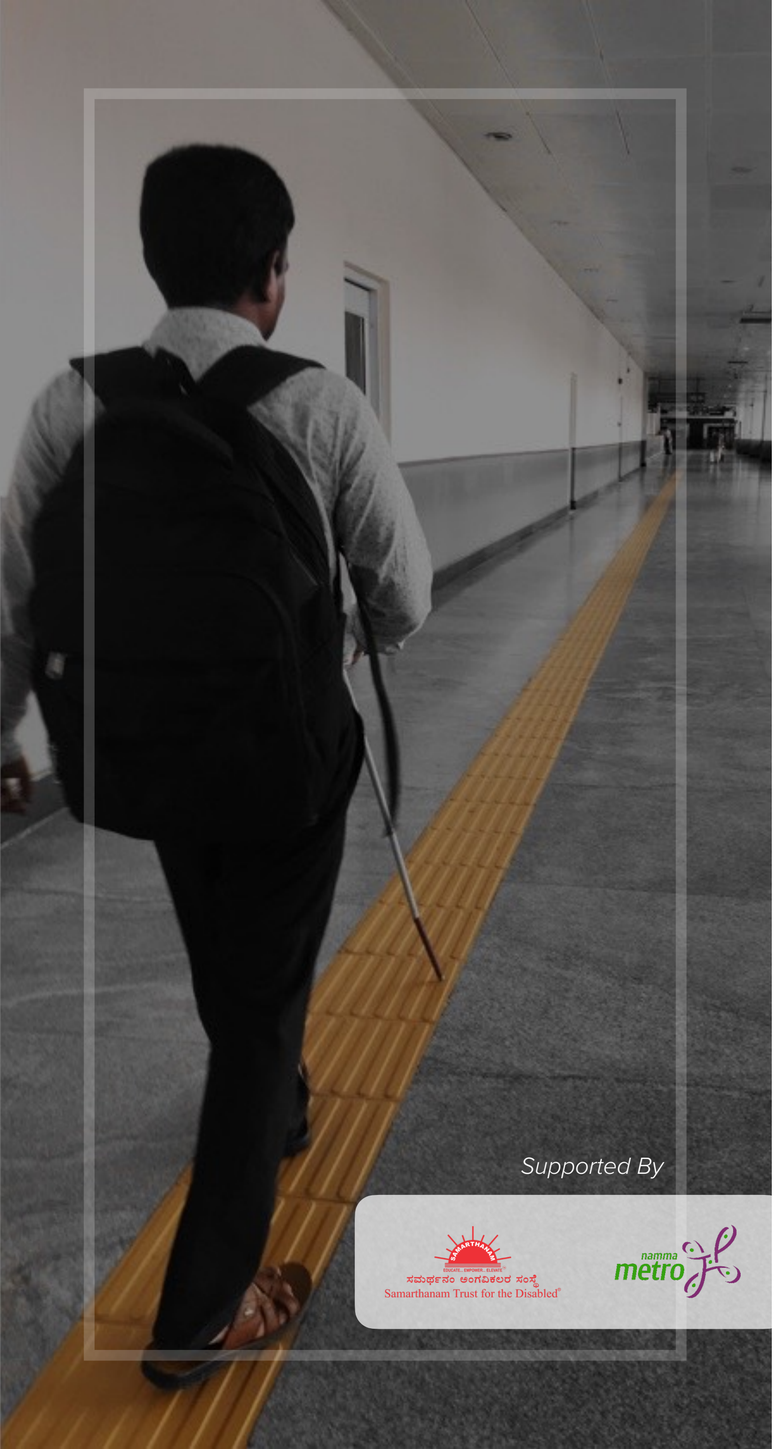


Study of Challenges Faced by Visually Impaired in Accessing Bangalore Metro Services

Research Publication: IndiaHCI '19 Proceedings Of The 10th Indian Conference On Human-Computer Interaction, Hyderabad, India.

Role:
User Researcher

Duration:
4 Months

Team:
2 Researchers

Methods:
Ethnographic study, Heuristic Evaluation, User Interviews, Field Study.

Context

Apart from that conversation, the below points motivated me to carry out the research to find out the challenges and suggest various interaction techniques to improve the facilities at the Metro stations.

Visually Challenged People

- Public transportation should be accessible to all. Commuting in the Bangalore metro is stressful. Especially for Visually challenged people, it is even more risky and hectic.

Bangalore Metro

- 380 k+ daily ridership. Only ~60% is completed, Construction plans up to 2025-2041.

People with disabilities, senior citizens don't favour metro

They struggle not just to find a seat, but even to get inside trains that are crowded, especially during peak hours

December 27, 2017 01:34 am | Updated 01:34 am IST -

NAYAN ANAND

COMMENTS SHARE READ LATER

Daily ordeal: It is travelling during the rush hours that is most taxing for senior citizens and people with disabilities.

The Namma Metro has been operational for over six years, and has earned lakhs of regular commuters. However, despite being dubbed a disabled-friendly transport option, woes of commuters who are physically challenged are far from over. They struggle not just to find a

Electronic Devices

- Around 50–60% of the touch-points include electronic devices.

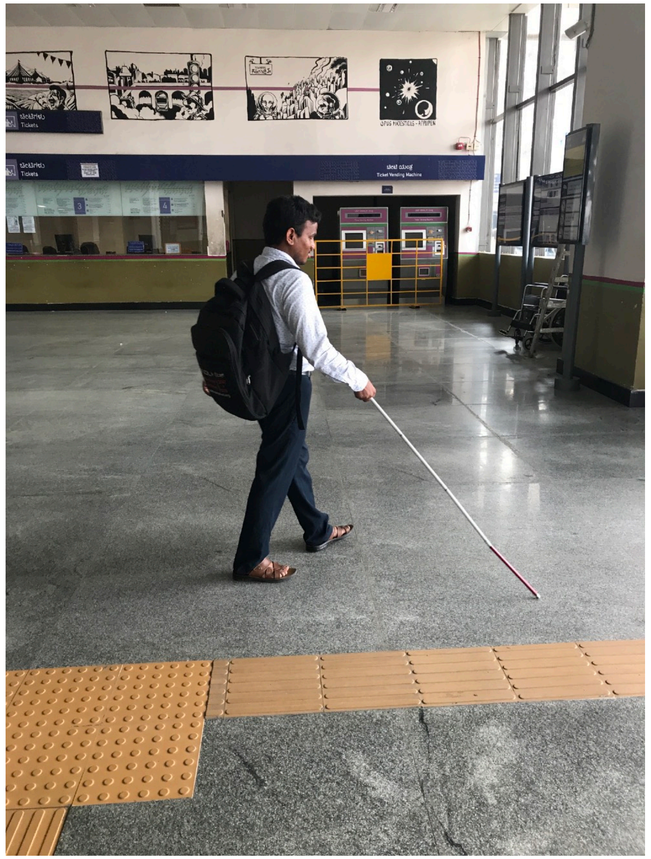
Problem Statement

How might we improve the accessibility of Visually Challenged person while commuting in Bengaluru Metro service so that they can travel hassle free?

Objective

- Outlines the inspection of the **facilities existing** in Metro Stations.
- Understanding the **expectations** of VCP during the use of Metro service including the accessibility problems of various electronic gadgets.
- Possible **suggestions** and various interaction techniques to improve the facilities at the Metro stations.

Early Challenges



User

Accessing and
understanding the user.

Permission

Require official permission from
BMRCL to conduct any research.

Research Methodology

Study of Existing facilities

In order to know the level of facilities provided in the Metro, we inspected the Metro stations.

Top Findings:

- Voice Announcements

  Installed in most of the places. Language(English & Kannada)

  Some places not so loud and clear. Lack of Consistency.

- Tactile

  Followed the standards.

  Lack of consistency. Doesn’t cover the entire station.

- Staff Assistance

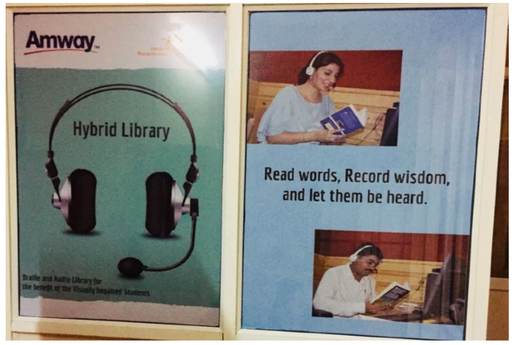
  Friendly and helpful staff. Strictly instructed to attend any disabled people including VCP.

  Busy managing people during peak time.

Research Methodology

Ethnography study

Spent a lot of time with them to know their routine, how they interact among themselves, their ability in operating digital gadgets, etc. by visiting their hostel, training centres, e-library, house etc.



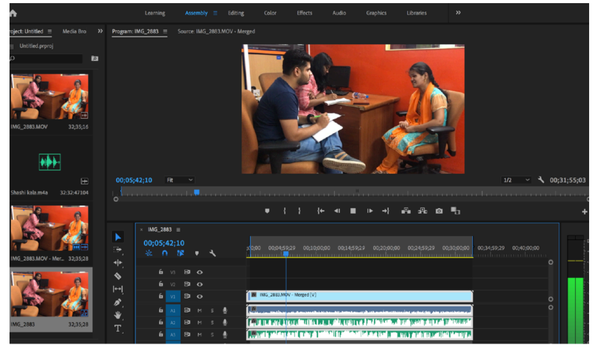
Research Methodology

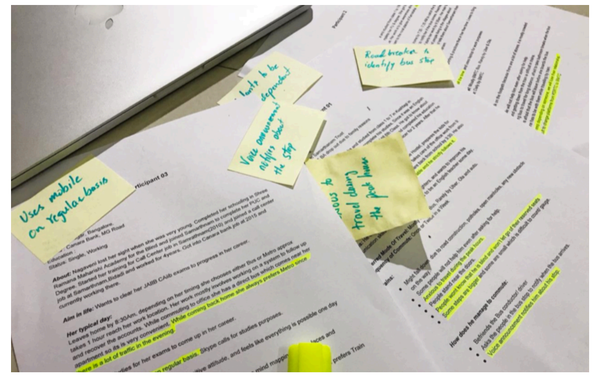
User Interview

Conducted user interviews of **10 potential users** and identified some of the interesting insights.

User Demography

Gender	Age	Occupation	Distance Of commute	Metro Usage	Preferred Mode Of Transport
	27	Hostel Warden	16km - 20km	Rarely	BMTC Bus & Rarely by Cab
	22	Student	6km - 9km	Never Used	BMTC Bus & Rarely by Cab
	29	Computer Instructor	20km	Eager to Travel	BMTC Bus
	27	Peer Officer	5km - 7km	Eager to Travel	BMTC Bus & Rarely by Cab
	27	Computer Training	7km - 10km	Never Used	BMTC Bus & Rarely by Cab
	23	Student/Part Time Job	6km - 9km	Rarely	Metro
	18	Student	6km - 9km	Never Used	BMTC Bus
	20	Student	6km - 9km	Rarely	BMTC Bus & Rarely by Metro
	34	Bank Official	11km	Daily	Metro
	24	Part time Job	16km - 17km	Daily	Metro

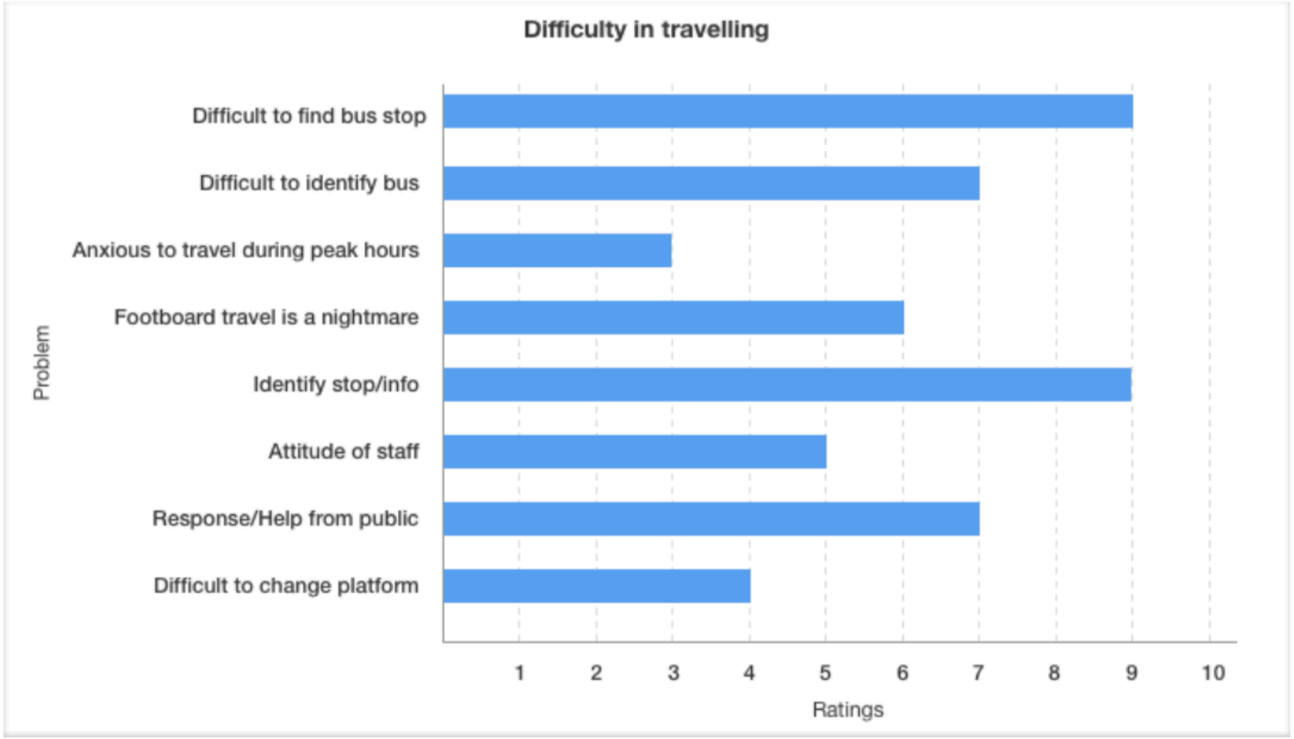




Research Methodology

User Interview

Summary of Findings from the User Interview:

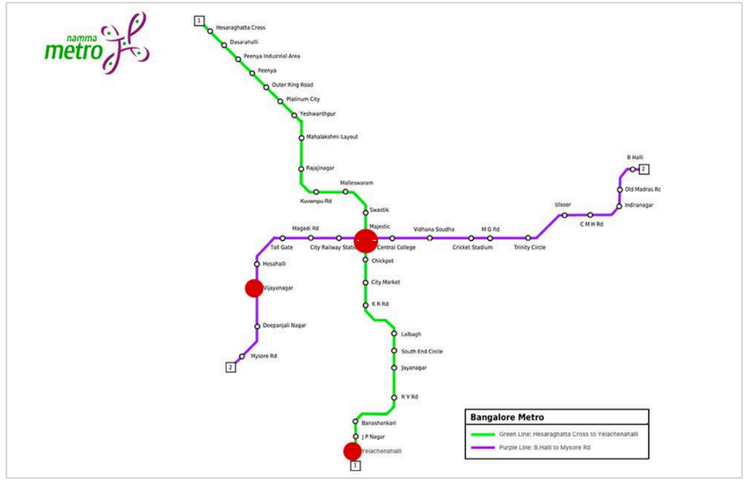


- Use of senses
- Mobility Training
- Tech Savvy

Research Methodology

Task

- Commute from Vijayanagar(A) station to Yalechana Halli(C) station via Majestic(B) with minimum help from the public.



Preparation

- Planned the task
- Dry run
- Audio and Video Recordings

Challenges

- Interrupted by securities
- Due to their own commitments, users asked to to postpone the dates at last moment.

Field Study

Research Methodology

Conducted **field study with 5 users** and uncovered the main touch-points where the accessibility issue was identified.

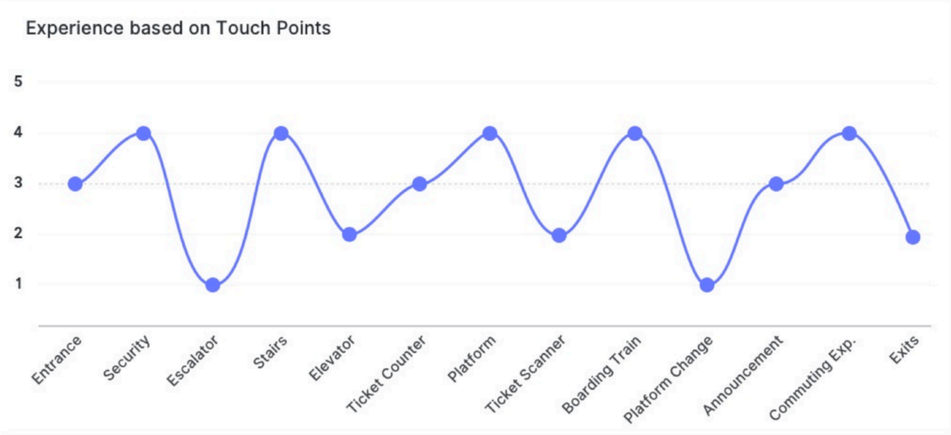
Field Study

Research Methodology

Findings:

- Inconsistency in overall design of metro stations.
- The gadgets were not VCP friendly
- Advance alert system was missing.

	POINTS OBSERVED	PARTICIPANTS					
2	Problems	K	H	NG	C	NR	Total
3	Difficult to identify bag checking scanner						5
5	Tactile was so lengthy journey						5
6	Tactile leads only to one compartments not for all						4
7	Inconsistency in tactile laid between entry of stair and exit of stairs						5
9	No knowledge about different types tactile						4
10	Difficult to follow back tactile after purchsing ticket counter						4
12	Failed to guess closing time of Ticket checker machine						5
13	Failed/Difficult to identify platform details to access lift						4
14	Failed to identify some of lift announcements						5
15	No info about time of train arrival						5
16	Announcement of opp platform confused the user						4
17	Could minimise the gap between train and platform						1
18	Failed to understand the announcement of door opening (left door and right door)						2
19	No idea about reserved seats and its location						5
20	Difficult to hear announcement inside train when it is rush (esp male announcement)						3
21	Went off track from tactile many times						4
22	Failed to understand Majestic platform info						5



Field Study

How we suggested

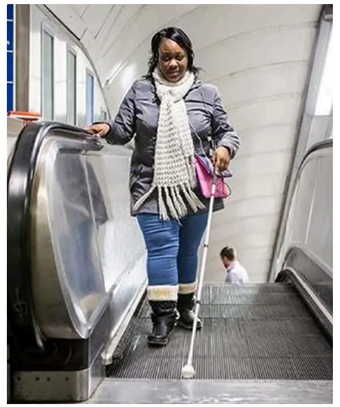
- Accessibility in other countries

Japan

Malaysia

Tactile warning strip & clear indication of direction

Singapore



USA

- Research Journals

- Observations during field study and suggestions from the Users.

Suggestions

Structure and Building Consistency

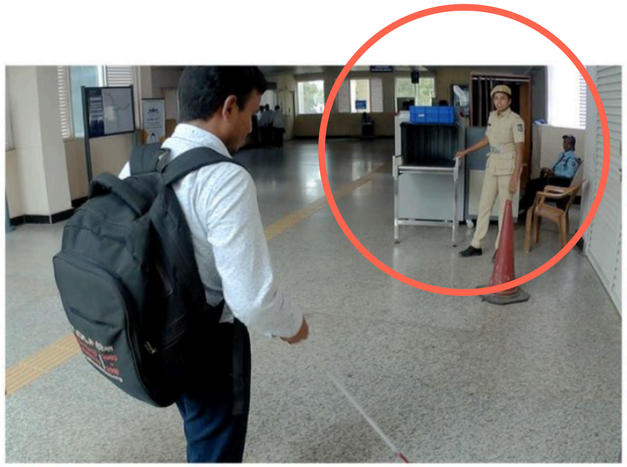
Overall consistency of structure and flow needs to be fixed.

- Security Check
- Tactile
- Entrance
- Escalator/Staircase
- Train Platform

Suggestions

Structure and Building Consistency

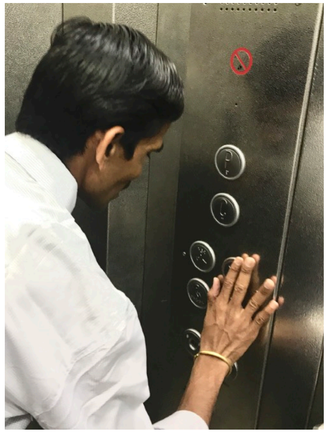
Examples

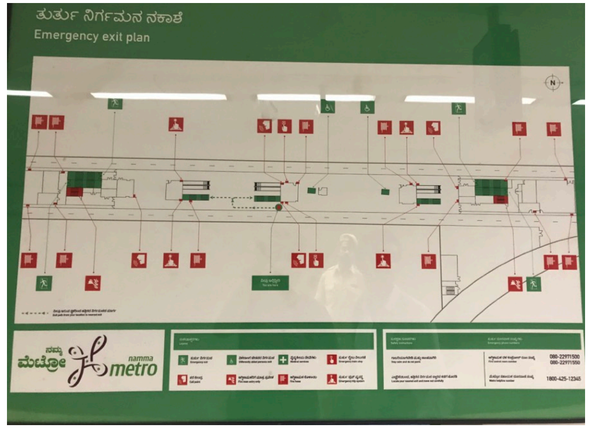


Suggestions

Better Interactive Gadgets

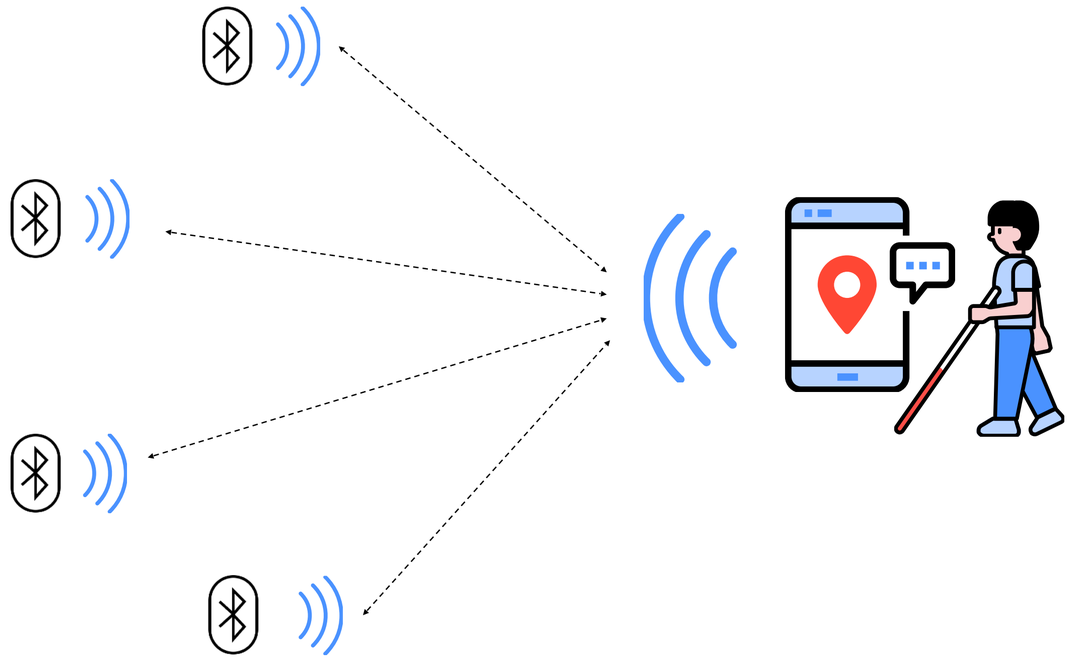
Machines with confirmatory feedback along with braille support to be provided.





Suggestions

An app to assist the VCP with indoor navigation system using Bluetooth Beacons enabled all around the Metro Stations.



Potential app

User’s Comments

“

It is good that BMRCL has done so much for VCPs. However, I would be happy if they seek our feedbacks, to take it forward.

Impact

The report was presented to Ajay Seth, MD, BMRCL. We briefed on the current challenge that VCPs are facing and stressed on how it could be rectified accordingly.

Implementations we observed lately

Bangalore Mirror

BMRCL plans to introduce platform screen doors, save up on energy

To conserve energy at its underground Metro stations, Bangalore Metro Rail Corporation Limited (BMRCL) plans to introduce platform screen ...

Bengaluru

Locality, Ragigudda Metro station for specially-abled on cards

This station is on the elevated RV Road-Bommasandra Line and has a prosthetic Institute and an organisation for the specially-abled in the vicinity.

- Announcement are now loud and clear.
- Number of compartment during arrival of train are being announced now.

Limitations & Future Work

- Permitted to analyze a limited number of Metro Stations.
- Some of the implemented task could be tested along with the actual users.
- This research can be further extended to other class of disabilities to create a barrier-free environment.

Retrospect

What didn’t go well?

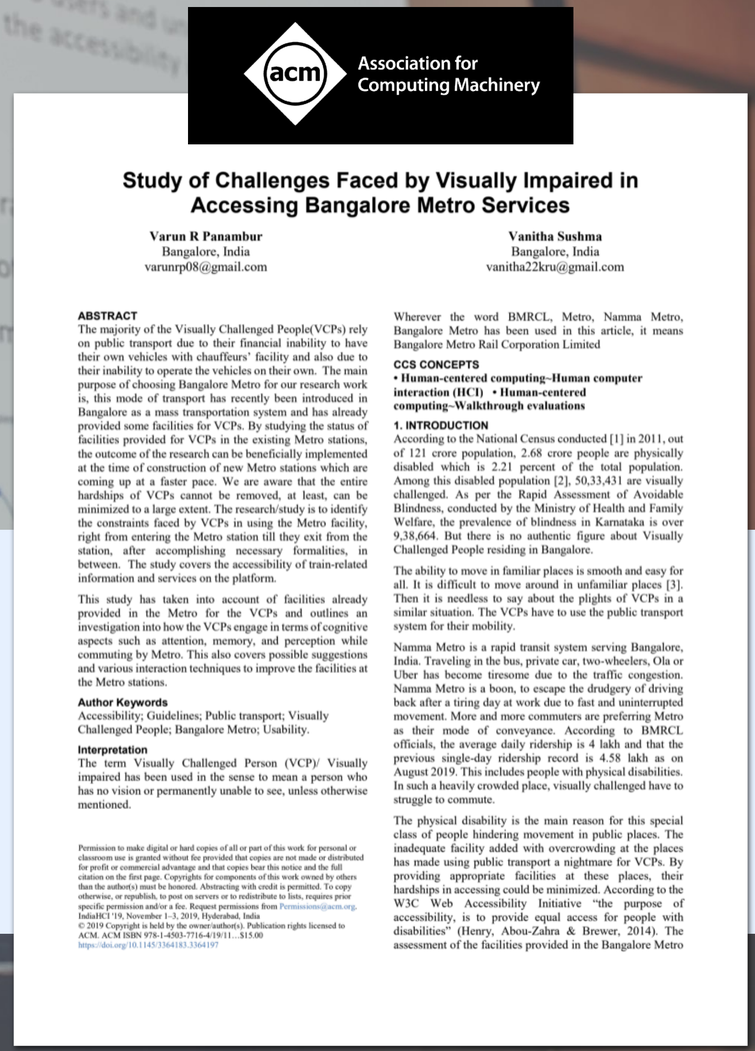
- It was difficult to manage field study for two of us.
- Getting all the permission was a bit tedious job.
- We had dependency on weekend to meet and match users’s schedule.

What went well?

- We were able to complete on time even though there were few changes in the schedule.
- Support from Metro service staff and Samarthanam Team
- Dry run of filed test was helpful.
- Back up equipment was useful.

Thank You!

View Paper



Association for Computing Machinery

Study of Challenges Faced by Visually Impaired in Accessing Bangalore Metro Services

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ABSTRACT

The majority of the Visually Challenged People(VCPs) rely on public transport due to their financial inability to have their own vehicles with chauffeurs' facility and also due to their inability to operate the vehicles on their own. The main purpose of choosing Bangalore Metro for our research work is, this mode of transport has recently been introduced in Bangalore as a mass transportation system and has already provided some facilities for VCPs. By studying the status of facilities provided for VCPs in the existing Metro stations, the outcome of the research can be beneficially implemented at the time of construction of new Metro stations which are coming up at a faster pace. We are aware that the entire hardships of VCPs cannot be removed, at least, can be minimized to a large extent. The research/study is to identify the constraints faced by VCPs in using the Metro facility, right from entering the Metro station till they exit from the station, after accomplishing necessary formalities, in between. The study covers the accessibility of train-related information and services on the platform.

This study has taken into account of facilities already provided in the Metro for the VCPs and outlines an investigation into how the VCPs engage in terms of cognitive aspects such as attention, memory, and perception while commuting by Metro. This also covers possible suggestions and various interaction techniques to improve the facilities at the Metro stations.

Author Keywords
Accessibility; Guidelines; Public transport; Visually Challenged People; Bangalore Metro; Usability.

Interpretation
The term Visually Challenged Person (VCP)/ Visually impaired has been used in the sense to mean a person who has no vision or permanently unable to see, unless otherwise mentioned.

IndiaHCI '19, November 1–3, 2019, Hyderabad, India

ACM ISBN 978-1-4503-7716-4/19/11…$15.00
https://doi.org/10.1145/3364183.3364197

Wherever the word BMRCL, Metro, Namma Metro, Bangalore Metro has been used in this article, it means Bangalore Metro Rail Corporation Limited

CCS CONCEPTS
• Human-centered computing~Human computer interaction (HCI) • Human-centered computing~Walkthrough evaluations

1. INTRODUCTION

According to the National Census conducted [1] in 2011, out of 121 crore population, 2.68 crore people are physically disabled which is 2.21 percent of the total population. Among this disabled population [2], 50,33,431 are visually challenged. As per the Rapid Assessment of Avoidable Blindness, conducted by the Ministry of Health and Family Welfare, the prevalence of blindness in Karnataka is over 9,38,664. But there is no authentic figure about Visually Challenged People residing in Bangalore.

The ability to move in familiar places is smooth and easy for all. It is difficult to move around in unfamiliar places [3]. Then it is needless to say about the plights of VCPs in a similar situation. The VCPs have to use the public transport system for their mobility.

Namma Metro is a rapid transit system serving Bangalore, India. Traveling in the bus, private car, two-wheelers, Ola or Uber has become tiresome due to the traffic congestion. Namma Metro is a boon, to escape the drudgery of driving back after a tiring day at work due to fast and uninterrupted movement. More and more commuters are preferring Metro as their mode of conveyance. According to BMRCL officials, the average daily ridership is 4 lakh and that the previous single-day ridership record is 4.58 lakh as on August 2019. This includes people with physical disabilities. In such a heavily crowded place, visually challenged have to struggle to commute.

The physical disability is the main reason for this special class of people hindering movement in public places. The inadequate facility added with overcrowding at the places has made using public transport a nightmare for VCPs. By providing appropriate facilities at these places, their hardships in accessing could be minimized. According to the W3C Web Accessibility Initiative "the purpose of accessibility, is to provide equal access for people with disabilities" (Henry, Abou-Zahra & Brewer, 2014). The assessment of the facilities provided in the Bangalore Metro