



Kinect Interior Designer



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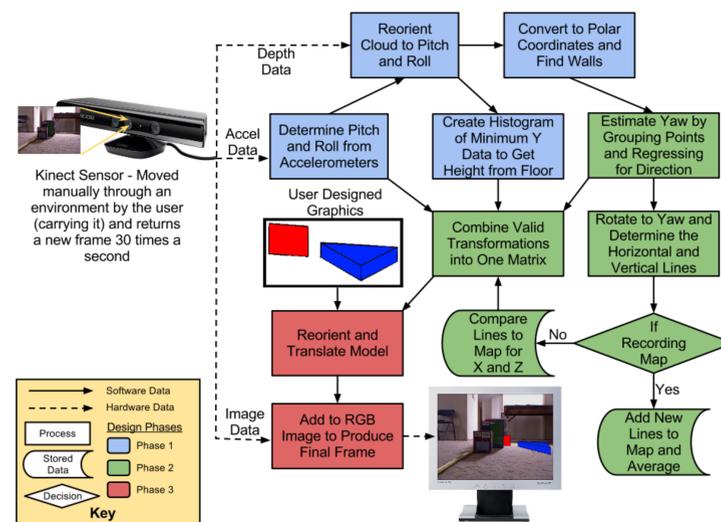
Dr. Chia Han

Motivation

- Originally designed for video games, the Kinect laser scanner also has the potential to be used in 3D imaging, navigation, and virtual reality
- With the recent increase in popularity of augmented reality applications, there has been a growing need for efficient tracking algorithms

Tracking Algorithm

- Designed to track all 6 degrees of freedom independently — pitch, roll, yaw, x, y (height), z
- Constrained to interior spaces, relying on the fact that most walls form right angles with each other
- The user must stand in one position and rotate in order to map the room for accurate tracking



Block Diagram of Algorithm

Project Goals

The aim of this project is to design new 3D scanner processing algorithms with low computational requirements. These algorithms are then used to augment 3D models (table, chair, etc.) into a room.

Augmentation

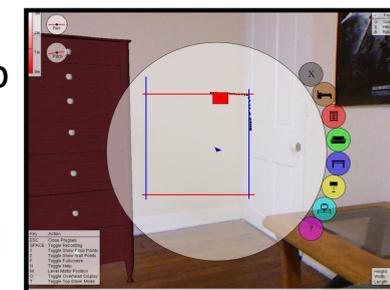
- 3D models are drawn on live 2D RGB camera view
- Models are rotated, scaled, and transformed according to tracking algorithm
- Real time tracking causes the models to appear to be in the room



Adding Furniture to a Classroom

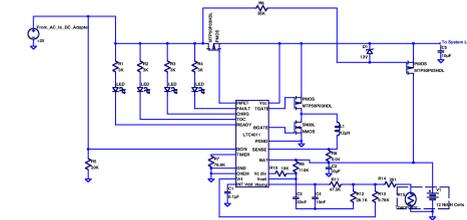
Room Designer Application

- Models chosen from menu and placed in top down map
- Models can be scaled, rotated, and shifted
- Actual dimensions of placed object displayed in editor



Furniture Placement Editor

Power Supply



LTSpice Schematic of Power Supply

- Mobile power supply unit using high capacity NiMH rechargeable batteries
- Use of LTC4011 IC chip to charge the batteries
- Automatic switching between AC adapter and battery power through Power Path technology

Challenges & Conclusions

- Challenge of comparing many different tracking algorithms for accuracy and efficiency
- Difficulty finding components for power supply
- Encountered slight stability problems when camera is not moving, resulting in shaking
- Includes 19 models that can be augmented into a room, and additional models can easily be added
- Is able to correctly draw models in a moderately sized room as camera is moved
- Much lower computational requirements than other laser scanner tracking algorithms