

Development of SHESOP Website Based on usability factors

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Abstract— SHESOP is a health monitoring system that records heartbeat data, weight and footsteps user. SHESOP is a health monitoring system that records heartbeat data, weight and footsteps user. SHESOP has three products including smart heart chair, steppy, and SHESOP website. Smart health chair is a health chair that designed for car transport driver. Smart health chair is useful for monitoring the vital signs of health body, weight, and heart rate. Steppy is android mobile applications which used to calculate the number of footsteps. This application will monitor user activity. SHESOP Website accommodate the data from the two previous products and is a provider of media information related to health, the condition of the users that use the service SHESOP, advice to users in order to maintain health and gamification steppy information. This paper will discuss the development of the website SHESOP use usability factor. Stage of this research is to analyze the data requirement which related to heart rate, body weight, and footsteps number of users, determining system specifications, website designing, implementation and testing. The goal is to make users easily understand the information that provided by the system through the website SHESOP.

Keywords— website SHESOP, smart chair, steppy, usability

I. INTRODUCTION

According to the UUD RI No. 36 of 2009, Health is a healthy physically, mentally, spiritually and socially to enable more people to live socially and economically productive. Importance of health make the people have to monitoring their health every day, so that health can be detected early. Health monitoring is collecting data on the situation of physical, mental and social well-being. Furthermore, the data used to answer health problems suffered by every human being.

To perform health monitoring, a simple routine examination should be done. In the era of current technologies, humans tend to be busy and ignore the importance of health. This problem resulted in the decrease in body condition belatedly realized. Day by day the degradation of body condition become higher, and that makes users easily get sick. For that, they need a solution in the health system in order to monitor health without having to disrupt daily activities. From the doctor side, with the limitations of doctors to check patients with significant amounts, a monitoring

system will help doctors to providing health information and early detection of diseases suffered by patients.

Smart Health System as Open Platform (SHESOP) is a development of the system of Ubiquitous Health Monitoring System (UBI-Health), 2013. SHESOP is a health system that is focused on monitoring health the user in everyday life using steppy applications and smart chair. SHESOP can monitor health the user without disrupt the activities of the user. So users can work comfortably and effectively. Furthermore, users will receive information in the form of statistical data of weight, heart rate statistical data and statistical data the number of footsteps that have been achieved. The data can be viewed on the website SHESOP, so the user can check the results of health monitoring anywhere and anytime.

Some features of the website including data display heart rate, weight and number of footsteps users into infographics, Displays the number of calories burned is achieved along with the activities performed by users, display information food menus recommended based on user activity, calculator food menu features to calculate the number of calories of food eaten, hospital information and hospital search features, pharmacy information and the availability of drugs at pharmacies, drug search feature and a list of pharmacies that sell the drug, health suggestion information of the results analysis of the data monitoring heart rate, weight and the user's footsteps.

II. LITERATURE REVIEW

A. User Experience

User Experience is the process of enhancing user satisfaction by improving the usability, accessibility, and pleasure provided in the interaction between the user and the product. User experience design encompasses traditional human-computer interaction (HCI) design, and extends it by addressing all aspects of a product or service as perceived by users^[7].

Useful. Usable. Desirable. It is three essential elements necessary for good UX^[7].

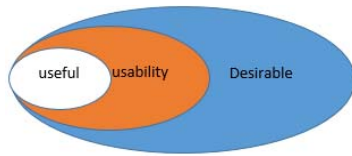


Fig. 1 The three elements UX

1. Useful

Useful is an important element in the UX. A product or service must solve a problem or meet a need to create exceptional UX. Functions or features of a product should be useful for users.

2. Usability

According to Jakob Nielsen, usability regard it is important that a site can survive. Sites that have a high usability have a tremendous opportunity to frequently visited by Internet users. In general, users want to get information quickly and as expected. If a site fails to show clearly what can be done with these sites, users tend to be immediately leave the site and move on to another site.

3. Desirable

Desirable is how attractive the product to let users enjoy and want to use the product regularly.

B. Physical Activity

According to the Centers for Disease Control (CDC) for the health benefits of physical activity are much greater than the risk of injury. Science shows that physical activity can reduce the risk of early death from major causes of death, such as heart disease and some cancers. All people can achieve health benefits of physical activity, regardless of age, ethnic group, body shape or body size^[2].

People who are physically active for about 7 hours a week at risk of premature death 40 percent lower than those who are only active for less than 30 minutes a week. By doing moderate-intensity aerobic activity for at least 150 minutes a week can reduce the risk of premature death, including early death from coronary heart disease is the number one cause of death in many countries around the world.

C. Heart Rate

Heartbeat is the description of fitness. When moving, the muscles that work requires oxygen supply to process the energy obtained from food. Air inhaled by the lungs, blood delivered to the heart, then by the heart is pumped throughout the body, especially the muscles working. Muscles, especially the limbs of the body, can be controlled. The more muscle work, the more oxygen demand, the heart beats faster and faster rate. Indirectly heart rate can be controlled. In addition to be used as a sign of fitness, heart rate can be a guide to the dose of sport.

Generally, maximum heart rate of healthy people during exercise is $80\% \times (220 - \text{age})$. More accurately, Sally Edward gives maximum heart rate calculation formula as follows^[5].

- Calculation of maximum heart rate for males

$$220 - (0.5 \times \text{Age}) - (0.05 \times \text{weight(Pound)}) + 4 \quad \dots(1)$$

- Calculation of maximum heart rate for women

$$210 - (0.5 \times \text{Age}) - (0.05 \times \text{weight(Pound)}) \quad \dots(2)$$

In exercise, given the three tiers of the heart rate needs to be achieved.

- For healthy, 50-70% of maximum heart rate.
- For fitness (fitness): 70-80% of maximum heart rate.
- For athletes (performance): 80-100% of maximum heart rate.

D. Footsteps

According to Catrine Tudor-Locke, a potential step achieved adults per day can be seen in the following table.

TABLE 1
STEP BY CATEGORY CATRINE TUDOR-LOCKE ^[4].

No	Footsteps per day	Category
1	≥ 12500	Very active
2	10000 – 12499	Active
3	7500 – 9999	Active enough
4	5000 – 7499	Less active
5	< 5000	Sedentary

E. Body Mass Index (BMI)

BMI is a mathematical formula in which a person's weight (in kilograms) divided by height (in m). BMI is associated with body fat compared with other indicators for height and weight. BMI can estimate body fat, but it can not be interpreted as a certain percentage of body fat. The relationship between fat and BMI is influenced by age and gender.

$$\text{BMI} = \text{BB} / (\text{TB} * \text{TB}) \quad \dots(3)$$

Note.

BMI = Body Mass Index.

BB = Weight (Kg).

TB = Height (Meters).

III. DESIGN AND DEVELOPMENT

A. Requirement Analysis System

The user needs to access information on the SHESOP website must be able to qualify useful, usable and desirable. Here are some of requirements analysis system.

1. Under the terms useful, SHESOP website should be able to provide information that is correct and useful for users.
2. Under the terms usable, SHESOP website should be easily accessible, easy to understand information provided and the user can quickly learn the features contained on the SHESOP website.
3. Under the terms desirable, SHESOP website should be attractive in providing information and displays the features SHESOP website.

B. System Specifications

Based on requirements analysis, it determined some specifications as follows.

1. SHESOP website can display data heartbeat, weight and step foot into the infographic.
2. SHESOP website can display the number of calories burned is achieved along with the activities performed by users.
3. SHESOP website can display information suggested food menu based on user activity.
4. SHESOP website features food menu calculator to calculate the number of calories of food eaten.
5. SHESOP website can display information about hospitals and hospital search features.
6. SHESOP website can display information about pharmacy and the availability of drugs at the pharmacy.
7. SHESOP website can have a drug search features and a list of pharmacies that sell the drug.
8. SHESOP website can display information health advice from the analysis of data monitoring heart rate, weight and user steps.

C. Database Design

The database was designed based on specifications of the system to be achieved. Figure 2, 3 and 4 explain the relationship between each of the tables contained in the database SHESOP.

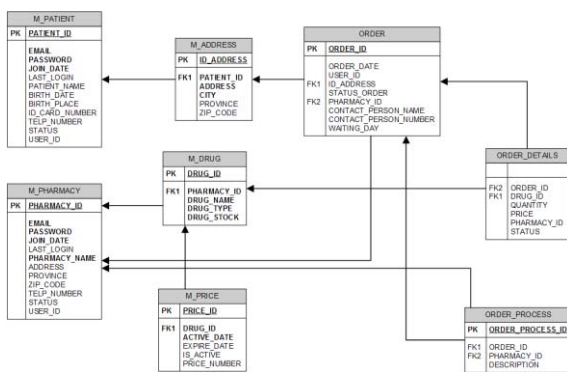


Fig. 2 SHESOP database Design (patient data, pharmacy and medicine)

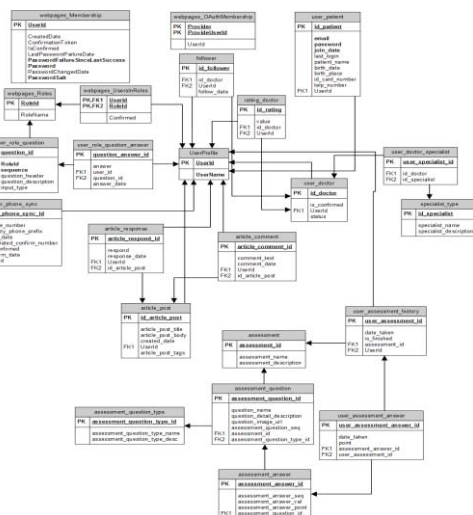


Fig. 3 SHESOP database Design (user data)

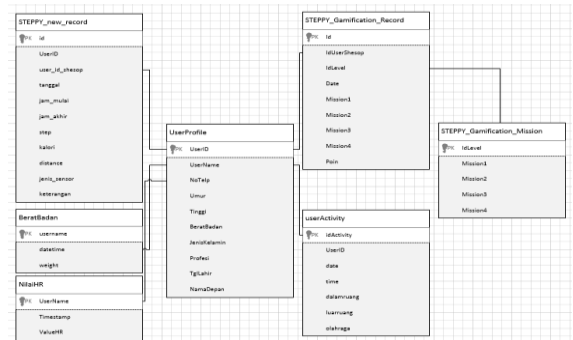


Fig. 4 SHESOP database Design (data steppy)

D. Design System

Useful namely SHESOP website can solve functional problems. In this study, SHESOP website should have functions that can answer all the user needs to be able to help users determine the health condition early.

1. The function calculates the calories of the data heartbeat.

Calories burned will be displayed on the chart heartbeat. Each heartbeat of data entered into the database, the data is analyzed and calculated how many calories are burned from the value of the heartbeat recorded into the database. To calculate the calories burned using the following calculation^[7].

- Calorie calculation for the male

$$\text{Calorie} = [(\text{age (year)} \times 0.2017) + (\text{weight (Kg)} \times 0.1988) + (\text{heartrate(BPM)} \times 0.6309) - 55.0969] \times \text{time (minute)} / 4.184$$

- Calculation of calories for sex Women

$$\text{Calorie} = [(\text{Age (year)} \times 0.074) + (\text{weight (Kg)} \times 0.1263) + (\text{heartrate(BPM)} \times 0.4472) - 20.4022] \times \text{time (minute)} / 4.184$$

For an accurate calculation of the amount of calories burned, heart rate value is between 90-150 bpm. To calculate the number of calories burned also need to include the value of the weight, sex and the long duration of the exercise.

1. The function calculates the energy requirements every day information of the energy required per day is given as suggestions to the user so that the user knows the number of calories needed for activity. To calculate the energy needs using the following calculation^[2].

- Calorie requirement calculations for the female.

$$\text{BMR} = 655 + (9.6 * \text{weight (Kg)}) + (1.8 * \text{height(Cm)}) - (4.7 * \text{age(year)}) = ______ * ______ (\# \text{activity factor}) = ______ \text{calorie in day.}$$

- Calorie requirement calculations for the male.

$$\text{BMR} = 66 + (13.7 * \text{weight (Kg)}) + (5 * \text{height(Cm)}) - (6.8 * \text{age(year)}) = ______ * ______ (\# \text{activity factor}) = ______ \text{calorie in day.}$$

Description :

the value of Factor Activity:

- sedentary = 1.2
- regular activity with exercise 1-3 days per week = 1.375
- regular activity with exercise 3-5 days per week = 1.55
- regular activity with exercise 6-7 days per week = 1.75

2. The function calculator food menus

In the database system data contained food with calorie. The food menu consists of staple foods, side dishes, vegetables, fruits and drinks. Users choose the foods and the system will calculate the number of calories the food chosen.

3. Functions of activity prediction

To predict the activity, calculation used is substituting calorie calculation of the data into the heart rate calorie calculation is based on the user's physical activity. From the results of these calculations obtained MET value. Furthermore, MET values obtained will be matched by the MET value of the database. Furthermore, the system will determine the prediction of activity with the MET value.

Calorie calculation is based on the user's physical activity^[2].

$$\text{Calorie Burn} = (\text{BMR} / 24) \times \text{MET} \times T$$

Description :

BMR = Basal Metabolic Rate (over 24 hours)

MET = Metabolic Equivalent (for selected activity)

T = Activity duration time (in hours)

4. functionality health suggestion

From the literature and the results of the data analysis of heart rate, body weight and the attainment of footsteps can be formulated some suggestions as follows.

TABLE II
HEALTH SUGGESTIONS USERS

No	Suggestion	Description
1	Increase your steps, your activities now are not good for health	Achievement of steps seen from age and gender
2	You are less active, multiply your steps	
3	There are quite active, you need a few more steps to reach the recommended measures	
4	You have reached the recommended steps, keep your activities now	
5	Your activities are very active, balanced with foods with enough calories	
6	With your speed now, you will feel tired, reduce your speed	Based on the running speed
7	Calories burned is still lacking, multiply again step	Based on the successful calories burned
8	Calories burned is enough	Based on the prediction obtained activity
9	your activity is less, change your activities in the following hours.	

E. Interaction Design

Interaction design to be achieved using aspects of usability and desirable. The design of the layout, color selection and delivery of information on the development aspects of the website SHESOP must meet learnability, memorability and satisfaction of users. With desirable aspects website development SHESOP must interesting so that users constantly visiting the website SHESOP.

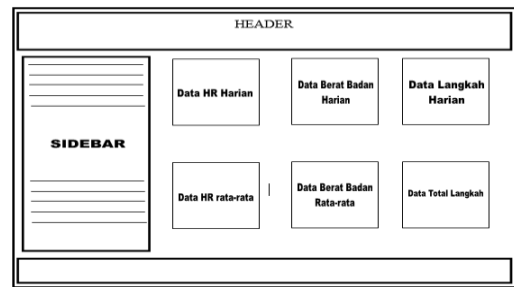


Fig. 5 Dashboard page

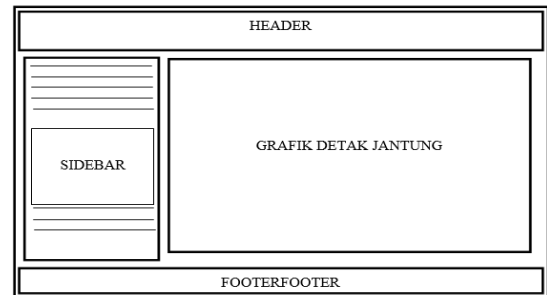


Fig. 6 Heartbeat page

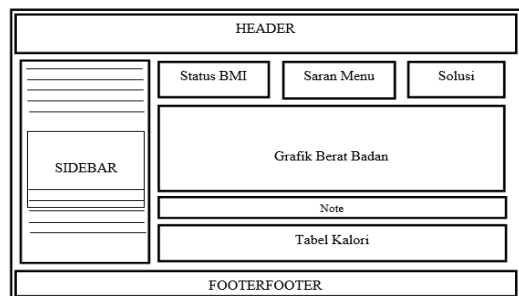


Fig. 7 Weight pages.



Fig. 8 Design of the hospital page.

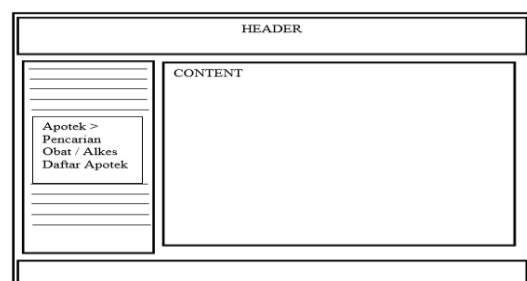


Fig. 9 design of pharmacy page.

IV. ANALYSIS AND IMPLEMENTATION

A. Implementation System

Implementation of the system is done after conducting requirements analysis and system design. Parts of the system that has been designed to be implemented into real form so as to form an integrated system.

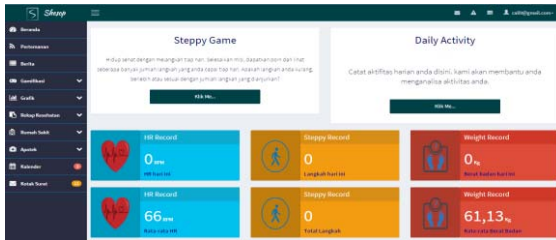


Fig.10 Implementation of dashboard page

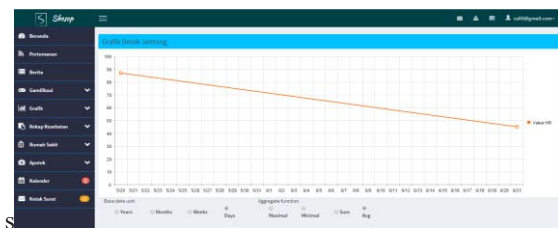


Figure 11 Implementation of heartbeat page

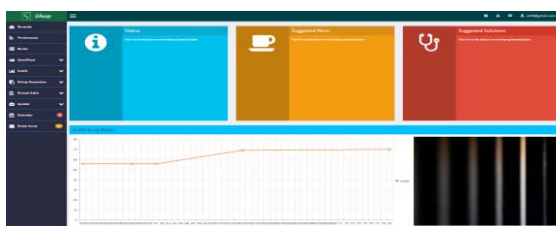


Figure 12 Implementation of pages weight

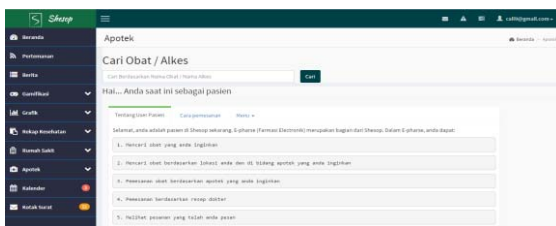


Figure 13 Implementation of pharmacy page

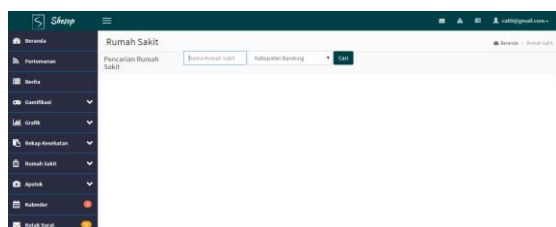


Figure 14 Implementation of the hospital page.

B. Functionality Testing System..

Tests on SHESOP system development will be carried based on the success of the system's functionality. Function test related to the purpose of research. The following test results.

TABLE III
TESTING OF FUNCTIONALITY.

No.	Functionally tested	conclusion results
1.	data display heart rate, body weight and the number of steps the user reached into infographic.	succeed
2.	displays the number of calories burned is achieved along with the activities performed by users.	succeed
3.	displays information suggested food menu based on user activity.	succeed
4.	Running a food menu features a calculator to calculate the number of calories of food eaten.	succeed
5.	hospital information display and features hospital search.	succeed
6.	displays information pharmacy and the availability of drugs at the pharmacy.	succeed
7.	Conducting features drug search and a list of pharmacies that sell the drug.	succeed
8.	displays information health suggestion from the analysis of data monitoring heart rate, weight and user steps.	succeed

C. Usability Analysis of SHESOP Website Development
Usability aspect into the evaluation phase to assess whether the interaction between the user and the website SHESOP goes well. Measurement is done by testing cobakan SHESOP website to respondents. Furthermore, respondents are required to fill out a questionnaire to obtain a picture of the level of satisfaction in the use SHESOP website. Suggestions of respondents used as feedback to complement the functional requirements and needs user interaction. Here are the results of calculations based on the analysis of usability aspects of the questionnaire obtained from 50 respondents were distributed at the event EE Days 2015 and through online using google form facility.

TABLE IV
LEARNABILITY ASPECTS OF THE WEBSITE SHESOP

Description	amount	percentage	Value	Skoce	average
Strongly agree	12	30%	4	48	2.94
agree	23	46%	3	69	
Doubtful	15	24%	2	30	
Disagree	0	0 %	1	0	
total	50	100%		146	

TABLE V
EFFECIENCY ASPECTS OF THE WEBSITE SHESOP

Description	amount	percentage	Value	Skoce	average
Strongly agree	7	14%	4	28	2.7
agree	24	48%	3	72	

Doubtful	16	32%	2	32
Disagree	3	6%	1	3
total	50	100%		135

TABLE VI
MEMORABILITY ASPECTS OF THE WEBSITE SHESOP

Description	amount	percentage	Value	Skoce	average
Strongly agree	5	10%	4	20	2,84
agree	32	64%	3	96	
Doubtful	13	26%	2	26	
Disagree	0	0	1	0	
total	50	100%		58	

TABLE VII
ERROR ASPECTS OF THE WEBSITE SHESOP

Description	amount	percentage	Value	Skoce	average
Strongly agree	10	20%	4	40	2.66
agree	20	40%	3	60	
Doubtful	13	26%	2	26	
Disagree	7	14%	1	7	
total	50	100%		133	

TABLE VIII
SATISFACTION ASPECTS OF THE WEBSITE SHESOP

Description	amount	percentage	Value	Skoce	average
Strongly agree	15	30%	4	60	2.98
agree	20	40%	3	60	
Doubtful	14	28%	2	28	
Disagree	1	2%	1	1	
total	50	100%		149	

Here is a recap of the value of the five aspects of usability based on the results of the questionnaire plot.

TABLE IX
RECAP VALUE OF ASPECT USABILITY

No.	Aspek usability	Nilai
1.	Learnability	2.94
2.	Efficiency	2.70
3.	Memorability	2.84
4.	Errors	3.00
5.	Satisfaction	2.98

V. CONCLUSION

After analyzing the needs, determine the system specification, system design, implementation, evaluation and usability analysis of SHESOP website development, it can be concluded as follows.

1. From the assessment of respondents obtained the lowest score is the aspect of error with an average value of 2.66. The highest value obtained satisfaction aspect with an average value of 2.98. this means the system has not been well prevent errors and help users recover from errors that might occur. But the assessment of the aspects of the system

satisfaction shows users are satisfied with the functionality of the website SHESOP.

2. The results of this study, SHESOP website development has generally been able to meet the information needs of users. However, the user calls for improvements in several ways, including the addition of disease detection function, the addition of better health advice, page layout dashboard, additional navigation aids, as well as additional service and menu.
3. Health suggestion is simple. The system can still be improved by providing the ability to predict the disease which may be incurred, suggestions for preventing the disease, suggestions to reduce the risk of the disease, suggestions for change and maintain a better lifestyle

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