

Humanless Device Control on field Using Color Gesture

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Abstract - Color based device control and gesture based device control is an emerging field in the area of automation and remote control access of device. In recent time in most risky fields like mines, construction work and in sea areas a human have to personally go there for work. There is no other option. A New approach presented here in this paper deals with the solution with elimination of human from work on risky places. A human can control their application remotely just by use of gesture or color code. There is a saving in cost as well it's a fully automatic system, so there is no risk of human life. Like in underground mines, a machine can be controlled using color code in front of camera.

Index Terms - Blob analysis, color detection, device control, Gesture, image processing, plc

I. INTRODUCTION

In day to day life a human have to face many difficulties as well there are much tragedies even after much innovation in technology. To save life of a human due to failure of machine is a most challenging task for technology. Many of researchers and scientist are working on this and they approached much ahead, even there are some limitations. One of the best approach is presented here which deals with tracking of red color. We can call this as an image processing application which deals with high resolution camera and high speed processor as well accurate tracking of color.

II. ALGORITHM

In color based device control we take a RED color to control device. As we are dealing with color tracking so camera which we are going to use in our application should be a high resolution camera. Here it is a PPT Vision fire wire camera. It have a resolution of 800*600px with CCD sensor and focal distance of 16 mm. The camera is RGB color sensitive and it is compulsory to use this because black/white camera is not suitable for color tracking application. When system is going to be implemented on hardware then information about the image acquisition adaptors should be available. An adaptor is the interface between software and the image acquisition devices connected to the system. The adaptor's main purpose is to pass information between software and an image acquisition device via its driver. In color tracking application camera will be only in access mode.

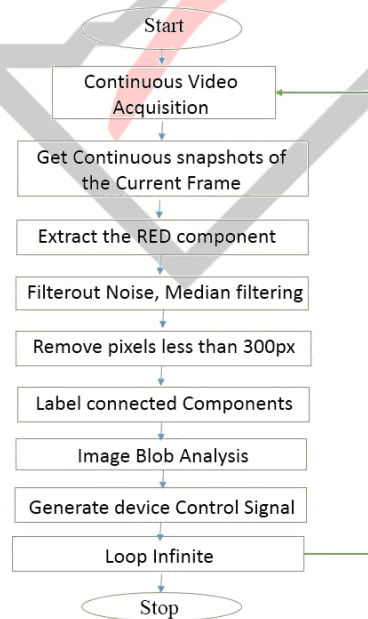


Fig: 1 Programming Algorithm

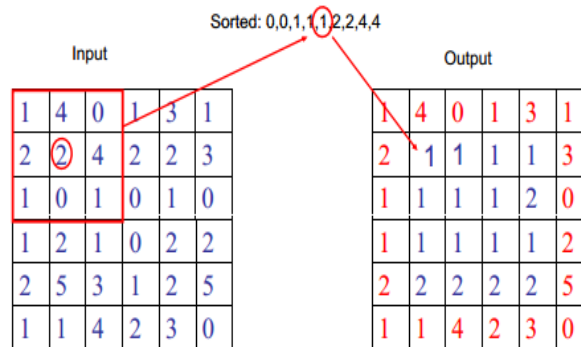
Initially to operate device a camera screen need to be initiate. Then it will capture a continuous video. It is continuously scanning for RED component and flushing previous data simultaneously.

Image or current frame is composed of
 $0.2989 * R + 0.5870 * G + 0.1140 * B$

```
R=rgbImage(:,:,1);
G=rgbImage(:,:,2);
B=rgbImage(:,:,3);
```

Median filtering is a nonlinear method used to remove noise from images. It is widely used as it is very effective at removing noise while preserving edges. The median filter works by moving through the image pixel by pixel, replacing each value with the median value of neighboring pixels. The pattern of neighbors is called the "window", which slides, pixel by pixel over the entire image.

The median is calculated by first sorting all the pixel values from the window into numerical order, and then replacing the pixel being considered with the middle (median) pixel value.



2D Median filtering example using a 3 x 3 sampling window, Keeping border values unchanged.

Label procedure go through the following steps.

- Encode the image with given length
- Assign preliminary labels and record data in table
- Separate each class,
- Reassign labels based on class

In Blob analysis

- We get a set of properties for each labelled region.

Shape Measurements like Area, Orientation, Bounding Box, Perimeter, Centroid, Convex Area, Filled Area, Convex Hull, Filled Image, Solidity, MajorAxisLength, MinorAxisLength. And Pixel Value Measurements like MaxIntensity, MinIntensity, Weighted Centroid, Mean Intensity this all can be set by setting the properties of each labelled region according to our application. Bounding Box is the smallest rectangle containing the region, a 1-by-Q *2 vector, where Q is the number of image dimensions Centroid is a 1-by-Q vector that specifies the Centre of mass of the region.

We are dividing our camera screen in four quadrants. As our camera resolution is 800*600 and we take X as our row pixels and Y as vertical pixels of Camera.

- X = 0-400, Y = 0-300 will be our first quadrant,
- X > 400-800, Y = 0-300 will be our second quadrant,
- X = 0-400, Y > 300-600 will be our third quadrant,

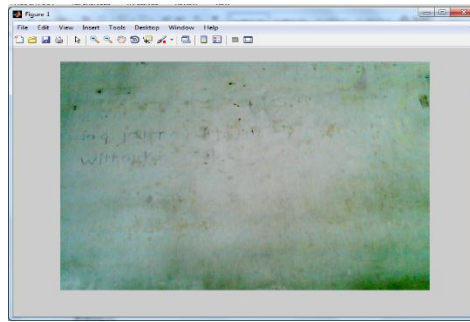
And X > 400-800, Y > 300-600 will be our fourth quadrant.

Continuous tracking is required for accurate and continuous control of device during operation.

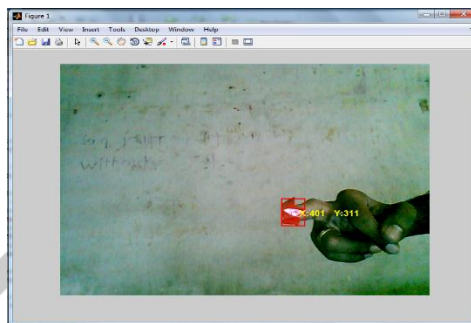
We need not to save all the data which is in current tracking mode. We flushout the all previous image data continuously so that saving in memory buffer can be done.

III. RESULTS

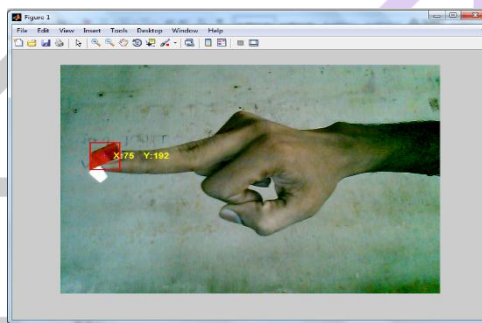
Our camera system and algorithm will track the red color and it will decide the quadrant and accordingly signal will be sent to the RS232 port of computer or Processor which we are using, then accordingly device will be controlled through standard controller.



No RED Component



RED Component in Second quadrant



RED component in third quadrant

Fig: 2 Camera screen configuration

L = 401 311
P = 4

L = 75 192
P = 1

Here L represents the pixel dimensions on screen and P represents the quadrant value. While tracking the red component, the remaining portion of the screen should be except red. So, only one component can be extracted correctly.

When particular quadrant is sensed, then its id is sent by MATLAB to PLC and the changes of value on PLC is shown below.

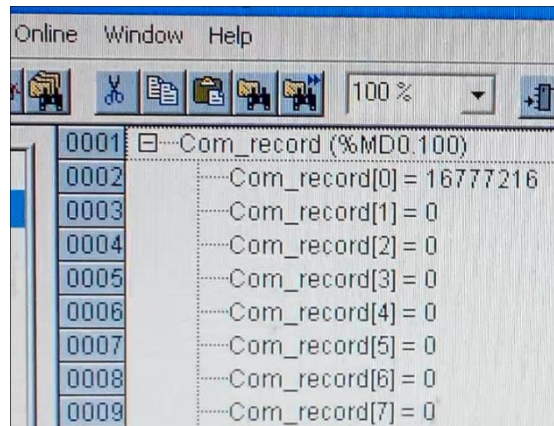


Fig: 3 Data received by Codesys

And according to the data sent the output on PLC is shown below.



Fig: 4 Output on PLC

Here figure 4 shows that quadrant 1 is sensed and command is sent to device for operation. This is DC 523 which is used as data out port whatever data is sent to the plc according to the program, it sends the output on it and a LED shows the status of each pin. Codesys software is used which acts like a bridging component between the software part MATLAB and the PLC. Codesys after getting intimation from MATLAB will show the particular signal and accordingly device is being controlled in the field.

IV. CONCLUSION

The algorithm for this application is developed in MATLAB and an algorithm works perfectly to control external device using color code. This is a much fast enough even on Core2Duo, 2.0GHZ processor. Using FPGA or DSP one can go for higher speed. This is a practical form of application which is controlled and can be widely used in Mines for operating humanless machines and in risky areas where there is a risk for human life.

V. REFERENCES

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