | Wednesday | Day 17

1. Continued designing the mobile banking user interface:

- i. Coded the mobile application screenshots
- ii. Visual design

Link*

2. Continued documenting the report - Design Experiments

Link*

12th June, 2014 | Thursday | Day 18

1. Continued designing the mobile banking user interface:

- i. Coded the mobile application screenshots
- ii. Visual design

Link*

2. Continued documenting the report - Design Experiments

Link*

13th June, 2014 | Friday | Day 19

1. Documented the report

Link*

2. Modified the mobile banking application interface

Link*

16th June, 2014 | Monday | Day 20

I have attached the internship research report herewith.

Link*

Visited Saguna Baug, Karjat

17th June, 2014 | Tuesday | Day 21

1. Documented the report

2. Worked on the presentation

Link*

18th June, 2014 | Wednesday | Day 22

1. Report

Link*

2. Presentation

Link*

19th June, 2014 | Thursday | Day 23

1. Final internship presentation.

2. Submitted the final internship report, presentation and files created during my internship in the SVN Link and a hard copy of the same.

18. PEOPLE INTERACTED WITH DURING INTERNSHIP AT TCS

Human Resources Department:

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Prasad Sandbhor

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P.O. Neral,

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