

**A STUDY OF CHALLENGES FACED BY VISUALLY IMPAIRED PERSONS IN
ACCESSING PUBLIC BUSES**

AND

**DESIGN AND USER TESTING OF AN AFFORDABLE BUS IDENTIFICATION AND
HOMING SYSTEM FOR THE VISUALLY IMPAIRED**

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Purpose of the Study:

For a majority of blind and visually impaired persons, public transport is the only viable mobility option to seek education, work and social connectivity. They face major difficulties in independently accessing public buses since they cannot read the route number and are unsure about the physical location of the bus and its entry/exit door. Despite constantly seeking help from sighted fellow travelers, blind persons frequently miss their desired bus, are unable to reach the gate and get hurt in the process; causing fear and anxiety.

This research aims to study, in a developing country context, (i) the challenges faced by blind persons in identifying and boarding public buses, (ii) the nature and

effectiveness of help sought from fellow travelers and (iii) the resulting user anxiety and frustration.

Additionally, we present the design and user field testing of a user-triggered bus identification and homing system that allows blind persons to independently access public buses.

Approach:

Questionnaire-based qualitative interviews were conducted with thirty visually impaired bus commuters encompassing gender, age, occupation and socio-economic variations in New Delhi. Users were asked about their experiences in locating a bus stop, seeking help from fellow travelers, difficulty in identifying and reaching the bus and ad-hoc measures used when they are all alone.

A radio-frequency based system was developed in which the user presses the *query button* on the handheld module to obtain route numbers of the buses in vicinity. The desired route number is selected by pressing the *selection button*, which triggers voice output of the number from a module on the bus, directing the user towards its entry. The system was installed in two university buses and evaluated by the study group in real-life settings.

Results:

During questionnaire-based interviews, all users expressed that accessing public buses is a day-to-day problem and reported seeking help from fellow travelers, who often forget to assist or leave without informing, causing failure to board the desired bus. Users mentioned that identifying and locating buses is extremely difficult when they are alone where they depend on engine sound (causing false alarms), poke their white-cane against the bus body and trail till they locate the entry.

On average, users rated the anxiety of boarding a bus as 8 on a scale of 10 (where 10 implies “fear the thought of it”). Majority users reported getting hurt due to the bus suddenly increasing its speed. Blind women bus commuters expressed greater reluctance in seeking help from male fellow travelers and avoid travelling during non-office hours.

During bus identification system trials, users demonstrated high responsiveness to auditory cues and successfully boarded buses without sighted assistance. The system requires minimal modifications on the bus. Projected cost of the user and the bus module is under 25 USD, hence affordable for users in developing countries.

Conclusion:

This research brings to light the day-to-day challenges faced by visually impaired while accessing public buses, particularly in the developing country context. As a potential solution, we successfully developed and field-tested a user-triggered bus identification and homing system.

Our Topic Code:

E. Accessible Public Transport (Bus Rapid Transit, Metro, Para-transit system, etc.)