

Programmed Natural Product Sorting Machine Based On Color and Weight Utilizing AVR Microcontroller

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Abstract-Sorting of items is an extremely troublesome modern process. Ceaseless manual sorting makes consistency issues. This paper depicts a working model intended for programmed sorting of articles in view of the color and weight. TCS230 sensor was used to recognize the color of the product, load cell was utilized to gauge the weight and the AVR microcontroller was utilized to control the general procedure. The distinguishing proof of the color depends on the recurrence examination of the yield of TCS230 sensor. Conveyor belts was utilized, controlled by partitioned DC engines. The belt is for putting the item to be examined by the color sensor and weight sensor and a moving system having isolated compartments, keeping in mind the end goal to isolate the items. The exploratory outcomes guarantee that the model will satisfy the requirements for higher creation and exact quality in the field of mechanization.

Keywords-Weight Sensing, Color Sorting, AVR, DC Motor, TCS230

1. INTRODUCTION

Machines can perform exceedingly monotonous undertakings superior to people. Laborer exhaustion on sequential construction systems can bring about lessened execution, and cause challenges in keeping up item quality. A representative who has been playing out an investigation assignment again and again may in the end neglect to perceive the color of item. Mechanizing a large number of the assignments in the enterprises may enhance the effectiveness of assembling framework. The reason for this model is to plan what's more, actualize a framework which consequently isolates items in light of their color and weight. This machine comprises of five parts: conveyor belt, color sensor, weight sensor, buzzer and dc motor. The yield and contribution of these parts was interfaced utilizing AVR microcontroller. To lessen human endeavors on mechanical moving distinctive sorts of sorting machines are being produced. These machines are too exorbitant because of the multifaceted nature in the creation procedure. A typical necessity in the field of color sorting is that of color detecting, weight sensing and recognizable proof.

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at the speed of generation line. They are utilized as a part of sequential construction systems to recognize and group items by color. The goals of their use incorporate to check the nature of items. Subsequently, there is a wealth of color sensors and the decision is frequently application-driven [1,2].

In[3] the process used is to separate image into several areas to get only the particular area of interest from its background. It consist of image segment which is based on traditional methods like Otsu, K-mean and Fuzzy C-mean. But it does not produce accurate segment as there is existence of illumination on the object surface. As per [4] the author proposed a system which identifies the external and internal inspection stage. It is just used to inspect the internal and external conditions of oranges. This system does not take into account that if another fruit same as that of orange comes in between, discarding technique is not provided here.

A system which sorts the fruit based on its maturity. Here the sensing is done at frequency of 915 MHz to classify the Durian fruit. But this system fails to measure weight of the Durian[5].

2. SENSING AND IDENTIFICATION OF COLOR

Color sensor frameworks are progressively being utilized as a part of computerized applications to recognize computerization blunders and screen quality at the speed of generation line. They are utilized as a part of sequential construction systems to distinguish and arrange items by color. The destinations of their use incorporate to check the nature of item, to encourage sorting and bundling, to survey the uniformity of items away, and to screen squander items. Thus, there is a wealth of color sensors and the decision is frequently application-driven. Minimal effort and basic color sensors are favored over complex answers for less requesting applications where the top need is cost and power utilization. Color names can be utilized and summon sensibly predictable recognitions. There have eleven fundamental color names that have been recognized, for example, white, dim, dark, red, yellow, green, blue, orange, purple, pink, and cocoa. Most or all colors can be depicted as far as varieties and mixes of these colors. Because of the way that human color vision is achieved to some extent by three distinct sorts of cone cells in the retina, it takes after that three qualities are essential and adequate to characterize any color. Color hypothesis portrays that there are three values that can be considered as directions of a point in three-dimensional space, offering ascend to the idea of color space. Hue, saturation, luminance is one such color co-ordinate framework, or color space.

3. METHODOLOGY

3.1. Block Diagram

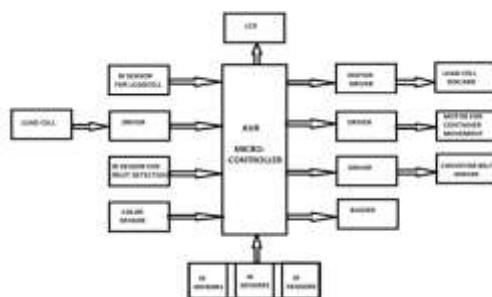


Fig. 1. Hardware design of the proposed system

3.2. Description

In this prototype, the IR sensor for load cell is used to sense the fruit. Load cell measures the weight of the fruit arrived and if it is in the prescribed range then it will move further for color sensing. If it is not in the prescribed range then it will be smoothly discarded in the container. When it move further then second IR sensor will detect the fruit and the color sensor will sense the its color. Depending on the frequency analysis technique it will detect its color. According to its color it will be placed in the respective containers. Every container will have a separate IR sensor. This sensors are used to check whether the containers are full or not. If it is full then the buzzer will buzz and the LED of the respective container will glow. Thus, we can replace the container.

4. PROTOTYPE DESIGN PARAMETERS

4.1. AVR Microcontroller

The Atmel 8-bit AVR RISC-based microcontroller consolidates 32 kB ISP flash memory with read-while-compose capacities, 1 kB EEPROM, 2 kB SRAM, 23 universally useful I/O lines, 32 broadly useful working registers, three adaptable clock/counters with think about modes, inner and outer intrudes on, serial programmable USART, a byte-arranged 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-directs in TQFP and QFN/MLF bundles), programmable watch dog clock with inside oscillator, and five programming selectable power saving modes. The gadget works between 1.8-5.5 volts. The gadget accomplishes throughput moving toward 1 MIPS for each MHz.

4.2. TCS230

The TCS230 is a programmable color detecting module outfitted with GY-31 light-to recurrence converter that consolidates configurable 8x8 silicon photodiode exhibit as single solid CMOS incorporated circuit. The yield is a square wave (50 rate duty cycle) with recurrence straightforwardly corresponding to light power (irradiance). The full scale yield recurrence can be scaled by one of three preset qualities by means of two control input pins. Advanced information sources and computerized yield permit guide interface to a microcontroller or other rationale hardware. Yield empower (OE) places the yield in the high impedance state for different unit sharing of a microcontroller input line. The light-to-recurrence converter peruses a 8 x 8 cluster of

photodiodes. Sixteen photodiodes have blue channels, 16 photodiodes have green channels, 16 photodiodes have red channels, and 16 photodiodes are clear without any channels. The four sorts (colors) of photodiodes are between digitated to limit the impact of non-consistency of occurrence irradiance. Every one of the 16 photodiodes of a similar color are associated in parallel and which sort of photodiode the gadget utilizes amid operation is stick selectable. Photodiodes are 120 mm x 120 mm in size and are on 144-mm focus.

4.3. LOAD CELL

Applicable to electronic scale, price computing scale, electronic platform scale, digital scale; parcel post scale, electronic balance and all varieties of commercial scales by single load cell. It can measure upto 10 kg of weight. Material used is aluminum.

4.4. LCD Display

LCD Display generally used to display the weight . It is a 16X2 characters display.

4.5. DC Motor & Motor Driver

The L293 and L293D are quadruple high-momentum half-H drivers. The L293 is intended to give bidirectional drive streams of up to 1 An at voltages from 4.5 V to 36 V. The L293D is intended to give bidirectional drive streams of up to 600-mA at voltages from 4.5 V to 36 V. Both gadgets are intended to drive inductive loads, for example, transfers, solenoids, dc and bipolar venturing engines, and in addition other high-present/high-voltage stacks in positive-supply applications. 60RPM Center Shaft Economy Arrangement DC Engine is fantastic ease DC outfitted engine. It has steel gears and pinions to guarantee longer life and better wear and tear properties. The gears are settled on solidified steel shafts cleaned to a mirror wrap up. The yield shaft turns in a plastic bushing. The entire get together is secured with a plastic ring. Gearbox is fixed and greased up with lithium oil and require no support. The engine is screwed to the apparatus box from inside. Although engine gives 60 RPM at 12V yet engine runs easily from 4V to 12V and gives extensive variety of RPM, and torque. Tables underneath gives genuinely smart thought of the engine's execution as far as RPM and no heap present as an element of voltage and slow down torque, slow down present as a component of voltage..

4.6. IR Sensor

It is a similar standard in ALL Infra-Red closeness sensors. The essential thought is to send infrared light through IR-LEDs, which is then reflected by any object in front of the sensor. At that point every one of the one need to do is to get the reflected IR light. For recognizing the reflected IR light that was transmitted from another driven. This is an electrical property of Light Transmitting Diodes (LEDs) which is the way that a drove creates a voltage difference over its leads when it is subjected to light. As though it was a photograph cell, yet with much lower yield current. At the end of the day, the voltage created by the LED can't be - in any capacity - used to produce electrical power from light, it can scarcely be recognized. That is the reason as one will see in the schematic, Operation Amp (operational Amplifier) will precisely recognize little voltage changes. Both the sender and the beneficiary are developed on a similar board.

5. ADVANTAGES

1. No defect in color recognition.
2. Manual work is reduced.
3. We can sort fruits according to the required range.
4. Time required in detecting the color is less.
5. We know that human eyes can cause errors in the detection of color of fruits but here detection of color is 100 percent.

6. APPLICATIONS

This system can be used in many large scale industries where packed fruit juices are manufactured. Fruits can be easily sorted here without human interventions.

7. CONCLUSION

This work displays new coordinated procedures for sorting of different organic products. By and large picture catch is a major test as there is a shot of high instability because of the outside lighting conditions, so we are taking the favorable position of dark scale picture which are less affected to the outer environment changes as well as beneficial for finding size of an organic product. Sorting can be efficiently done.

8. FUTURE WORK

It is extremely valuable in wide assortments of ventures alongside the assistance of PLC and SCADA, particularly in the bundling segment. Programmed sorting machine upgrades productivity, common sense, and security of administrators. It guarantees surprising handling limit and in addition flawless execution including shading discovery. Obviously we have to include fast DC engines and sensors with obvious reaction to accelerate the framework for modern application. The model can be enhanced by rolling out a few improvements in the program and parts. A few recommendations are given underneath.

- We can include a counter to count the quantity of items.
- Speed of the framework can be expanded accounting to the speed of generation.
- The framework can be utilized as a quality controller by including more sensors.
- The sensor can be changed by the sort of item.
- The DC engine can be replaced with stepper engine.
- The AVR can be replaced with PLC.

Instrument and Control Engineers(SICE2002), Osaka, Japan, August 2002, pp 1346-1351.

[5] P.Leekul, S.Chivapreecha, *Member, IEEE*, C.Phongcharoenpanich *Member, IEEE* and M.Krairiksh *Senior Member, IEEE*, "Rician k-factors based Sensors For Fruit Classification by Maturity Stage."

REFERENCES

- [1] C. Zhang and K. S. Suslick, "Colorimetric sensor array for soft drink analysis", *J. Agric Food Chem*, vol 55, pp 237-242, 2007.
- [2] H. Escid, et al., "0.35 mm CMOS optical sensor for an integrated transimpedance circuit", the *International Journal on SmartSensing and Intelligent Systems*, vol. 4, no. 3, pp. 467481, September 2011.
- [3] Hamirul' Aini Hambali, Sharifah Lailee Syed Abdullah, Nursuriati Jamil, Hazaruddin Harun, "A Rule-based Segmentation Method for Fruit Images under Natural Illumination", 2014 International Conference on Computer, Control, Informatics and Its Applications.
- [4] John B. Njoroge, Kazunori Ninomiya, Naoshi Kondo and Hideki Toita, *Automated Fruit Grading System using Image Processing*, The Society of