

# RT X-R



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Fall 2010

# Real Time X-Rays



## The Proposal:

To simulate and utilize **X-rays** in **real time** to augment human vision controlled by gestural commands captured through a **3D motion tracking camera** and displayed in **real time** through a projector.

# The Technology



- ✓ X-Ray machine
- ✓ 3D Motion Tracking Technology
- ✓ Photosynth Technology
- ✓ Projector

# X-Ray Technology

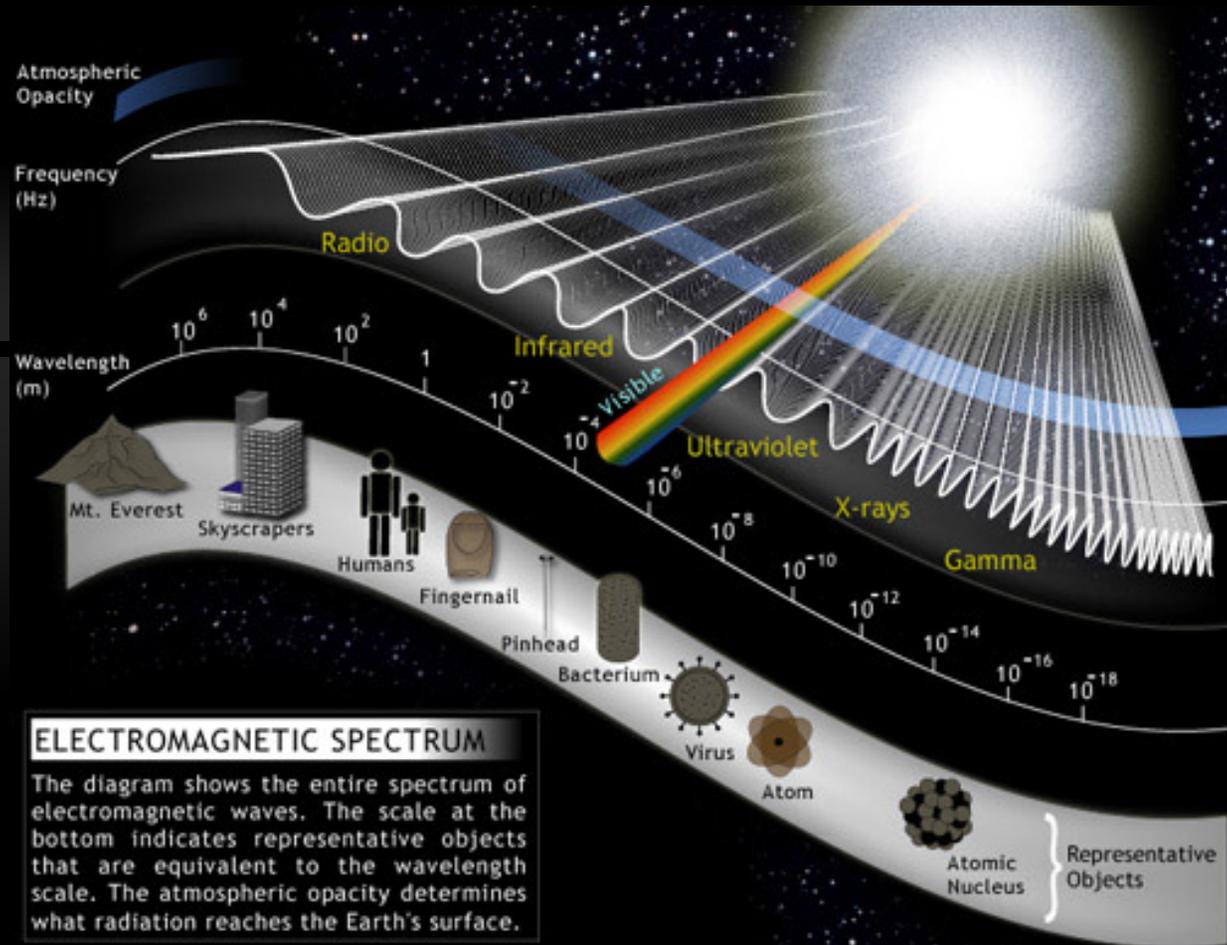
## How it works: Electromagnetic Radiation

- ✓ **X-rays** are essentially the same thing as visible light rays.
  - ✓ Both are wavelike forms of **electromagnetic energy** carried by particles called **photons**.
- ✓ The difference between **X-rays** and visible light rays is the **energy level** of the individual **photons**.
  - ✓ This is also expressed as the **wavelength** of the rays.



# X-Ray Technology

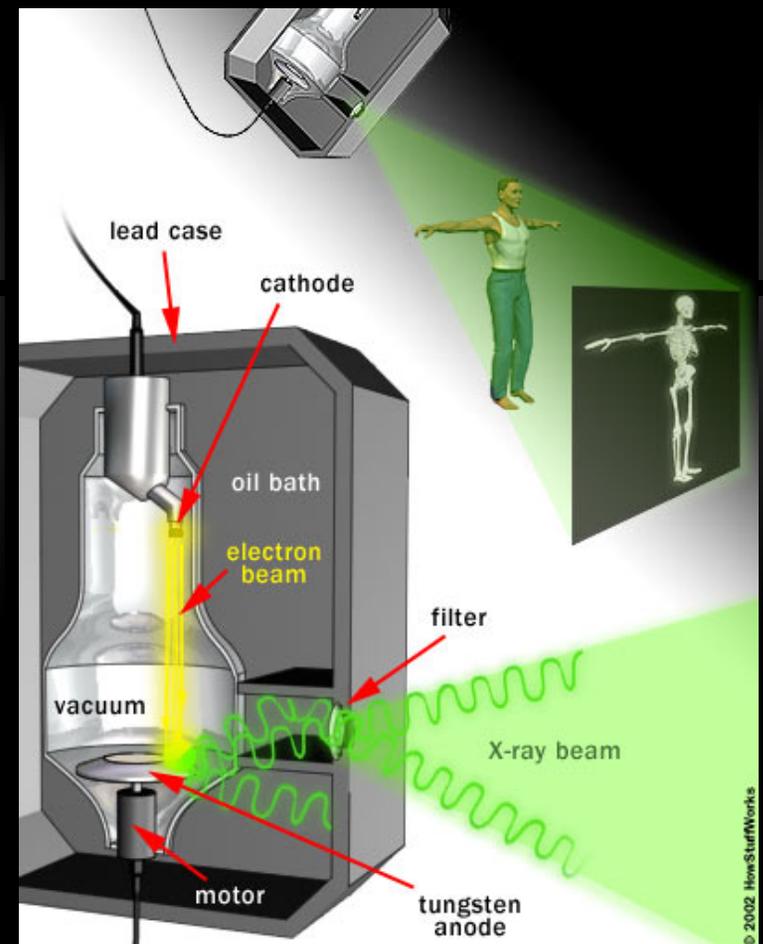
## How it works: Electromagnetic Spectrum



# X-Ray Technology

How it works: X-ray photon absorption

- ✓ The **soft tissue** in the human body is not very good at absorbing **x-ray photons**
- ✓ Bones, being comprised of **calcium atoms**, which are much larger, absorb **x-ray photons** much better.



# X-Ray Technology

## Use in Project



- ✓ X-ray photons contain high levels of energy and thus are dangerous to humans.
- ✓ Objects will be X-rayed before hand and the images will be saved to be superimposed in real time
- ✓ Objects will be x-rayed from various perspectives (depending on camera count from above)



# 3D Image Tracking

## How it works: Xbox 360 Kinect



- ✓ Device emits **infrared light** to illuminate scene
- ✓ **Sensor chip** detects distance traveled to each pixel within the chip

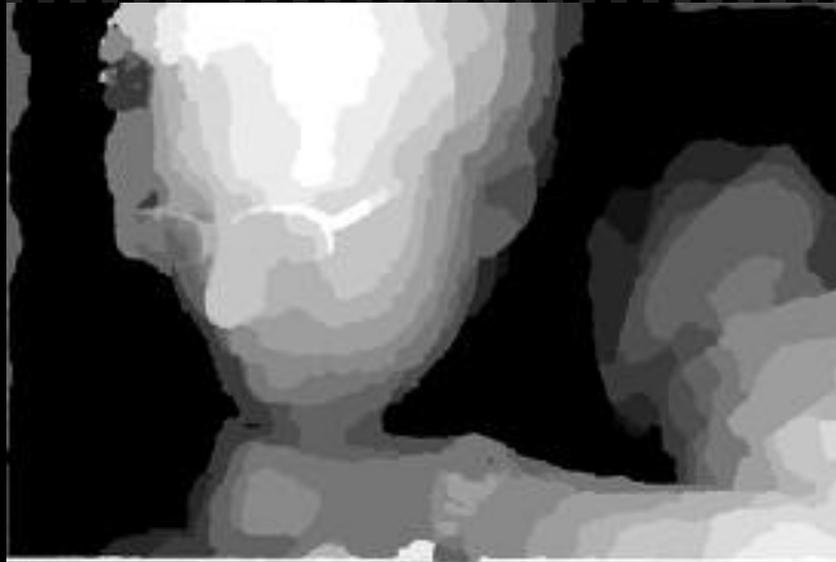


# 3D Image Tracking

## How it works: Xbox 360 Kinect



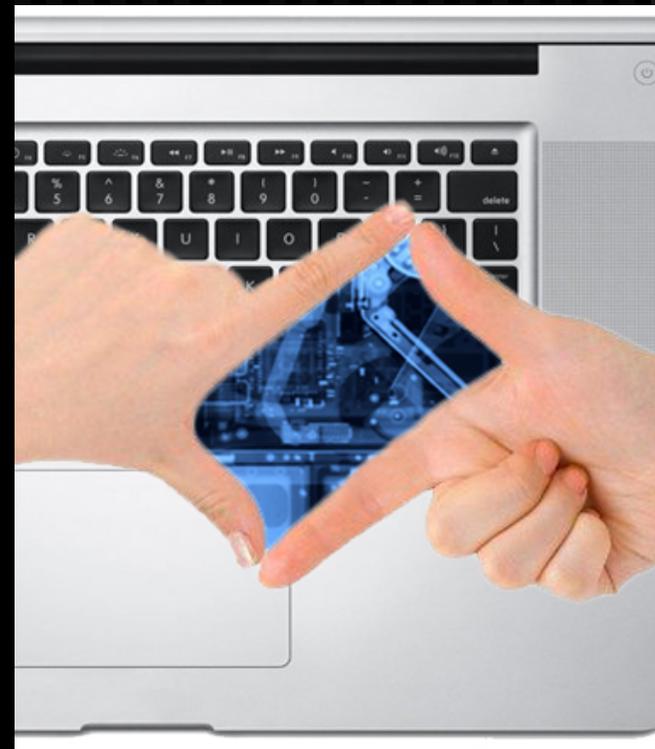
- ✓ Imaging software uses **depth map** to identify and perceive objects in real time
- ✓ End **user device** reacts appropriately



# 3D Image Tracking

## Use in Project

- ✓ Increasing size of **negative space** between hands increases size of **X-ray** portion displayed



# Photosynth

## Fluid Image Synthesizing

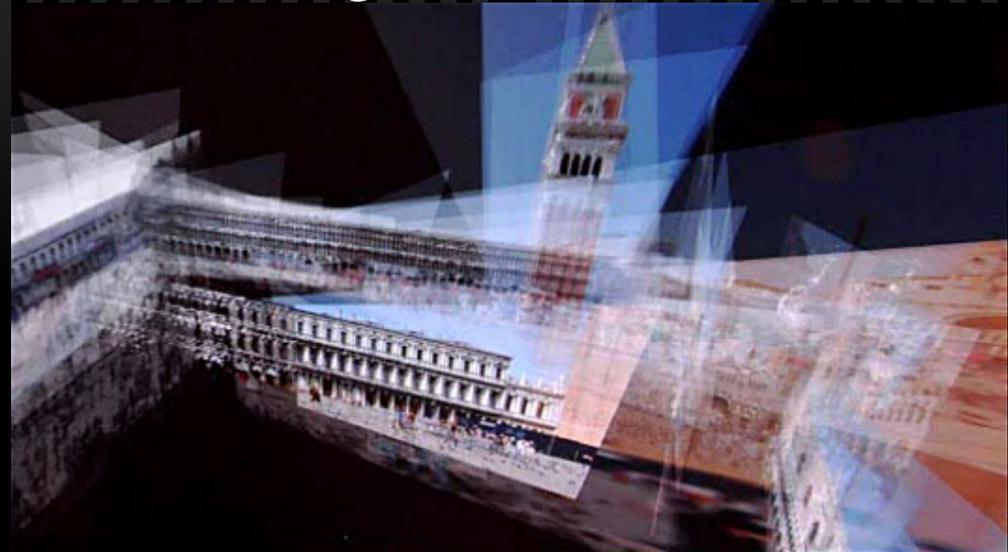
- ✓ Combination of 'SeaDragon' and 'Photo Tourism' technology
- ✓ Seamlessly stitches photos together based on **computational analysis** of image
- ✓ Able to create **3D environments** on the fly with image database



# Photosynth

## Use in Project

- ✓ Seamlessly stitch **X-ray** images together to be superimposed over video
- ✓ Allows user to rotate around object and have **perspectively relevant** images



# The Space

## The Setup

- ✓ **Platforms** set up around room with **objects** placed on top of them
- ✓ **Kinect cameras** placed above platform
- ✓ **Projectors** set up to display **real time video** on walls

# The Space

## Interaction

- ✓ Users will select a **preset perspective** to interact with
- ✓ Users will be able **interact** with pieces by forming hands in a rectangular pose imitating a **camera frame**
- ✓ **Imaging software** will detect negative space between hands and **superimpose** the relevant portion of the **X-ray** on the video displayed on the wall

# References

The Facts behind the ideas

- ✓ X-Ray machine
  - ✓ [http://en.wikipedia.org/wiki/X\\_ray](http://en.wikipedia.org/wiki/X_ray)
  - ✓ <http://en.wikipedia.org/wiki/Radiography>
- ✓ 3D Motion Tracking: Xbox Kinect
  - ✓ <http://en.wikipedia.org/wiki/Kinect>
- ✓ Photosynth Technology
  - ✓ <http://en.wikipedia.org/wiki/Photosynth>