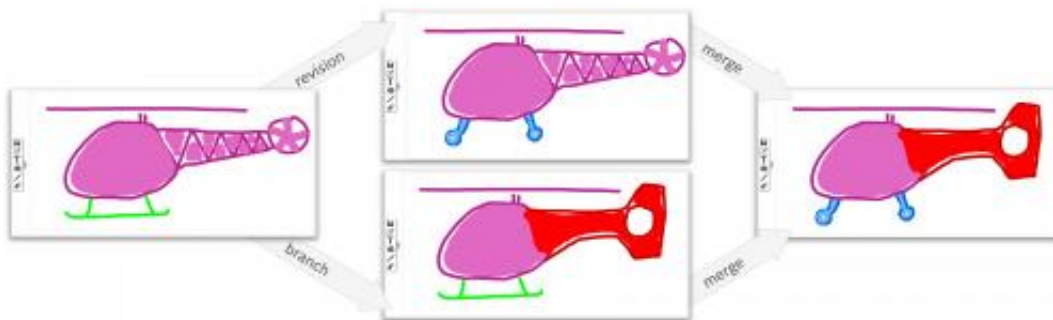# Sketching on tablets promising for collaborative design, creativity

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Two new "cyberlearning" platforms allow non-artists to create illustrations rivaling the work of expert designers, an innovation thought to boost collaborative creativity. Here, several users work collaboratively to modify a helicopter drawing. Credit: Karthik Ramani image/Purdue University

(Phys.org) —Two new "cyberlearning" platforms allow non-artists to create illustrations rivaling the work of expert designers.

The platforms sidestep a key creative barrier by eliminating the need for drawing skills in developing new designs.

"Non-experts are becoming more empowered and interested in means of creative self-expression," said Karthik Ramani, Purdue University's Donald W. Feddersen Professor of Mechanical Engineering. "More importantly, I think this is the beginning of a new field of computer-supported creativity where you are extending the human mind."

The platforms represent an important step toward replacing or augmenting the use of paper to create designs, said Niklas Elmqvist, an assistant professor of electrical and computer engineering at Purdue.

"Traditionally, in design studios around the world people do a lot of paper mockups and sketching and the typical back-of-a-napkin scribbling," he said. "You can sit anywhere and come up with an idea."

Paper, however, has drawbacks that constrain the creative process and limit collaborative design.

"It's not persistent, meaning you can lose it, and you can't easily work with colleagues collaboratively to make design changes, which is especially limiting when you are working with people separated geographically," Elmqvist said.

The new platforms - called skWiki (pronounced squeaky) and Juxtapoze - may usher in a new era of digital-scribbling and creative collaboration.

Findings are detailed in two research papers being presented during the Association of Computing Machinery's Conference on Human Factors in Computing Systems this week in Toronto, Canada.

"Our research shows that when using the skWiki system, designers generate more ideas, which is an indicator of creativity, and are more collaborative in discussing their ideas," said Lorraine Kisselburgh, an assistant professor in the Brian Lamb School of Communication. "This indicates that the skWiki system has the potential to change not only the mechanics of sketching but also the social processes underlying collaborative design."

The idea of creating something from existing material is ubiquitous: programmers build on existing libraries, people retweet other tweets on

Twitter, and composers weave pieces of existing songs into remixes.

"Every idea is a combination of old ideas," said Ramani, who has been working on the cyberlearning platforms for about three years. The research is supported by the National Science Foundation's Cyberlearning program.

Also leading the work are S.V.N. Vishwanathan, an associate professor of statistics and computer science, and doctoral students Zhenpeng Zhao, Sriram Karthik Badam, Senthil Chandrasegaran, Deok Gun Park, William Benjamin and Devarajan Ramanujan. A key consultant on the project is Kylie Peppler, an assistant professor of learning sciences at Indiana University.

Ramani and Peppler have been asked to speak about the project at an upcoming distinguished lecture at the National Science Foundation in May.

"The tools, themselves, are already transforming the kinds of research that we're able to do on creativity, collaboration and learning," Peppler said.

The platforms operate on servers and do not require users to install any software.

"You only need a Web browser, so you can use just a tablet or laptop," Elmqvist said. "We implement all of this using JavaScript, which is the programming language that all browsers have."

The skWiki platform allows collaboration with multimedia, including text, sketches, photos and "vector images" important for computer-aided design and other applications.

"Wikipedia is built on software called wiki, but most wiki software is geared toward text," Elmqvist said. "It has images, but there is no easy way to edit the images in a wiki."

The skWiki platform does for clipart what Wikipedia does for text.

"Say a person created a drawing of a helicopter," Ramani said. "Somebody else on the design team could make a clone of your drawing and replace the landing gear, and someone else might modify it further. So you have branching designs that can then be merged. It's a very dynamic collaboration, and it's in real time within seconds."

Whereas skWiki concentrates on collaborative creativity, Juxtapoze focuses on individual creativity.

"If you are a designer, many times you would like to be informed by other people's ideas, especially if you are rapidly sketching an idea," Elmqvist said. "It would be useful if you could build on other people's work."

The platform accesses databases of shapes to help the user find the right one.

"An analogy is typing text on a smartphone," Ramani said. "While you are typing, the program tells you the possible ways to complete the word. We apply that concept to drawing. So if you start drawing something, the computer looks in a database of previous drawings and says, 'It looks like you might be drawing this.' "

Visually similar shapes appear in a suggestion panel.

"You don't have to know how to draw," Ramani said. "All you have to do is draw sort of the shape you are thinking of, and then you pick the

shape you want."

The approach is conducive to serendipity because it provides the user with creative options. At the same time, because the platform is engaging it is enjoyable to use, he said.

"We were able to get a group of non-experts - mechanical engineering students - to create all these amazing compositions that rival what an industrial designer who is an expert in sketching was able to do," Elmqvist said. "We were able to show that even an untrained person was able to generate some really impressive things."

A sliding dial lets the user select how broad or specific they want the selection to be. Broad settings generate a diverse variety of shapes, but moving the slider to a more narrow range provides fewer, more specific shapes.

The two platforms can be used in combination. A person working on an idea might use Juxtapose to sketch the concept and then allow others to work on it with skWiki.

"We have great tools for sharing and collaborating in text, but to date we lack the tools we need to collaborate on visual media," Peppler said. "Yet, visual images are a very strong and powerful way to communicate complex ideas quickly. These tools fundamentally shift the design process from an individualistic mode to thinking about how we can more effectively build on visual ideas over time. This will have far-reaching effects on many different fields."

  More information: Juxtapoze - Engineering.Purdue.edu/cdesign/wp/?p=1797
skWiki - Engineering.Purdue.edu/cdesign/wp/?p=1783