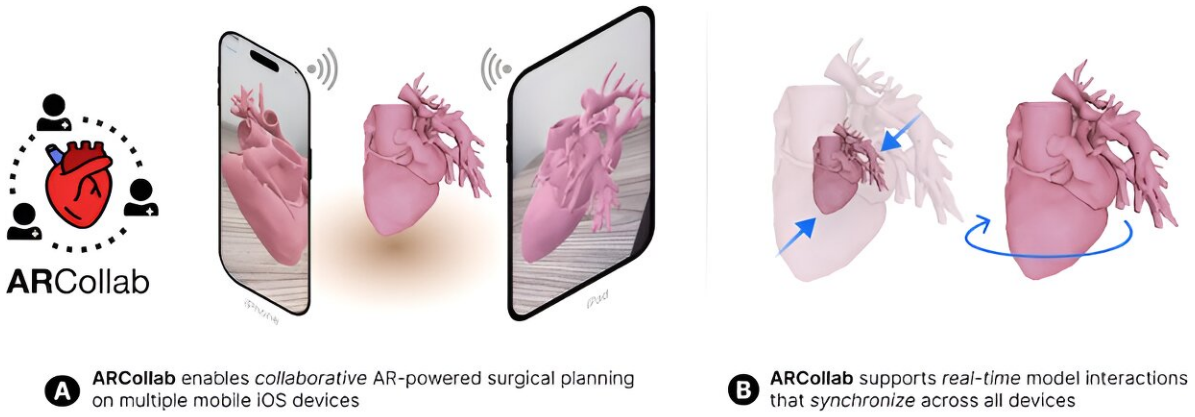
Medical Xpress

Researchers partner with children's hospital on new heart surgery planning tool

May 13 2024



Credit: Georgia Institute of Technology

Cardiologists and surgeons could soon have a new mobile augmented reality (AR) tool to improve collaboration in surgical planning.

ARCollab is an iOS AR application designed for doctors to interact with patient-specific 3D heart models in a shared environment. It is the first surgical planning tool that uses multi-user mobile AR in iOS.

The application's collaborative feature overcomes limitations in traditional surgical modeling and planning methods. This offers patients better, personalized care from doctors who plan and collaborate with the tool.

Georgia Tech researchers partnered with Children's Healthcare of Atlanta (CHOA) in ARCollab's development. Pratham Mehta, a computer science major, led the group's research.

"We have conducted two trips to CHOA for usability evaluations with cardiologists and surgeons. The overall feedback from ARCollab users has been positive," Mehta said.

"They all enjoyed experimenting with it and collaborating with other users. They also felt like it had the potential to be useful in surgical planning."

ARCollab's collaborative environment is the tool's most novel feature. It allows surgical teams to study and plan together in a virtual workspace, regardless of location.

ARCollab supports a toolbox of features for doctors to inspect and interact with their patients' AR heart models. With a few finger gestures, users can scale and rotate, "slice" into the model, and modify a slicing plane to view omnidirectional cross-sections of the heart.

Developing ARCollab on iOS works twofold. This streamlines deployment and accessibility by making it available on the iOS App Store and Apple devices. Building ARCollab on Apple's peer-to-peer network framework ensures the functionality of the AR components. It also lessens the learning curve, especially for experienced AR users.

ARCollab overcomes traditional surgical planning practices of using

physical heart models. Producing physical models is time-consuming, resource-intensive, and irreversible compared to digital models. It is also difficult for surgical teams to plan together since they are limited to studying a single physical model.

Digital and AR modeling is growing as an alternative to physical models. CardiacAR is one such tool the group has already created.

However, digital platforms lack multi-user features essential for surgical teams to collaborate during planning. ARCollab's multi-user workspace progresses the technology's potential as a mass replacement for physical modeling.

"Over the past year and a half, we have been working on incorporating collaboration into our prior work with CaridacAR," Mehta said.

"This involved completely changing the codebase, rebuilding the entire app and its features from the ground up in a newer AR framework that was better suited for collaboration and future development."

Its interactive and visualization features, along with its novelty and innovation, led the Conference on Human Factors in Computing Systems (CHI 2024) to accept ARCollab for presentation. The conference occurs May 11–16 in Honolulu.

M.S. student Harsha Karanth and alumnus Alex Yang (CS 2022, M.S. CS 2023) co-authored the paper with Mehta. They study under Polo Chau, an associate professor in the School of Computational Science and Engineering.

The Georgia Tech group partnered with Timothy Slesnick and Fawwaz Shaw from CHOA on ARCollab's development.

"Working with the doctors and having them test out versions of our application and give us feedback has been the most important part of the collaboration with CHOA," Mehta said.

"These medical professionals are experts in their field. We want to make sure to have features that they want and need, and that would make their job easier."

Provided by Georgia Institute of Technology

Citation: Researchers partner with children's hospital on new heart surgery planning tool (2024, May 13) retrieved 16 June 2024 from https://medicalxpress.com/news/2024-05-partner-children-hospital-heart-surgery.html