

## IMPLEMENTATION OF SHAPE AND SIZE DETECTION USING RASPBERRY PI FOR INDUSTRIAL APPLICATIONS

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### ABSTRACT

*This paper presents an application for the detection of colour, shape and textual content of numerous gadgets at real time. This design of gadget is achieved the use of a raspberry pi as a machine of on chip, in conjunction with a USB camera, show unit. to be able to decide the colour of the object placed in front of camera. the principle purpose of layout of this unique device is to become aware of the shade, shape and size as well as the quantity of objects placed in front of the camera. So on the real time information could be up to date and constantly displayed over the display unit.*

**Keywords:** Raspberry Pi, Camera, Display Unit.

### 1.0 Introduction

Nowadays, significance and the observe over the laptop vision in field of commercial, teachers are on a hike. specifically while coping with the economic environment, this design may be used for diverse packages based totally upon vision thru laptop for the motive of figuring out, differentiating and collection of numerous object are completed based upon shade, shape and length which can be the primary elements. This layout gadget may be carried out in diverse fields for diverse purposes such as Defence, commercial functions, video games, automation, protection, tracking etc. Even these systems also can play a vital function in field of radar and navigating including detecting, tracking of a transferring coloured item and so on Detection of color play an vital position even inside the discipline of medical, inclusive of detection of colour of pores and skin,

identification of a face, recognizing registration code. The processing unit i.e. a raspberry pi at the side of a USB digicam for capturing the bundle, a show unit for displaying the count number and the packaging along with its diagnosed colour. the general processing diagram is shown in fig 2. Single Board Computer

A unmarried board pc is a complete laptop built on a unmarried circuit board, with microprocessor, memory, enter/out (I/O) and other characteristic required of a function pc. unmarried-board computers had been made as demonstration or development systems, for educational structures, or to be used as embedded computer controllers. Many sorts of home computer or transportable laptop included all their features onto a unmarried published circuit board a computing device private pc, single board computers frequently did now not rely on enlargement slots for peripheral features or expansion. a few single-board computer systems are made to plug right into a backplane for system expansion. single board computer systems were built using a extensive range of microprocessors. easy designs, which includes constructed by means of computer hobbyists, frequently use static ram and coffee-cost 8 or sixteen bit processors [9].

single board computer systems were made viable by way of growing density of included circuits. A single-board configuration reduces a gadget's ordinary

value, by way of decreasing the quantity of circuit forums required, and by means of disposing of connectors and bus driver circuits that would in any other case be used. through putting all the features on one board, a smaller typical device can be acquired, as an example, as in notebook computer systems. Connectors are a common supply of reliability troubles, so a single-board machine eliminates these issues.

## RaspberryPi

Raspberry Pi is a card sized unmarried-board laptop evolved in the uk by means of the raspberry pi basis with the goal of promoting the coaching of basic computer technological know-how in schools. The raspberry pi manufactured in 3 board configuration thru certified production agreements with network element14 (superior Farnell), RS element and Egoman. those organizations sell the Raspberry Pi on-line. Egoman produce a version for distribution soley in China and Taiwan, which may be distinguished from different Pis through their crimson colouring and shortage of FCC/CE marks. The hardware is the equal throughout all manufactures .[1,2,4,5] In 2014 Raspberry pi basis released the compute module, which packages a Raspberry Pi model B into a SODIMM two hundred-pin module, to encourage its use in embedded structures .The Raspberry Pi is based at the Broadcom BCM2835 machine on chip (SoC),which incorporates an ARM1176JZF-S seven hundred MHz processor, videocore IV GPU and became at the start shipped with 256 MB of RAM ,later upgraded ( model B & version B+) to 512 MB. The system has cozy SD or MicroSD socket for boot media and

continual garage .T he basis provide Debian and Arch Linux ARM distribution for down load. tools are available for Python as the main programming language, with assist for BBC simple (through the RISC OS picture or the Brandy primary clone for Linux ),C,C++,Java, Perl and Ruby.



Fig 1: Raspberry Pi

It provides hardware specifications as follows.

- ARM1176JZF –S Core (ARMv6K) 700 MHz
- 4 USB port (via the onboard 5-port
- USB OTG (mini AB)
- 512MB of Memory
- Micros SD Card
- S-Video
- DVI-D
- Ethernet port
- Camera port
- Stereo in and out jacks

## RGB and HSV Color Space

A digital picture is made up of fundamental element referred to as Pixels. No of pixels an image rely upon its decision. grey level photo one pixel each described as eight bits unsigned values. In coloration photo 3 such eight bits unsigned values are used in step with pixels .In grey image best one channel in gift, however in color photograph 3 channel are gift so in

RGB image one pixel get RGB values as RGB is 0 to 255. If one pixel get values as RGB (255, zero, 0) way coloration pixel is natural "pink". If one pixel get values as RGB (zero, 255, zero) manner coloration pixel is natural "inexperienced". If one pixel get values as RGB (zero, 0, 255) manner coloration pixel is pure "BLUE". If all of the pixel as value as (255, 255, 255) means colour pixel is "white" and vice versa [10] HSV is mean another colour area become founded Alvy Ray Smith in 1978. HSV imply Hue, Saturation and price. Hue constitute the shade, Saturation constitute amount to which that respective color is mixed with white and value represents the amount to which that respective shade is mixed with black. it's miles closer to human vision than RGB. it's miles received via non linear transformation of RGB. in this undertaking HSV coloration area is used to locate colour of package deal passing on conveyor belt also named as HSB. In HSB, H and S have the equal which means with HSV and B is for Brightness. HSV colour space turned into found out via Alvy Ray Smith in 1978. it's miles towards human imaginative and prescient than RGB colour area is. it's miles received with the aid of non-linear transformation of RGB colour space. [11, 17] The equation of RGB to HSV transformation is shown in Equation (1), transformation from HSV to RGB is given in Equation (2). HSV colour area is used to locate the color of the programs passing at the conveyor belt on this look at.

$$\begin{aligned}
 M &= \max(R, G, B) \\
 m &= \min(R, G, B) \\
 C &= M - m \\
 H' &= \begin{cases} \text{undefined,} & \text{if } C = 0 \\ \frac{G-B}{C} \bmod 6, & \text{if } M = R \\ \frac{B-R}{C} + 2, & \text{if } M = G \\ \frac{R-G}{C} + 4, & \text{if } M = B \end{cases} \\
 H &= 60^\circ \times H' \\
 S_{HSV} &= \begin{cases} 0, & \text{if } C = 0 \\ \frac{C}{V}, & \text{otherwise} \end{cases} \\
 V &= M
 \end{aligned}$$

(1)

$$\begin{aligned}
 C &= V \times S_{HSV} \\
 H' &= \frac{H}{60^\circ} \\
 X &= C(1 - |H' \bmod 2 - 1|) \\
 (R_1, G_1, B_1) &= \begin{cases} (0, 0, 0) & \text{if } H \text{ is undefined} \\ (C, X, 0) & \text{if } 0 \leq H' < 1 \\ (X, C, 0) & \text{if } 1 \leq H' < 2 \\ (0, C, X) & \text{if } 2 \leq H' < 3 \\ (0, X, C) & \text{if } 3 \leq H' < 4 \\ (X, 0, C) & \text{if } 4 \leq H' < 5 \\ (C, 0, X) & \text{if } 5 \leq H' < 6 \end{cases}
 \end{aligned}$$

$$\begin{aligned}
 m &= V - C \\
 (R, G, B) &= (R_1 + m, G_1 + m, B_1 + m)
 \end{aligned}$$

(2)

### Mechanism for Color, Shape, Size Detection and Display

Fig 2. shows the Block Diagram of the machine, so the system starts off evolved functioning as soon as item start passing over the camera there with the aid of the photo of the item is captured with the assist of an USB digicam The captured picture is sent to Raspberry Pi. Parameter of the particular item is decided by processing the captured image. Then something information are obtained after

processing is displayed with assist of showing unit.

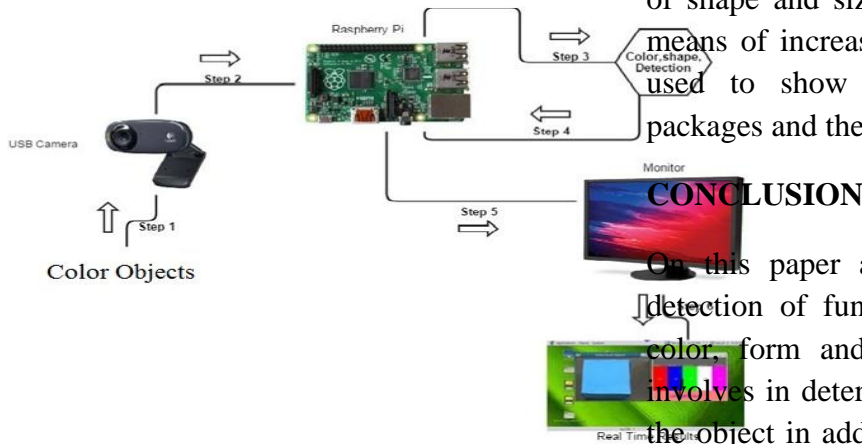


Fig 2: Block Diagram of the system

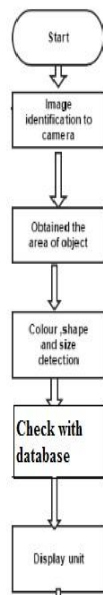


Fig 3. Flow Chart of the System

The system of detecting a color of a bundle is processed within the processing unit that is in Raspberry pi .The technique is proven within the flowchart shown in parent 3. The location of picture acquire with using USB digicam is taken into consideration as RGB which is wanted to be transformed into HSV colour area using a few described mathematical equation. whilst

the colour of that precise package is decided, then we will pass for the detection of shape and size of the bundle there by means of increasing the range i.e counter used to show the number of similar packages and the whole quantity.

### CONCLUSION

On this paper a gadget is advanced to detection of functions of the object like color, form and text. the typical utility involves in determining the capabilities of the object in addition to the main purpose of layout of this precise machine is to figuring out the number of items placed in front of the digicam. finally, the information collected is updated over an c program language period cyclically and the identical is displayed are efficaciously implemented.

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