PERCEPT-V

Image-Based Indoor Navigation for the Visually Impaired

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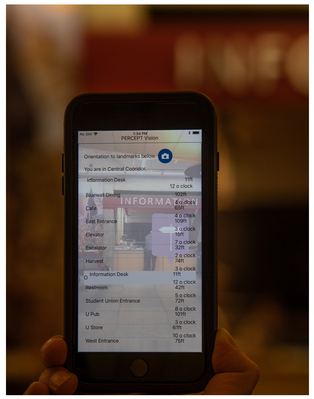
Abstract

PERCEPT-V is an indoor navigation system for the blind and visually impaired (BVI). Using an iPhone that runs the PERCEPT-V app, the BVI take pictures to obtain their position and orientation in the environment. The calculated position is used to provide the user wayfinding instructions to their selected destination. The prototype system has been deployed at the UMass Amherst Campus Center, and we have completed the first phase of the system usability trials.

How PERCEPT-V Works

1 SNAP pictures

2 Select destination

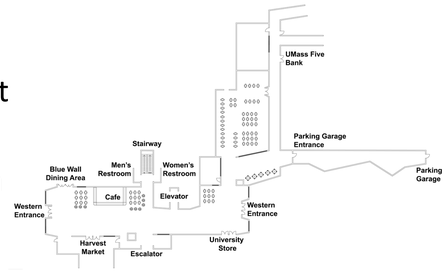


3 Follow directions

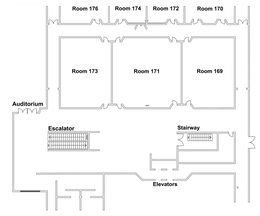
4 Reach destination

Phase B of Usability Study

- Conducted ten trials with three blind and visually impaired (BVI) participants
- Trials were conducted on the main and and basement floor of the UMass Campus Center
- Trials were conducted either in morning or afternoon with moderate to heavy foot traffic in the area



Main



Basement

Trial Composition

1 **PERCEPT-V Orientation**
- Sit-down orientation in UMass Campus Center
- Hands-on orientation performing navigation tasks

2 **PERCEPT-V Trial**
- Participant is asked to complete seven navigation tasks independently

3 **Post Trial Questionnaire**
- Questionnaire to obtain:
  - Subjects feedback and experience
  - Qualitative evaluation of PERCEPT-V

Phase B Results

#ID	Statement
A	It is easy to learn how to use the PERCEPT-V system
B	It is easy to use the PERCEPT-V system
C	The PERCEPT-V trial design was easy to complete
D	The PERCEPT-V app user interface is clear
E	The PERCEPT-V system provided sufficient re-orientation information when lost
F	I am confident I can reach a destination using the PERCEPT-V system

- Participants were asked to score their agreement with following statements using a Likert scale: from 1 strongly disagree to 7 strongly agree, with 4 being neutral

Statement ID#	Avg.	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
A	6.2	6	7	7	7	4	7	6	4	7	7
B	5.7	7	6	7	6	5	4	6	5	5	6
C	6.2	7	6	7	7	5	4	6	6	7	7
D	6.4	7	7	7	7	5	7	6	6	6	6
E	5.9	6	7	7	6	4	6	6	5	6	6
F	6.0	7	7	5	6	6	4	6	5	7	7
Avg. Per Participant	6.67	6.67	6.67	6.50	4.83	5.33	6.00	5.17	6.33	6.50	

		Participant ID#									
Tasks	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
Task 1	1	1	1	2	2	1	1	2	1	1	
Task 2	1	1	1	1	2	1	1	2	1	2	
Task 3	1	1	1	1	1	3	1	1	1	1	
Task 4	1	1	1	2	1	2	1	1	1	1	
Task 5	1	1	1	1	1	2	1	1	1	1	
Task 6	1	1	1	1	1	3	1	1	1	1	
Task 7	1	1	1	1	1	3	1	1	1	1	
Uses Voiceover	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	No	

Legend

1: Independently completed task
2: Asked for assistance to complete task
3: Did not complete task

Conclusion & Next Steps

- We received invaluable feedback from participants
- Phase B results demonstrate that participants are able to use PERCEPT-V to independently navigate the main concourse and basement areas of the Campus Center