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Smart feature based apple sorting system

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ABSTRACT

In automation world, sorting of apples manually produce consistency issue. Continuous manual sorting is time consuming and desires high labour value. The proposed technique is an effort to sort apple automatically supported digital image processing. A color based apple sorting system is intended with Arduino Uno microcontroller, Servo Motor, USB cable with the assistance of Matlab and Arduino computer code programming. In MATLAB computer code, specific program is written to perform the specific task like image handling and color detection. The Arduino Uno microcontroller handles overall operation by getting binary input from the computer and control DC servo motor. Servo motor issued to place detected apple in respective place. This smart feature based apple sorting system sorted red and green apple with accuracy of 95%.

Index Terms: Image processing, image handling, color detection and sorting, DC servo motor.

INTRODUCTION

Automated image processing is technique, wherever we have a tendency to provide an image as input to come up with output, without giving the other data. DIP focuses on drawback, we have a tendency to propose "Smart feature based apple sorting system". This paper shows a replacement approach for continuous recognition and sorting of apple into desired location. A color based apple sorting system is researched, designed and created with Arduino Uno microcontroller, Servo Motor, USB cable with the assistance of Matlab and Aurdino computer code programming. In MATLAB computer code, specificdeveloping automatic data process system that's able to perform processing on a picture. Ancient technique of sorting red and green apples manually consumes more time and unable to induce consistent output. To avoid this program is written to perform the specific task like image handling, color detection, etc. The binary data send to Arduino Uno that successively adjusts the servo motor that settled slightly below the propeller to move with the angle of 0^0 and 180^0 depends on the apple color. The stations are in a red and green respectively. After each appleplacement, the propeller can return to its default angle position of 90^0, awaiting successive color apple.

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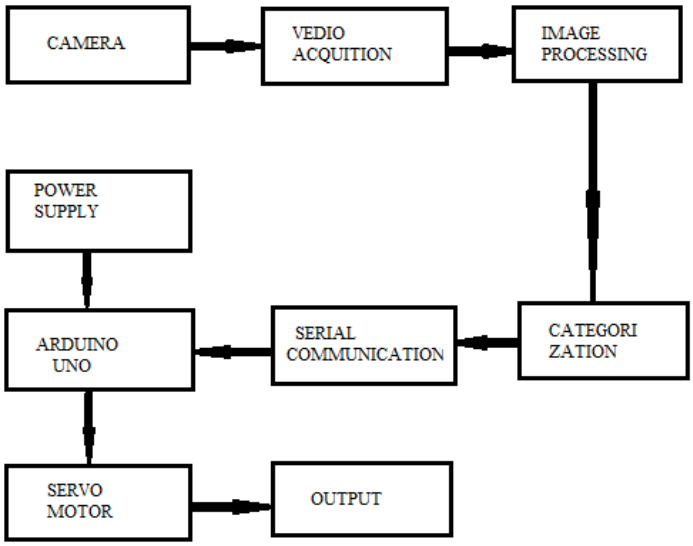
PROPOSED METHOD

BLOCK DIAGRAM



HARDWARE DETAILS

Arduino uno microcontroller

The Arduino Uno is a microcontroller board supported the ATmega328. Arduino is AN open-source, prototyping platform and its simplicity makes it ideal for hobbyists to use likewise as professionals.

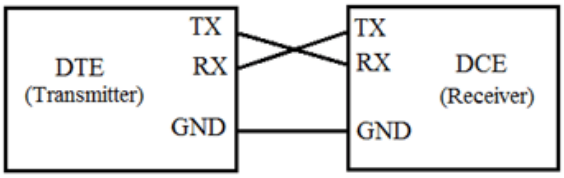
The Arduino Uno has 14 digital input/output pins, VI analog inputs, a 16 MHz quartz oscillator, a USB connection, a power jack and a reset button. It contains everything needed to support the microcontroller; merely connect it to a pc with a USB cable or power it with AC-to-DC adapter or battery to urge started [1-5]. The Arduino Uno has a variety of facilities for communicating with a pc, another Arduino board, or alternative microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, that is available on digital pins 0 (RX) and 1 (TX).AN ATmega16U2 on the board channels this serial communication over USB and seems as a virtual com port to package on the pc. The 16U2 firmware uses the standard USB COM drivers, and no external driver is required. However, on Windows, a.inf f ile is needed. The Arduino package (IDE) includes a serial monitor that permits simple textual data to be sent to and from the board. The RX and TX LEDs on the board can flash when knowledge is being transmitted via the USB-to-serial chip and USB association to the pc. A software Serial library allows serial communication on any of the arduino Uno's digital pins.

Dcservomotor

A servomotor is a mechanism or linear actuator that permits for precise control of angular or linear position, velocity and acceleration. It consists of an appropriate motor coupled to a device for position feedback. It additionally needs a relatively refined controller, often a dedicated module designed specifically for use with servomotors. Servomotors don't seem to be a specific category of the motor though the term servomotor is usually used to refer to a motor suitable for use in an exceedingly closed-loop control system. Servomotors are used in applications like artificial intelligence, CNC machinery or automatic producing.

Rs 232 serialcommunication

RS 232 is a standard protocol used for serial communication.It's used for connecting PC and its peripheral devices to permit serial data exchange between them.As it obtains the voltage for the path used for the information exchange between the devices.RS 232 is employed for connecting Data Transmission Equipment (DTE) and data communication equipment (DCE).RS 232 works on the two-way communication that exchanges information to at least one another.



SOFTWAREDETAILS

Matlab

It is an application-oriented language for numerical computation, visualization and application development.It also provides associate interactive environment for iterative exploration,style and downside resolution.It provides large library of mathematical functions for algebra, statistics, harmonic analysis,filtering ,improvement,numerical integration and resolution standard differential equations.[6, 7].It provides built-in graphics for visualizing data and tools for making custom plots. MATLAB's programming interface provides development tools for improving code quality maintainability and maximizing performance. Image process tool cabinet in MATLAB allow us to automatize common image process work flow.

Arduino

The open-source Arduino computer code (IDE) makes it simple to write down code and transfer it to the board.It runs on any Windows, MacOSX, and Linux. The setting is written in Java and supported process and alternative open-source computer code. This computer code isused with any Arduino board.

Features ofarduino ide

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board [8-11].You can simply use a USB cable.

OPERATION

Step 1:

Initially,connect the web camera in the computer to capture the live video of apple and switch on power supply of DC 5 V which interconnect with Aurdino and servo motor.

Step 2:

Set the pixel, intensity and baud rate of image in MATLAB driver.

Step 3:

Image processing technique is used within MATLAB to accept frame format image of apple,detect the colour of apple and display the output of respective colour apple in binary digit form(0s or 1s).

Step 4:

RS 232 Serial communication cable is used as protocol to transfer bit value from the computer to

Arduino. Arduino IDE is used to accept the bit value in order to control servo motor.

Step 5:

The binary information sends to Arduino Uno which in turn adjusts the servo motor which located just below the propeller to move in angle of 0^0 and 180^0 depends on the apple colour.

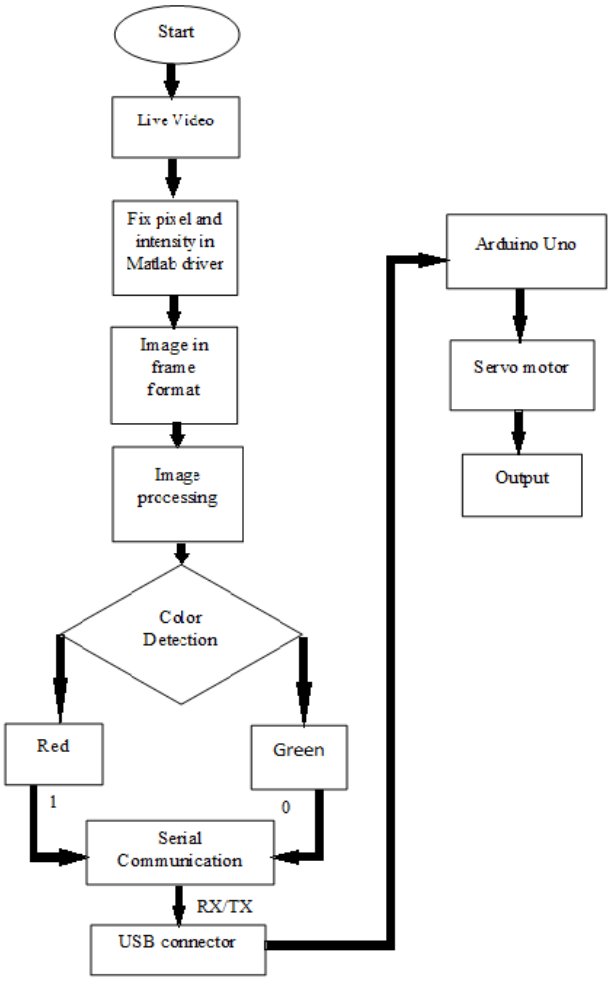
Step 6:

Servo motor is employed to put apple in individual color pout by rotation in clockwise and anticlockwise direction.

Step 7:

After every apple placement,the slide will go back to its default angle position of the 90^0, awaiting the next apple [12-15].

FLOW CHART



SIMULATIONOUTPUT

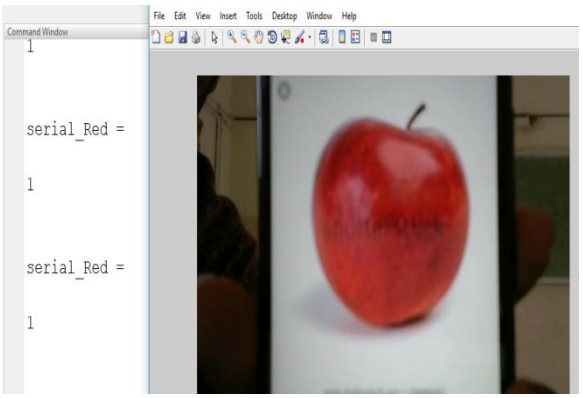


Fig1. Red apple input and binary output

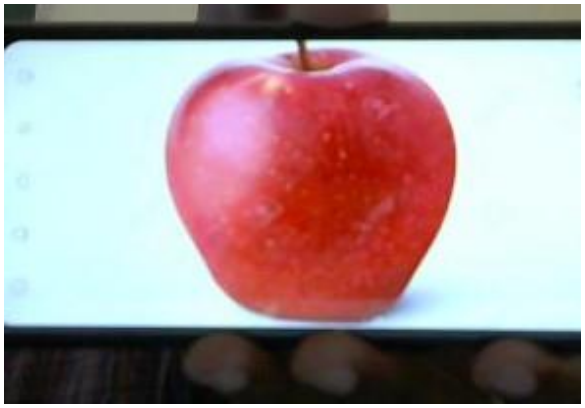


Fig3. Red apple input

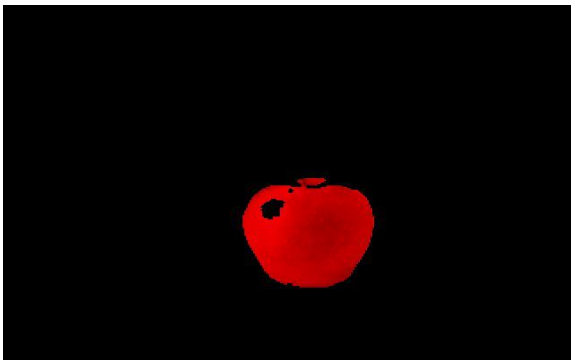


Fig4.Red color intensity output of red apple

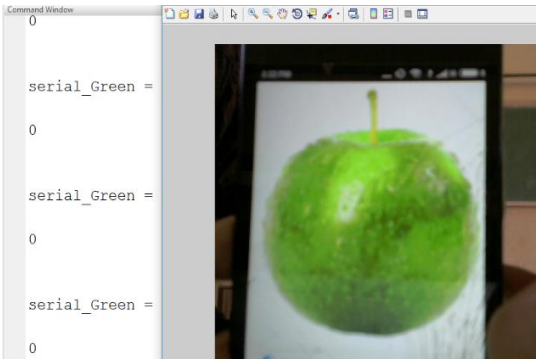


Fig2. Green apple input and binary output

Fig5. Green apple input

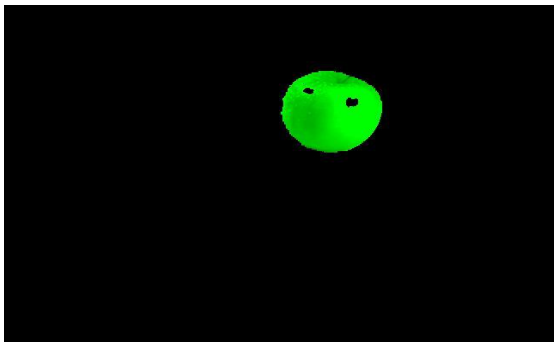


Fig6. Green color intensity output of Green apple

CONCLUSION

The projected system is predicated on automation can elimates the manual effort in sorting the apple. And it's economical, versatile and robust compared to existing one. In future this method can even use to analyze the defect within the apple.

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