Redesigning Power Strip With Case Study: Security Information Use Of Products

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Abstract TThere are 212 cases of fire from 2015-2018 that have occurred by electricity failure in Bandung City, those failures happen because of power strip misused by users. The power strip has a certain maximum electric current input from electric devices, misused happen when the electric devices that connect have exceeded the electrical current of the power strip. This situation can cause a fire because of the power strip overheat. From 50 user 68% of users do not know the maximum electric current that can be delivered by a certain power strip and 32% of users knowing the maximum electric current but do not know how to use it for everyday use. These research aims are to redesign security of use certain power strip, focus on user habit and user interface information.

Keywords Product Development, Power Strip, Security of Use

1. Introduction

The fires in the city of Bandung itself caused by electricity there are 212 cases of fires that occurred from 2015 2018. In electrical cases fires occur in home electrical installation products, namely extension outlets whose use is misused, which is caused by information about products that are still lacking understood by users. The result of 50 users of extension outlets is 68% who do not know the maximum information on the current that can be delivered by extension outlets and 32% know the maximum current information contained in extension outlets.

However, there is a lack of understanding of the users on the information so that there is an abuse of extension outlets where there is often a buildup of plugs and exceeding the current that can be delivered by extension outlets. This causes two negative impacts that harm users and products, namely high resistance connection and excessive low where these two negative impacts can cause a fire. This buildup provokes a process of high resistance connection which is an event when the connection of an electronic device is not properly connected which makes he delivered electric current blocked and causes excessive heat and sparks. Stacking can also pass through the maximum current that can be delivered to this extension socket, where two negative impacts from this buildup can cause a fire.

This starts from understanding information that is not absorbed by the user and is accustomed to making unknown mistakes and the habit is a series of actions done repeatedly for the same thing and takes place without a process of thinking again (Siagian, 2012) . According to the Basic Regulation of the Minister of Energy and Mineral Resources Regulation No.4 of 2009 concerning the Rules for the Distribution of Electric Power. The home electricity limit set for the electrical installation current is not less than 50 V and not more than 440 V or not exceeding 32 Amp so that the electrical installation device is set to take the midpoint of 10/16 Amp and the voltage is 220/240 V which is effective measure. However, extension outlets are designed for use in homes and their temporary use and are destined to connect electronic devices whose current is weak and not demolished as the main supplier of electronic devices due to heavy currents.

Based on the background explanation above, problems can be identified as follows:

1. Out of 50 user respondents extension outlets 68% do not know the maximum current that can be delivered by extension outlets and 32% know the maximum current of extension outlets.
2. Information already exists but there are still many who do not see the information printed on extension outlets.

Based on the identification of the problems above, conclusions can be drawn as follows:

1. How to redesign extension outlets that can apply information that is easy to understand and easily seen by users?
2. How can the information applied or delivered through the extension socket redesign be understood by the user?

From the explanation above, the boundaries of the problems obtained are as follows:

1. Research and design of the extension socket is carried out based on the application of the right information on the socket to the user in using the extension socket.
2. The design of the extension socket is adjusted to the data, theory, and product comparison analysis of the extension socket.

Referring to the formulation of the problem, the objectives of this design are as follows:

1. General Purpose
   Product design science can be used as a reference for making products that are beneficial to the community in solving the problems raised in the product extension socket.
2. Special Objectives
   Can design extension sockets which include developments in the application of security information and effective and efficient functions that are tailored to the needs of users.

2. Term of Reference (T.O.R)

Based on the redesigned extension socket analysis, T.O.R (tram of reference) will be created a Design demands (design requirement) as follow:

a. The extension socket designed must refer to applying 10 user interface principles and 3 usability comlex information system characteristics.
b. Extension outlets designed to focus on implementing systems, security and information related to electric current.
c. Extension outlets designed for use in homes.
d. Designated stopstones that do not change existing components except those related to current which are as follows:

   - Information - Current Components / Indicators
   - Safety of using Flow
   - Flow Safety System

3. Design Concept

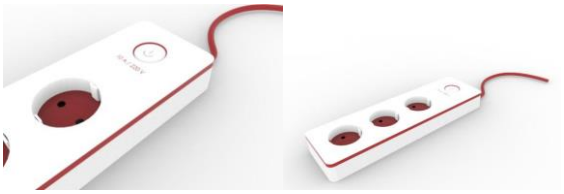
The design concept is the stage and process stages in a design, where this concept is used as a reference design to be designed.

3.1 Scamper

The Scamper method is done to find solutions and develop designs reset the Extension socket to find the design
conclusion.

1) Substitute:

1. Replace the current switch with the current switch system push on / off
2. Replace the shape of the toggle button into a curved circle inside.
3. Replace the right and left edges of the led lamp connected to the on / off button
4. Change the location of the current information behind to be located on the front.



Picture 1 Substitut Sketch

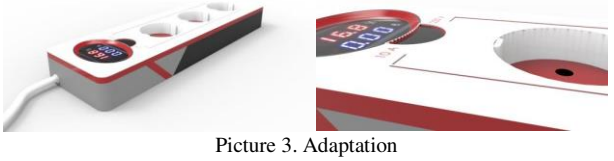
2) Combine:

1. Combining Flow Information with current guidelines.
2. Combine AmperMeter with the on / off button
3. Combine the led lights with the on / off button lights
4. Combining white and red on the product
5. Combining the impression of modern and firm with principles of UI, Consistency, Simpliticty, and Familiarization

Picture 2. Combine Sketch

3) Adapt (Adjust):

1. Adapt the clear line on the hexagonal shape to be applied to the right and left side led lights.
2. Adapting the circuit breaker system to the main breaker will be applied to the on / off button as an automatic circuit breaker sub-breaker.
3. Adapting the lines and soft shapes that will be applied to the form:
   Button - Shape - Flow Information - Ampere Meter
4. Adapting various UI principles What you see is what you get
5. Adaptation of buttons from the iPhone 6 trackpad



Picture 3. Adaptation

4) Modify:

1. 1.Modifications The shape of the ampere meter is a modern impression and a firm impression.
2. 2.Modify the current instructions in the form of colors and lines to make it appear firm, modern and soft.
3. 3.Modification of product shape becomes larger and current information forms add font size to 12
4. 4.Modify the ampere meter by applying 2 principles of the User interface in the form of Simpilitcy and easy to learning
5. 5.Modifying the combined shape of the on / off button and ampere meter becomes more modern and soft
6. 6.Modify the switch with a current breaker (circuit breaker) when getting excess current and will be inactive after getting a certain amount of temperature of 90C ^

Picture 4. Modification Sketch

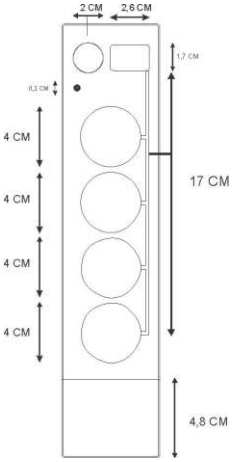
4. Product Visualization

4.1 System Blocking

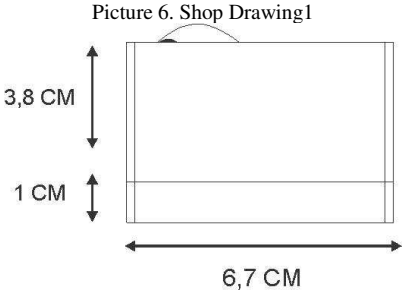
Picture 5. Component Blocking

4.2 Technical Drawings

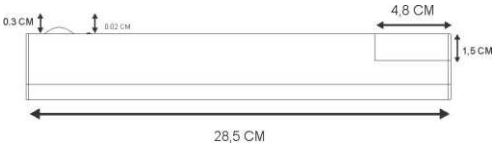
Technical Drawings are detailed size images of the designed design. Which includes from the top, front, left side and bottom view, as follows:



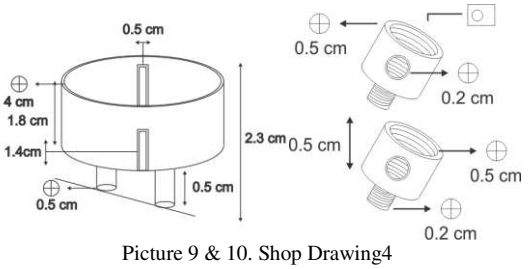
Picture 6. Shop Drawing1



Picture 7. Shop Drawing2

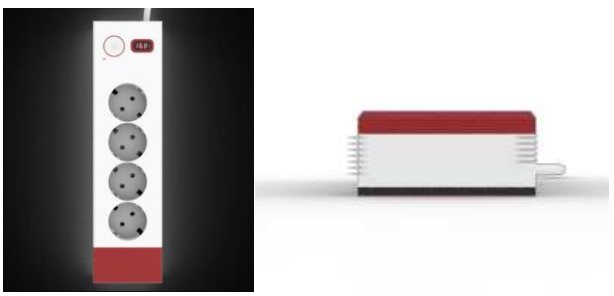


Picture 8. Shop Drawing3



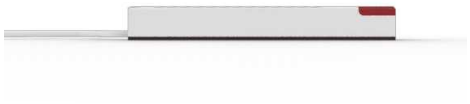
Picture 9 & 10. Shop Drawing4

4.3 Final Sketches



Picture 11. Final Sketch 1

Picture 12. Final Sketch 2



Picture 13. Final Sketch 3

Picture 14 Final Sketch 4

6. Conclusion

Based on the results and discussion of the design issues in the previous chapter about redesigning the extension socket, it can be concluded:

1. Designing an extension socket is done to review the product in terms of current information and current safety.
2. Redesigning the extension socket follows the literature data and UI principles as well as UX usability characteristics
3. Redesigning the extension outlet is done by paying attention to the user in using the product and paying attention to product safety.
4. The results of the study prove the need for UI and UX approaches to users to find out the advantages and disadvantages of a product, so they can find out the advantages and disadvantages when using the product.
5. And from the results of this study indicate that the UI Principles and UX Characters can be incorporated into the product design to be able to better understand user problems. This indicates that the use of products by users is good based on the user's knowledge and user experience.

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