Review Article

Internet of Things (IoT) Product Design and Modeling Amikom Purwokerto Hand Sanitizer (AMPUH)

Alif Yahya Syafa'at[1], Hasri Akbar Awal Rozaq[2], Trisna Maulida[3], Agnis Nur Afa Zumaroh[4], Rona Sepri Ananda[5], Imam Tahyudin[6]*

[1,2,3,4,5,6] Informatics Engineering, Amikom Purwokerto University
* Corresponding author: imam.tahyudin@amikompurwokerto.ac.id

Abstract:

In previous research, an automatic hand sanitizer prototype tool was made to prevent COVID-19. The product design in this research is quite complicated and too large. Then, in other studies, a prototype tool has also been made to measure body temperature. The study also had an inefficient prototype design. So, it can be concluded that no product design model is efficient, simple, and has its charm. In this research, the concept design method consists of several stages: planning, measurement, design, and implementation. To identify the production needs that will be used in making AMPUH product design, researchers carry out measurement stages based on a schematic series (Schematic) of the product to be made. AMPUH product designs are made with shapes and models that have been adapted to their components without reducing the aesthetic value, compatibility, complexity, and design applicability. The advantage of this product design is that it always looks at the compatibility with the components that will be installed in it so that it is certain that both in terms of form and function will work well. The drawback of this product design may still leave a little free space in it to minimize the remaining free space and repair.

Keywords: Design Product, IoT, Corel Draw, Multimedia, COVID-19

check for updates

Citation:A.Y.Syafa'at, H.A.A.Rozaq, T.Maulida,A.N.A.Zumaroh,R.S.Ananda.,I.Tahyudin," Internet of Things (IoT) Product Design and Modeling Amikom Purwokerto Hand Sanitizer (AMPUH)". *Iota*, **2022**, ISSN 2774-4353, Vol.02, 03. https://doi.org/10.31763/iota.v2i3.544

Academic Editor : P.D.P.Adi

Received : July, 03 2022

Accepted : July, 16 2022

Published : August, 19 2022

Publisher's Note: ASCEE stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1. INTRODUCTION

Product design is a pioneer and the key to the success of a product penetrating the market [1]. Especially now, with the development of technology, product designs must follow the times or trends. As is the case today, many agencies are vying to make an innovation in preventing COVID-19. Product design plays an essential role in implementing a product because the shape indirectly affects the benefits and usability of the product [2].

In previous research, an automatic hand sanitizer prototype tool has been made to prevent COVID-19 [3]. However, the product design in this research is quite complex and too large. Then, in other studies, a prototype tool has also been made to measure body temperature [4]. The study also had an inefficient prototype design. Thus, it can be concluded that no product design model is efficient, simple, and has its charm. This research tries to overcome this problem by designing an automatic hand sanitizer [12-17] product and combining several sensors that can be placed in one product. Making product designs in this research is assisted by a 2D application called CorelDraw.

CorelDraw is a vector graphics editor computer program that processes images and is widely used in publications, printing, and other fields that require a visualization process (love references). After the application's sketch process is complete, a product design will be made according to the sketch. This product design is designed so that later the product can be produced and marketed to the general public, so it must have a good appeal so that during the promotion, it can win the hearts of consumers. The contribution that is felt in this research is that it has a complex design but can accommodate several devices in one product. In the end, this system will be collaborated and analyzed with an Internet server (IoT) [18-20] to become a real-time system.

2. LITERATURE REVIEW

2.1. Multimedia

Multimedia comes from the words multi and media. Multi comes from Latin, namely noins, which means many and various. While the word media comes from the Latin medium, an intermediary or something used to deliver, convey, or carry something. The American 17 Heritage Electonic Dictionary (1991) defines the word medium as a tool for distributing and presenting the information. Multimedia is a combination of various media or file formats in the form of text, images (vector or bitmap), graphics, sound, animation, video, interaction, etc., to deliver messages to the public. Multimedia is a combination of data or media to convey information to be presented more attractively [5].

2.2. Design

Design is a new word in the form of an Indonesian translation of the word design (English); this term shifts the word 'design,' which is considered less expressing the profession's knowledge, breadth, and authority. In line with that, engineers use the term design as a substitute for the term design. However, among fine arts scholars, the term 'design' is consistently and formally used. This was followed up by standardizing the names of study programs at universities, names of branches of knowledge, names of professional organizations, names of magazines, names of journals, and terms used in several intellectual protection laws. In almost three decades, the term 'design' has entered the solid Indonesian vocabulary and is widely used in the scientific and professional arenas, compared to the term 'design' which contains a very general sense [6].

2.3. Product Design

Product design is a form of effort to study and plan functional, ergonomic, and disposable aesthetic objects. Therefore, they can provide value to consumers, as well as give meaning the product itself so that the substance that product makers will give can be conveyed properly to consumers; product design also not only involves aesthetics but also involves many other disciplines [7]. According to Ulrich & Eppinger (2008: 190), the definition of product design is a professional service in creating and developing concepts and specifications that optimize the function, value, and appearance of the product to the system so that the product is more profitable for consumers and producers.

2.4. Graphic Design Principles

In graphic design, eight main principles need to be considered. These are unity, balance, proportion, emphasis, rhythm, simplicity, clarity, and space.

1. Unity (Unity)

Unity in graphic design means all design elements cohesion, consistency, wholeness, and harmony. By paying attention to the principle of unity, our work can be more cohesive and produce a strong theme. For example, when choosing a color tone in a design, you can use a color palette so that no colors collide. In addition, you can also use the same or the same type of font if your design contains a lot of text [8].

2. Balance

In addition to all the elements being united, we also need to pay attention to each composition. For that, we need the principle of balance. By applying the principle of balance, our designs will have a good aesthetic and be more communicative. There are two approaches to the principle of balance in graphic design: symmetrical, asymmetrical, equal, and radial balance [8].

3. Proportion

Mathematically, a proportion is a comparison between one part and another. In design, a proportion is used as a scale to compare individual elements. For example, you want to make a movie poster design. So, the part you want to highlight to the audience is the image and the film's title. So, the portion of these two elements will undoubtedly be more significant than the others [8].

4. Emphasis (Emphasis)

Emphasis is a way to determine which part is a priority in your design. Usually, this section is the information or impression we want to convey to the audience. Well, emphasis and proportion are undoubtedly interrelated, yes. The elements you think are the priority will have a greater proportion than the other elements [8].

2.5. Design Structure

The structure design is a process of making interactive multimedia to requires guidance or preparation. And to have an efficient design structure to facilitate development in further procedures; therefore, it can provide convenience in redesigning or starting to design from the initial process to completion of making designs, especially in the application of product design [9].

Product design is a way to improve product quality by designing product designs according to the needs of companies and consumers. Moreover, the redesign of the automatic hand sanitizer's components caused a longer production time and higher production costs. These conditions are Because the shape of the latest design is more complex and ergonomic but will produce a product that is more efficient, more concise, and easier to use. in application wherever it is [10].

Moreover, Corel Draw is a software or design program based on vector format. Corel itself is the name of a company headquartered in Ottawa, Canada. Coreldraw has many versions that are always updated, and each version has advantages and disadvantages of each performance—starting to be used Corel

Draw 5 to Corel 15 now. Coreldraw was originally developed to run on Windows operating systems and newer ones. Corel Draw was once developed for Linux and Mac OS but was discontinued for reasons of low selling value [7].

3. METHOD

3.1 Method of collecting data

In this research, supporting data is needed, obtained by relevant data collection methods. The stages of data collection carried out in this study are:

[1] A literature study is a method that informs the reader of the results of other studies that are closely related to the research conducted at that time and relates the research to the existing literature [11]. In this study, a literature study was carried out by reviewing and summarizing related reference literature in the form of books, journals, and other references related to the research being conducted.

[2] The observation method is one of the most commonly used data collection techniques. Data is taken using the five senses in the form of sight, smell, and hearing to obtain the information needed to answer research problems [12]. In this study, observations were made by observing all the components that will be used in the tool to be made in order to strengthen the additional data needed in the work of the research.

3.2 Research Concept

The framework used in this research involves several processes, including data collection, problem identification, concept design, and production. The following is a framework of thinking that can be seen in Figure 1.

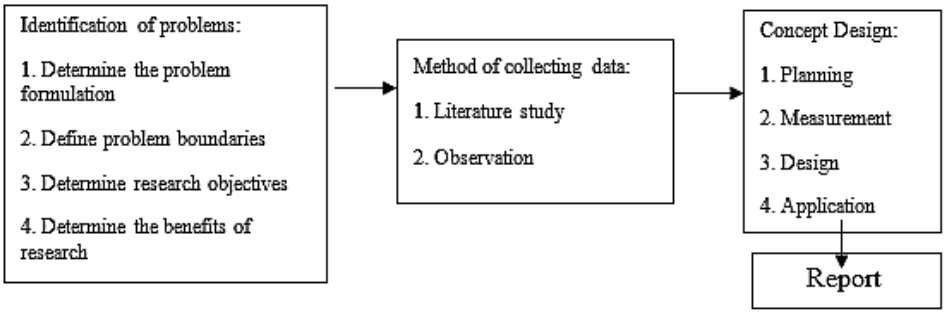

Figure 1. Framework of thinking

The stages in the research are to identify the problems found during the research. At this stage, the researcher identifies the problem by determining the problem formulation, problem boundaries, research objectives, and research benefits. Stages in research for data collection that will be used to support research. Data collection was carried out using literature study and observation methods. At this stage, the researcher performs the pre-production stage by determining the production series so that it can run according to the existing framework at the time of production. This concept design itself is made as a

reference in the production period, starting with the planning stage, the measurement, and analysis stage, the design and modeling stage, and the implementation stage or production stage. The final stage of the research carried out is that all the research results are reported in scientific papers. This report also contains conclusions and suggestions for this research and is expected to be developed in the future.

4. RESULT AND DISCUSSION

4.1 Prototype Design

In collecting data,, the researchers used several methods, namely the literature study and the observation method. To identify the production needs used in making an AMPUH product design, researchers carry out measurement stages based on a schematic series (Schematic) of the product to be made. The schematic series of the product to be made is then measured, and seen the components in their original form, and then, the original size is obtained so that, it remains only to arrange the layout of each component that will be used. The following is a systematic series of products:

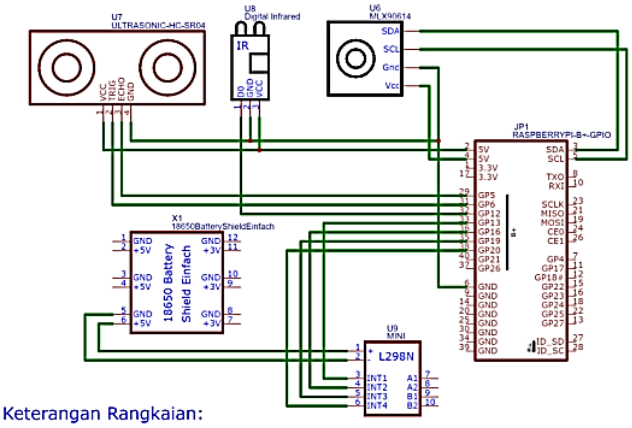

Figure 2. AMPUH Schematic Circuit

4.2 Design stage

From the results of observations of the existing schematic series, a production stage is made, starting from measurement to applying the design to the original model of the AMPUH product itself. Here are the stages in making the design:

4.2.1 Measurement Stage

The measurement stage is where, after seeing and analyzing the schematic circuit, the components that have been applied to the schematic circuit are matched and measured first. Then, all the needs that will be used in the production process are prepared so that they can be processed quickly. After that,

the application of the product with its layout as in the schematic circuit. In this measurement stage, there are many series of measurements ranging from measuring component boards to measurements that follow the container/bottle model of the hand sanitizer. The following is a picture of the measurement results on the component board.

Furthermore, in Figure 3 shows the measurement part of the component board from the top, the size of the component that will be used has got its final size. Moreover, In Figure 4 it shows the measurement of the component board from the front, the size of the component that will be used has got the final size.

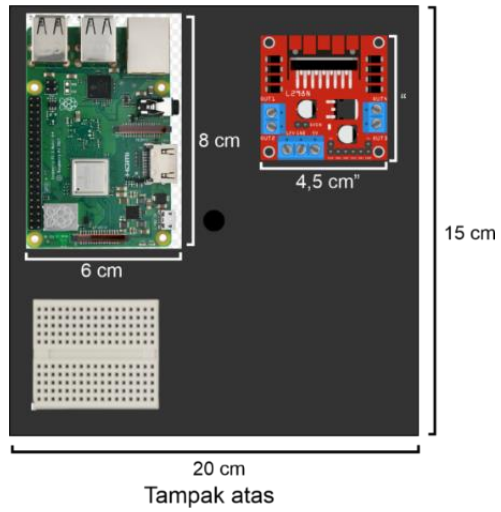

Figure 3. Component Board (Top View)

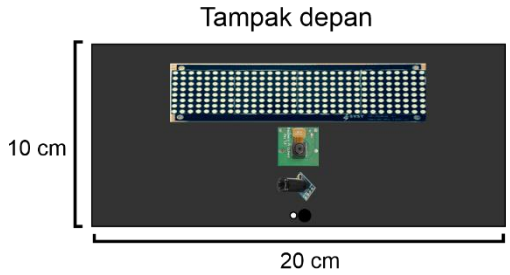

Figure 4. Component Board (Front View)

Figure 4 it shows the measurement of the component board from the front; the size of the component to be used has got its final size.

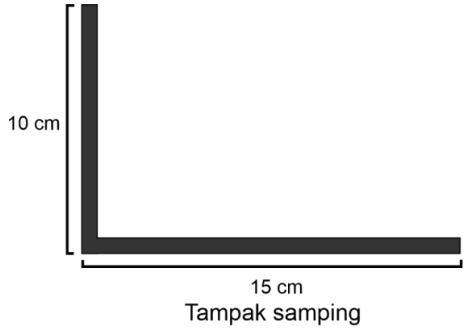

Figure 5. Component Board (Side View)

Figure 5 it shows the measurement of the component board from the side; the size of this component board finally has the final size, and the size of the components inside, and the sizes of all sides are clearly calculated.

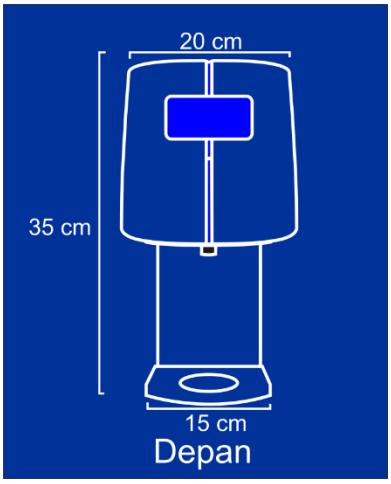

Figure 6. Blueprint Front View

Figure 6, it shows the front view of the blueprint that has been made, and the size has adjusted to the size of the component board, and the height has also adjusted to the size of the sanitizer bottle that will be used. This front-view blueprint represents the product's shape when viewed from the front; as has been said above, this blueprint already has a shape or model of the product that will be made later.

Figure 7, it shows the back view of the blueprint that has been made, and the size has adjusted to the size of the component board, and the height has also adjusted to the size of the sanitizer bottle that will be used. This blueprint back view represents the product's shape when viewed from behind; as has been said above, this blueprint already has a shape or model of the product that will be made later.

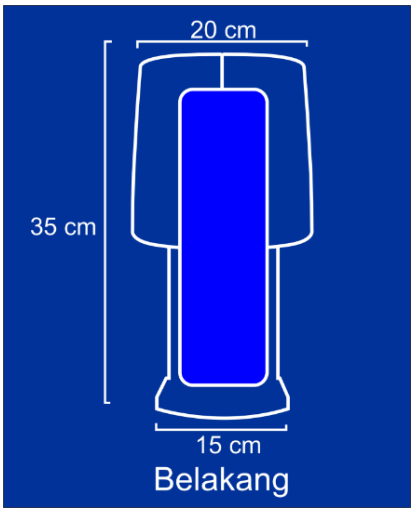

Figure 7. Blueprint Back View

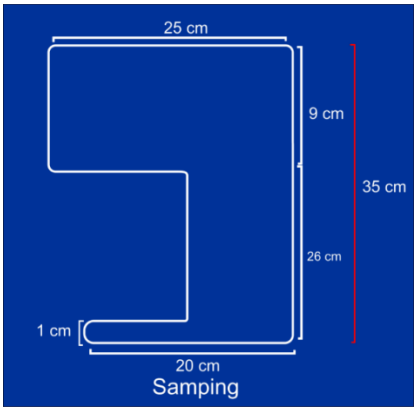

Figure 8. Blueprint Side View

Figure 8 shows a side view of the blueprint that has been made, and the size has adjusted to the size of the component board, and the height has also adjusted to the size of the sanitizer bottle that will be used. This side-view blueprint represents the product's shape when viewed from the side; as has been said above, this blueprint already has a shape or model of the product that will be made later. If seen from the side, this is the right side to see the size and shape that is expected for the product; if from this side it feels right and good, then the other side will follow.

Furthermore, In Figure 9, it shows a side view of the blueprint, which is slightly different in this image because the purpose of making this product will be very complex, so researchers think of ways to make this product in addition to being involved and flexible. The height is adjusted so that when applied in the field, it will also be flexible and look complex. So this section shows the blueprint design that has also been applied using a support pole.

Figure 9. Blueprint Side View Using Poles

4.2.2 Mockup Creation Stage

At the stage of making a mockup, which is a stage that is carried out after making a blueprint, after making a blueprint, working on a design form that has been adjusted to the final size, at this stage it is necessary to make a mockup or design the most realistic picture and resemble the results that will be shown later. Making a mockup is also not much different from the existing blueprint design; the picture that has been shown on the blueprint is a design that will be continued in making the mockup. Here's a mockup that has been created.

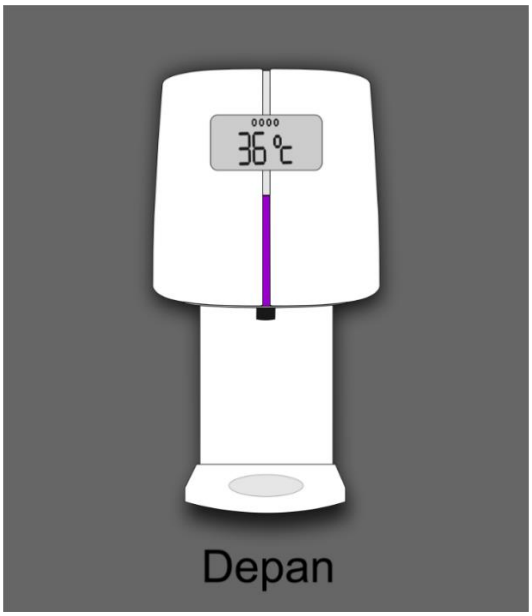

Figure 10. Front View Mockup

In Figure 10 it shows the front view of the mockup that has been made, which not much different from the blueprint design at this stage; the finished blueprint is given a design side to make it look like the original design; the mockup also aims to make it easier during the production process in choosing what materials and colors to use. Selected for the product to be made. So making the mockup itself is necessary to support later in the production process.

Figure 11. Back View Mockup

In Figure 11 it shows the back view of the mockup that has been made, which is not much different from the blueprint design at this stage; the finished blueprint is given a design side to make it look like the original design; the mockup also aims to make it easier during the production process in choosing what materials and colors to use. Selected for the product to be made. So making the mockup itself is necessary to support the production process later. When viewed from the back side, you can see the details of the product's contents to be made; the placement and size follow the sizes that have

4.2.2 Stages of Making Blueprints

The blueprint-making stage is the stage after measurement, the results of each measure are then matched back, and a blueprint or blueprint is started to make it easier in the production process later. This blueprint has been made to adjust to the final size that has been carried out at the measurement stage; here, the blueprint is a little visible in how the shape of the product will be made so that later it will be used as a reference again during the production process. The following is a blueprint that has been created.

In Figure 12 it shows a side view of the mockup that has been made, which is not much different from the blueprint design at this stage; the finished blueprint is given a design side to make it look like the original design; the mockup also aims to make it easier during the production process in choosing what materials and colors to use. Selected for the product to be made. So making the mockup itself is necessary to support later in the production process. If you look at it from the side, you can see what the shape of the product will look like when it's finished; more or less, when viewed from the side, it will look like this. Does not reduce the aesthetic value of the product but can also accommodate all the components needed in it.

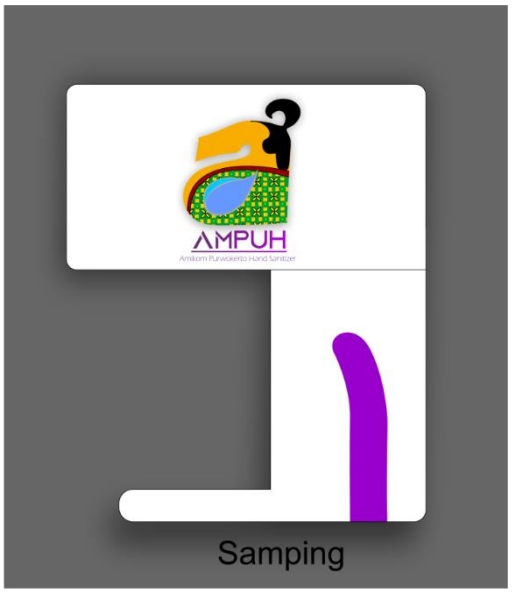

Figure 12. Side View Mockup

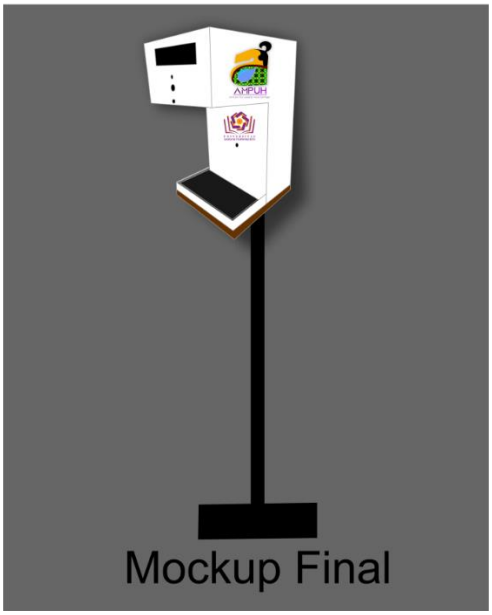

Figure 13. Final Mockup

Figure 13 is the final mockup design of the product to be made; after the above has been shown from various sides, this time, the author will show the mockup that is already final. From this view, the realistic shape and design of the product to be made are presented. The hope is that when the product is finished, it will be able to display what has been made in this mockup, not only in terms of appearance but also the functionality of the product is also expected to match. Therefore, it can be said that this final mockup can be a reference for the visualization of the product being made.

4.2.3 Stages of Prototyping

The prototype model stage is a stage that can be assessed as the main reference material for all existing locations, at this stage that researchers create a framework for the real form of the product that has been designed, starting from measurement, blueprint design, and mockup design. The picture given in the previous stage is still a virtual picture, or it can be said that there is no real form, so at this stage, the researcher makes a prototype framework of the product to be made to make it easier and finalize as well as synchronize the size, shape of the design, and the mockup that has been made. At this stage the prototype will be made using used cardboard materials, so there is no need to spend more and can use materials that are in the surrounding environment.

The manufacture begins with applying existing sizes into the design, then the sizes and designs are applied to the used cardboard that has been prepared. Furthermore, the making of this prototype is divided into several sides, so the blueprint that has been made is very helpful in making this prototype because the sizes from various sides have been recorded, it remains only to apply it to the cardboard design. After all, sides have depicted the pattern of the product and checking the size is appropriate, the next process is cutting the pattern from the product. After the pattern is cut and put together with the other side, the next process is gluing so that the parts can be connected and form the expected shape. After everything is done, check again between the finished prototype and the mockup that is made, whether it is the same size or shape. Here is the finished prototype framework.

Figure 14. Prototype Framework

Figure 14 is the result of making a prototype based on the size, design, and shape that have been made in the previous stage. With the existence of this prototype framework, it will provide convenience during the production process. Later, the description of the product will be clearer and realized in real terms.

4.2.4 Production

This stage is the final stage after all the pre-production stages above have been passed, then the production stage is the final stage, and at this stage, the product of this research will manifest its form. Before the production process begins, the selection of materials to be used is carried out; the material chosen is polymethyl methacrylate or acrylic. This material was chosen because it was considered appropriate because in addition to having a lightweight, the use of acrylic material also creates an aesthetic effect, and when applied to the design, it will be easier and faster. After selecting the size pattern material, the blueprint design, mockup design, and prototype framework are submitted to the production department so that the production process can be analyzed and carried out. The first production is the manufacture of component boards first because this part is the core of the product. After all, it contains the main components of the product. The following is the result of the production of the component board.

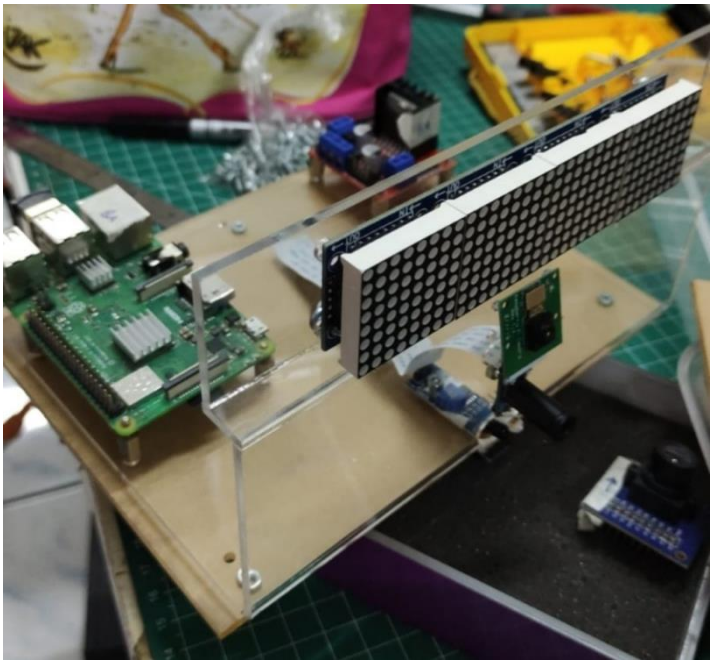

Figure 15. Component Board

In Figure 15, the component boards that have been produced display the original results of the designs that have been made. The size and shape of the component board are in accordance with the description that has been made. After the component board parts are made, other supporting parts are also produced; in addition to the component board parts, which are considered the main part, other parts are also needed to make this product closer to the desired shape. A casing or shell is also required from the outside of the product to coat and protect the components inside. The following are the production results of other parts of the product.

Figure 16. Product Case

In Figure 16, the more clearly the shape of the product is made, the clearer the shape of the design that has been made on this product. The production process was carried out for approximately one week; the results of the pre-production stages, such as measurements, blueprint making, mockup making, and making prototype frameworks, have yielded results. The existing design produces a very complex and precise product design with the components in it so that the purpose of making this product design is correct and produces an output that is in accordance with what has been made previously. Here's a view of the product from the other side.

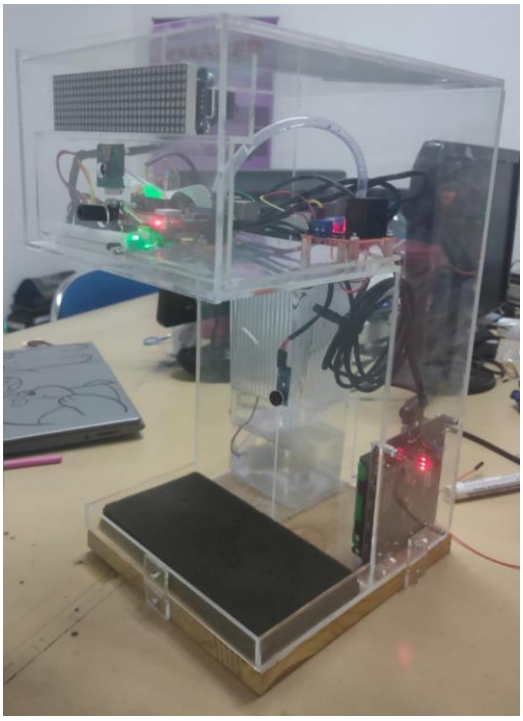

Figure 17. AMPUH Products

From Figure 17, this is a finished product and the components in it have been arranged so that it makes this product more attractive, dynamic, aesthetic, and complex, of course, with the product design that has been made. The design that has been made is in accordance with the existing one, and the size is also in accordance with the existing size.

4.2.5 Evaluation

4.2.5.1 Production Evaluation

The evaluation stage is the last stage of the entire series of stages that have been made. Evaluation of each stage is always carried out directly while it is still in the process of working in stages so that immediate evaluation and improvement are carried out so that the process for the next stage of the process does not experience obstacles due to the evaluation and also reduces the delay in the process at the next stage due to having to revise something at the next stage. Previously.

It's just that this evaluation stage is also needed at the end of the process stage; after the production process is complete, several evaluations are obtained, namely, the model of the product still has a static shape because in the production process, the production party has difficulty implementing it according to the requested design, the reason is that if the experiment If the implementation is forced, then if it fails, this process will run for a long time and consume a lot of raw materials just to experiment with adjustments to the design, while time and energy and raw materials are also limited so that the evaluation after the production is complete is only an improvement in the shape of the product so that it can be seen more dynamic and has aesthetic value when viewing this product.

Another evaluation is also on the application of the product in the second version later, it is hoped that it will be even simpler, and more concise, but the features and functions remain the advantages of this product. The division of the sequence of stages and the checking of each stage must also be maintained because it is proven effective when the evaluation is carried out at the end of all stages and at each stage while it is running.

4.2.5.2 Customer Satisfaction Evaluation

The evaluation in this study used a questionnaire with a survey method for user satisfaction with product design. The test was carried out with the aim of determining the feasibility of the AMPUH IoT product design (Amikom Purwokerto Hand Sanitizer). The calculation of results of this questionnaire uses a Likert Scale calculation, which is a calculation to produce statistical data. The data collection of this questionnaire uses google Forms in order to make it easier for researchers to get data. In this test, eight questions were given to 30 respondents.

Moreover, Table 1. Assessment Index and Interval, and Table 2 is a Final Result of the Respondent Test. Finally, from the results of the calculation of the

questionnaire conducted, the percentage value of 120.5% is classified as very good, so from the results of the questionnaire, it can be concluded that the AMPUH Product Design is feasible to use.

Table 1. Assessment Index and Interval

Score	Criteria
0 – 19,99%	Very Not good
20 – 39,99%	Not good
40 – 59,99%	Pretty good
60 – 79,99%	Good
80 – 100 %	Very good

Table 2. Final Result of Respondent Test

Question	Number of Research					Respondent
	SS	S	RG	TS	STS	
1	5	22	3	0	0	30
2	5	21	4	0	0	30
3	6	22	1	1	0	30
4	7	21	2	0	0	30
5	5	21	3	1	0	30
6	6	17	6	1	0	30
7	3	20	4	3	0	30
8	6	20	4	0	0	30

The formula used to calculate the questionnaire is to use a Likert scale calculation (Widagdo et al., 2020):

Index % = (Total Score)/(Highest Score) x 100

From the results of the questionnaire obtained the following results:

Total Score = (Total Respondents x Score)

Question 1: (5 x 5) + (22 x 4) + (3 x 3) = 122

Question 2: (5 x 5) + (21 x 4) + (4 x 3) = 121

Question 3: (6 x 5) + (22 x 4) + (1 x 3) + (1 x 2) = 123

Question 4: (7 x 5) + (21 x 4) + (2 x 3) = 125

Question 5: (5 x 5) + (21 x 4) + (3 x 3) + (1 x 2) = 120

Question 6: (6 x 5) + (17 x 4) + (6 x 3) + (1 x 2) = 118

Question 7: (3 x 5) + (20 x 4) + (4 x 3) + (3 x 2) = 113

Question 8: (6 x 5) + (20 x 4) + (4 x 3) = 122

Total Score = Total Score / highest score = 122 + 121 + 123 + 125 + 120 + 118 + 113 + 122 / 8 = 120.5

Highest Score = (highest score x number of respondents) = 5 x 30 = 100

Index % = (Total Score)/(Highest Score) x 100

Index % formula = 120.5/100 x 100=120.5 %

5. CONCLUSIONS

AMPUH product designs are made with shapes and models that have been adapted to the components in them without reducing the aesthetic value, compatibility, complexity, and applicability of designs created by looking at product references that have been created. The advantage of this product design is that it is made carefully and always looks at the compatibility with the components that will be installed in it. so that it is ensured that both in terms of form and function will work properly. The drawbacks of this product design may still leave a little space in it to minimize the empty space that still exists and repairs on various sides where there are still shortcomings.

Future research is expected to be able to make product designs even better, and more efficient both in terms of shape and in terms of production and raw materials later. Hopefully, all the existing shortcomings can be corrected and improved so that the products made later can always have their charm and become product designs that can be excelled. In terms of shape, it is also hoped that it can be improved from what was previously still in the static form, changed so that its shape is more dynamic and certainly has good aesthetic value.

AUTHOR CONTRIBUTIONS

Conceptualization; Alif Yahya Syafa'at [AYS], Hasri Akbar Awal Rozaq [HAR], Trisna Maulida [TM], Agnis Nur Afa Zumaroh [ANAZ], Rona Sepri Ananda [RSA], Imam Tahyudin [IT], methodology; [AYS],[HAR],[TM],[ANAZ],[RSA],[IT]; validation; [AYS],[HAR],[TM],[ANAZ],[RSA],[IT], formal analysis;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], investigation;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], data curation;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], writing—original draft preparation;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], ;writing—review and editing;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], visualization;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], supervision;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], project administration;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], funding acquisition;
[AYS],[HAR],[TM],[ANAZ],[RSA],[IT], have read and agreed to the published version of the manuscript.

ACKNOWLEDGMENTS

Thank you to all the teams involved in making the AMPUH hand sanitizer prototype, who worked on Software and Hardware, hopefully, this article will be a reference for prototype development, primarily to deal with COVID-19 and continue to maintain health protocols.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. B. J. Rachman dan S. B. Santoso, "Analisis Pengaruh Desain Produk dan Promosi terhadap Kemantapan Keputusan Pembelian yang Dimediasi oleh Citra Merek (Studi pada Customer Distro Jolly Roger Semarang)," Diponegoro J. Manag., vol. 4, no. 1, hal. 1–15, 2015.
2. N. Desi In Diana Sari, "Elemen Visual Kemasan Sebagai Strategi Komunikasi Produk," Profetik, vol. 6, no. 1, hal. 43–52, 2013.
3. P. W. Rusimamto, N. Nurhayati, E. Yundra, R. Rahmadian, A. Widodo, dan M. A. Dermawan, "Automatic Hand Sanitizer Container to Prevent the Spread of Corona Virus Disease," in Proceedings of the International Joint Conference on Science and Engineering (IJCSE 2020), 2020, hal. 60–64, doi: 10.2991/aer.k.201124.011.
4. S. Paramasivam, C. H. Shen, A. Zourmand, A. K. Ibrahim, A. M. Alhassan, dan A. F. Eltirifl, "Design and Modeling of IoT IR Thermal Temperature Screening and UV Disinfection Sterilization System for Commercial Application using Blockchain Technology," in 2020 IEEE 10th International Conference on System Engineering and Technology (ICSET), Nov 2020, no. November, hal. 250–255, doi: 10.1109/ICSET51301.2020.9265363.
5. P. D. Munir, "Multimedia konsep & aplikasi dalam pendidikan," bandung: Penerbit Alfabeta, 2012.
6. A. Sachari dan Y. Y. Sunarya, "Pengantar Tinjauan Desain," ResearchGate, no. July 2000, hal. 159–190, 2000.
7. Safitri dan D. Sudjanarti, "Desain Katalog Digital Sebagai Media Promosi Menggunakan Aplikasi CorelDraw X7 dan Flipbook Maker Pada Pusar Creative Malang," J. Apl. Bisnis, vol. 4, no. 01, hal. 233–236, 2018.
8. N. B. Bangun dan B. Silaban, "Analisis Cenderamata Kerajinan Ukir Kayu Di Pasar Buah Berastagi Ditinjau Dari Prinsip-Prinsip Desain," Gorga J. Seni Rupa, vol. 6, no. 2, 2017, doi: 10.24114/gr.v6i2.7009.
9. A. T. Cahyadi, "Analisis struktur desain multimedia interaktif pada produk cd interaktif lab fisika tata surya," vol. 19, no. 1, hal. 45–53, 2021.
10. F. Ardani, R. Ginting, dan A. Ishak, "Perancangan Desain Produk Spring Bed Dengan Menggunakan Metode Quality Function Deployment," J. Tek. Ind. USU, vol. 5, no. 1, hal. 1–6, 2014.
11. N. T. Hariyanti dan A. Wirapraja, "Pengaruh Influencer Marketing Sebagai Strategi Pemasaran Digital Era Moderen (Sebuah Studi Literatur)," J. Eksek., vol. 15, no. 1, hal. 133–146, 2018.
12. M. M. Srihari, "Self-Activating Sanitizer With Battery Imposed System For Cleansing Hands," 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), 2020, pp. 1102-1105, doi: 10.1109/ICIRCA48905.2020.9183347.
13. M. S. Khatoon, S. Chakrabarty and S. B. Pal, "Do-It-Yourself (DIY) Hand Sanitizer," 2022 Interdisciplinary Research in Technology and Management (IRTM), 2022, pp. 1-5, doi: 10.1109/IRTM54583.2022.9791520.
14. G. Lastovicka-Medin and B. Vanja, "From Contactless Disinfection Intelligent Hand Sanitizer Dispenser for Public & Home towards IoT Based Assistive Technologies for Visually Impaired Users Institutional Responses to the COVID-

19 Pandemic," 2021 10th Mediterranean Conference on Embedded Computing (MECO), 2021, pp. 1-4, doi: 10.1109/MECO52532.2021.9460137.

15. R. Santhosh and R. Mahalakshmi, "Low-cost automatic hand sanitizer dispenser for Covid-19 pandemic period," 2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA), 2021, pp. 534-538, doi: 10.1109/ICIRCA51532.2021.9544530.
16. P. Manikandan, M. Tirupathi Rao, M. Vinay and K. David Ratna Raj, "Arduino Based Automatic Hand Sanitizer Dispenser System," 2021 3rd International Conference on Advances in Computing, Communication Control and Networking (ICAC3N), 2021, pp. 744-747, doi: 10.1109/ICAC3N53548.2021.9725600.
17. V. Bello, E. Bodo and S. Merlo, "Quality Control of Ethanol-Based Hand Sanitizer Gels in Micro-Opto-Fluidic Devices," 2021 Conference on Lasers and Electro-Optics (CLEO), 2021, pp. 1-2.
18. Y. A. Liani et al., "The Broiler Chicken Coop Temperature Monitoring Use Fuzzy Logic and LoRAWAN," 2021 3rd International Conference on Electronics Representation and Algorithm (ICERA), 2021, pp. 161-166, doi: 10.1109/ICERA53111.2021.9538771.
19. P. D. P. Adi, A. Kitagawa, D. A. Prasetya and A. B. Setiawan, "A Performance of ES920LR LoRa for the Internet of Things: A Technology Review," 2021 3rd East Indonesia Conference on Computer and Information Technology (EIConCIT), 2021, pp. 1-7, doi: 10.1109/EIConCIT50028.2021.9431912.
20. Fransiska Sisilia Mukti, Puput Dani Prasetyo Adi, Dwi Arman Prasetya, Volvo Sihombing, Nicodemus Rahanra, Kristia Yuliawan and Julianto Simatupang, “Integrating Cost-231 Multiwall Propagation and Adaptive Data Rate Method for Access Point Placement Recommendation” International Journal of Advanced Computer Science and Applications(IJACSA), 12(4), 2021. http://dx.doi.org/10.14569/IJACSA.2021.0120494