A Study on Building Surface Design using Smart Technology

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Abstract: Since the Industrial Revolution, with the development of technology, the skin and surface design in architecture has been separated from a main body as various architectural materials appeared either and formulated its unique characteristics and fields. This study is intended to examine the possibility of a smart building surface to develop the next generation technology by applying smart technology.

That is a normative alternative in the future, in a situation that the expression of skin and surface design, as an interface to be expanded since the advent of digital media era, may not reach the limit of design, based on the expression of the skin and surface design experimented by the recognition of architects together with the separation from the main body and the structure from the progress of technology.

1. Introduction

With the introduction of mass media in the 1960s, machine-led era when changes are driven by the development of machines was put to end. Following the Industrial revolution which put a top priority to the value of hardware, information revolution has started to emerge. Architecture, sensitive to mechanical progress, technical development has led main style in a period by changing structures and patterns of architecture. Information generated by media has separated structure and surface, allowing them evolve into its own individual area. As the surface of a building takes up its own functions and forms regardless of those of inside of a building, the representation becomes varied with new materials and digital media. Unlike one directional mass media, digital media what is called "new media", is defined as a media which mediates interaction between a sender and receiver. The reason such media can be implemented on a surface of a structure is that the fact that interaction is not limited to human beings, an aesthetic form using new media brought about a shift in perspectives towards technology by changing sensibilities of humans. As a result, some people started to view surrounding environment as a text and symbol. Due to industrial development, concrete and steel frequently used in the building surface gave way to a transparent glass screen and an advertisement took the place of such materials. Going further, smart technology offers an opportunity to implement intellectual surface based two-way interface and pursue non materialism of surface of a building. The paper attempts to open the way to implementing an intellectual surface using smart technology.

2. Characteristics of Smart Surface

The emergence of digital media has changed the surface of buildings from one-directional "facade" to two-directional "interface" which has both continuity and non-continuity between internal and external spaces. Such interface functions as an interface among multiple layers and entities such as different spaces, functions and users and external surface that produce information provided by interaction among different elements. An intelligent surface of a building of which recognition type has extended to such interface can be affected by tension generated from different layers and the types of surfaces can be varied depending on how you define the layers.

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3. Architectural inference from smart technology

According to a definition and concept of smart technology, the target of smart technology aims to implement can be represented in a keyword such as Calm, Anywhere, Interactive, Tangible. In regards to such target of smart technology, diachronic concept needs to be defined and how such technology is applied to architecture. This chapter delves into research and implementation case studies and analyzes factors related to architecture based on the following four technical implementation targets.

① Calm
A) Disappearing Computing Initiative
As part of European Union's Information Society Technologies (IST) Programme since 2001, Disappearing Computing Initiative started to help and improve people's life by embedding information and technologies in daily objects and environment. In other words, smart technology enables us to create new opportunities and services by planting a sensor, driver and processor in a objects we use in a daily life, which autonomously recognizes each other via wireless communication.
B) Smart Dust Project
- It means "intellectual dust". The project aims to figure out as to whether to embed automatic sensor or communication function to m³-sized finest dust and link to a wider sensor network.

② Anywhere
- Oxygen Project: This project enables us to use human-oriented computers via network anywhere and directly handle human's requirements. This project aims to investigate various interfaces which enable us to use a computing environment freely anywhere just like electric socket or oxygen.

③ Interactive
A) Easy Living Project: Easy living Project is based on ubiquitous strategy of Microsoft pursue. The project aims to create the most user convenient space for human beings by combining physical space, electronic sensing, world modeling space and distributing computing system.
B) Things That Think: The ultimate goal of the project is to make computers more intelligent to meet the needs of people by equipping computers with more delicate functions.

④ Tangible
- Ubiquitous Interface
The environment implemented by "Ubiquitous Interface-Smart Technology" requires 3-dimensional interface and thus output devices include 3-dimensional hologram, beyond 2-dimension. In the environment of ubiquitous interface, the output device is not limited to one device.

4. Implementation and technology of smart surface using smart technology
The surface of an intellectual building implemented by smart technology can be analyzed and inferred by identifying metaphor and features of various surfaces in life such as the skin of a human body and clothes and so on and analyzing those based on the design features of the surface of an intellectual building. The surface of an intellectual building implemented the interface can be affected by tension generated from between different layers. The types of surfaces can be varied depending on how you define the layers and thus relevant technology is needed. Smart technology functioned and implemented between human beings and environment consists of five core elements as follows. The elements or functions among those elements are performed functioning with based technology.

5. Conclusion
The surface of a building has been separated from the structure of the building ever since the emergence of modernism and developed on its own. With smart technology, facade has changed into interface. Study about smart technology at current point will be limited to concept, directions and research and implementation case studies. However, we can infer attributes and theories internally reside in which can be used in intelligent surface with interface. In order to implement in reality, developments are needed to express new requirements and more active interaction based on extracted design features is essential.

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