CAD and Creativity

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Contents

• Various aspects of CAD
• CAD training in the university and the industry
• Conveying fundamental concepts in CAD
• Students work
• The road ahead
CAD – Computer-Aided Design

• Emerged after the 2nd World War
• Blooming in the sixties
• Becomes a basic tools in the industries

Different Aspects of CAD

Users’ perspective

– A tool for creating drawings and 3D models
– A tool for making prototypes and tooling
– A tool for multimedia content development, e.g. web page design, animation, etc.
Different Aspects of CAD

Developer’s perspective
– A robust system for graphics application
– A suite of algorithms for manipulating graphics and geometric entities
– A means for automating the design process

Designer’s Perspective
• A tool for creating layouts
• A tool for developing forms
Engineer’s Perspective

- A tool for functional design
- A tool for analysis
- A tool for process planning

Creativity

General interpretation
- Associated with artistic endeavors and writing of literature
- Creativity \( \propto \) artistic skill
- linked with moments of sudden scientific or engineering insight
Creativity and Constraints

\[ \text{Creativity} \propto \frac{1}{(\text{Constraints})^n} \]

CAD and Creativity

- There is no direct relation between CAD and Creativity
- A competent CAD user is not necessary a good designer
- CAD provides a platform for visualizing design concept
- CAD allows non-artist to develop concepts and ideas easily
CAD Training

• CAD user training
  – Appreciation of geometry
  – Application of different construction techniques
  – Presentation technique

• CAD developer training
  – Analyzing existing design process
  – Develop techniques for automating/assisting the design process

CAD User Training

• Basic knowledge on different geometric entities: curves, surfaces, solid models
• Construction and manipulation of geometric entities
• Use of different rendering techniques
  – e.g. phone shading, ray tracing
• Feature based design techniques
CAD Developer Training

- Basic graphics computing techniques
- Mathematical concept of various geometric entities e.g. curves and surfaces
- Various algorithms for geometric computing
- Simulation techniques

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CAD Training for Industries

- Usually system specific
- Sometimes industry specific

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CAD Training for Undergraduates

• To prepare graduates capable of
  – using CAD systems
  – extending existing CAD techniques
  – developing CAD systems
• Graphics programming techniques

CAD Related Courses in the ACE Programme

• ACE1040 Design Principles and Practices
• ACE1050 Design Computing
• ACE1060 Computer-Aided Design and Practice
• ACE2020 Engineering Product Design
• ACE2040 Multimedia Technology for Design
• ACE2050 Engineering Computer Graphics
• ACE2910 Product Design Practice
• ACE3090 Computer Game Design and Development
• ACE3120 Geometric Modeling and Processing
**Mobile Home Phone**
- Users can chat on phone without holding it.
- Round-neck style ear-phone
- Can also use wired phone when wireless ear-phone is recharging.
- Slim
- Cyber look

Lam Tak Wai (02692582)
IDE 2/3
IDE 2030 Assignment 2 (Home Phone)

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**Multimedia/Game Phone**

- Big touch screen
- Simple but efficient control for games and all operations
- Volume/brightness control
- Camera
- Play/stop and control for video/MP3
- Small LCD screen
- Sound output (earphone)

Dream phone for all who loves:
- GAMES/MOVIES/MUSIC/PHOTO!!!
- It’s a multimedia phone featuring photo/video taking, mp3, video, recorder and games.
- Large storage size with the use of memory card
- Now, u can play all your favorite games and music anywhere anytime!
CAD for Digital Entertainment

- Animation
- Effects
- Games
Game Design and Development

• A good platform for creativity development
• Relatively little constraint for content development
• Require techniques in design, computing, knowledge in physics, etc.

Design Elements in a Computer Game

• Game play design
• Characters design
• Sceneries
• Effects
Engineering Elements in Game Development

• Real time rendering
• Real time animation
• Artificial Intelligence
• Collision detection
• Physic based animation
  – Demo www.rthk.org.hk/special/technofrontier/

Student’s Work

• Three types of students
  – Competent in CAD modeling
  – Competent in computer programming
  – Competent in both CAD modeling and computer programming
• Individual or group project?
The Road Ahead

• CAD is a mature technology
• CAD system becomes more user friendly and intelligent
• CAD training starts in the secondary school

The Road Ahead

• What benefit secondary students in learning to use CAD?
• Do we need students to learn classical drawing techniques?
• For sure, CAD will become a basic concept development tool.
The Road Ahead

- An important message to students
- Design is not simply an artistic skill
- Design requires
  - analytical skill,
  - knowledge in science, humanities, etc.