[IT 9] COMPUTER-AIDED-BANDAGE-FABRICATION: FOR HAND INJURY

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ABSTRACT

Problems such as a broken arm injury requires treatment that is not troublesome patients. Most hand wraps used so troublesome when the patient feels itchy and when I shower. A prototype is created to issue a broken arm that makes it easy to perform activities and can prevent allergies. This prototype is drawn using software uploaded into the computer. The model is scanned to create a prototype that according to the desired size. After the sketch will be printed using 3D printing.

Keywords: bandage, hand, computer

INTRODUCTION

Crash problem often occurs at present and many issues that arise. Problems that are often associated with the problem is a broken bone. Fractures hand is one that is often seen in patients. broken hand will be in cement and allowed to heal. In this method, the patient will have to wait a long time to heal and the various issues that arise during the application of the cement. The cement that cannot be removed from the hands of the patient and when problems such as itching, pain and fever, patients had to refrain from handling the problem is gone. The impact of these problems a solution has been made. A prototype in sketch and created. The tool named arm bandage.

Arm bandage is a prototype patient-friendly because it is lightweight, can be opened when needed, beautiful and no problem about tingle. Arm bandage is sketched using a software called 'blender'. before it was drawn in a blender, hand the patient will be scanned and then put in a blender. The bandage will be by the hands of the patient. So, patients no longer have hands in the cement. the patient will feel comfortable with the bandage.

PROBLEM STATEMENT

The problem is the patients uncomfortable with cement used by the hospital for broken bones. The cement makes the patient becomes uncomfortable because when pain or itching, patients should not be eliminating itching or pain relief on the skin. In addition, patients are also difficult to move because of the heavy and difficult to remove from the hands. Patient difficult to hold hands or do something because the cement on hand is very heavy and tired patients likely to lift something. Hands will become weak and pale because no sun exposure. Most lighting will not be exposed to the skin on their hands.
because they are protected by cement and this will cause the patient to become pale hands.

**RESEARCH OBJECTIVE**

1. To scan the arm area
2. To design arm bandage using CAD method
3. To fabricate arm bandage that suitable with patient arm sizes
4. To test the arm bandage

**METHODOLOGY**

**Scanning**

![Scanner sense](image)

*Figure 1*
Scanner sense

Figure 1 is an example of scanner sense used in this study. The first step is scanning. This scan is called scanner, a tool used to scan the hand. Before the scan is done, the software downloaded into a laptop that is "sense". Sense serves as a software to record images from the scan and also a place to save the image of the scan. The scanner is used to scan hand and deposited into sense. To perform the scan, the midpoint of the scan on laptop noteworthy that did not happen trekking lost. Help a friend get some time to do this activity because it is quite difficult to get the right result. Good results will help to get a good design.

**Insert to software**

![Design from scanner](image)

*Figure 2*
Design from scanner
Figure 2, results from the scanner will be entered into the software for editing. Sense will be used to record the shape of the hand and the hand scanner will scan it. All dimensions will be viewed in 3D. Perfect shape will be selected for inclusion in the software and ready to be edited. Many steps that need to be done to get a design that follows the contours of the hand scanned.

**Design**

*Choice best design*

The best design in the search for a sketch by hand in the scan. Design it to be perfect and right according to the selected shape. All dimensions must be good and bad no defects.

*How to design*

In this section, the steps shown in detail developing. The first step in this process is to import 3D scan results into the software. Scanning models imported into the blender to modify the desired option. After that, the curve generated by the right and by the hand. After adjusting the bandage will form well-formed. Results are perfectly smooth, as shown in Figure 4.

*Printing (3D printing)*

The results show that the new method can be used to develop a prototype arm bandage. Hand experience of the problem can be resolved and sketches of software that are ready to be printed. 3D is a tool to print an item in 3D. Therefore, the design may be printed using 3D printing.

**RESULT**

This section discussed the process of 3D printing for the facial arm bandage.

*Result scanning*

Hands in physical form is scanned and converted into digital form. After that, the result is transferred to the sense of software called 3D builder. The results show that in the Figure 3.
Arm bandage design result
Arm bandage is made in the software called "Blender". There are several ways to make this design them subtract and union. The design results in a show in Figure 4.

![Image of arm bandage design](image)

**Figure 4**
Design arm bandage

3D printing result
Design of arm bandage has print with 3D printer. The 3D printer that been used is Flashforge Creator Pro Dual Head 3D Printer. Model has been modified before print in Makerbot software. Model has been saved in X3G format. The printing process took about 2 hours 35 minutes.

DISCUSSION
The project managed to identify a new method for developing software arm bandage using low cost and low-cost 3D printer. The objective of this project is to develop arm bandage using 3D printing and 3D scanning tool has been successfully achieved. Through this project, it brings to manufacturers and doctors within the low for medicinal purposes. The first advantage of this method is the low production cost. With a 3D scanner combined with a low-cost 3D printer low cost, arm bandage was reduced compared with conventional methods. The second advantage is time savings. For professional users, they should not take a long time to make this arm bandage. For the conventional method, it takes time to set up an arm bandage because the process is complicated. There are defects that vary for each issue is a broken hand. So, arm bandage should fit perfectly in accordance with the patient. The advantage of this method is a fourth green process. Using 3D printing technology, there is a zero-emission fuel. It reduces air pollution. Raw materials used in this project is the PLA, which is made of thermoplastic and corn starch, sugar cane and some polymers. Therefore, arm bandage is environmentally friendly and recyclable.

CONCLUSION
The project has been successful in identifying low-cost method to create a tool to help arm bandage that many in the medical field. This method has been explained and described in the paper. for the future research, researchers proposed to use methods that help issue a broken arm that is created using this method.
REFERENCES


