Designing Buildings in Realtime from Anywhere

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01 | KPF Overview
02 | Designing Real Time
03 | Collaborating Real Time
04 | KPF 10th Office
01 | KPF Overview

A: Introduction to KPF
KPF Overview
Abu Dhabi International Airport
Abu Dhabi
B: Workflow – Realtime Analysis and Collaboration
1: 9 KPF Locations
2: External Partners
3: Client Collaboration
4: Fabricators + Vendors
01 | KPF Overview

C: 5 Digital Areas of Focus
1: Digital Practice
2: Applied Research
3: KPFui

4: Data Analytics + Visualization
5: Global Infrastructure
D: Core Technologies
01 | KPF Overview

E: Collaboration Expectations
- Sharing Digital Models Among Multiple Constitutes
- Realtime Immersive Experiences for Design Communication
- 24 Hour/Multiple Time Zone Realtime Collaboration
01 | KPF Overview
02 | Designing Real Time
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02 | Designing Real Time – Visual Design Process
Designing Real Time – Computational Design using GPU
Designing Real Time – Computational Analysis using GPU
02 | Designing Real Time – GPU Visual Computing for AR
Vray on 3D Max – 4K render on GPU only

NVidia Quadro P4000   = 25m 21s
NVidia Quadro P6000   = 15m 13s
NVidia Quadro RTX4000 = 13m 9s
NVidia Quadro RTX6000 =  8m 22s
Vray on 3D Max – 4K render on GPU only

NVidia Quadro VCA P6000 (X8) = 3m 17s
NVidia Quadro GV100 (X2) = 3m 31s
02 | Designing Real Time – GPU Visual Computing for CGI on RTX

Chaos - Project Lavina
02 | Designing Real Time – GPU Visual Computing
KPF
TRAFFIC CAMERAS
The traffic camera tool enables you to visualise the current state of the traffic around London. The feed, as provided by TfL, is updated every 10 minutes.
02 | Designing Real Time – Machine Learning for Knowledge Sharing
Choose image for search

So, how does it work?

Drop an image and the computer vision software will look for other images with the similar visual characteristics. It’s comparable to a “Show similar” feature (Google Images) but it’s based on KPF Imagery.
Bots

Testing and Training

Use the chat window to ask IT related question to test the bot.
If you see strange response, please log it so we can retrain the bot.
Designing Real Time – Machine Learning for Design Exploration

Generative Design
- generate
- spaces: living, sleeping, cooking, bathroom, study
- characteristics: area, access, natural light, noise, proportion

Machine Learning
- Supervised Learning
  - Convolutional Neural Network
  - Image, feature maps, max pooling, fully connected output layer
- Unsupervised Learning
  - Deep Neural Network
  - .csv file

Immersive Evaluation
- trained neural network: new design, characteristics
- clustering
- Immersive Human Evaluation: real-time
02 | Designing Real Time – Machine Learning for Design Exploration
# WE ARE GOING TO VISUALISE PART OF THE DATA
X = dataframe.Height
Y = dataframe.Width
Z = dataframe.Length

# USE MATPLOTLIB TO VISUALISE 3-D SCATTERED DATA
ax = Axes3D(plt.figure())
ax.scatter(X, Y, Z)
plt.show()
```python
# VISUALISE THE OUTPUT
if assignments is None:
    assignments = [0] * len(X)
fig = plt.figure(figsize=(14, 8))
cmap = ListedColormap(['red', 'green', 'blue', 'magenta', 'yellow'])
ax = Axes3D(fig)
ax.scatter(X, Y, Z, c=assignments, cmap=cmap)
plt.show()
```
Designing Real Time – Machine Learning in BIM
02 | Designing Real Time – Designing Cities
High Density

Mid Density

Low Density
Annual Comfort Improvement: -3.5%
02 | Designing Real Time – Designing Cities
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Collaborating Real Time - HoloDeck
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04 | Our 10th office

Virtualise

Infrastructure

Real Time

Collaborative
Thank you