Visual Computing
CS 211A
The Course

- Introductory Graphics, Vision and Image Processing course
- Prerequisite for Advanced Graphics and Vision courses
- Visual Computing concentration
Course Format

- **Lecture Format**
  - Text Book: Intro to Visual Computing by A. Majumder and M. Gopi

- **4 Programming Assignments (3 people group)**
  - IP, Vision, Graphics, Final project

- **1 Midterm and Final**

- Use the notebook effectively

- Schedule is online
Grading and Office hours

• Do not worry about grades
• Learning is the priority

• Tentative Policy
  – Programming Assignment – 20%
  – Midterm – 30%
  – Final – 50%

• Instructor Office Hours
  – Thursday – 3-4pm
Course Motivation

• What is Visual Computing?
  – Use of computing to perform the functions of the human visual system

• Traverses within several traditional domains
  – Computer Vision
  – Computer Graphics
  – Image Processing

• Addresses converging domains
Course Organization

- Image-based visual computing
- Geometric visual computing
- Radiometric visual computing
- Visual content synthesis
Course Organization

• Image-based visual computing
  – Low level vision in eye

• Geometric visual computing
  – Higher level vision
  – Combining information from two eyes

• Radiometric visual computing
  – Processing light and object interaction

• Visual content synthesis
  – Synthesize realistic 3D worlds
Image Based Visual Computing

- Detecting features
- Background removal
- Image Segmentation
Geometric Visual Computing

- Detecting shapes
  - Binocular cues
  - Shading cues
  - Texture Cues
  - Motion Cues
Radiometric Visual Computing

• High dynamic range imaging

Sky oversaturated

Ground undersaturated

HDR image

• Perceiving reflectances
Visual Content Synthesis

• Can we reverse engineer?
  – Fool the eye? (e.g. Perfect Storm)

• Effects
  – Geometry
  – Lighting
  – Material
  – Motion
  – Trade off between time and quality
Bump and Environment Map
With more time...
With more time...
Materials: Subsurface Scattering
Materials: Transluscency

Different levels of subsurface scattering (increasing from left to right) on Venus
Merge real and synthetic

Show Fiat Lux
Simulation
Non Photorealistic Rendering

- Photorealistic
- Illustrations
- Painterly Rendering
- Dithering
- Pen and Ink
- Engraving
- Fur and Grass
This class

- We will NOT learn ALL of these
- Provide you with the fundamentals so that you can learn all of these