

Designing an adjustable electricity extension plug board to enhance the concept of Usability

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Abstract:

The research discusses how to design the multi-input electricity extension plug board, known locally as the electrical connection panel, which is one of the most important products or simple tools that people rely on in their daily lives, and it is indispensable in connecting electrical-powered device. However, sometimes these products may be the most dangerous If its manufacturing's quality is neglected or misused especially these types of products are found in all homes, companies, and institutions. The research aims to redesign the conventional electrical plug-in board based on identifying the deficiencies of the traditional product common among users.

The study made it possible to identify the potential risks that occur because of faulty design and poor product materials, thereby re-designing an adjustable multi-entrance electricity extension plug board that takes into account the proposed solutions for a safe and effective design. The researchers also provide different design solutions that suit the interaction environment and periodic maintenance of the product, which makes it suitable for the process of human use and promotes the concept of usability of products which makes the work environment less stressful and more enjoyable.

Keywords:

Ergonomics, Usability, , Domestic Appliances•Electricity plug board

Introduction:

Ergonomics is a precise scientific discipline directly related to understanding the interactions between humans and other elements or systems (Dawood, 2017), and it is the science that applies theories, principles, and information in order to improve human well-being and the overall performance of the system within the work environment (IEA, 2019). Ergonomics is about planning, designing, and evaluating tasks, functions, products, environments, and systems to make them compatible with human needs, capabilities, limitations, and limitations, and to improve the quality of life in general (Stensland, 2020), which enriches our daily lives.

There are many daily interactions that humans usually conduct with various products within work environments (Dawood, 2021a), including those that operate with electricity such as various household products, electronic devices, battery-powered products and other necessary products within the framework of daily life (Walport, 2016). Many times the user may be

unaware of the deficiencies that he may encounter during interactions that he experiences over and over again when using electrically powered products and devices (Hunter, 2021), but the actual deficiencies that may expose the user to face direct danger from electricity, such as those in The direct connection product of this type of power to the devices to be operated.

The search does not target a specific user category; The electrical connection board interacts with most people in their normal daily lives, and it is used with many products that operate on electric energy. Therefore, the main goal in this research is to redesign the electrical board with multiple entrances in an innovative way, taking into account the factors of efficiency, effectiveness and achieving safety from Through the selection of materials and the general shape of the design to be of a low cost; The research presents the proposed solution in the form of an industrial product as an output resulting from the design solutions that have been applied and tested, and the research contributes to the process of upgrading the concept of usability for such types of products, and we have shown that through simple measures it can improve the quality of life.

Statement of the problem:

The multi-input electrical connection board has become a necessary product in different work environments, and from here the research problem is represented in the low quality of the manufactured electrical connection board, and this happens as a result of the deficiencies in the design and development processes, and there are many outstanding issues related to the use of this type of product, The most important of which is that the user often encounters shortcomings within the work environment, and it is related to the scarcity of sufficient electrical outlets or sockets around the user and outlets compatible with his products that he interacts with, and this scarcity does not suit our current daily products that all operate on electric power or batteries, And the user is then forced to permanently use a multi-input electrical connection board, bearing in mind that the current electricity subscriber supports only specific types of entrances as well as a limited number of energy distribution points, in addition to that it is not safe in a large percentage due to the low quality of the materials and raw materials used. In the design and manufacturing processes, which may result in many serious problems.

Research Hypothesis: Hypothesis

By taking advantage of the ready-made tools and elements that are used for household electrical sockets installed in the walls, and then employing them within the design of a multi-inlet and adjustable electrical connection board, using the remnants of the remaining raw materials such as A-cured thermosetting polymer panels or Acrylonitrile butadiene styrene (ABS).) Being strong and durable and compatible with many manufacturing processes in designing the external structure of the product to be achieved; This would provide a multi-input electrical joint product that is adjustable, and it provides various outlets for the distribution of electrical energy that is compatible with the nature of the products that surround the user, and this enhances the concept of usability in general within normal work environments such as offices, meeting room tables, and other work environments that need a lot of availability electrical power distribution outlets.

Objective search:

The research aims to innovate the design of a multi-input electrical connection panel that is adjustable according to the requirements and needs of the user, by examining the negative aspects of the already existing product, and identifying the existing deficiencies that appear during interaction with the product, especially since it is among the products whose use is not limited to a specific category, but rather Humans use it continuously in most of the current interaction environments, and the product was designed to be adjustable to the possibility of adapting its operational procedures according to the user's needs in terms of the forms of electrical distribution outlets inside the product, and thus achieving a tangible improvement in the specifications of the proposed product within that category of auxiliary products.

Significance of Research:

Designing an electrical connection panel with multiple entrances and adjustable according to the need, including the availability of various outlets for the safe distribution of electrical energy, to supply various products that are within the scope of the user's work environment, as well as providing the user's usual work environment such as offices, meeting tables, and others in which users need electrical distribution outlets with a product Innovative multi-input electrical connection board, reducing the risks and stresses that the user may be exposed to as a result of his many movements in the work environment to connect the various products with electricity, as well as reducing the expected economic cost as a result of the design and manufacture of this type of auxiliary products, among which the research was able to help in promoting the concept of usability within Different work environments that have a variety of products need electrical power distribution outlets.

Results:

The research reached the design of a multi-inlet electrical connection board that can be modified according to the need, and supports many different shapes of electrical sockets that are found in the socket connections of industrial products.

The research was able to re-design the general structure of the electricity subscriber to make it adjustable at any time, and the user can define his needs for the product, as well as the forms of electrical power distribution points that he needs - customized design and user needs - according to the products available to him within his usual daily work environment.

Enhancing the concept of usability of the work environment, by providing a multi-input and adjustable electrical connection board, and showing an objective description of the reality of the interaction environment and its various elements, in which the user is usually inside while using various industrial and technological products, so that the product fits with the requirements and special needs of the user.

Reducing risks such as exhaustion, stress, and repetitive stress, to which the user may be exposed during direct interactions with products that operate on electrical energy directly within the work environment, by providing a product that has electrical distribution outlets of various shapes, to meet the requirements and needs of the user.

Providing a relatively high-quality electrical connector to what is available in the market, consisting of simple ores using the remnants of the remaining raw materials panels such as A cured thermosetting polymer or Acrylonitrile butadiene styrene (ABS) being strong, durable

and compatible with many manufacturing processes in Designing the external structure of the product to be achieved, after conducting simple manufacturing operations on it, since those types of raw materials used are relatively solid and are not easily affected by heat.

The research was able to address the problem of periodic maintenance, which is one of the most important requirements of the user in such types of necessary products, and it is possible to maintain the electrical connection board designed by considering that each unit of electricity distribution units and outlets is separate and independent from the rest of the product, unlike the traditional electrical subscriber.

The research was able to append some functional additions that the user may need, such as the lighting unit and phone charging, and demonstrate the possibility of integrating the multi-input electrical connection board into many related products, and works mainly on electrical energy.

Conclusion:

The quality of the products remains one of the important matters related to the extent of development of the concept of usability and the statement of user satisfaction, and many users suffer while interacting with these types of necessary products within the daily work environment, and after our lifestyles changed depending on electrical energy in all matters of our lives, the electrical connection board became Multi-input is one of the most important auxiliary products that are used daily on a regular basis. In this research paper, the deficiencies in the locally common traditional product were identified, and the sources of risks that may occur, including the presentation of a proposed design for a multi-input electrical panel product, and it is adjustable according to need user, depending on the multiplicity of personal products and their different socket shapes; Moreover, some other functional options have been added according to the desires and needs of the user, such as the phone charging feature, the wireless charger for smart phones, and a lighting unit as well. Concept of usability of products.

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