*International Conference on Human-Conputer Interaction,657-662, 1993*

Virtual Kitchen System using Kansei Engineering

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Abstract ,

A new paradigm for relationship between human and computer has been called

artificial reality, Virtual reality or cyberspace. Using three―dimensional computer

graphics, interactve devices, and high‐ resolution display, a virtual world can be

realized in which one can pick up imaginary objects as if they were physical

world. Using this technology and Kansei Engineering, virtual Kitchen System

has been developed in Matsushita Electric Works. Kansei Engineerng is deflned

as a”translation system of a customer is favorite or image into real design components” (Nagamachi,1986)。Virtual Kitchen System can be used for the customers

to design virtual kitchens which just they image and experience them in virrtual

space. And in future , it will be able to deal with whole of house, then customers

can design their house and check the housing performances such a light, sound,

vibration, ternperature, air and living‐ space amenity.

This paper details Kansei Engineering and the Virtual Kitchen System.

1. INTRODUCTION

When planner plans living space, it is important to get customer’s need or

lifestyle. But because of diversified lifestyle and floodded products, it is being

difficult to grasp customerls lifestyle and needs.Then it has become important for

manifacturer to change the process of how to design products and how to sales to

deal with this problem. Product designer is required to implement customers

need and feeling, and interior planner must grasp customer's lifestyle and what

he images through their conversation and embody his willing. But customers

needs are diversifled and their expression of kitchen images are vague. Kansei

Engineering is valid such a problem. U,ing this technology, Virtual Kitchen Sys―

tenl can translate the customer’s image of kitchen what he desires into the virtual

kitchen, and after that, he can step in into his virtual kitchen space to check

it. As a Kansei information , this prototype system is using lifestyle and kitchen

image in adjective word.

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2.KANSEI ENGINEERING

Kansei Engineering is deined as"a translation system ofa consumersimage Or

feeling into real design components"(Nagamachi,1986)。Namely,when a cus\_

tomer expresses their image toward a object in attective,detail design items(for

instance,object style,color,material,。ize and so on)are selected through the

Kansei Engineering procedure,and using this outputs,designer or planner can

design the object.

The Kansei Engineering Procedure is;

Step 1. Collect the adjective words

Collect many attective words which have relation to the object domain.

Step 2. Aslides or pictures on SD scales

Make pair these attectives in a good― bad fashion for the SD(Osgood's Semantic

Direrentials) scales. Then assess inany slides or pictures related to the object

Domain on these SD scales.

Step 3. Elicit effective adjectives from collected adjectives.

Calculate the assessed data at Step2 by factor analysis br principal component

analysis,and obtain the semantic factoral structure of ajecectives on the related

design domain. And elicit adjectives which have a close relation to the object

domain from the collected adjectives.

Step 4. Subdivide the object design into the design components.

Subdivide the object design on the slides or pictures into the detail design components,

then classify each component into category according to its quality. For

example, L‐style(category) layout(component), mahogany (category) cabinet

(component).

Step 5. Get the relevancy between an adjective and design components.

Using the assessed data at Step2 and qualitative data at Step4,analyze by

Hayashi;s Quantiflcation Theory Type l, which is a kind of multivariate regression

analysis dealing with qualitativ e data(Hayashi,1976).The results of this

analysis means relevancy between an adjective and.each design component.

3。ⅥRTUAL KITCHEN SYSTEM

3‐l MATIS/ViVA Overview

ViVA(Virtual Reality for Vivid A&i space) system is developed which allows

our customers to pseudo‐ experience their custom kitchens before purchasing

them. The kitchen planning process is detailed in Fig.1.When a interested customer

comes to the showroom, the kitchen planner first explains the kitchen

products' descriptions using catalogues and exhibits,

The kitchen planner next draws a rough layout according to the desires of the

customer. Then a floor plan, an elevation view, a perspective drawing, and a writ―

ten estimate are created on a CAD system based on the rough sketch. This CAD

system called MATIS(Matsushita Amenity Total lnterior System) includes

approximately 30,000 of Matsushita’s kitchen products as well as data on previous

and current customers in its database. This customer data includes flelds for

room dimensions, cabinet placement, standardized parts information, special

order information, etc.

After drawing the plan on the MATIS system, the two― dimensional picture is flrst

translated to a three― dimensional layout to be experienced in the ViVA system.

The Customer’s own kitchen plan can be translated into a ViVA database within a

day. The next time the customer comes to the showroom, he can now experience

many aspects of his own kitchen. The customer can check his kitchen with the

Viva system and decides if it matches his own idea of how the kitchen should be.

And using the Texture Mapping techno1ogy,ViVA system allows the custotmer to

coordinates colors of the kitchen cabinets, the wall, the floor and the ceiling.

Once the custolner is satisfied with the virtual kitchen and approves his kitchen

design, final approval and appliance drawings are made and the order is sent to

the CIM line. The CIM line starts its operation according to the specifications

decided by the customer. Tolerances of lmm can be kept using this CIM system

only one week from placing the order, the completed kitchen is delivered to

owner’s home ready for installation.

Usual kitchen planning system without the ViVA pseudo― experience system , the

customer often cannot image his own kitchen vividly. Sometilnes there are many

disrepancies between the customr and the kitchen planner. In such a case, the

consultation is started afresh. The ViVA system helps elinlinate these mistakes

that are often made. Figure 2 shows the impressions of customers experienced the

ViVA system.

With ViVA, the fo1lowing items can be experienced in the virtual kitchen:

1. The arrangement of cabinets and appliances.

2, The general feeling of available space.

1. Overall ergonomic design: The user can open and close cabinet doors, turn on

faucets, move goods on the counter etc.

4.The color― coordination of the room components (kitchen cabinets,the foor, the

ceiling)

The ViVA kitchen planning system, located in Matsushita Electric Works'

Shijyuku showroolm near Tokyo, has been available to custormers since October

1991。Since then many people have experienced the system.

3‐2 Virtual Kitchen System using KANSEI Engineering Overview

As the next version of ViVA system, Kansei ViVA system is being developed

(stage l― type system on Fig. 1).This system is valid to the following customers'

types:

1, The customers who have no idea of the kitchen

2. The customers who are in confusion because they saw many catalogues and

exhibits

3.The custorrlers who cannot image what the size of their kitchen space (usually,

kitchen looks smaller than actual size in showroom because the height of the

room in showroom is higher than housing one).

Using this system, vagueness and confusion of customer's image are cleared. So

we expect that this system can decrease the number of the consultation between

planner and customer (usually it repeat 4 or 6 times, sometimes over 10 times),

and decrease the time of the consultation (usually it takes 2 hours, sometimes

over 4 hours). The ViVA systern using Kansei Engineering is detailed in Fig。3.

First, customer inputs the fleld for room dimension and height of customer who

use kitchen as restriction conditions. Next, he inputs lifestyle of his family and

his image toward the kitchen in adjective words as Kansei conditions. Then the

Kansei ViVA system identifles the kitchen plan in detail (for instance, kitchen

layout, cabinet color, f1oor color,counter hight and soon) using Kansei Engineering,

and selects the kitchen plan used before similar to his kitchen plan from the

ViVA database, We gathered over 200 of adjectives and 18 items featured

Life style. After experience, customer can change the wall size, cabinet arrangement,

cabinet co1or and so on of the similar kitchen plan into his own kitchen

plan.

3-3 Living Amenity Simulation System Overview

Current ViVA systern and Kansei ViVA system are dealing with kitchen space. In

the future, we wish to develop to model an entire house. Figure 4 shows such a

system. This development is joined with the project which is a 7-year plan since

1989 called “Technology Deve1opment Project for New lndustrialized Houses"

under the Ministry of lnternational Trade and lndustry. The aim of this project is

to develop a system which achieves new housing production for the coming 21st

century. For the implenlentation of the project, research and development is ber

ing proceeded by ”The New lndustrialized House Production Technology and Sys―

tem Development Technology Research Association (WISH21)". MEW takes

charge of development of "resident participation" amenity simulation system in

this project. Using this system, resident can experience and evaluate housing performance such as light, sound, vlbration, temperature, air and so on.

FIGURE 1, FIGURE 2, FIGURE 3 & FIGURE 4 are here.

1. CONCLUSION

This paper described about Kansei Engineering and the Virtual Kitchen System:

As indicated in this paper, current system kitchen simulation system is Valid.

And Kansei ViVA system could cover gap which arose between customer and

kitchen planner in their consultation, and decreased consultation― time to a certain

extent. ln future, Kansei ViVA system will be developed which can deal with

the Kansei information in a broad sense, Namely, advanced Kansei ViVA systeln

will be able to deal with customers" amenity“ such as favorite lighting effect,

comfortable temperature and so on.

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