Mass Manufactured vs. User Customized

Today: Mass manufactured products

Our Goal: Allow end-users to easily create their own customized objects

Why Difficult?

Designing 3D shapes is difficult for everyday user
- 3D modeling, CAD modeling software hard to use

Modeling Software

Goal: Create your own complementary objects

Create new lid (broken or missing teapot lid)

Create new shelf to organize desktop objects

Input

Output
Our Solution: Draw on Photo of Existing Objects

New object is not in photo – we provide 2D interface for user to sketch it with existing objects as rough guide

Photo gives hints of perspective and relative dimensions of new object
Optimization
Convert user input into 2D graph and “expand” to 3D structure

Example: User-drawn 2D outline and right angle annotations

Sketch-based Modeling, Design, and Fabrication
Modeling-in-Context  SketchChair  Shape-Stamping
Fabricating 3D Models  Enclosures for Gadgeteer

Mass Manufactured vs. User Customized
Today: Mass manufactured products
Our Goal: Allow end-users to easily create their own customized objects - chairs

SketchChair: An All-in-one Chair Design System for End-users
Sketch-based Modeling, Design, and Fabrication

Modeling-in-Context  SketchChair  Shape-Stamping

Fabricating 3D Models  Enclosures for Gadgeteer

Simulation is used to validate the stability of a design and to explore its feasibility.

Cutting profiles using a paper cutting plotter.

Examples of paper chairs produced using this system.
**Mass Manufactured vs. User Customized**

Today: Mass manufactured products

Our Goal: Allow end-users to easily create their own customized objects

---

**User Interfaces for Sketch-based Modeling and Fabrication**

Modeling-in-Context

SketchChair

2D interface  3D interface

---

**Draw 3D objects in real 3D space**

Image from Head-mounted display

Augmented Reality (Real-world table + Virtual chair)

Situating Modeling (Existing table + New chair)

---

**Shape-Stamping**

Primitive Shapes

Stamping  Dragging  Sweeping

---

**Results**

Primitive Shapes

Do-it-yourself Furniture and Products

---

**Clothes Hanger**
Component-Centric Interface

Sketch-based Modeling, Design, and Fabrication

Modeling-in-Context  SketchChair  Shape-Stamping

Fabricating 3D Models  Enclosures for Gadgeteer

Personal Fabrication

Sketch, design, test, visualize, simulate, and fabricate user-customized products

Personal Fabrication

Sketch, design, test, visualize, simulate, and fabricate user-customized products

Thank you!