

# *Sumanta N. Pattanaik*



- ❑ Associate Professor of Computer Science
- ❑ Director, Computer Graphics Lab
- ❑ PhD, BITS Pilani, 1993

## Primary Research

- ❑ Realistic Rendering
  - Real-time Realistic Rendering
  - Physically Based Lighting for Realistic Rendering
- ❑ Data Visualization
  - Medical Volume Visualization
  - Multi-Dimensional Data Visualization

## Current Funding Agents

NSF, UArizona/DARPA

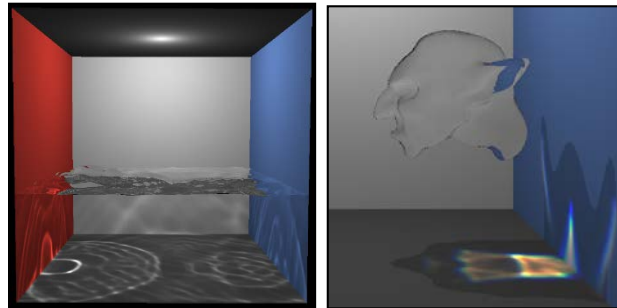


# *Real-Time Rendering*

Real time Rendering: Billions of Grass Blades



Real Time Caustics



Real Time Translucency



Real-time Rendering of Trees with Indirect Lighting



Real-Time Ray Tracing Huge Urban Terrain



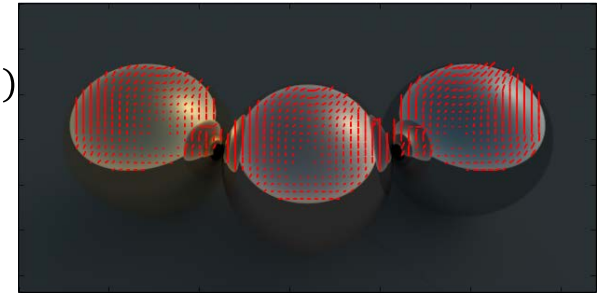
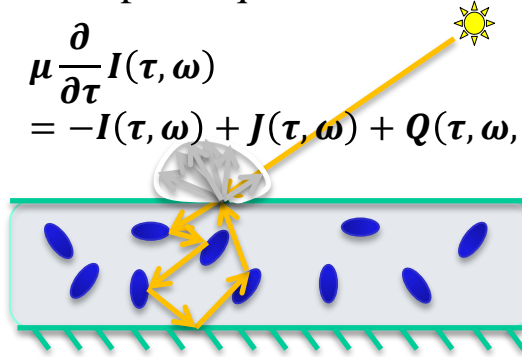
# Physically Based Lighting

Light Transport in Participating Medium



Physically Based Rendering: Solving Vector Radiative Transport Equation for Reflection Modeling.

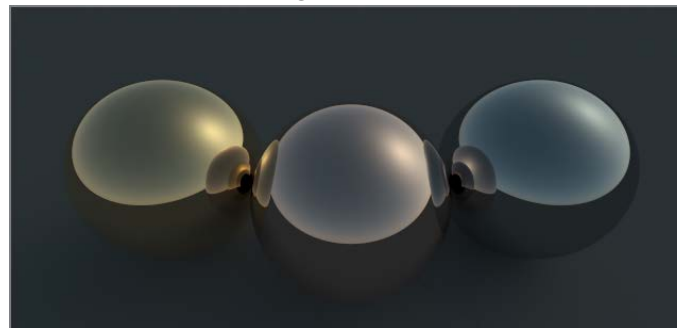
$$\mu \frac{\partial}{\partial \tau} I(\tau, \omega) = -I(\tau, \omega) + J(\tau, \omega) + Q(\tau, \omega, \omega_{in})$$



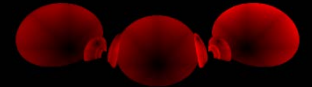
PIRATE: A PolarIzed RAy TracEr



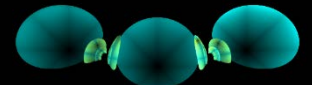
Visualizing Polarization States



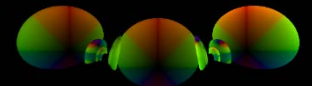
Degree of Polarization



Type of Polarization



Plane of Polarization



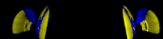
5/24/2017



COLLEGE OF ENGINEERING &  
COMPUTER SCIENCE



Circular Polarization



# Data Visualization

Palette 2 : 1D

Save Transfer Function: tfCadaver.txt Load Transfer Function

Reset Anchor Points: Choose First No file chosen

Disable Gradient Shading

fps: 17

2D Barthel Transfer Function

2D Levy Transfer Function

Web-Based Interactive Real-Time Volume Rendering  
University of Central Florida  
Graphics Research Lab

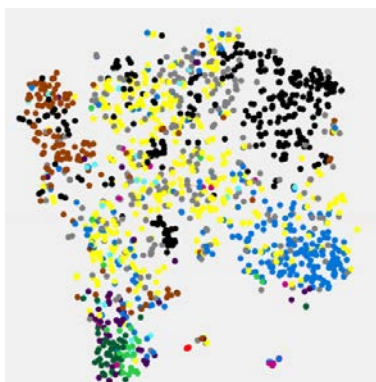
Level level: 0.17277  
0.2680  
0.13411  
0.01  
0.12  
0.2  
0.2  
0.1  
0  
0

User Defined  
vfp Load Volume

Reset Anchor Points  
Network Latency  
 Disable Gradient Shading  Toggle Grid FOV: 35

10.03 fps

<http://graphics.cs.ucf.edu/tools/VOLREN/>



MultiDimensional  
Data  
Visualization:  
Flow Cytometry  
Data

Out-of-core Large Volume Visualization: Client-Server  
Application (Visible Female Data: NIH)

