CardioVision: A Software Platform to Bring Artificial Intelligence and Mixed Reality to Pediatric Cardiology

CardioVision represents a promising step forward in personalized pediatric heart care

Andreas Jahnen[1], Jérémie Dabin[2], Giuseppe Alberto Annoni[3], Alexandru Adrian Tantar[1], Bjorn Cools[4], Isabelle Thierry-Chef[5,6,7]

Abstract

Pediatric cardiology presets a unique set of challenges, where the accurate diagnosis and treatment of rare and complex conditions demand a thorough understanding of patient-specific anatomy and physiology. However, the integration of cutting-edge research and AI models into clinical practice remains a significant practical challenge. CardioVision is a new software platform designed to bridge this gap, providing pediatric cardiologists with an easy accessible and comprehensive tool for preparing and managing challenging cases. By integrating AI-powered analytics, 3D visualization, and collaborative workflows, CardioVision enables clinicians to make more informed decisions, reduce radiation dose to the patient, and improve patient outcomes. This paper presents the CardioVision platform, highlighting its key features and functionalities, and discusses the potential CardioVision has for improving personalized medicine in pediatric cardiology.

Keywords: personalized medicine, pediatric cardiology, AI, software platform, collaborative workflows, visualization, Mixed Reality

Methods and Materials

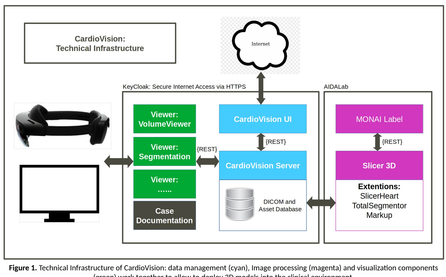

Figure 1. Technical Infrastructure of CardioVision: data management (cyan), Image processing (magenta) and visualization components (green) work together to allow to deploy 3D models into the clinical environment.

Overview of Technologies

The CardioVision platform combines advanced technologies to help doctors better understand and treat complex heart conditions in children:

- **Secure Case Management:** The platform securely manages each patient's medical data, enabling doctors to review cases and collaborate with specialists.
- **Artificial Intelligence (AI):** AI algorithms are used for image processing, allowing tailored preparation of the data.
- **3D Visualization:** CardioVision creates detailed 3D images of the heart that doctors can view in VR or MR. These interactive 3D views allow healthcare teams to see the heart's structure more clearly and plan treatments more effectively.

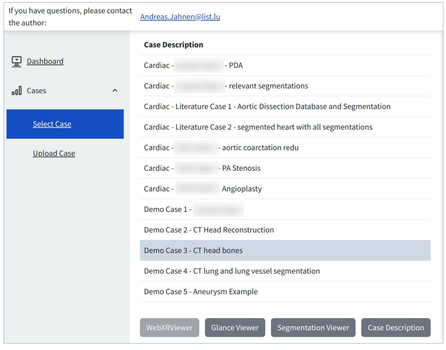

Figure 2. The CardioVision UI: select and visualize cases in using the build in viewers. Once a case is selected, different viewers are available, depending on the available visualizations.

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Contact

Andreas Jahnen
Luxembourg Institute of Science and Technology
Email: Andreas.Jahnen@list.lu
Website: http://www.list.lu
Phone: +352 42 59 91 - 2294

1. Luxembourg Institute of Science and Technology (LIST), 5 Avenue Des Hauts Fourneaux, Esch Sur Alzette 4362, Luxembourg
2. Belgian Nuclear Research Centre (SCK CEN), Boeretang 200, Mol 2400, Belgium
3. Department of Pediatric Cardiology, Regina Margherita Pediatric Hospital, Turin, Italy
4. Departement of Cardiovascular Sciences, Catholic University Leuven, Leuven, Belgium
5. Barcelona Institute for Global Health (ISGlobal), C Rosselló 132 Planta 05, Barcelona 08036, Spain
6. Universitat Pompeu Fabra (UPF), Plaça de la Mercè, 10-12, 08002 Barcelona, Spain
7. CIBER Epidemiología y Salud Pública (CIBERESP), Av. Monforte de Lemos, 3-5. Pabellón 11. Planta 0 28029 Madrid, Spain

Do you want to test the software?

We offer an DEMO of the platform. Please support us and answer our **experimentation questionnaire:**

Expectation Questionnaire

https://nettskjema.no/a/453593

User Experience Questionnaire

https://nettskjema.no/a/453594

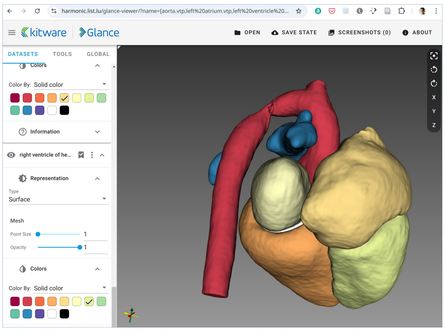

Figure 3. Shown here is the KITWARE Glance Viewer, showing a segmented heart. Data is loaded automatically and the user can Control the visualization options.

Figure 4. Screenshot taken in Mixed Reality with the Microsoft Hololens 2. The images shows a reduction in the aorta.

Results and Conclusion

CardioVision has shown promising results in supporting doctors with complex heart cases in children:

- Improved Diagnosis: By using AI, the platform helps doctors analyze images faster and with greater accuracy, leading to more precise diagnoses.
- 3D Interactive Models: With VR and MR, doctors can explore detailed 3D heart images, making it easier to understand patient-specific issues and plan treatments.
- Reduced Need for Additional Scans: CardioVision makes the most of existing medical images, which can reduce the need for extra scans, lowering radiation exposure for young patients.

These results highlight how CardioVision can make a real difference in pediatric heart care, supporting better treatment decisions and outcomes.

The software is available for research purposes on request.

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