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Automatic Attendance Machines for Staff in the Politeknik Negeri Samarinda

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Abstract**—** *To improve the quality of education among Politeknik Negeri Samarinda, one of them is by controlling the attendance list of teaching staff so that a system is created to control the attendance list of teaching staff automatically where the input of teaching staff attendance data entered on the computer in each study program can be directly read on the main computer. There are two advantages of making automatic attendance machines for teaching staff in the Politeknik Negeri Samarinda environment, including the ease of controlling the attendance list of teaching staff andtTime and energy efficiency. The methodology used in this study is product design which includes preliminary design, design development and final design. The result obtained is an attendance machine that uses a touch screen system and can also be used to provide important information needed by the academic community of the Politeknik Negeri Samarinda.*

Keywords**—** *Attendance machine, politeknik negeri samarinda, staff.*

I. INTRODUCTION

To improve the quality of education among the Samarinda State Polytechnic, one of them is by controlling the attendance list of teaching staff so that a system is created to control the attendance list of teaching staff automatically where the input of teaching staff attendance data entered on the computer in each study program can be directly read on the main computer. The system has been created and given to each department in POLNES, the included hardware includes a CPU, monitor, keyboard, identity card sensor and mouse. A design is needed to integrate existing hardware so that the automatic attendance system can be operationalized comfortably.

In making the attendance infocom design, stages are needed that must be carried out so that the prototype produced is appropriate and includes product aspects, namely usability aspects, technical aspects, market aspects, production aspects and aesthetic aspects. limaSeveral parties have made research on the design of attendance information systems for employees such as [1]–[10].

There are two advantages of making automatic attendance machines for teaching staff in the Politeknik Negeri Samarinda environment, including:

1. The ease of controlling the attendance list of teaching staff is because the data input from each computer of the study program can be directly entered and read on the data center computer.
2. Time and energy efficiency, when compared with manual attendance in which the teaching staff must fill out the absentee list manually, then the administration of the study program recapitulates and the process is handed over to the central administration.

The problem of employee time and energy efficiency as has been done by other parties [11] in their research which concluded that the direction of the relationship between *Fingerprint* Attendance and Work discipline is positive, meaning unidirectional.

Infocom attendance for teaching staff at Politeknik Negeri Samarinda is included in the scope of environmental facilities products, in this case the Politeknik Negeri Samarinda campus environment. Infokom was created for the purpose of developing the quality of education in which the operation of machines is carried out by teaching staff as users and technicians as workers for maintenance and repair. There is interaction either directly or indirectly between users, machines and the environment, so a solution to the problems that will be faced in making automatic attendance machine designs is needed, including:

- How to configure interior and exterior components that facilitate the activities of users and workers.
- Dimensions that match the needs of the hardware space in it and correspond to the anthropometry of users and workers.
- How the graphic display is used so that it provides operational convenience for users.

This study aims to:

Make a design tool that can help realize academic quality improvement in the POLNES environment that has;

1. Component configuration that makes it easy to use by users and workers
2. Optimal dimensions according to the needs of the hardware space in it as well as user and worker anthropometry
3. Graphic display that is easy and quick to understand by users.

II. METHOD

A. Definitions

What is meant by the Attendance Infocom Design for Teaching Staff in the POLNES Environment is a kiosk / infocom in which there are several hardware including monitors, CPUs, keyboards, mice with placement in each department / study program at POLNES where online to the data base server. So that the lecturer attendance process that was originally manual becomes more effective by electronic means.

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Production costs, namely the amount of costs incurred in carrying out the infocom production process consisting of:
- metal plate
- monitor
- CPU
- keypad
-Wiring
- cat duco
- bass day
-workforce
- Production Assistance

B. Details of Required Data

The data needed for the design of this infocom consists of: (reference data and field data) and literature studies
The required data are:

- Supporting data to strengthen the background requires research
- Data required for analysis

C. Data Collection Techniques

The data collection methods carried out by the author are:

1. Field Research

Namely the collection of secondary data, where the author in this case makes observations by conducting direct observations on the object under study.

2. Tenik Interview

Namely data collection in this case is carried out by interviewing techniques directly with the production department and other related elements then recording the data obtained.

3. Literature Study

That is, data collection in this case is carried out by taking data on the literature that is in accordance with the research and related to this research.

D. Research Location

This research activity is carried out at the Samarinda State Polytechnic as well as production workshops outside POLNES if there is a possibility that it cannot be produced in the model workshop of the POLNES Product Design Study Program

G. Data Analysis Design

Analysis. The analysis is carried out in order to be able to determine the criteria that must be established that are directly related to the tool. The analysis carried out is:

- Needs Analysis
- Anthropometric analysis and ergonomics
  Anthropometric and ergonomic analysis is carried out to determine the optimal and comfortable dimensions of the tool to use in accordance with the standards of human body dimensions that allow for the operation of the tool as well as percentile standards that can be used as a reference for determining dimensions adjusted to the activities carried out on the tool.
- Configuration analysis
  After the needs analysis and anthropometry and ergonomics, a configuration analysis is carried out to determine the arrangement and layout of the components on the tool so that it can be optimal according to the dimensions that have been obtained and comfortable to use in accordance with existing comfort (ergonomic) standards.
- Shape analysis
  Shape analysis is carried out to determine the appropriate form to apply the attendance infocom design for teaching staff in the POLNES environment
- Color analysis
  Color analysis is carried out to determine the appropriate color to be applied to the design of attendance infocom for teaching staff in the POLNES environment
- Graphical analysis
  Graphic analysis is carried out to determine what graphics are appropriate to be applied to the design of attendance infocoms for teaching staff in the POLNES environment

After the analysis is carried out, conclusions can be made from each analysis, these conclusions are summarized in a provision called design criteria in which there are provisions for object components, dimensions, configurations, shapes, colors, graphics.

III. Result and Discussion

A. Analysis of Activities and Needs

Activity analysis is carried out to determine the needs/facilities that should be available in the design of automatic attendance machines for teaching staff in the POLNES environment both interior and exterior.

Activities that can be done during machine operation are:

1. Read display instructions for use
2. Insert an ID card while reading the display
3. Operationalize the mouse while reading the display
4. Pressing keyboard keys while reading the display
5. Retrieve id card

So that from each activity can be determined the needs / facilities that exist in the design of the machine, both interior and exterior, are:

1. Interior: monitor, exterior: space for monitor screen
2. Interior: card reader, exterior: hole for card input
3. Interior: mouse: exterior: place for the mouse
4. Interior: keyboard, exterior: place for keyboard

So that a table can be made:

No	Activity	Necessity Interior	Exterior Needs
1.	Reading the display	Monitor	Holes for monitor screens
2.	Entering and retrieving an ID card	Card reader	Holes for card input and output
3.	Operationalize the mouse	Mouse	Place for the mouse
4.	Pressing keyboard keys	Keyboard	Place for the keyboard

B. Anthropometric Analysis and Ergonomics

Anthropometric analysis is performed to determine the dimensions of the attendance infocom design.

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The necessary anthropometry is:

- Eye height for monitor height determination
- Elbow height for determining the height of the keyboard, mouse and input hole and ID card output.

Before the elaboration of anthropometry, it is necessary to determine the percentile that will be used for the use of automatic attendance machine design.

The design of the automatic attendance infocom when connected to the user is a relationship between the product and the user, so that the user's physique is directly related to the automatic attendance machine. With the varying percentiles of male or female adults, it will be very difficult to determine which percentile to use because each determination of percentile use has its own consequences.

Because the users of the automatic attendance machine are men and women, the size range for study is 5 percentile women and 95 percentile men.

Data on the height of the eye view when standing is 5% female tile and 95% male tile for determining the maximum height of the display (monitor screen). In anthropometric data, it is known that the height of the male eye of 95%tile is 161.5 cm and the height of the female standing eye of 5%tile is 135cm, so it can be concluded that the *height of the monitor screen (display)* is no more than 161.5 cm and not less than 135 cm.

Elbow height data of 5% female tile and 95% male tile are required for keyboard and mouse height determination and identity card input. In anthropometric data it is known that the elbow height of women 5 %tile is 886 cm, male 95 %tile is 1074 cm, so it can be concluded that the height of the keyboard, mouse and card input is not less than 886 cm and not more than 1074.

While the determination of the *maximum width* of the automatic attendance machine design is to look at the anthropometric data of the distance of the fingertips of the right hand to the fingertips of the left hand in the position of the forearm rotating in a horizontal plane with a fixed elbow for women 5%tile, which is no more than 1016 cm

The position of the monitor surface forms an angle of 90° relative to the line of sight (Greenstein and Arnaut). For the convenience of vision on the monitor.

Temperature and exposure

Every human being performs an activity generating heat in his body, The human impression of comfort according to Grandjean (1 986) is influenced in general by four factors that determine heat exchange, namely: (a) air temperature, (b) temperature of adjacent wall surfaces, (c) air humidity, and (d) air humidity.

There is a thermal measurement of the room with a certain index, namely by using WBGT (Wet *Bulb Globe Temperature)* recommended by *NIOSH (National lnsfitut for Occupational Safety and Health),* obtained the maximum value of WBGT (Stevenson, 1989).

The use of infocom is including light work / work with, so a comfortable *room temperature* is recommended a *maximum of 300*

Body Dimensions	Man				Woman			
	5%	X	95%	S.D.	5%	X	95%	S.D.
1. Height of standing position upright	1.532	1.632	1.732	61	1.464	1.563	1.662	60
2. Eye Height	1.425	1.520	1.615	58	1.350	1.446	1.542	58
3. Shoulder Height	1.247	1.338	1.429	55	1.184	1.272	1.361	54
4. Elbow Height	932	1.003	1.074	43	886	957	1.028	43
5. Hand Grip Height (*knuckle*) in a relaxed position down	655	718	782	39	646	708	771	38
6. Shoulder Width (*bideltoid*)	382	424	466	26	342	385	428	26
7. Distance from Elbow to Fingertips	405	439	473	21	374	409	287	34
8. Handheld Height (*grip*) at hand position vertical up & stand tall	1.795	1.923	2.051	78	1.713	1.841	1.646	79
9. The span distance from the fingertips left hand to right	1520	1.663	1.806	87	1.400	1.523	1.969	75
10. Hand Grip Distance (grip) to the back in position hands forward (horizontal)	649	708	767	37	610	661	712	31

Lighting

In the book 'Ergonomics, Basic Concepts and Applications of Eko Nurmianto), it is stated that in order to understand a *display*, a human being needs:

a.Adequate visual ability

b. Presentation of appropriate information, including the size, lighting, differences and design of the display.

c. Human expertise and knowledge possessed in an effort to understand displays.

C. Configuration Analysis

After determining the position of each component of the automatic attendance machine design, an alternative configuration of the components can be made so that a most suitable configuration is obtained to facilitate and provide convenience for users in operating the machine.

From the activity analysis, it can be determined that the components in the design of the automatic attendance machine

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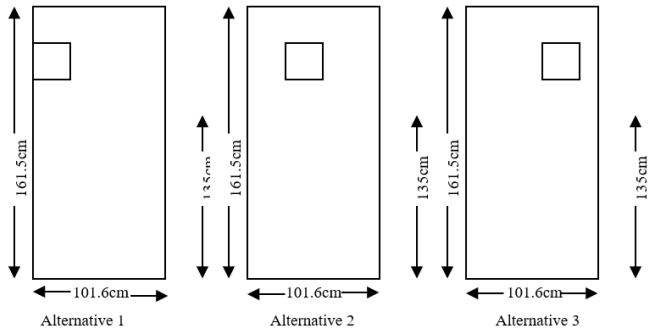
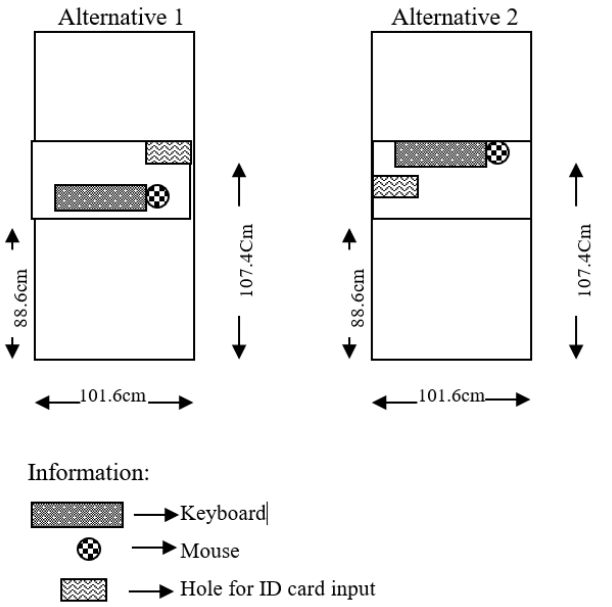
that are often related to users are monitors (displays), keyboards, mice and identity card input holes.

From anthropometric analysis, it has been determined that the position of the monitor height is no more than 161.5 cm and not less than 135 cm, and for the width dimensions of the automatic attendance machine design is no more than 1016 cm, so that several alternative *monitor positions* with limitations as above can be described are:



There are three alternative monitor placements with the condition that the width and height of the monitor are assumed to be 40 cm x 30 cm (17"), against the limitations of the width of the automatic attendance machine design which is 101.6 cm and the monitor height is not more than 161.5cm and not less than 135cm. The three alternatives are still within the limits of predetermined dimensions, but one of the most ideal positions must be selected. In ergonomics that the eye view sees comfortably in a straight eye view position 0° to 20° down. So that the most convenient alternative *to the monitor* position is *alternative 2.*

From the anthropometric analysis, it is also determined that the position of the height of the keyboard, mouse and hole for identity card input is between 886cm and 1074cm, then an alternative configuration of keyboard placement, mouse and hole for identity card input can be made as follows:



From the two alternative keyboard positions, mouse and hole for identity card input, an assessment table can be created as follows:

No	Parameter	Alternative 1	Alternative 2
1.	Comfortable positioning of components	0	1
2.	Operational convenience	0	1
	Total	0	2

Information:
Value 0 = less, value 1 = good

(Table of *assessment methods* taken from *DESIGN METHODS*, J. Christopher Jones, London, 1970, on the basis that for the weights of the scoring figures 0 and 1 or less and is either the freedom/full right of the designer according to the existing theme and according to the existing standards of each aspect of the product)

From the table, it can be explained that in *alternative 1* the position of the hole for the input of identity cards at the convenience limit of anthropometric analysis that has been made and located on the right, is a good position because most Indonesians use their right hand for their activities including for the operation of inserting and issuing cards such as during the operation of ATM cards. So that in the comfort parameter the position of the components is given a value of 1, while for the operational comfort parameter it means that with this configuration there are no obstacles when operating the machine so that it is given a value of 1

For *alternative 2* hole positions for identity card input on the left reduces ergonomic value when connected with the comfort of hand reach when compared to the position on the right, so it is rated 0 or less. As for the operational convenience parameter where the hole for the identity card input below from the keyboard and mouse is less because the user's activity on the hole for the identity card input is blocked with the dimensions of the keyboard length greater than the dimension of the hole for the identity card input so it is rated 0 or less

Options for alternate configuration of keyboard, mouse and input holes for identity cards are *alternative 2.*

D. Material Analysis

Structural material is a material used in the manufacture of infocom dad structures. The structure serves as a mount for the architectural components of the machine and retains both the inner and outer dads against the vending machine.

The structure must also be able to maintain this ability for a certain period of time, meaning that the material used must have the ability to withstand the environmental conditions where the vant machine will be placed.

Casing Wrapping Material

What is meant by wrapping material is the material used to coat the infocom structure as well as membrane the shape of the infocom

The material used must have excellent durability considering that this material will interact with the surrounding environment. Then the criteria that must be met by a wrapping material include

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a.Have the convenience of maintenance daiam.
b.Has resistance, strength and hardness to influence milieu.
c.Have good shape ability in accordance with the design demands of train ticket vending machine
d. Able to provide protection for the engine architecture in it.
e.Easy in the fabrication process so as not to increase costs production
f.Have good feasibility and durability.

For infocom material, a metal plate is used as a casing and an elbow iron for the structure.

E. Color Analysis

There are two divisions of color groups in general, namely Wama -the color that has the greatest impulse energy; orange, yellow, red, green and mauve red Colors that have the smallest impulse energy; blue, turquoise and purple Some guidelines for determining which colors to use, that infocom:
Building color trend: pastellm uda, crome and glass colors
Placed indoors

F. Shape Analysis

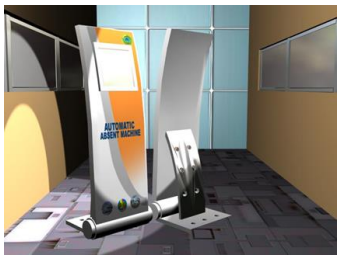
The shape of the object here departs from the selection of the material to be used, in addition to the impression that you want to display as the main element of the shape. In the analysis of the 'casing' material, the material for the casing to be used is an aluminum plate with a 'manufacturing' system of scissors and lipat. Thus the form to be tamped is dominated by an inorganic form (shape) with the limitations of the manufacturing process, in ping also the emergence of an organic form for the development of the use of oak by humans. With the consideration of mass production, the form used is a simple form (basic form).

Design Alternatives

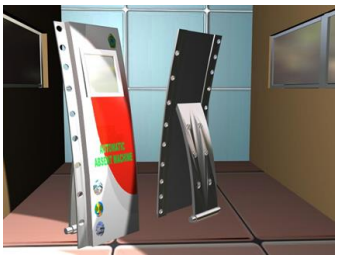
Product Design Alternatives

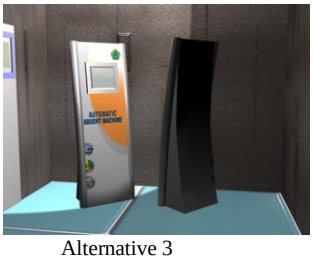
After analysis, it can be known the design criteria as a basis for the next step, which is an alternative design.

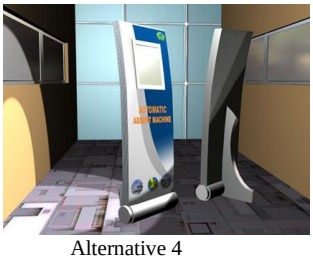
There are 4 (four) alternative designs made, namely:



Alternative 1


Alternative 2


Alternative 3


Alternative 4

Graphic Alternatives

Graphic design needs to be displayed to clarify the function as well as the identity of the product. On the design of this infocom, the POLNES logo is displayed, the identity of the product function and the overall color of the product. There are 3 (three) graphic alternatives that have been made.

Final Design

With the consideration and assistance that has been carried out, alternative 1 was selected as the selected design and alternative 1 graphic was selected.

After one design is selected as a selected design, a working drawing is made to facilitate the production process.

IV. CONCLUSION

After the analysis process is carried out, conclusions can be made about the design criteria in the design of attendance infocom for teaching staff in the POLNES environment, namely:

1. *Object components*

The object has components
- Interior: monitor, keyboard, mouse, identity card reader, CPU, UPS and stavolt.
- Exterior :'casing' with holes for identification card input.

2. *Object dimensions*

Objects have minimum outer dimensions: 142.0 x 36.7 x 56.5 cm, and a maximum of 179.5 x 101.6 x 56.5 cm

With a maximum keyboard height of 88.6 cm, the maximum monitor height is 161.5 cm and the minimum is 135.0 cm.

3. *Material object*

The main object material is lambercore and the supporting object material is fiberglass

4. *Object shapes*

The shape of the object is modern.

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