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Usability: Improving UI/UX in Design by challenges of Materials Innovations

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Abstract:

When people use interactive products, the first thing they interact with is the user interface. UI/UX is always designed considering the cognitive responses and behavioral patterns of users. However, research on the evolution of UI-User Interface and UX-User Experience still has many limitations related to the diversity of materials used, as well as its production technology. In this research, we will discuss the design of industrial products and user interfaces, their evolution from traditional forms, and the application of multiple improvements to it until reaching an attractive dynamic form, which we find on the smartphones' screen, and afterwards reaching the stage of intelligent systems capable of analyzing data through cognitive interactions. We will also study the direct relationship between the development of material production, that are used in the manufacturing processes of smart and interactive products, and the improvement of user experiences which has a great impact on enhancing the use of these products significantly. The diversity of materials and their development provides the designers with many alternatives that they can choose among them to implement the different parts of the product. And on this basis, the presence and diversity of materials is the first determinant of implementing the designer's innovations, and their presence within a specific product as a real and tangible reality, and there are still many future products and systems that will not appear except with emergence of other advanced materials; Then the search process for and improvement of new materials is a combined scientific and engineering endeavor. **Background and problem:** The designer always works to facilitate the interaction procedures between the user and the product, by creating a cognitive scenario that acts as a lexicon for the communication between the user and the product, and in this case, it is called the user interface (UI). The interactive products and their traditional ones have the user interface directly correlated to the evolution of materials and the emergence of new ones including improvements to user interfaces based on the evolution and availability of materials within products. Through this, the research problem is limited to the inadequacy of the designers to keep up with the material production technology, and the designers' familiarity with the characteristics of the materials they need within the product design and development process. This is due to the scarcity of exploratory research that introduces the designer to what is new in the engineering of materials developed in the field of design, and the lack of innovative materials to introduce new creative additions within interactive products and make them more fun and attractive. **Objectives:** In light of the tremendous development of the product design process and the shift towards interactivity, the research aims to increase the awareness of the industrial and interactive designer of the revolutionary development in materials science and engineering, and the extent to which new materials innovations affect the flexibility of designing more efficient interactive products, by making improvements to the user interface/user experience UI/UX, and providing the user with fun and effective interaction experience, which represents a major challenge for the industrial and interactive designer, who in turn aspire to provide advanced improvements in user interfaces during the process of direct interaction with products/systems, to achieve maximum product usage efficiency and enhance the utilization factor. **Significance:** Demonstration of the importance of materials found in nature as the first engine of human creativity, by providing innovative and unusual solutions for the development of tools, equipment, and systems in parallel with the discovery of new materials throughout human history, as well as the subsequent evolution of materials science and engineering through the four industrial revolutions, and the creation of new laboratory-produced materials used to conduct effective improvements to the user interface/user experience UI/UX, and to provide the interactive products with a new aesthetic measure through the developments of available materials. This supports the designer decisions in reaching innovative materials that fit the parts of the product to be designed and provides solutions and functional treatments for user interaction interfaces and achieve sustainability element of products in general. **Methodology:** The research relied on the inductive approach to study the problem, achieve the research hypothesis, and indicate its importance. **Major results:** The materials found in nature are the first engine of human creativity throughout history, and all human innovations were inspired by nature, such as the forms of external structures and the functions of components and internal parts as well, and they are produced from existing materials discovered, mixed, or manufactured. The research discussed the impact of the development of materials science and engineering on the development of products and their transformation towards interactive, including the orientation towards the future in the availability of alternatives and available standards in the problems of choosing and availability of materials, and there is still a need to enhance the ability of methods for selecting appropriate materials for design based on available characteristics or that can be manufactured. Materials play an important role in the product design process of their various forms, that is, the basic features and characteristics of materials determine the nature of the product or may limit the tasks because the products were found to achieve some performance objectives, which are determined by considering the design specifications in terms of choosing the most appropriate materials for these processes. The design field needs a lot of focus on the importance of physical modeling tests, as it is the first factor in evaluating materials and their suitability within the parts of the designed product, which will allow designers to be able to easily evaluate different materials, and compare them with different characteristics, performance indicators and costs simultaneously. Keeping pace of the latest technologies of materials science and engineering enriches the design process of interactive and future products, creates products characterized by attractive, dynamic shapes, and enriches the quality of life in general, because the examination and testing of materials is a prerequisite for the final testing stage of the actual production model. It may be possible in future versions of interactive product design and development processes to have software programs and tools to simulate and to test materials realistically, and they are integrated with the design, taking into account the role of choosing materials in the current design simultaneously within the simulation of physical tests for materials and products.

Keywords:

Interaction Design, Interactive Ergonomics, User Interface, User eXperience, Usability, Materials Science

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