Improving Radiology Diagnostics and Training with XR

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Motivation

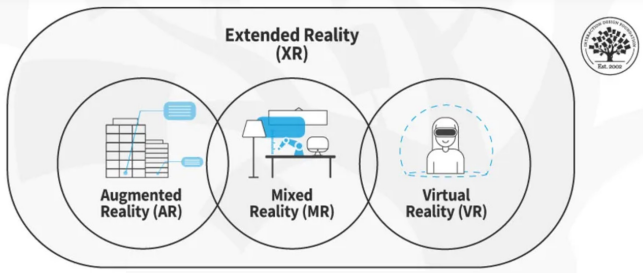
XAVIER: eXplainable Artificial intelligence and VIrtual reality for Enhanced Radiology [6]

- Millions of chest X-rays are taken annually, highlighting their importance in diagnosing various health conditions. However, the global shortage of radiologists cannot meet the growing demand, straining healthcare systems.
- Machine Learning (ML) can improve radiologist's workflow efficiency and diagnosis quality. Despite advancements in AI and DL, their opaque mechanisms raise concerns about biases and misdiagnoses. To mitigate these concerns, there is a pressing need to develop interactive, explainable models that provide radiologists with clear and understandable explanations.
- The XAVIER Project (eXplainable Artificial intelligence and VIrtual reality for Enhanced Radiology) [2,6] aims to bridge this gap by offering human comprehensible insights into AI predictions, thereby fostering trust and facilitating the adoption of AI based solutions in clinical practice.

Research Objectives

XR (Extended Reality) technologies (combination of VR,AR and MR) in radiology offer promising 3D visualization and interactive experiences, but their impact on diagnostic accuracy, efficiency, decision-making, and training effectiveness is under explored. My PhD research investigates XR's effectiveness in radiology practice and education. Integrating XR with AI-driven tools like XAVIER helps radiologists understand and trust insights, improving decision-making and training, alleviating workload, and leading to better patient outcomes and resilient healthcare systems [3].

- Enhance diagnostic effectiveness with 3D visualization.
- Provide immersive and interactive training environments for new radiologists.
- Integrate XR technology into routine radiological workflows to improve efficiency.



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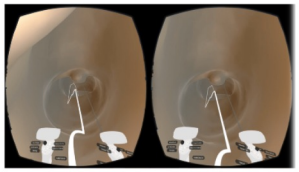
Expected Results



Radiologist is examining the colon with Immersive virtual colonography (VR-based) [1]

The anticipated results of this research includes significant advancements in radiological practices, improved diagnostic accuracy and enhanced educational experiences for radiologists. These results are expected to contribute to better patient outcomes and revolutionize the field of radiology.

Measurement of Anticipated Results:

- **Diagnostic Effectiveness:**
  - Conduct user studies to evaluate the effectiveness of XR versus traditional 2D imaging.
- **Enhancement in Educational Training:**
  - Implement pre- and post-training assessments to gauge the improvement in training outcomes with XR technology.

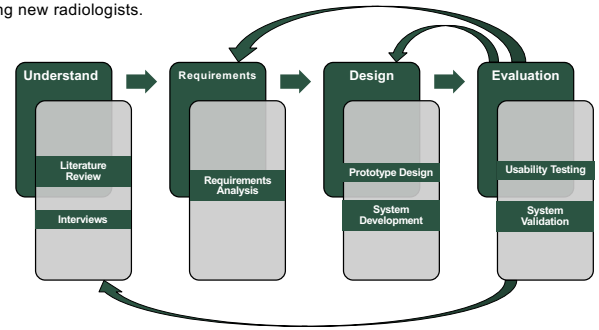
Research Problem

Radiologist is examining the colon on a desktop [1]

Traditional 2D imaging methods in radiology pose significant challenges in visualizing and interpreting complex anatomical structures, often leading to diagnostic inaccuracies and inefficiencies. These inaccuracies and inefficiencies can lead to misdiagnoses or delayed treatment, potentially compromising patient outcomes and increasing healthcare costs. Consequently, there is a critical need for innovative diagnostic tools that enhance visualization and interpretation capabilities, thereby reducing errors and improving the speed and quality of patient care for better health outcomes.

Research Methodology

This project will follow a User Centered Design [5] approach and involves development and integration of XR technology into radiological workflows, creating visualization tools and immersive training environments. The research will include designing, testing, and validating the XR software application, ensuring its effectiveness in improving diagnostic processes and training new radiologists.



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XAVIER Project