VCU School of Medicine

Quality Improvement and Safety Applications of Surface Imaging:

Collision Detection & Avoidance

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Disclosures

Grant for collision prediction work from Philips Radiation Oncology Systems

Overview

- Relevance of collision prediction/avoidance in RT
- Previous/current solutions
- Advantages of Surface Imaging
- Implementation of SI
- Conclusions

What is the problem?

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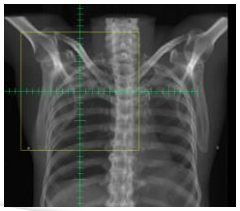
What is the problem?



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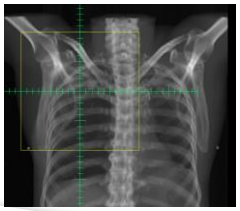
What is the problem?



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Relevance of collisions in RT

- Patient safety concerns
- Increase in treatment time
- Re-planning
- Re-simulation

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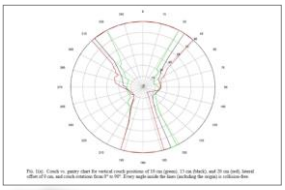
Previous/Current Approaches



Becker, JACMP, 2011

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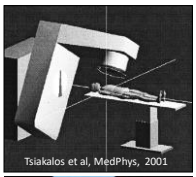
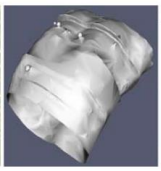
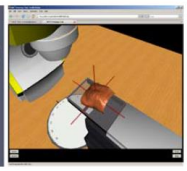
Previous/ Current Approaches



Tsiakalos et al, MedPhys, 2001

Humm et al, IJROBP, 1995





Hamza-Lup et al, Int J CARS, 2008

Why use surface imaging?

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Realistic model

No ionizing radiation

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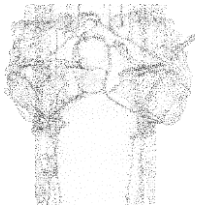

Point cloud file

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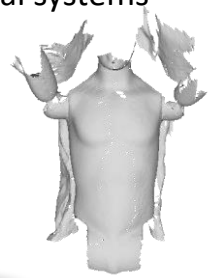
Current commercial systems

- Clinical Surface Imaging
  - Mostly in treatment room
  - Cameras fixed on the ceiling



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Non-medical cameras

KINECT

STRUCTURE SENSOR

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Recent developments

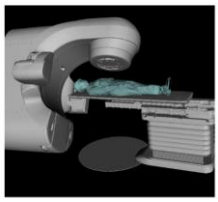


Fig 10

Yu et al

Med. Phys. 42 (11), November 2015

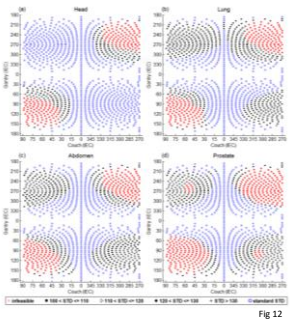


Fig 12

Recent developments

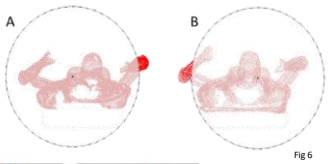


Fig 6

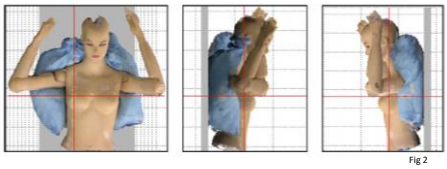


Fig 2

Padilla et al
Med. Phys. 42 (11), November 2015

Recent developments

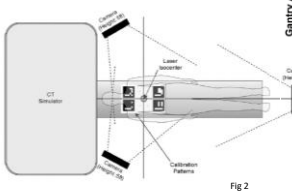


Fig 2

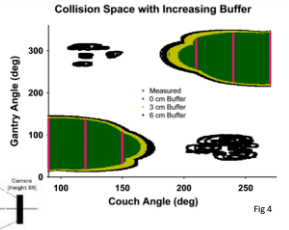
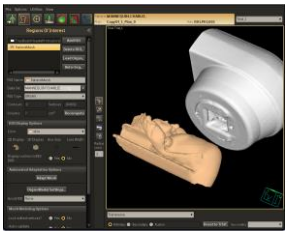


Fig 4

Cardan et al
Med. Phys. 44 (7), July 2017

Recent developments



Meltsner and Padilla, AAPM 2018
(SU-L-KDBRA1-4)

Meltsner and Padilla, AAPM 2018
(SU-L-KDBRA1-4)

Conclusions

- Surface imaging tools can provide missing information for collision calcs
- No additional dose to the patient
- Implementation can improve clinical workflow and efficiency

THANK YOU!