



Professors Study Smart Home Technologies in Google, Apple, and Amazon Labs

Dr. Wright just turned on his TV in his “Living room” lab using a voice command.

“Hey Siri, turn on the TV,” commands Dr. David Wright to the Apple HomePod mini. The television opens to the home screen across from him to choose from a variety of shows and movies. Wright, a professor in our department, has assembled a space dedicated to the testing of Apple products in the Humanities and Social Sciences building (H-SS G8B).

When people walk in, they are transported from the H-SS halls to what could be seen as a typical living room. Along with the furniture, the room is equipped with an iPad, iPhone, Apple HomePod mini, and other gadgets that people may find in their homes. Wright and his collaborator, Dr. Daniel Shank, assistant professor of psychology, set up this lab to test smart home products. Having conducted usability testing in another lab (H-SS G8A) made just for Google products, the researchers are using the Apple lab to test Apple products. There will soon be an Amazon lab in a room across the hall from the other labs.

Wright and Shank conducted two studies in the Apple lab in Fall 2022. The first study had three parts: (1) identifying devices, (2) performing routine actions such as turning on a light, and (3) performing complex actions that control multiple devices simultaneously. As Wright explained, “The study measured errors in performing specific tasks, time on task, and user feedback during and after the test. We then coded the data to get a picture of the common problems

with the different devices.”

The second study was a voice-bias study, which evaluated participants’ interactions with smart home assistants and their different accents. Based on the number of accents already found in smart voices, Wright predicated that new voices with international and regional accents may become more prominent as smart-home technology progresses. “I wouldn’t be surprised in a few years to hear Siri say ‘y’all,’” he said.

When Wright and Shank first started working together in 2017, they set up smart equipment in the Missouri S&T solar houses. “For the first study, we just gave the technology to them and said, ‘Here, let’s see what you do with it,’” Wright explained. “Then we did interviews and survey questionnaires to see what they had done. Basically, they played with it, and then when it got hard, they gave up on it. They didn’t really go out of their way to learn much. And that surprised us.”

“So we did another round where we said, ‘Okay, this time let’s give them some training,’ because we wanted to see how people were learning about these devices. They did more with it, but still people didn’t spend a lot of time trying to learn how to do more complex things.”

Wright and Shank did not know where people were getting stuck. “So that’s when we decided we needed a lab to see how people reacted to stuff to see what was tripping them up.” Unlike the studies conducted in the solar houses,

where subjects were actually living, the studies in the Apple lab employ a camera to record people’s behaviors, something you cannot do in the privacy of a person’s home.

How did Wright become interested in studying smart technology? “I was having a conversation with an electrical engineering professor, who said he was interested in smart grids, which are for citywide power systems. They try to regulate peak hours, times like 5 o’clock where everybody comes home and turns their air conditioners on and there’s a huge drain on the power system and that’s where we get things like blackouts. He made a comment on this smart home stuff and how it was like that. He said, ‘Nobody is studying how human beings interact with all this smart stuff.’”

That one conversation was all it took to push Wright into the world of smart devices. “A light went on, like ‘he’s got a point.’ I got into it shortly after that and just ran with it.”

Wright shows no signs of stopping, already thinking about future studies in his labs. The spaces are not limited to any specific type of testing. “There are lots of different types of studies and testing that can be done,” he said. “One thing I would like to try is having people set up the equipment. There could also be game studies in here, put in an Xbox or PlayStation. Lots of usability studies. Linguistics stuff with voice assistants. Direct comparison studies. Apple v. Google v. Amazon.”