



# Systems and Methods for Real-Time Remote 3D Radiotherapy Treatment Monitoring

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## SUMMARY

Researchers from the Department of Radiation Oncology at UCLA have developed a novel method that enables 3D patient monitoring during radiation therapy that enables remote patient visualization with high spatial resolution.

## BACKGROUND

A number of medical procedures benefit from consultations or input from remote clinicians. In addition to medical imaging such as computed tomography, monitoring is currently enabled by model-guided remote visualization and/or 2D cameras positioned inside the room. Unfortunately, such methods lack either real-time capabilities or the degrees of freedom required for consultation from remote experts, which could potentially impede successful treatment.

## INNOVATION

Researchers from the Department of Radiation Oncology at UCLA have developed a novel method that enables 3D patient monitoring during radiation therapy using multiple co-registered 3D cameras positioned inside the treatment room. This technology enables remote patient visualization with high spatial resolution, and will enable radiation therapists, radiation oncologists, dosimetrists, and medical physicists to visualize a patient treatment with the ability to adjust viewing angles as though they were present in the room. In additional to radiation therapy, this technology can be used for wide range of applications from medical education and training to remote surgery.

The 3D content is acquired from multiple cameras positioned inside the radiation therapy room. The positioning of the cameras is ad hoc, thereby enabling the 3D content to be specific to each treatment room. The documented 3D information of the patient and treatment setup are transferred over a network to the remote location. Currently, there are no systems allow remote experts to review patient setups as if they were in the room. This invention allows for remote clinics to take advantage of expertise that would otherwise be unavailable for consultation. The process is optimized using a Monte Carlo based formulation that maximizes the volume of the 3D room acquired by the cameras.

## APPLICATIONS

- ▶ Remote visualization of patient and setup, both before and during treatment, allowing for consultation from remotely located treatment experts
- ▶ Physician and medical technician education

## ADVANTAGES

- ▶ Real-time patient monitoring
- ▶ Information can be relayed locally and remotely
- ▶ Allows for communication between on-site and remote healthcare practitioners
- ▶ High spatial resolution (3D video)

## STATE OF DEVELOPMENT

This invention is at the developmental stage. A working prototype is being developed.

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

## CONTACT

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## INVENTORS

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## OTHER INFORMATION

### KEYWORDS

real-time patient monitoring, remote patient monitoring, 3D imaging, 3D cameras, radiation therapy, oncology, surgery

### CATEGORIZED AS

- ▶ **Imaging**
  - ▶ 3D/Immersive
  - ▶ Medical
- ▶ **Medical**
  - ▶ Devices
  - ▶ Disease: Cancer
  - ▶ Imaging

### RELATED CASES

2012-697-0

- ▶ [Systems and Methods for Real-Time Radiation Therapy Gantry Collision Detection](#)
- ▶ [Systems And Methods For Real-Time Tracking Of Patient Anatomy Changes](#)
- ▶ [Developing Physics-Based High-Resolution Head And Neck Biomechanical Models](#)

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