Shutaro Mukai

SEMIOTICS OF COMMUNICATION MEDIA: CONCERNING NEW SUBJECTS OF INDUSTRIAL DESIGN

1. *The Reorganization of Cognition and Semiotics*

One of the most weighty reasons for the fact that semiotics has been regarded as important this far, is due to the fact that the philosophical and academic systems and the conventional social order and values have disintegrated. The same can be said of modern designs which began in the early 20th century, and the disintegration of the philosophy or criteria of the "uniformity of the forms and functions" in modern design can clearly be seen in the present phenomenon of diversification in the designing of products. Due to this, the reorganization of cognition and a new appreciation of paradigm in all fields are requirements and there is no small amount of expectation towards semiotics as a logical measure in dealing with this. This is because it is considered that the key concept, the concept of "sign" will throw light on all the areas of human activities.

What is semiotics, then? Regardless of whether it is materialistic or non-materialistic, all human spiritual activities such as imagination, recognization, thinking and expression depend on some medium, and this medium is referred to in semiotics as "sign." The media or signs that are most significant in human activities can be said to be "language", which is a major medium for communication. Language consists of the phonetic language in the utterance and of the written or letter language in writing. When we communicate, we can use facial expressions or gestures as well as phonetic expressions, and, also, we can use the expressions by means of pictures, the expressions on the screens, and paradigmatic expressions as well as the written expressions. If the former is called "linguistic signs", the latter can be called non-linguistic, non-verbal signs. The concept "sign" contains them all.

Besides, if a product has "a meaning" in our life, the product is considered to be a "sign" which carries information, i.e. meaning. In other words, the product is not just a "thing" but a meaningful sign which conveys information. Semiotics is indeed being directed

towards the grasping of human activities and their products as the problems of "signification" and bringing about a new uniformity of the areas. This is why there exists much expectation with regard to semiotics as a method of reform in the appreciation of the world.

2. *Language and Culture*

In the study of semiotics a great deal of attention is being paid to the field "semiotics of culture," where the structure of a culture or the devices of innovation of a culture are being solved. It presupposes that "a culture is a language." From this viewpoint, language is called a primary model of the structure of a culture and other non-verbal signs such as gestures, pictures, etc.; paradigms, photographs, sound or rhythm are called the secondary model based on the structure of a language. In other words, we have a procedure of analogizing the structure of non-verbal signs by using the primary model based on the structure of a language. Being human beings, we have a different ecology than animals or plants, we cannot live without "a culture." "The culture" can be said to be set up by a language. Therefore, it is not exaggerated to say that a language is the primary model of a culture.

As I will mention later, non-verbal signs, such as facial expressions, gestures, a brief pause in a conversation, paradigms or reflections on TV, or the nature of patterns called "icon" cannot be described on the basis of pattern recognition and cannot be identified with the structure of a language. According to R.L. Gregory, they can be termed "pre-language," most basic in the history of evolution, and they are related to the "object-hypotheses" or the "perceptual hypotheses" which cannot be explained merely by the verbal model. Especially as design activities use many kinds of non-verbal signs, it is not sufficient to depend only on the verbal model, i.e. it is more necessary to study the non-verbal signs as expression media peculiar to design.

However, semiotics is striving to grasp the "unique aspects of signification in each culture." It is also focussing upon uncertain things rather than definite things in the relation of human beings to their culture. There is also a tendency for it to head in a direction of a rich significance rather than an unconditional one, co-existential rather than exclusion, form rather than content, and creativity that exceeds rules rather than creativity that follows

rules; the objective is to break and go beyond the barriers of the narrow limitations of specialization. In this sense, it is worthwhile paying attention to semiotics, because design is considered to be sign phenomena and, moreover, it gives the opportunity of newly reorganizing the so-called "theory of modern design" in the relation to designing.

3. *The Extension of the Significance of "Objects to Be Read" and the Interface*

First, the way of defining "What are designs?" changes greatly if we incorporate the concept of "sign" into the design phenomena. As mentioned above, as "signs" are the media of communication or signification, the products that were the objects of industrial designs were "material subjects to be used or things to be used" up to now, but, if we take a semiotic viewpoint, they become "objects to be read." This means that "things" change into "matters" of cognition, a fact which requires designers to change their mind.

Originally, the phrase "to be read" was used to describe books, but the concept of books must be extended in the field of semiotics. Even daily tools or equipment, cities or their environment become something "to be read", like a book. Conventionally, the fields that involve "objects to be read" in the area of designing have been considered to be graphic designs and visual designs. However, industrial products, interiors, architectures and even cities are objects to be read. Another way of expressing this would be to say that all of these are communication media which convey information or significance.

The fact that "Cities as a Text" or "Reading Tokyo" or something similar is frenquently heard or featured in special articles in magazines recently is the result of semiotic ways of looking at things. "Text" is a word that means some kind of sentence composition that has words tied together, and by overlapping the meaning of textile and texture which have the same roots as the word "text", it is even said that "Cities are textiles of meaning." Here, the change in the concept of modern cities can be seen. The fact that the word "text" with the same etymological origin as "textile" and "texture" has been introduced is considered to be one of the results of anti-modernism, where physical nature of human beings and the

sense of touch are regarded as significant. This means that a rich city as something "to be read" is required in the sense that textile or texture reminds us of close contacts among human beings and also the contacts between man and environment of cities.
Thus, we comprehend that industrial products, posters, interiors, architectures, and cities are regarded as texts, i.e. textile or something to be read. Now, let us consider another important subject, namely the concept "interactive-interface." The relation between man and books is considered as interactive-interface. Therefore, we think of all objects in our living environment as objects to be read, because we seek a rich interactive-interface between man and objects or between man and environment. That means, all of them can be the objects of conversations. Since the computer age has come, the man-machine-interface began to come into question. But it is not just a problem of a dialogue between man and machine. We must think how we can grasp it in the relation between man and all the devices in modern culture, namely, the interactive-interface.
As mentioned above, we accepted "a city as a text" or "a design as a book" and grasped the concept of "interface". In this respect, various meanings of living will be abstracted from the man-machine interface. In various aspects of the way of life, it can be said that a retrograde movement is being observed.

4. *Another View: The Disintegration in the Meaning of Books*
The concept "to be read" is not necessarily peculiar to modern culture. Even before the 20th century, it was quite common to read the symbolic meaning of things such as architectures, tools and equipment in relation to the quality and atmosphere of its shapes, styles or materials. It goes without saying that churches, cathedrals, shrines and Buddhist temples are religious, holy symbols, and even prior to recent times, their meaning was hierarchical, and the difference and borders of the area of their meaning was clearly defined. The difference between a sage and a layman was one of these examples. We could read the difference of the meaning of a farmhouse, a tradesman's house or a samurai house immediately after examining their shapes and styles. The relation between profession and clothing was also another typical example of this kind.
As modern designs, created by the modern machine production process, had the objective of popularization and communization of mass

production products, the meaning structure of the previously existing hierarchical and regional atmosphere have, in effect, been dismantled. Therefore, the present situation in which designed objects are "objects to be read" is significantly different from that of the medieval age. This is closely related to the fact that we are now in an age of communization, urbanization and information. In conjunction with this, let us look at one of the reasons for its uniqueness.

One of these is the disintegration in the meaning of books or the end of books as a form of printed media. Since the invention of the printing machine by Gutenberg, books were the only source of information and enjoyment up to the middle of this century and were available only to a restricted number of well-educated persons, as well as being the thing which formed the basis of the education of such people. Since then, with the development and proliferation of television and other information equipment, society has become more highly educated and books are only one among the many sources of information. Furthermore, with the trend for people to depend less on printed words, magazines etc. have increased their visual content, for instance with photographs and illustrations. In this way, books, information equipment and daily industrial products, cars, posters, stores and cities are all equidistant and without hierarchy. It can be said that they have all become objects to be read in a broad sense by using various senses such as "sight, hearing and touching" some of which are selected depending on the sense of value or the occasion.

It is said that the encyclopeadias published simultaneously by two publishers will be the last encyclopeadias that are in a book format. This is because there are now plans to have this on a data base by computers. Although I believe that books will never become completely extinct,the fact that comics or objet magazines are being increasingly published, on the one hand, seems to reflect the overmaturity of books in their final age. On the other hand, the environment and matters which are regarded as media which carry information have become relative, and it can be said that everything such as cities, cars, cassette recorders, advertisements and even customs have come to be"so-called popular books." With the transition in modern technology from mechanical to electronical technology, the process of precision simulation and reproductive recreation is

accelerated even more, so that this will cause the structure of society to become more uniform in quality. It appears that the recent objet magazines reflect and present the way of life of people who cannot be restricted to such a uniform-quality format. The indication is even advant-garde.
This can be described in semiotic terms as a reflection of consciousness that is suppressed by the technical society of uniform quality or as an action of substitution. To understand this it is necessary that cultural semiotics should incorporate the knowledge of depth-psychology of Freud and Jung, and cultural anthropology etc.

5. *The End of Forms and the Interface*
In connection with books I mentioned briefly the transition to regard the objects of design as "the objects to be read," but I would like to mention another typical phenomenon of industrial design. With the advances in micro-electronics, the objects that are the subjects of industrial designs related to high technology are commonly referred to as "light, thin, short and small," which means that the trend is for things to be smaller, thinner, shaped like a box of uniform quality or contained within an architecture, and they are losing their forms.
This trend has been still more accelerated with the spreading of office automation recently, but the indication was of long standing. When the Exposition of 1967 was held in Montreal, the British pavilion presented the new problem "a box in a box in a box" treated ironically from the point of design esthetics, and also presented the problem of design in the future. The "interactive interface" is a serious problem of design, and before studying computers and the interface it seems necessary to endeavour to solve the problem of the objects of design losing their individual forms.

Industrial designs produce these smaller or thinner objects, and one of the fields called "industrial graphics" has emphasized visual designs of color, graphic elements, etc. It seems that this trend is related to the fact that the objects are getting smaller like a box or thinner like a panel (that is, to convert black boxes as far as possible). However, we cannot grasp these subjects of design or the items of their study only within the scope of "graphic"

design. Consequently, this means that we must consider products as product language and regard this as a new discipline of design.

Studies on the product language in relation to objects like boxes and the interface have not been pursued yet. To mention some examples of the subjects to be studied: a color and sensation texture of "Qualisigns," which support the basis of human communication; the pauses of sound and movable speed; quality of form of details in manipulation buttons which have index capabilities for converting black boxes to glass boxes; details of quality of layouts and structures; quality characteristics of graphic elements as legal signs called "Legisigns", etc. Broader and deeper studies of these subjects are necessary.
However, it is difficult to convey clear and definite meanings by means of texture, color, details of quality etc. Here, another new semiotic subject "design as a code" emerges, which I will describe later.

6. *The Relation between Forms and Functions (or Meanings) - concerning Modern design and Its Code*

In modern design, the significance of design has been comprehended as "function"; however, this view apparently implies that there is an obligatory relation between form and function in the norm that "form follows function." In fact, modern design has sought the uniformity of forms and functions. This, because modern design in those days sought humanity in the machine age, and used living things as organisms for a criterion. It is certain that living things are approximately uniform in forms and functions, and that they follow natural laws and at the same time present mysteries of life. Modern design aimed at the uniformity of such forms and functions as seen in living things and used simplicity and compactness as criteria for beauty. But this is in a sense clearly contradictory. The relation between them not only follows natural laws but also obeys the convention of culture. To say this in another way: modern design established the uniformity of forms and functions in those days by depending on living things as a model. In other words, it can be said that it produced the cultural code as reflection of those days. And so, at that time, such simple plastic art, as though forms were in harmony with functions, was useful

as the only criterion to evaluate beauty.
But this cultural code changed as time went on. If the style of good design of the present day still depends on such a code and does not match the cultural context such as the present-day social situation or our sense of value, it has just become a custom and has continued to exist simply by force of habit. Therefore, when designing we must seize the code of the time and reflect it in the design, and also destroy the older code and formulate a new one. Once American styling was criticized from the European point of view of design, by contrasting it with true design (that is, honest design). However, as the relation between forms and functions (or their significance) is considered to be arbitrary, the criticism is not to the point, because it can be said that the phenomenon called styling was the design-code of the day which reflected American culture. But American styling involved an excessive significance, namely, encoding the exaggeration of significance.
Modern design in Europe, consequently, includes self-contradiction from the very beginning. The contradiction is based on the fact that it resulted originally from the movement of art which set great value on humanism, contrary to the technological civilization, rather than from the rise of industry. From the modern semiotic point of view, art was placed opposite to technology, with the necessity of overcoming the contradiction and unity between them. Living things were considered as a model and matching of forms with functions was used. The code used in such a manner was at the same time an esthetic criterion and an ethical one. In that sense, as contrasted with the state of the spiritual crisis in Europe from the 19th century to the 20th century, it is not appropriate to criticize the modernism without hesitation. The crisis which modern Europe perceived at that time has become one of the common problems in the World now.
However, today, with the realization of the fact that forms and functions should be studied from the standpoint of "significance" and that the relation between a form and its significance should be comprehended as convention of culture, new solutions or paradigmatic researches are indispensable requirements.

7. *The Outside and Inside of the Form: Another Argument*

Another view that comes to mind is the fact that the relation between forms and functions is substituted by the relation between the inner form and the outer form, and also by the relation between the outer layer of the form-or its surface-and the inside of the form. In the technological era in the first half of the 20th century, the treatment of technique of production and new materials was poor. Therefore, for this and other reasons, the outer form was often decided according to the inner technical conditions. That is to say, the background of that period seems to have been another reason to approve the thesis that "Form follows function."

Since the technique of production and technology such as electronics made rapid progress after that, it is not too much to say that at present it has become possible to make every kind of outer form. The structural change in technique revealed spontaneously the fact that there is no obligatory relation between the outer and inner form. On the contrary, it seems that design is in such a critical situation that it is impossible to find out what the concept and the criterion of the form should be based on. Ironically, when the fact that the form can be free turned out to be evident, even the outer form is disappearing.

As far as the objects of design are considered from the view point of technology, and especially the relation with information equipment, the fact that design of the outer layer or the surface has become an independent subject, is clear. However, it is considered that, whatever object it may be, we have come in contact with the object via the surface of the form. In this sense, human culture was built up by the expression of form, or the surface of form. It is worth while noting that while information equipment and the like are heading towards the use of the uniform surface, the desire to use various forms and surfaces has burst forth in the design domains of the primitive tools and those related to manners and customs.

8. *The Form (or the Surface) and the Code*

In industrial design there has been a tendency toward regarding design of information equipment such as records, tape recorders, television sets, computers, etc. to be the same as tools or utensils, such as chairs, coffee cups, or spoons; it is, however, reasonable to consider that the designs for the former originated from the

relation to "books" in order to relate this with the problems pointed out earlier. This, because the problem of the surface of these things has a closer relationship to the theory of the code to read the face of them.
The way how to use the product is the subject of the code. Therefore, in order to manifest the functions, it is necessary to discover the codes which are latent in a specific society or human behavior, and also to discover or formulate the codes which can be acquired easily from learning. At the beginning of the 1960's, from the standpoint of semiotics and information esthetics, Max Bense advocated the necessity of instructing students of semiotic design who are well asquainted with both graphic and industrial design and who would solve the problems of design language from the middle viewpoint between both. As a matter of fact, such a man of talent would be requisite to the solution of the problems regarding "interactive interface."

9. *Context as "Interface"*
In the rooms of European hotels, pottery vessels like a big dish are often put in the bedside cabinets. This is a kind of a chamber pot to be used at night. There exists a story that a Japanese traveler used that kind of pot as a dish because he understood that the hotel did him a favour, e.g. he interpreted it as a dish on account of the codes in his own culture. In this case, as mentioned above, a dish can be regarded not as an "object" but as a "matter." A "matter" was referred to as a correlative concept in section 3. Even if a chamber pot looked like a dish, the meaning of such a shape develops from the network of meanings from the culture of the country and the position, that is, the bedside. Such conditions as the network of meanings can be referred to semiotically as "contexts."

The linguistic usage of "context" is referred to as "the environment of meanings" where a word as a unit of a dictionary meaning is used as a real word with a meaning according to the situation or environment of the word in the sentence. For instance, if a man said to a woman, "I love you," and if the man often said so only when he wanted to beg her for money, the context of the phrase used between them does not mean friendliness or a declaration of love as the dictionary usually indicates.

The same is true in the plastic language. In the dictionary (for instance, in the Munsell Color System) the same red colors look different in relation to the other juxtaposed colors and the ratio of the area of the color. This depends on the interaction of colors called simultaneous contrast or assimilation of colors. The designers are very familiar with them and they make good use of the effect. We call this variable meaning in the context situational or contextual meaning.

The relationship of these contexts with design must be considered. Contexts at various levels - physiological perceptive level such as colors, structural level such as manipulation buttons or the service areas for instruments, combination level of instruments and the peripheral, environmental level of the use of machines, environmental level of the office equipped with these machines, the sense of value of the users or cultural environment of the period etc. - are classified into a multiplicity of categories to the objects and their background.

Recently, in the sphere of industrial design, the fact that not only the relationship between man and objects, but also the relationship with the peripheral environment have attracted much attention is related to the consideration of the related matters. It is a fact that the context must be comprehended as the environment of the development of meaning: the so-called "interface." As described earlier, the contexts of design objects can be classified into a multiplicity of categories. Therefore, I would like to extend the concept of "interface" and am endeavouring to structuralize the interface such as "aspect of time," "the environment of usage," etc. in correspondence with each context.

10. *Design Process as an Encoding Process*

Design process has been considered so far with the relation of signification to objects or environment. It should be stressed that designing and its process can be considered as the very process of good encoding. This is implied in the word "design" composed of "de" plus "sign." Originally "sign" means "characteristic, nature, scope, difference, distinction" etc. and, on the other hand, "de" is a prefix which means "to complete, define, specify" etc. Therefore, it could be said that etymologically "design" means "to define characteristics or properties" or "to make clear the scope of

distinction." If so, a design process is a kind of semiotic process or semiosis just like language.

In design processes, when we randomly look at what kind of sign expressions are used, it can be seen that we use a great number of groups of signs such as research data, product plans, flow charts, concept drawings, check lists, modular coordination, rough-sketches, idea-sketches, drawings, clay-models, rendering, presentation-models, trial models for actual things, etc. These various sign-groups were not listed according to the proper order of the design process, but, between the designer and these signs, there is a process of sign generating by an interaction called signification.

For example, if a designer decodes the sign media of a product plan document and expresses schematically a design concept of the general framework of a direction in a design on ideas of what kind of design concepts will be proposed, this means that a new sign expression is created by the schematical expression of a design concept by the interaction of the plan document and the designer, who is its recipient. In this way, designing is the process of generating signs, where the non-existent subjects are revealed consecutively by various sign expressions and made into concrete objects.

In the case of the interaction of signification between the designer and the various groups of signs, the images in the designer's mind, the tendency of its interpretation and the interpretation itself are referred to in the semiotic theory of C.S. Peirce as a "sign" called "interpretant." The design process is a chain-reaction of the designer, the various groups of signs and the generation of the signs. The designer, in every case, uses sign expressions to review the meaning of those signs, and this can be said to be a process where the profiles of the indicated subjects of the signs are revealed consecutively.

If the design process is understood from a semiotic viewpoint as a process of generating signs, with the exception of the sign process of touching a three-dimensional model by hand or checking the actual model physically, all other processes can be substituted with the sign generating process of designs by communicating with a computer. The above mentioned groups of signs can be categorized by applying semiotic concepts based on each of their individual natures or functions.

While industrial designs are losing their individual forms, the

subject of industrial design is shifting from the solution of the problems of the interface between man and machines like a panel or a box, to the problems of the "interactive interface" with computers. Simultaneously, this means that they are shifting from the designs for "objects" to a communication design in a broad sense (containing the concept of environment). The objectives of interface design can be the intersection of ergonomic design and semiotic design. The main object of semiotic design is to reorganize qualities of so-called non-verbal, semiotic information, such as colors, forms, diagrams, textures, light, space, time, rhythm, sound etc., which have been called plastic language, and to study non-verbal, semantic information, such as human gestures or acts.

To achieve an interactive communication with computers, it is desirable for the computer to be centered upon human qualities in the interface of man and machine with the synchronization of non-verbal, semantic quality information, such as pauses, rhythm, etc. Even so, as there is a further loss of meaning interaction with reality, it is necessary to formulate the broader concept of interface, which is not restricted only to the concept of the interface of man and machine. Though it is not possible to discuss this matter further in detail, we are confronted with the problem of semiotics in a broad sense, which can decode how the human mind or culture works, and the problem of creativity.

11. *"Interface" and Creativity*

In the quality of the communication between humans and computers, Aaron Marcus asserts that with computers there exist three faces: the "outerfaces" (presentation display), the "interfaces" (commands and documentation), and the "innerfaces" (programming and maintenance).

As a matter of fact, though this proposition is interesting and important, I think that the neighborly relations among machines and among humans and their surroundings are still important. In this sense, I would like to introduce the concepts of the "neighborfaces" and the "surroundingfaces" as one of the "interfaces" in a broad sense.

Not only the exchange of words, but also non-verbal information such as facial expressions and gestures serve well for communication in our conversation. The hearer tries not only to understand the

meaning of the words articulated by the speaker, but also to grasp the meaning of facial expressions or gestures. On the contrary, there is a case where it is possible to understand the speaker's intention or feeling only by facial expressions. This leads to the fact that imagination plays an important role for mutual understanding of the conversation. Even if the persons used the same word mutually, the meaning of the word used by the two men would not always be equivalent. The scope of the usage of the words used by one person are not the same as that of the words used by others, but the scope of the meaning overlaps with a little difference dependent on men and the difference in the scope always arises and changes.

Because of this, we must read the facial expression or gestures as well as the meaning of the utterance, but language is not perfect as a medium of expression as is said in a proverb that "Least said, soonest mended." It must be considered that in order to make up for the imperfection of language, humans are perhaps endowed by nature with the talent of lively "imagination" and that we are preparing for the opportunity to use our human capacity of creativity. More imagination than necessary sometimes leads to misunderstandings, and if it is abnormal it even leads to delusions. Therefore, it is well known that imagination can be said to be a source of human creativity.

From a viewpoint of information esthetics, such a quality of communication is comprehended as the phenomenon of the existence of "noise" or the "fluctuation" of meaning. At the present time, in theoretical physics seen in the theory of "Self-organization through Synergetics" by H. Haken or in the theory of "Self-organization in Nonequilibrium System-from Dissipative Structures to Order through Fluctuation" by I. Prigogine, it is clarified that a new meaningful source called "creation" consists of this "noise" or "fluctuation." This means that the fact that human beings live together, and also the fact that we human beings try to express the meaning of our living as individuals, depends on the fact that language is imperfect as a communication medium. On the contrary, the imperfection of language is the very evidence of our living as individuals. Furthermore, according to the view on modern life science developed by the theories based on Haken and Prigogine, it is considered that in the noise or "fluctuation" there is a source of self-organization

to attain both life and material. Children are certainly the copies of their parents but they are not exactly the same as their parents though they resemble their parents to a certain extent. That is, they can be considered to be new-born personalities. That is why such an organization of order or a new source of meaning is kept transmitted and decoded in spite of continual "fluctuation" of gene information.

Because of the fact that conversation between living men is always alive, there exists an interactive "fluctuation." If there is a source of creation or a new meaning, how can we carry out such a conversation with computers?

Though it was mentioned earlier that the tendency of interpretation in the mind of the recipients who decode signs is a sign called interpretant, it is needless to say that it is man who decides which interpretants,can be expected by way of emotional and dynamic fluctuation. In the design process where the designer draws sketches by himself and performs designing following conversation with others, a source of "fluctuation" mentioned above and dynamic process in response to reciprocal, interactive interpretants are assured. In the case of a conversation with computers, however, a response to men is a response dependent on programs, but it is not a response to a sign called dynamic interpretants through fluctuation.

In that sense, my submission is that not only a communication of a person with a computer but also stratified communication - such as interface communication of some persons with some media with various expressions (such as computers, videos etc.) and a reciprocal conversation among men - are important. Therefore, the concepts of "neighborfaces" and "surroundingfaces" were presented before. The significance of surroundings as a work station must be stressed. In other words, it is necessary to consider a work station in the future to be a stage of so-called design activities which have opportunities to give various performances.

Finally, in the case of computers,it is possible to simulate noise or fluctuation by using random sampling numbers or the fluctual theory, but on the other hand I would like to remind my readers of the recognition that the principles of computers come from the pursuit of the exact identification of meaning and form eliminating fluctuation based on human living. The way to comprehend this is

fundamentally a great presupposition of a new objective in design. From the viewpoint peculiar to design which does not follow the structural change of machines conducted by technology but is controlled by man, there lies a reason to approach another problem regarding machines, their surroundings and what individuals and groups should be.

There it will become evident that the way to comprehend human level including the problem of human mind in a broad sense, and the way to evaluate them are the main objectives of design in the future.

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