WYSIWYR
What You See Is What You Reconstruct!

POSTECH
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When you visit a model house...
At night...
We can help you!!

- Real-time 3D reconstruction and structure understanding of large scale indoor environments
Microsoft Kinect!

- Real-time capture of RGB & depth images
Kinect Reality

- Real-time view-oriented 3D scanning
- Users can reconstruct ‘what they see’ using **Kinect helmet** in real time
- **WYSISWYR = What You See IS What You Reconstruct!**
Kinect Helmet w/ HMD

- Safety helmet with MS Kinect
  - View oriented 3D reconstruction
- Head Mounted Display (HMD)
  - Display of 3D reconstruction result
  - Augmented Reality with RGB image from Kinect
Overall Structure of Kinect Reality

Kinect Reality

= Augmented Reality + Real-time view-oriented 3D scanning + HMD + Hand gesture interaction
Prototype System of Kinect Reality

**Input:**
- Depth image
- Color image

**Output:**
- Real-time Reconstructed Scene

**User Interaction:** Touch
Research Issues

- **Real-time 3D scanning**
  - Efficient handling of scanning noise and reconstruction errors

- **Light-weighted polygonal representation**
  - Compact representation for large-scale indoor scenes

- **Scene structure understanding**
  - Registration and merging of locally scanned geometry

- **User interaction**
  - Tablet, hand gesture interface

**RGB image + Depth data processing!**
Real-time 3D Scanning

- **KinectFusion**
  - Computation and memory intensive processing for a small region
- **Efficient and robust tracking and processing of RGBD data**
Light-Weighted 3D Representation

- Compact representation of scene structure and details
  - Noise filtered geometry & less memory usage
- Robust real-time plane detection from RGBD images
  - Simplified polygonal mesh + displacement map
Scene Structure Understanding

- High-level understanding of the scene structure from RGBD images
  - Local geometry from depth images
  - Registration and merging of local geometry using scene structure
  - Structural analysis, such as repetition and symmetry detection
  - Globally registered hierarchical scene representation
User Interaction

- User interaction using RGBD images
  - Hand gesture interaction using depth data from Kinect
  - Touch gestures on a tablet for user interaction (drawing)
Ultimate Kinect Reality System

- **WYSIWYR** for interactive scanning of large-scale indoor scenes
  - Walk & Watch! Then... You will Get the (compact) Geometry!
  - Portable system w/ laptop & battery
Summary

- Kinect as real-time scanning device for RGBD images
  - **WYSISYR** for interactive scanning of large-scale indoor scenes
  - **Synergism** of RGB image and Depth processing
  - Effective and robust extraction of information for scene reconstruction!
  - Many interesting research problems!
Thank you!!

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