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# Trainer Distance Sensor and Color Sensor As Learning Media

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***Abstract*—The advances in technology is developing rapidly.Entire household appliances and industries will use the technology with the principles of automation.Sensor as one important component in the automation function to sense any changes in the environment around.According to Accelerate the achievement of the learning process needed a media that simplify and accelerate the understanding of the learning process.Surabaya State University has a course of Electrical Engineering Education.One of the subjects that there are Electronic Components, who learn about the various sensors. Trainer of proximity sensor and color sensor as instructional media have two sensors namely infrared sensor of GP2Y0A21 and TCS230 color sensor. The results of the sensor output is read by the microcontroller ATmega16 which then converted into centimeters and frequency of colors to be displayed on the LCD 16x2.This study was conducted to determine the feasibility of the trainer along with experiment sheet and subsequently tested on 30 samples.Each student is given a sheet experiment to experiment. Assessment of experiment sheet readability is done by observing students doing experiments.Feasibility trainer's proximity sensor, and the color of 89.16%, while the feasibility of the experiment sheet amounted to 89.69%, which means fit for use as a media of learning.Results of testing the readability of students to experiment sheet obtained by 93.12%, which means that learning media eligible for use in teaching and learning.**

***Index Trems*-- GP2Y0A21 proximity sensor, a color sensor TCS230, experiment sheet.**

## I. INTRODUCTION

The advances in technology is developing rapidly.The sensor serves to sense any changes in the environment around as well as the senses for example temperature sensor that can sense temperature changes occur, the proximity sensor that can measure the distance of objects that are in front of us, the gas sensor to identify and measure the gas levels, weight sensor can measure the weight ofan object, the sensor identifies the color of a color and many more types and the use of sensors.

Intrumentasi technological developments that utilize infra red rays in the field of health, industry, telecommunications and others. Infrared is used as a counter or detector of objects through it, human motion detection in a room and also as a distance meter. Distance measuring sensor that uses a lot of ultrasonic waves compared to infra-red and therefore need to be developed sensors that use infrared range.

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Education is an effective means to support the development and improvement of human resources toward a more positive direction.The progress of a nation depends on the quality of human resources, where it is determined by their education. As stated in Laws No. 20 of 2003 on National Education System, one of the contents concerning education is a conscious and planned effort to create an atmosphere of learning and learning process so that learners actively develop their potential to have spiritual power, self-control, personality, intelligence, noble character and skills needed him, society nation and state. School is a place to study and prepare a person for the challenges of the future.

Supporting media in the form of color sensor trainer is not currently owned by the laboratory at the Department of Electrical Engineering, State University of Surabaya. In addition to the color sensor, proximity sensor is also not owned by the laboratory in the Department of Electrical Engineering, State University of Surabaya, so it takes Trainer color sensor in the course of electronic components and sensors within a development discussion sensor material in the course of electronic components.

Based on the background described above, various problems faced by development trainer is (1) How the feasibility Trainer Proximity Sensor and color sensor as the Learning Media Electronics Components courses at the State University of Surabaya?(2) How is the implementation and legibility experiment Trainer Proximity Sensor sheet and color sensor as the Learning Media Electronics Components courses at the State University of Surabaya?

The boundaries of the discussion to be more effective in accordance with the purpose of: (1) The object of this research was conducted at the Surabaya State University student in Electrical Engineering Department of Electrical Engineering Education Program Electronic Telecommunication fields of study that have been through the course of electronic components.(2) The proximity sensor is a proximity sensor that is used GP2Y0A21.(3) The color sensor used is TCS230 color sensor.(4) The microcontroller used is ATMega 16. (5) Display output is presented on a 16x2 LCD measurement.

The benefits of this research are as follows: (1) Provide input and information to educational institutions to further develop the infrastructure and facilities in an effort to improve the competence and student learning outcomes.(2) Assisting lecturers to improve the knowledge and materials to better know and understand about the proximity sensor. (3) It is expected that students can quickly understand in learning about the components of electronics and sensors, especially the proximity sensor and color.

The definition of media, [1][11]suggests that the media when understood in broad outline is human, material or events that create conditions that enable students to acquire

knowledge, skills or attitudes. According to [2] following criteria (1) Theaccuracy with teaching purposes.This means that the media must be in accordance with the purpose of learning so that the media can help in achieving the learning objectives.(2) Support to the content of the lesson material.Instructional media must have the conformity of the content so that it supports.(3) Ease of getting media (4) teachers skill in using it.(4) Available time to use it. (5) In accordance with the level of thinking.

Sensor or transducer is a device that serves to convert the quantity being observed or measured, for example, mechanical movement, temperature, pressure, or force, into an electrical signal [3]. Infrared sensor used is GP2Y0A21.Infrared sensor which utilizes as a measure of distance.GP2Y0A21 is a distance measuring sensor signal and the output of the process Integrate analog voltage [3].The proximity sensor works on the principle of infra-red light reflection and time received by the detector is used to detect a specific object in front of the sensor.

Color sensor used is TCS230.This color sensor using a photodiode to read the reflected color of the LED light.These sensors convert light into frequency color, with a square wave output [4]. These sensors pick four LEDs to illuminate the color to be identified.Sensors will be faced with shining colors that will be identified with a distance of 2 cm, thus light reflections will be read by the photodiode.Photodiode contained in this sensor array shaped 8 x 8. Sixteen photodiode has a blue filter, sixteen photodiode has a green filter, sixteen photodiode has a red filter, and sixteen white photodiode with no filter [4][5][8][10].Electromagnetic waves are the two fields (electric and magnetic fields) changing travel at the same speed with the rapid propagation of light [6].

Light waves or visible light is a wave that is very important.This wave has a narrow region of the spectrum between 7800Å to 3900Å. The colors produced by light to the eye depend on the frequency or wavelength of light.

## II. METHOD

In This Research Using R & D Method (Research And Development). The Steps Of The R & D Method Are As Follows:Research is only done until the trial use of the product because the results of this study is not a mass produced product but a product that has been tested feasibility and applicability along with analysis of its use that can be developed further in the future. Chronology of the study as follows:

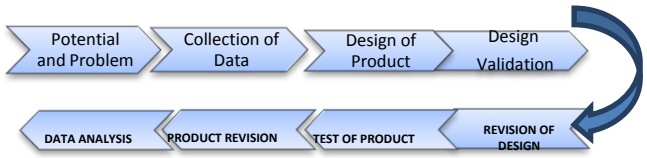


Figure 1.Step Research

So the revision stage product and mass production is not carried out and analyzed the data based on the results of product testing and trial use of the product. The subject of this research is Trainer of Distance Sensor and Color sensor trainer which is tested to the Electrical Engineering student of Surabaya State University concerned with the field of Electronics. The research time will be conducted in Odd Semester 2015. This research will be conducted in Electrical Engineering Department.

Trainers made consist of GP2Y021 distance sensor, TCS230 color sensor, ATMega16 microcontroller and 16x2 LCD display. The following block diagram trainer.


Figure 2. Block diagram trainer

The instrument used to collect the data, where the data will be used as a reference for assessment by experts of the trainer produced.The research instrument used in this study were (1) sheet product validation (trainer and experimentsheet), (2) Observation sheet experimentsheet legibility.

Data analysis method is used to determine the effectiveness of a method in a study. This study used a qualitative descriptive analysis technique which means illustrates the fact or facts in accordance with the data obtained in order to determine the results of the effectiveness and feasibility of the tools resulting from this research.Data analysis methods were used: (1) Analysis of Data Validator, and (2) The level of implementation and Readability Experiment Sheet.

From the results of the validation sheet can be determined eligibility media that have been made.Assessment to measure the feasibility of instructional media is done by responding to the criteria is very good, good, not good, not very good.Validation sheet analysis done by responding to the following criteria: no good, fairly good, good, and excellent. Analyzing the validator's answer needs to be analyzed to find out the result of the feasibility of using the rating result.Level of Experiment Sheet implementation and readability, calculation of the result of the overall observation sheet is analyzed using percentage.

## III. RESULTS AND DISCUSSION

The products resulting from this research is the media trainer proximity sensor and a color sensor and experiment sheet.Trainer Results proximity sensor and a color sensor as shown below.

Figure 3. Trainer Sensor distance and color sensor

Trainer proximity sensor and a color sensor tested before being used in learning.The trial results trainers to measure the distance of objects as follows.

Table 1. Data Measurement sensor Distance

| Actual distance (CM) | Distance read (CM) |
|---|---|
| **4** | 9 |
| **5** | 8,25 |
| **6** | 7,15 |
| **7** | 7,5 |
| **8** | 7,97 |
| **9** | 9 |
| **10** | 10,3 |
| **11** | 11,35 |
| **12** | 12,15 |
| **13** | 12,87 |
| **14** | 13,84 |
| **15** | 15,15 |
| **16** | 16,13 |
| **17** | 17,1 |

The results of distance measurement test using distance sensor obtained sensitivity and accuracy of distance sensor at distance of 7 CM to 15 CM.

While the results of color sensor testing by identifying the color card as follows:

Table 2. Identification Data Color

| Card color | Frequenci ( Hertz ) | The color the trainer reads |
|---|---|---|
| **Red 1** | 62700 | Red 1 |
| **Blue 1** | 11500 | Blue 1 |
| **Blue 4** | 34700 | Blue 4 |
| **Green 1** | 15400 | Green 1 |
| **Green 3** | 60600 | Green 3 |
| **Yellow 1** | 18900 | Yellow 1 |
| **Yellow 3** | 26300 | Yellow 3 |
| **Pink** | 38500 | Pink |
| **Purple** | 53700 | Purple |
| **Brown** | 21700 | Brown |

The results of color identification tests using color sensors obtained sensitivity and accuracy of color sensors for reading colors include blue, yellow, green, red, purple, pink and brown.

From the assessment results of the three validators will be calculated the rating results of each aspect that has been assessed and the rating results will be categorized according to the rating scale.

The result of the trainer validation assessment by the three validators is shown in Table 3.

Table 3. Trainer Rating Validation Results

| No. | Instrument | Rating result | Kategory |
|---|---|---|---|
| **1** | Trainer | 89,16% | Good &feasible |
| **2** | Experiment Sheet | 89,69% | Good &feasible |

The results of the experiment sheet legibility test consisted of two experiments that measured the distance, and identified the color. This assessment is carried out for 30 samples of students who are divided into two classes, namely, A andB by observation.

In the first experiment to measure the distance, students are given knowledge of the sensor, the sensor readings output data and process the sensor readings.Students are individually trying to practice the instruction contained in each experiment sheet.The result of student observation test on the legibility of experiment sheet in the use of distance sensor and color sensor. Table 4 contains the results of the observation test of experimental sheet test in experiment I.

Table 4. Test results of experiment sheet legibility in experiment I

| No. | Criteria | Rating Result |
|---|---|---|
| **1** | Process assessment | 82,81% |
| **2** | Psychomotor assessment | 98,22% |
| | **Average** | **90,51%** |

In a second experiment, identifying the color, students are given knowledge of the color sensor, the sensor readings output data and process the sensor readings.Students are individually trying to practice the instruction contained in each experiment sheet.The test results of students to legibility experimental observation sheet in trainers use a proximity sensor and color. Table 5 contains the results of the observation test of experiment sheet readability in Experiment II.

Table 5. Result of observation test of experiment sheet legibility in experiment II

| No | Criteria | Rating Result |
|---|---|---|
| **1** | Process assessment | 93,25% |
| **2** | Psychomotor assessment | 98,22% |
| | **Average** | **95,73%** |

From data in Table 4 and Table 5, it can be concluded that the observation of legibility experiment sheet in the experiment I and experiment II trainer distance and color sensors can be categorized very well with the result of

93.12% rating.Based on the ratings data, it is feasible to use instructional media.

## IV. CONCLUSION

Based on the results of research and discussion can be concluded as follows:

Learning media use the distance and color sensor in the subjects of electronic component at the Department of Electrical Engineering, State University of Surabaya to know the feasibility, it is divided into two parts, namely: (1) the feasibility test on the eligible trainers (very eligible) with details in the form of rating result at trainer 89.12%, with some aspect in it. In the ergonomic aspect of the color sensor trainer trainer has a percentage of 87.49%, the aspect of the circuit has a percentage of 90%, and in the aspect of dimensions has a percentage of 89.99%. The feasibility test on the eligible experiment sheet with the details of the rating on the 89.69% experiment sheet, with some aspects in it. In the aspect of the layout and the layout of the worksheet has a percentage of 88.88%, the illustration aspect has a percentage of 88.48%, and the content aspect has a percentage of 91.71%. This means the learning media is very feasible to be used for the learning process.

In the testing of experiment sheet legibility to know the process and psychomotor level of the students in the use of the distance sensor and the color sensor as the media in the electronic component course is divided into two parts of the experiment. In the first experiment of the distance measurement obtained completeness percentage of students in group A and group B by 90.51%.In a second experiment about recognizing or identifying colors completeness students obtained percentage of 95.73%.In this case means the students of that class otherwise have reading level high with indicators mostly students were able to carry out practical activities and are able to solve problems in the experiment sheet that has been created for the learning activities using the trainer proximity sensor and color for the students in the subject of electronic components in the programelectrical engineering, state universityof surabaya.

## V.SUGGESTION

It is hoped to develop similar research, so it could focus more attention to the function and materials designed to make it more complete and varied, and add the components that the latest technology to allow students to develop their new material and have insight knowledge and psychomotor abilities are good so that students can applyproximity sensor application and the color in everyday life in order to assist the work of humans in the future.

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