Generating 3D architectural modeling based on hand motion and gesture

1. Related key words
2. The goal of our research
3. Research procedure
4. Future work
1. Related key words

**Human machine interaction**

- Interface
- Communication
- Input tool
- Hand sign
- Hand motion
- Motion capture

**3D rapid modeling**
1. Relevant key words

**Human machine interaction**
- Communication
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**3D rapid modeling**
2. The goal of our research

**3D rapid modeling**

Complex building generating easier
Help architect to express exact idea by 3D model at the beginning
Architecture generating instantly
Let client join in design works via gesture language
Communication with disable client

**Architecture modeling software**
3. research procedure

I. Hand sign design
II. Marker place
III. Motion capture test
IV. Data processing
V. Drawing by software
VI. Editing rough sketch
VII. Architecture 3D modeling
I. Hand sign design

Chinese Sign Language (CSL)
British Sign Language (BSL)
American Sign Language (ASL)

BSL  ASL  CSL

stop

love
Architectural Hand Sign (AHS)

most buildings are made of the basic units

GROUND FLOOR ROOF WALL COLUMNIATION WINDOW DOOR

......
Architectural Hand Sign (AHS)  

Building Structure

Vertical Structure
- Wall
  - External Wall
  - Inside Wall
- Columniation
- Fundamentation

Transverse Structure
- Slab
- Roof
- Beam
- Door
- Window
- Plan Roof
- Slope Roof
- Curve Roof

Staircase
II. Marker place

NUMBER & POSITION
III. Motion capture test

Motion capture

Input tools
IV. Data processing

Analysis the markers data of hand and pen coordinate axis xyz.

EVaRT, to collect the data of test
IV. Data processing

We use Matlab to deal with the matrix of the data.

\[
\cos \theta = \frac{\text{Normal1} \cdot \text{Normal2}}{|\text{Normal1}| \cdot |\text{Normal2}|}
\]

\[
\cos \beta = \frac{\text{Normal2} \cdot \text{Normal3}}{|\text{Normal2}| \cdot |\text{Normal3}|}
\]

If \(145^\circ > \theta > 45\), we define the surface P1-P3-P4 and P3-P4-P5-P6 are in the same surface.
V. Drawing by software

\[
\cos \delta = \frac{(T_1T_2 \cdot T_2T_3)}{|T_1T_2| \cdot |T_2T_3|)
\]
VI. Editing rough sketch

Use Alias to edit rough sketch generated by Matlab.
VII. Architectural 3D model
4. Future work

**MATERIAL DATABASE**

**ACCRURATENESS**

Reference point
Multisense left hand sign
Assistant drawing tools
...

**INTERFACE WITH OTHER SOFTWARE**

Open Datalink Interface (ODI)

Auto CAD
3D Max
Alias
Sketch up
...

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• Beijing Jiaotong University (BJTU), located at centre of Beijing, beside the second circle line.
• under the administration of the Ministry of Railways nearly for fifty years
• directly under the administration of the Ministry of Education now
• about 2700 faculty and staff members
• nearly 19,000 full-time students
• nine schools

• Department of Architecture and Art Design.
Department of Architecture and Art Design

Architecture Design

Postgraduate research group

Architecture design
urban planning
Graphic design
Interior design
Industrial design
Design history & theory
Branding strategy

Art Design
Xiao Yi

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Give my thanks to CAD Group of Brunel Design
Thank you for your attention

谢谢 Xiexie

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