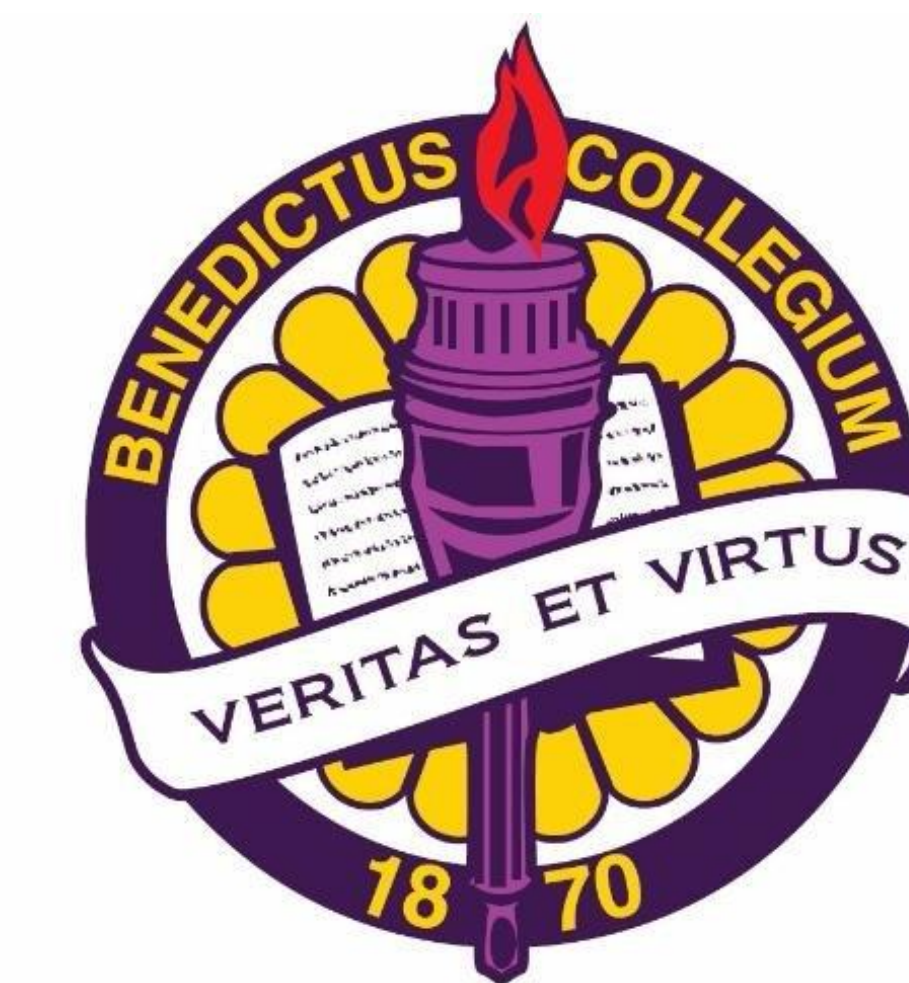# Comparison of Two Tutorial Methods for SHiB(Smart Home in a Box) Installation

Zamzam Mumin, Yang Hu, Matthew E. Taylor, & Diane Cook
College of Electrical Engineering and Computer Science, Washington State University
School of Computer Science and Mathematics, Benedict College

Background

- This project focused on a study that compares the teaching effectiveness of two methods to train participants for installing a Smart Home in a Box (SHiB), an online intelligent tutoring system (ITS) and a standard paper manual.

- SHiB is a kit that consists of motion sensors, temperature sensors, relays and an Ethernet server and is used to collect and transmit sensor data, developed by the Washington State University Center for Advanced Studies in Adaptive Systems (CASAS).

- The long-term purpose of this project is to design a tutorial guide that can be easily used to self-install the SHiB kit by individuals from diverse backgrounds and can thus be utilized to provide valuable activity information.

Methods

- Participants involved in this study are Pullman residents and students from the Summer Research community (n=20).

- Demographics: Mean age = 29.4 (18 was the lowest age and 55 was the highest), 12 Males and 8 Females.

- They were assigned randomly into one of two groups.

- Group 1 participants were trained using a SHiB ITS that consisted of pre-test, training and post-test sessions teaching the participants how to effectively position the sensors in a home.

- Group 2, participants were given a textbook. The textbook contains three worked examples and participants could spend as much time as needed to read the textbook.

- After the training, all participants were given an instructions guideline explaining different devices in the kit and a visual description of the design.

- They were given the SHiB to self-install through two experiments.

- After installation of the SHiB, their performance were evaluated by the researchers for accuracy of device positioning and efficiency of overall installation.

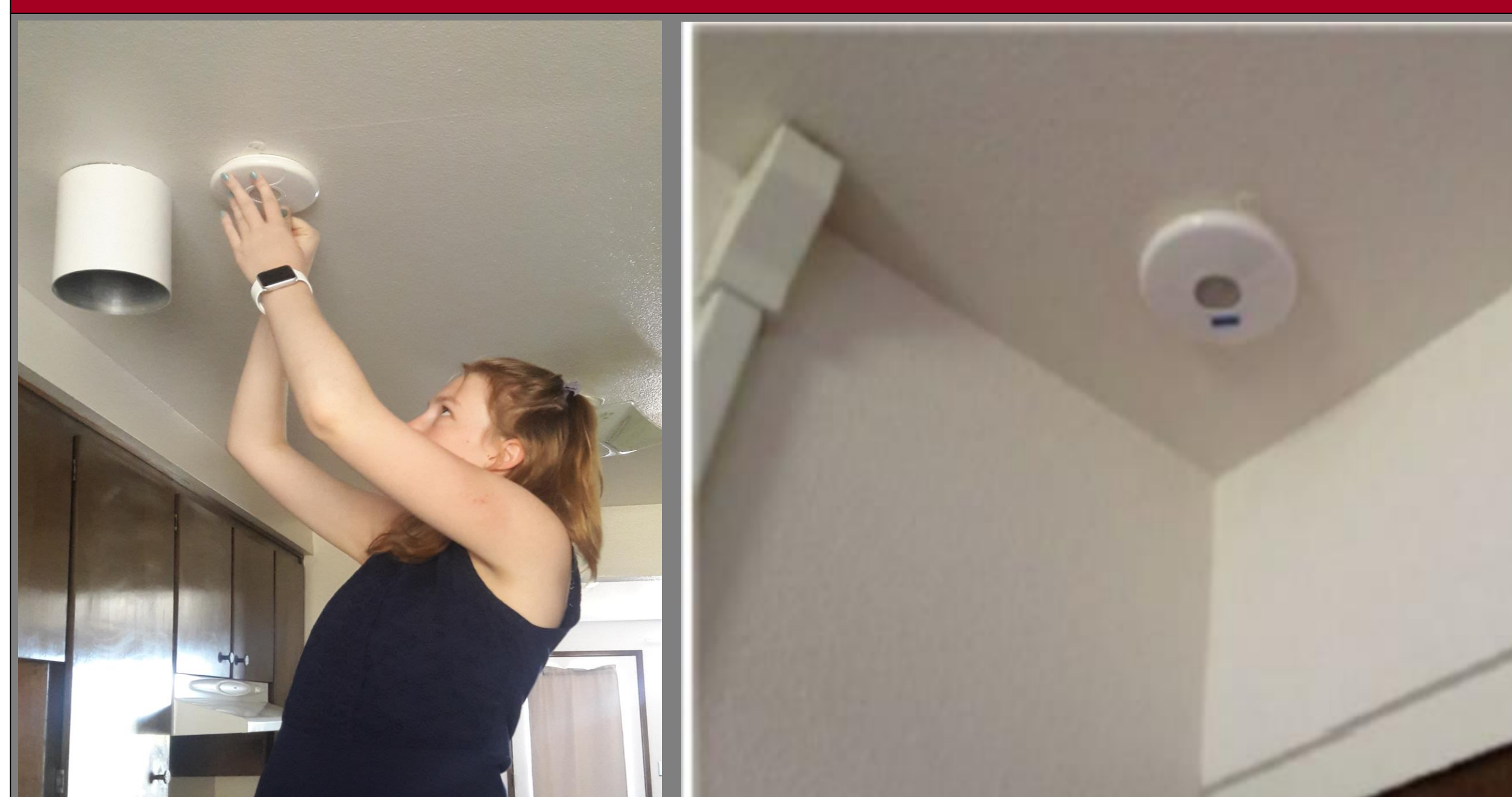- The results are used to compare the two training methods.

Figure 1 (left) A Participant installing a sensor. (right) An illustration of a correct installed sensor

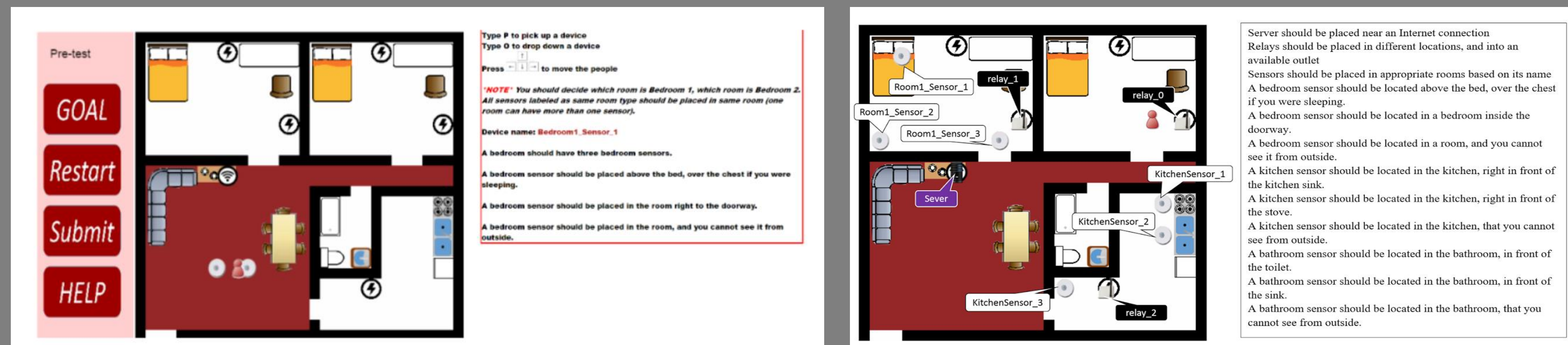## Sensor Installation Preliminary Data

Figure 2: (left) An overview of SHIB ITS User Interface. (right) An overview of Textbook Manual
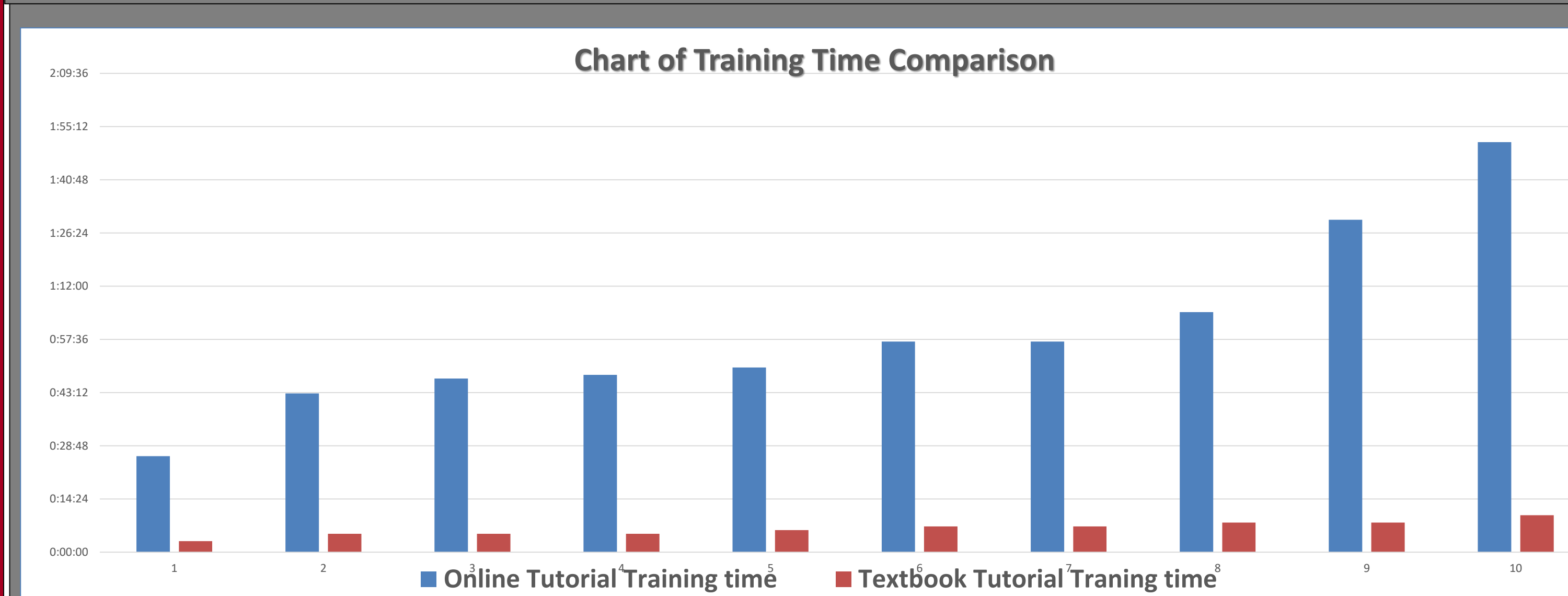

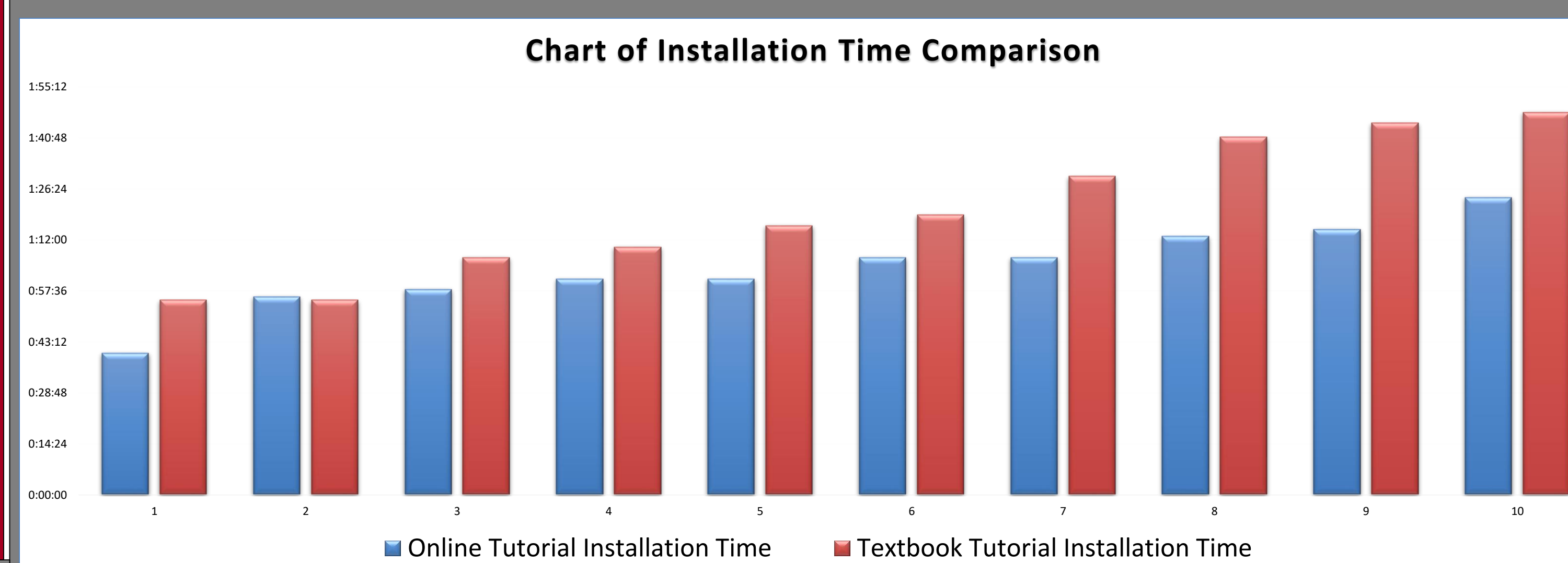Figure 3 : Chart of Training Time Comparison
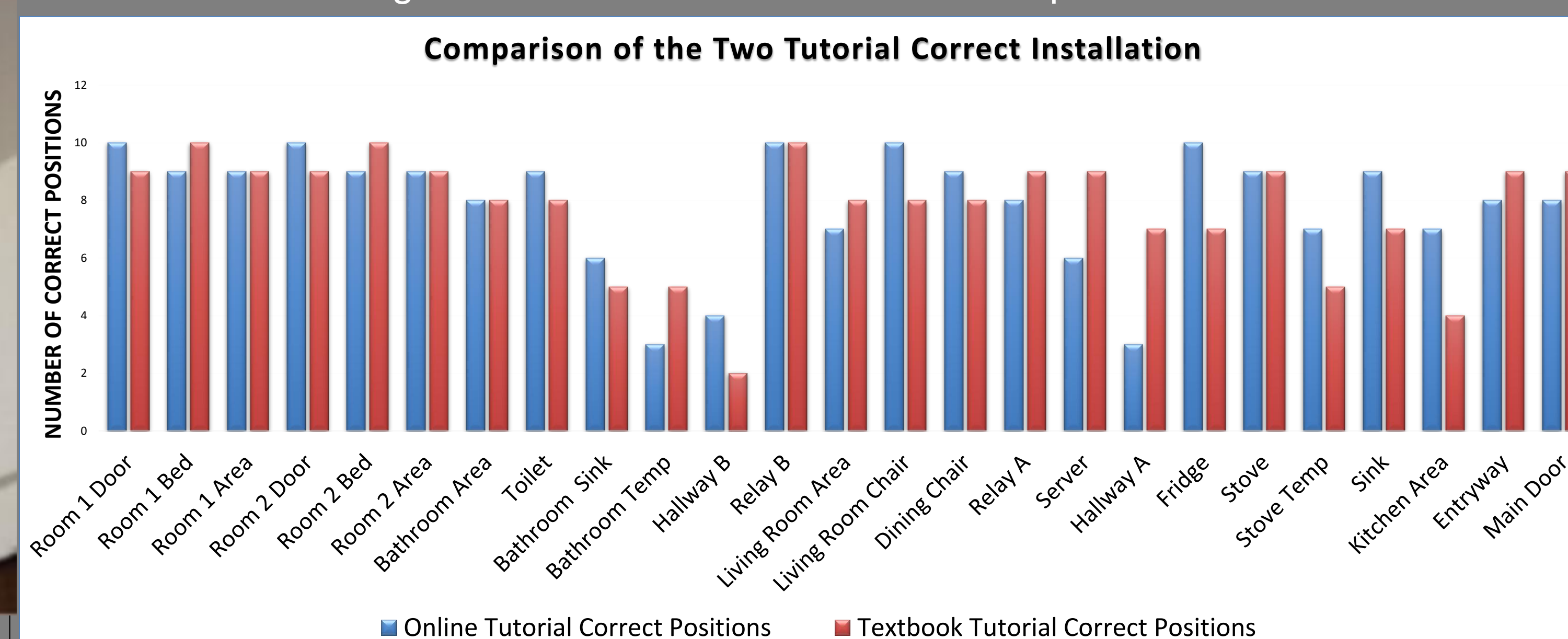

Figure 4: Chart of Installation time Comparison

Figure 5: Chart that compares correct installation

Results and Discussion

- The average textbook training time taken was 6 minutes 24 seconds while for SHIB ITS it was 59 minutes 24 seconds.

- The average installation time taken by Textbook group was 1 hour 20 minutes 36 seconds while for SHIB ITS was 1 hour 4 minutes 12 seconds.

- The total number of correct positions by the SHIB ITS group was 197 while for Textbook was 193.

- The sensor with the highest correct installation for both groups is Relay Upstairs.(B) while the lowest being Hallway Upstairs (B).

Conclusion and Future Work

- Our conclusion is that SHIB ITS is the best option for training people for the installation of the SHIB kit.

- The participants who used SHIB ITS felt the training mode with examples was more effective.

- The Textbook group took longer installation time because they had to remember the position examples given in the manual.

- The younger participants liked the textbook manual more than the SHIB ITS because the ITS was taking longer.

- Area sensor positioning is affected by the participants' heights so more information is needed for the guidance.

- Based on the high incorrect installation for the hallway sensors, finding a guideline could make the process easier for the people.

- Adding pictures of sensors to the questionnaire will make it easy for the participants to rate the installation of each sensor.

- The instruction manual that comes with the SHIB kit needs to have more explanation on what the devices mean.

- Pre-recorded installation videos could help with the training process.

- We plan on continuing to expand the sample size.

Acknowledgements