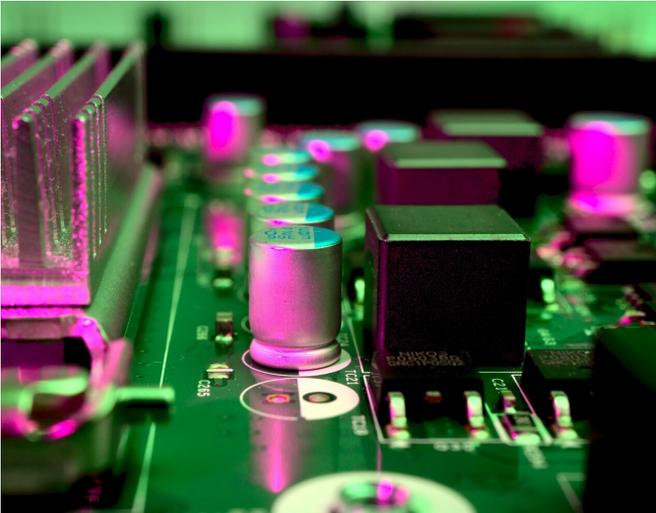# Research brings tech tutorials to people with visual impairments

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Credit: Unsplash/CC0 Public Domain

A research project that aims to help people that are blind or that have other visual impairments learn computer circuit design was recognized recently by a global conference on human-computer interaction.

The Dartmouth study, "TangibleCircuits: An Interactive 3-D Printed Circuit Education Tool for People with Visual Impairments," allows users to interact with models of circuit boards that provide audio feedback in response to being touched.

The research received an honorable mention award from the annual conference of the Association for Computing Machinery's Special Interest Group on Computer Human Interaction (CHI2020).

"This is a powerful tool that can help people with visual impairments learn electronics," said Xing-Dong Yang, an assistant professor of computer science and the senior researcher on the paper.

"Through innovations like this, we hope that visually-impaired people will no longer miss out on education opportunities and high-tech careers."

According to the research team, web-based tutorials that teach novices how to make circuits are not accessible to everybody. As an example, many existing tools rely heavily on visual information for instruction, making them difficult to use for those who are blind or otherwise visually impaired.

While many accessibility tools already exist, most do not enable users that are blind or visually impaired to create their own accessibility tools.

The Dartmouth research uses an inexpensive practice circuit board that can be accessed by computer hobbyists and students. The design is intended to broaden the inclusivity and accessibility of maker spaces and engineering classrooms by allowing instructors to create cheap, portable, and easy-to-use tutorials.

"We spent substantial time interviewing some amazing engineers and students with visual impairments before we created our system," said Josh Urban Davis, the lead author of the paper and a Ph.D. student at Dartmouth. "We really wanted to get the design right since something like this could dramatically change people's lives."

The research is one of ten studies involving Dartmouth-affiliated researchers that were accepted by CHI2020.

A narrative-based smartphone application that promotes physical activity by visualizing and tying together the progress of the user with that of the app's main character was awarded a best paper award by the conference. The first author of the study, Elizabeth Murnane, will become the Charles H. Gaut & Charles A. Norberg Assistant Professor of Engineering at Thayer School of Engineering during the summer of 2020.

"Personal technology holds tremendous potential to help tackle public health challenges rooted in [human behavior](link), but the conventional style of quantitative feedback most apps deliver is confusing and unmotivating for a majority of people," said Murnane, currently a postdoctoral scholar in the Human-Computer Interaction group at Stanford University. "Our research to develop data-driven stories shows the power of more richly qualitative approaches in positively shaping actions and attitudes."

Other projects presented at CHI2020 by Dartmouth-affiliated researchers include the use of interactive fabrics, innovations for eyes-free interaction with devices, technology that addresses mental health challenges, and a study focusing on how women respond to social cues in online STEM courses.

"Human-computer interaction is a diverse and growing research community at Dartmouth. People can expect a lot of cool things from us in the future," said Yang.

More information: Josh Urban Davis et al. TangibleCircuits: An Interactive 3D Printed Circuit Education Tool for People with Visual Impairments. [www.cs.dartmouth.edu/~xingdong …](link) [TangibleCircuits.pdf](link)

Provided by Dartmouth College

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