Design Of Formalin Use Investigation System In Food Using Android-Based Tcs34725 Color Sensor

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Abstract—A system design has been made that functions to investigate formalin in food. This tool uses a color sensor (RGB) with type TCS34725 which can be accessed through an android phone to display the contained formalin contamination. In general, this system consists of four parts, namely the color sensor, Arduino Nano CH340, Bluetooth HM-10, and Android. Samples tested were chicken and beef. The concentration of formalin given was 0%, 2% and 5%. The data collection process was repeated 15 times for each type of food sample. Indicators that appear on the display are color. Green indicates that the sample is not contaminated, while the red color indicates that the sample is contaminated with formalin. Testing formalin contamination of beef and chicken meat samples has an accurate value of 99%.

Keywords — Color sensor, formalin, android

I. INTRODUCTION

Food preservatives are used to slow down the decay process, so food becomes more durable. Some materials and preservation methods that are often used are natural preservatives such as salt, vinegar, drying and others. However, the use of natural preservatives uses expensive and less effective in preserving long-term food. Therefore, many people are switching with synthetic preservatives, because the price is cheap and makes food last longer.

As reported by the okezone.com online news page on 12/17/2018, there are several types of dangerous food preservatives that are often used such as borax and formalin and textile dyes, namely Methanyl Yellow and Rhodamin B. The use of formalin can be found in the society [2].

The method commonly used to detect the formalin content of foods today is the spot test method. The method requires expensive costs because this method is only done in the laboratory, while not everyone can test the sample to the laboratory, and only certain agencies are permitted [1]. Therefore, we need a special tool that is able to detect formalin content in food with a system that is easy, inexpensive, fast and can be used independently, so that people can check at any time.

Food contaminated with formalin has a change in color compared to food that is not contaminated. Proportional color intensity differences can be used to determine whether food is contaminated or not. Based on this, by utilizing a color sensor (RGB), a formalin contaminant detection device was made in the food called BOLIN DETEKTOR

II. RESEARCH METHODS

A. Analysis and Literature Study

The initial stage that needs to be done is the analysis and study of literature, while the activities carried out are gathering information about the characteristics of various food samples containing formalin.

B. Design and Planning Stage

In general the system only consists of four phases as shown in figure 2.
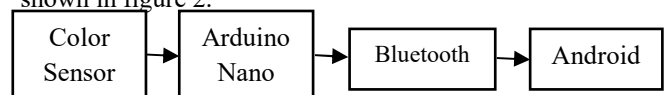

Figure 2. Parts of Bolin DETEKTOR

C. Hardware Assembly Stage

The activity carried out is to implement the component assembly in accordance with the design that has been made both at the design stage of the tool casing and at the schematic series stage. Then the wiring is done in accordance with the design of Photoshop software.

D. Programming Stage

After assembling the hardware, the program is loaded in the microcontroller by coding the Arduino IDE software in C language. The contents of the code include system control between the microcontroller with the TCS34725 color sensor and wireless Bluetooth communication control to the Android device.

E. Making food sample stage

The samples used were meatballs, chicken and beef. Each sample was made into 3 samples with 3 different

types of treatment. The sample would be given formalin treatment with different concentrations. The concentration of formalin given was 0%, 2% and 5%.

F. Testing Stage

The testing stage was carried out by looking at the ability and accuracy of the TCS34725 color sensor in identifying formalin in food. The data collection process was repeated 15 times for each type of food sample.

III. DISCUSSION

A. Food Sample

Food samples that have been given formalin contamination can be seen to have differences in each treatment given. Formalin contamination was given to chicken and beef meat samples. The more formalin content is given, the color in the food sample will be whiter, as in Figure 3.

B. The Appearance of Hardware and Software

The appearance of Bolin Detector can be seen in Figure 4, and software display can be seen in Figure 5.

(a)
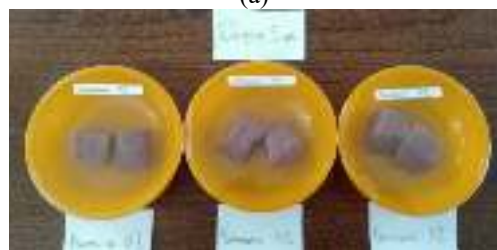
(b)

Figure 3. Formalin Contamination Sample (a) Chicken Meat (b) Beef

Figure 4. Appearance of BOLIN DETEKTOR

Figure 5. BOLIN DETEKTOR Software Display

C. Results of System Test

System testing is done on chicken and beef food samples. Indicators that appear on the display are color. Green indicates that the sample is not contaminated, while the red color indicates that the sample is contaminated with formalin. The results of system testing can be seen in table 1.

TABLE I. TEST RESULT OF SAMPLE WITH FORMALIN CONTAMINATION

Types of Food	Formalin Concentration	Sample	Results
Chicken Meat	0 %	1	Negative
		2	Negative
		3	Positive
	2 %	1	Positive
		2	Positive
		3	Positive
	5 %	1	Positive
		2	Positive
		3	Positive
Beef	0 %	1	Positive
		2	Negative
		3	Negative
	2 %	1	Positive
		2	Positive
		3	Positive
	5 %	1	Positive
		2	Positive
		3	Positive

Based on testing that has been done, BOLIN DETEKTOR can distinguish between samples without formalin contaminants and samples containing formalin. Testing formalin contamination of beef and chicken meat samples has an accurate value of 99%.

IV. CONCLUSION

Based on the results of this study, it can be concluded that food identification devices containing formalin have a color sensor input response that changes according to the color conditions of the food read by the TCS34725 color sensor from each sample.

This tool can distinguish between samples without formalin contaminants and samples containing formalin. The accuracy of this tool is 99%.

REFERENCES

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