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Smart Port Mobile App – AI app for patient specific port placement in minimally invasive surgery

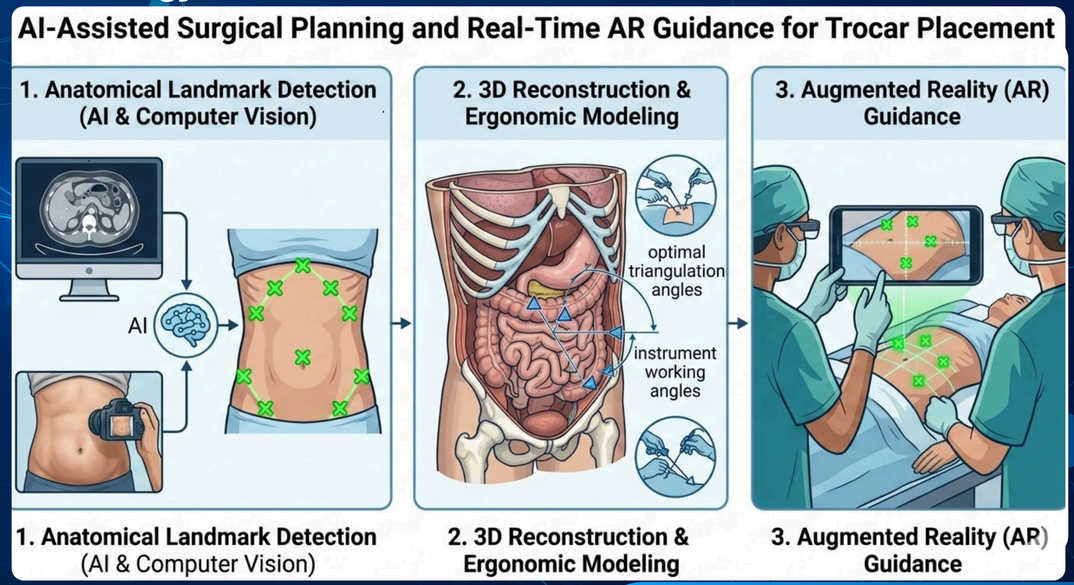
Background

- Variability in body habitus, organ position, and prior surgical scars makes standardized trocar placement unreliable.
- Suboptimal port placement can disrupt triangulation and lead to instrument crowding or collision.

Objective

- To develop Smart Port, a dual-mode AI mobile app that uses CT data or smartphone images to generate patient-specific, optimized port placement.

Technology and workflow



Organ Segmentation

A 3D U-Net architecture is used for organ segmentation.

Port Optimization

Optimizes surgical port coordinates using various libraries.

Anatomy Estimation

A CNN estimates internal organ locations from surface photos.

Clinical impact

- Enables patient-specific trocar planning using AI.
- Improves ergonomics and reduces instrument collision.
- Reduces operative setup time.
- Provides an accessible planning tool for resource-limited settings.

Conclusion

- Smart Port demonstrates accurate AI-guided trocar localization with improved ergonomic efficiency and may improve access to advanced minimally invasive planning tools in resource-limited settings.

Results

Validation model	Abdominal phantom
AI localization accuracy	**92%**
Setup time reduction	**34%**
Instrument collision reduction	**68%**

Refrences