

Quality Detector Level to Ripe Guava Gondang Sweet Jombang

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ABSTRACT

in the modern era, many modern tools are used in daily activities, especially in terms of selling fruit, actually in terms of selecting the quality of the fruit on a large scale which in this case still uses the old method, which is only using the human sense of sight and smell system. In this problem, a system for detecting the quality of fruit maturity levels is made digitally where the system detects fruit that can be used on a large or large scale by using a sensor device and then displayed on an LCD using Arduino Uno as the brain of the system and TCS3200 sensors and large-sized LCDs. 16x2 ple i2c.

Keywords: Color Sensor TCS3200, Arduino Uno, LCD 16x2.

INTRODUCTION

In the Jombang area, precisely in the Gondang Manis Village area, Bandar Kedungmulyo District, Jombang Regency, there is a fruit that is characteristic of the area there, namely Gondang Manis guava fruit where the fruit has been widely sold to various areas around Jombang and guava is also one of the livelihoods. local residents, so many people or collectors come to the village. The problem is that many traders or collectors are not right in choosing ripe fruit and in good condition because someone determines ripe fruit with good quality only by using the sense of smell or only relying on experience which of course cannot be maximized and guarantees the choice to be chosen Well.

For that we need a system that can reduce these problems so that the determination of the maturity level of guava fruit will be easier and more precise, with a combination of the seller's experience in choosing durian fruit and the help of electronic devices, even for ordinary people who do it. do not have experience in choosing guava fruit. help with that (Hardiyanto & Airlangga, 2021). Then came the prototype of detection and sorter of sweet gondang guava maturity based on color using an Arduino microcontroller to distinguish the color of ripe and rotten fruit. This prototype consists of an LDR sensor and an RGB LED to distinguish colors, two servo motors as a driver and an Arduino microcontroller as a controller, How to generate a new light color with mixing 2 or more light colors is called "additive color mixing" (Sufaidah & Asyari, 2021). The main colors of light (red, green, blue) are then known as additive primaries (Enita, 2019). mixing 2 or more light colors is called "additive color mixing". The main colors of light (red, green, blue) are then known as additive primaries. In this way, sellers and buyers can both buy or sell sweet gondang guava fruit with good quality. At first they chose to use only ordinary senses, but now they can use an electronic detection system.

METHOD

The research was carried out using an experimental method where a series of designs and experiments were carried out directly based on a study of field experience in traditional markets so as to produce the expected research. Here are the steps :

- System analysis
First step is system analysis that must be done to analyze and prepare the needs that are needed to create a scholarship application program and the features that the user needs.
- Design
Second step is design which is the creation of data structure, easy-to-understand and coding procedures.

- Program Code Generation
This step translates the design into a software program. Program code generation generates interfaces according to the previous design.
- Testing
At this stage, final testing is carried out on the system that has been made to determine the level of success according to the scenario of the goals to be achieved.
- Maintenance
The final stage of maintenance of this software does not include the possibility of the software encountering an error when executed because it was not detected during testing. With this stage is expected in the future able to do developments.

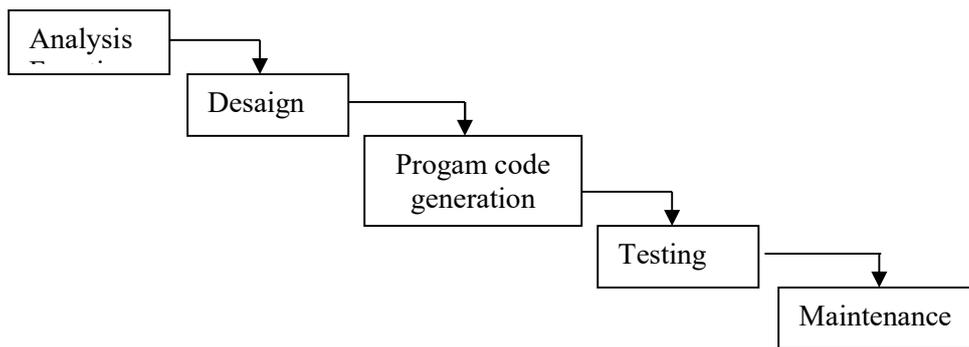


Figure 1. Waterfall Diagram

System Design

The design of the tool is made to help and make it easier to work on the tool to be made. The design of the tool starts from making a block diagram where each block has its own interrelated function so as to form a system of tools to be made. The block diagram of the system can be seen in the image below.

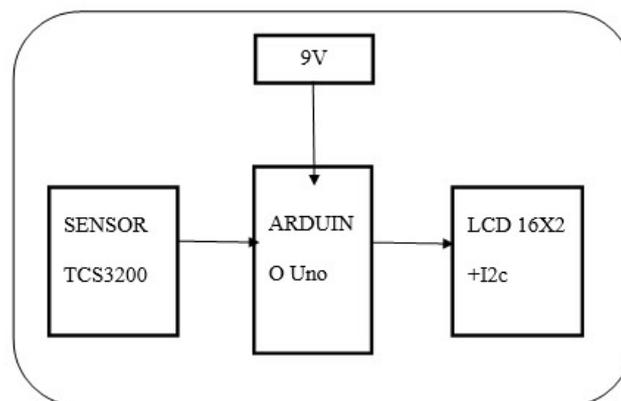


Figure 2. System Flowchart

Function Of Each Block Diagram

- One Power is used for power supply as well as for outputting DC to power the circuit.
- Arduino is used for the command center or main processor, because all commands will be carried out through Arduino.
- The TCS3200 sensor is used to read or detect an object.
- LCD (Liquid Crystal Display) is used to display colors that have been detected by the color sensor..

RESULT AND DISCUSSION

Implementation of this system is the implementation stage of the design that has been made. In this section, we will discuss the core implementation of the Arduino fruit ripeness quality detection tool.

Result

- Making a quality detector for Gondang Sweet guava fruit in Jombang begins with assembling the necessary tools such as Arduino Uno, Tcs3200, Batteries, 16 x 2 LCD and finally a container to unite all of the above tools into one to make it a little neater. The following are the results of the following set of tools:



Figure 3. Set of Tools

- Writing and uploading coding is done after the assembly is complete so that the tool can run according to the commands entered into the Arduino Uno which uses the default application, namely Arduino IDE, which includes commands to display the LCD display, instruct the sensor to work and analyze the colors to be scanned.

```
Kematang_Buah | Arduino 1.8.15 (Windows Store 1.8.40)
File Edit Sketch Tools Help
Kematang_Buah
delay(250);

digitalWrite(82, LOW);
digitalWrite(83, HIGH);
f_blue = pulseIn(OutputSensor, LOW);
Serial.println("B = ");
Serial.println(f_blue);
delay(250);
analogWrite(f_red, f_green, f_blue);
delay(500);
}

void setup(int red,int green,int blue){
  pinMode(13);
  pinMode(82,0);
  pinMode(83,1);
  pinMode(10,0);
  pinMode(11,1);
  if(red > 518 && red < 555 && green > 430 && green < 470 && blue > 425 && blue < 465){
    digitalWrite(10, HIGH);
    digitalWrite(11, LOW);
  }
  else if(red > 315 && red < 355 && green > 490 && green < 530 && blue > 400 && blue < 440){
    digitalWrite(10, HIGH);
    digitalWrite(11, HIGH);
  }
  else if(red > 400 && red < 440 && green > 380 && green < 420 && blue > 550 && blue < 590){
    digitalWrite(10, LOW);
    digitalWrite(11, HIGH);
  }
  else{
    digitalWrite(10, LOW);
    digitalWrite(11, LOW);
  }
}
}
```

Figure 4. Arduino Uno Coding Script.

- The main page that displays a detector where when the gondang sweet guava is brought near the TCS3200 sensor, the display will change according to the quality of the ripeness of the fruit itself where there are three states, namely raw, ripe, very ripe and if the color is not detected then the screen will display "Undetected fruit".



Figure 5. Tool After Installation.

Discussion

The main page that displays a detector where when the gondang sweet guava is brought near the TCS3200 sensor, the display will change according to the quality of the ripeness of the fruit itself where there are three states, namely raw, ripe, very ripe and if the color is not detected then the screen will display Undetected fruit.



Figure 6. Android Application Logic Block

As for the display when the sensor tries to detect an object and starts analyzing the color of the object if something is brought close to the sensor and the results will be displayed on the LCD, but if the color does not match or the object near the sensor has many colors then the sensor will not work because the sensor only able to analyze one color.



Figure 7. Detect Object Color

This section only consists of a 2 X 16 character dot matrix LCD that serves as a display of measurement results and display of some information. The LCD is connected directly to Port B of the microcontroller which functions to transmit the processed data to be displayed in alphabetical and numeric form on the LCD. The character display on the LCD is controlled by the EN, RS and RW pins: the EN line is called Enable. This line is used to tell the LCD that it is sending data to send data to the LCD, then the EN program must make a logic low "0" and set (high) on the two Read/Write control lines. When Rw is logic low (0), then the information on the data bus will be written on the LCD screen. When RW has a high logic "1", then the program will read the memory from the LCD. Based on the information above, we can make a program to display the characters on LCD.



Figure 8. Display Test.

Testing the photodiode circuit and infrared sensor by measuring the voltage sent to the microcontroller when the infrared LED beam is blocked and unobstructed. Then in my tool, the application of this photodiode sensor is as a color detector on colored solid objects that absorb light from the sensor. The program below is a program to find out whether the sensor is running properly. The sensor function can be seen from the data sent from the microcontroller to the computer via a serial monitor, then it will display a color sample in the form of red at what number, green and also blue.

As for the display when the sensor tries to detect an object and begins to analyze the color of the object if something is brought closer to the sensor and the results will be displayed on the LCD, but if the color does not match or the object near the sensor has many colors then the sensor will not work because the sensor is only able to analyze one color.

From the data above, the color samples that we will use for detecting the quality of the Gondang Sweet Jombang guava come out as follows.

Table 1. Color Sample.

NO	RAW	RIPE	VERY MATURE
1	R = 413 G = 396 B = 573	R = 333 G = 509 B = 430	R = 535 G = 655 B = 655
2	R = 412 G = 397 B = 569	R = 327 G = 511 B = 416	R = 535 G = 649 B = 643
3	R = 412 G = 396 B = 570	R = 330 G = 506 B = 416	R = 531 G = 648 B = 636
4	R = 413 G = 399 B = 568	R = 331 G = 506 B = 417	R = 537 G = 648 B = 637
5	R = 413 G = 396 B = 571	R = 333 G = 512 B = 411	R = 528 G = 649 B = 636
6	R = 413 G = 392 B = 572	R = 334 G = 513 B = 416	R = 529 G = 654 B = 637
7	R = 420 G = 398 B = 579	R = 330 G = 505 B = 418	R = 533 G = 648 B = 637
8	R = 420 G = 391 B = 564	R = 332 G = 512 B = 410	R = 536 G = 648 B = 637
9	R = 416 G = 398 B = 573	R = 329 G = 512 B = 411	R = 539 G = 654 B = 642
10	R = 422 G = 398 B = 575	R = 330 G = 505 B = 417	R = 544 G = 654 B = 642
11	R = 422 G = 391 B = 567	R = 335 G = 512 B = 410	R = 535 G = 653 B = 668
12	R = 419 G = 397 B = 569	R = 330 G = 512 B = 410	R = 532 G = 650 B = 644
13	R = 422 G = 397 B = 567	R = 330 G = 511 B = 411	R = 532 G = 648 B = 646
14	R = 425 G = 397 B = 568	R = 330 G = 505 B = 416	R = 532 G = 648 B = 639
15	R = 414 G = 391 B = 565	R = 335 G = 506 B = 417	R = 532 G = 648 B = 639

From the sample above, the minimum and maximum are taken from each condition

- Raw has color criteria = (Red : 400 - 450, green : 380 - 420, blue : 550 - 590)
- Ripper has color criteria = (Red : 315 – 355, green : 490 – 530, blue : 400 – 440)
- Very mature has color criteria = (Red : 515 – 550, green : 630 – 670, blue : 625 – 665)

Table 2. PIR Sensor Testing

CONDITION	RANGER					
	R	R	G	G	B	B
RAW	400	450	380	420	550	590
RIPPER	315	355	490	530	400	440
VERY MATURE	515	555	630	670	625	665

CONCLUSION

The fruit quality detector has been successfully made and the detected fruit has been read for quality and displayed on the LCD.

The detector has succeeded in selecting the quality of the fruit where

The accuracy of the sensor depends on the detected color because it only reads objects at a very close distance and also the speed of the sensor reading the fruit depends on the light. The program that has been created can only compare the similarity of two colors image. The results of this experiment are also only looking for similarity in color distribution, not on size. (Jatmika & Purnamasari, 2014)

SUGGESTION

From this final project, there are still some shortcomings and it is possible to develop it further. Therefore, the author feels the need to provide the following suggestions:

- It is better if the tool that has been designed can detect fruit ripeness, not only the color can be detected, so that the tool can function better.
- Need a proper understanding of how the TCS3200 sensor works.
- The tool should not only detect tomatoes, but can detect different fruit colors.

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