ERROR DETECTION OF GEOMETRICAL OBJECT(CUBE)

UNDER THE GUIDANCE OF :

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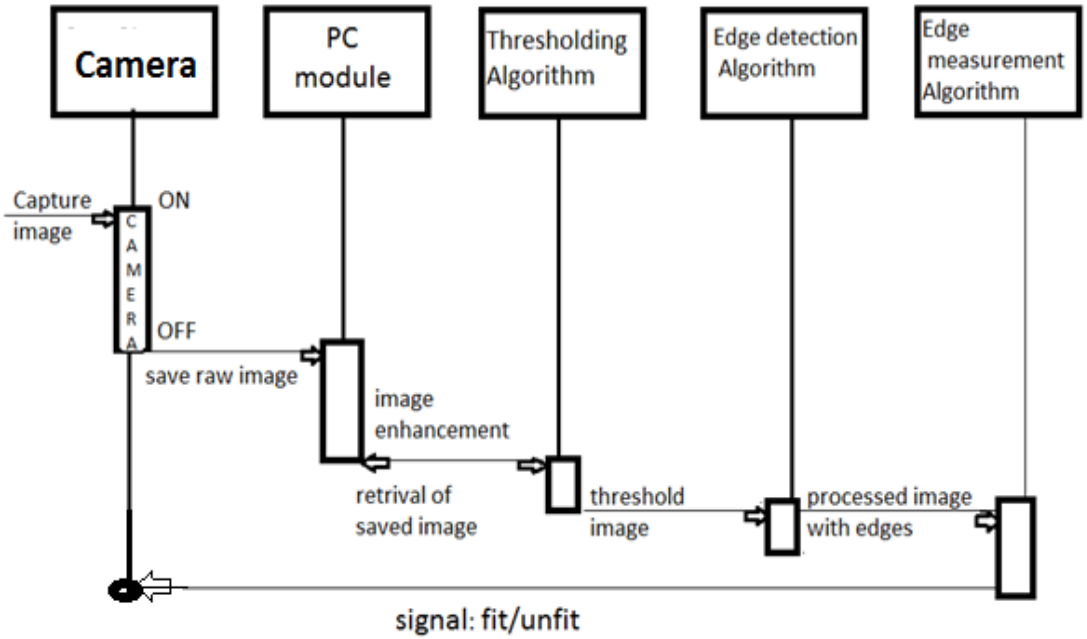
SEQUENCE DIAGRAM



STEPS INVOLVED

- Capturing of image from the cameras.
- Enhancement of the raw image.
- Thresholding the image.
- Detection of edges in the image.
- Measuring the edges from the processed image.

CAPTURING THE IMAGE

- The geometrical object picture is taken .Here it’s the picture of cube.
- The picture taken is stored in the PC.
- The picture is taken against a WHITE background without any shadow interfering.
- Then the picture is enhanced , threshold and the edge detection is done.

OTSU ALGORITHM

- Otsu's method’ (maximum variance) Thresholding is the easiest method of the image segmentation. From, thresholding converts any grayscale image to binary images.
- The algorithm assumes that the image contains two classes of pixels
- It calculates the optimum threshold separating the two classes.
- The extension of the original method to multi-level thresholding is referred to as the multi otsu method.

SOBEL ALGORITHM

1. Image edge detection is a process of locating the edge of an image .
2. The Sobel operator performs a 2-D spatial gradient measurement on images.
3. The Sobel edge detector uses a pair of 3 x 3 convolution masks.
4. one estimating gradient in the x-direction and the other estimating gradient in y–direction.
5. The Sobel detector is incredibly sensitive to noise in pictures, it effectively highlight them as edges.

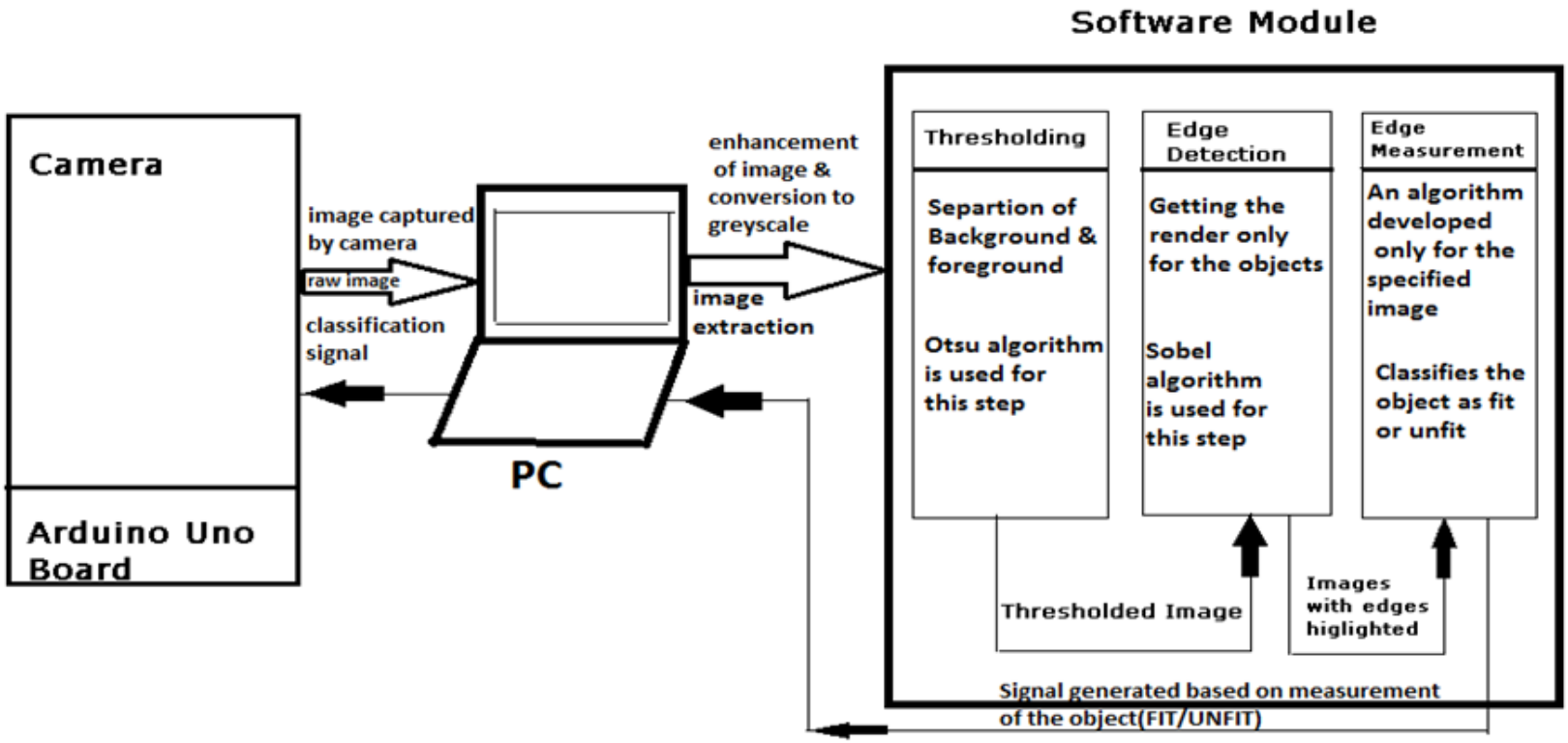
PROGAM DEVELOPED

```
fontSize = 14;

message = sprintf  ('Welcome to the project DEMO \n Only cubes with side 5 cm are accepted.')
uiwait(msgbox(message,'DEMO'));
% Browse for the image file.
[FileName, folder] = uigetfile('*.*', 'Specify an image file');
fullImage = fullfile(folder, FileName);
if folder == 0
return;
end

rgbImage = imread(fullImage);

% Display the original image.
subplot(2, 2, 1);
imshow(rgbImage);
set(gcf, 'Position', get(0,'Screensize')); % Enlarge figure to full screen.
set(gcf,'name','Demo by EDGO','numbertitle','off')
drawnow; % Make it display immediately.
title('Original Color Image', 'FontSize', fontSize);
```

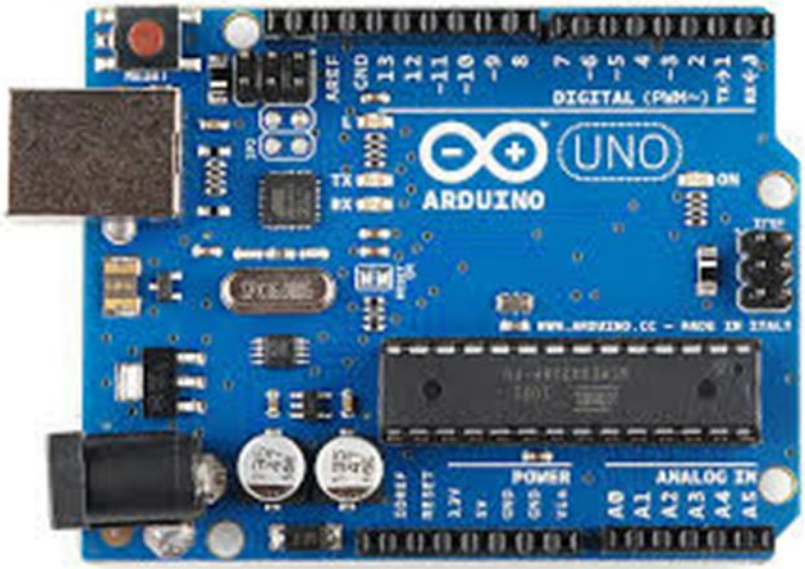
```
grayImage = rgb2gray(rgbImage);


% Display it.
subplot(2, 2, 2);
imshow(grayImage);
title('Grayscale Image', 'FontSize', fontSize);


level = graythresh(grayImage);
otsuImage = im2bw(grayImage, level);


% Display it.
subplot(2, 2, 3);
imshow(otsuImage);
title('Thresholded image by Otsu method', 'FontSize', fontSize);


sobelImage = edge(otsuImage, 'Sobel');


% Display it.
subplot(2, 2, 4);
imshow(sobelImage);
title('Edges detected by Sobel method', 'FontSize', fontSize);
```

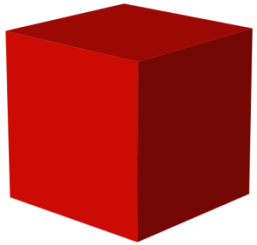
```
ans = (nnz(sobelImage)/4);


if(ans >= 465 && ans <=485)
   ed = 5;
elseif(ans >= 385 && ans <=405)
   ed = 4;
elseif(ans >= 540 && ans <=560)
   ed = 6;
end

if(ed == 5)
   status= 'accepted';
else
   status= 'rejected';
end


message = sprintf ('The edge measurement = %d cm \n %s',ed,status);
uiwait(msgbox(message));
```

SEQUENCE DIAGRAM

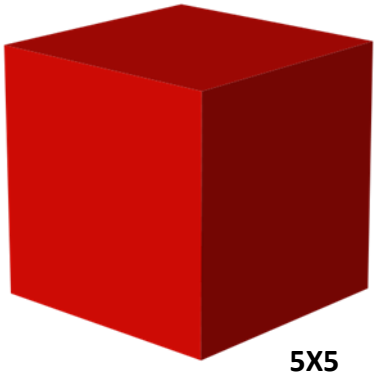


AURDINO MICROCONTROLLER,CAMERA,CUBE

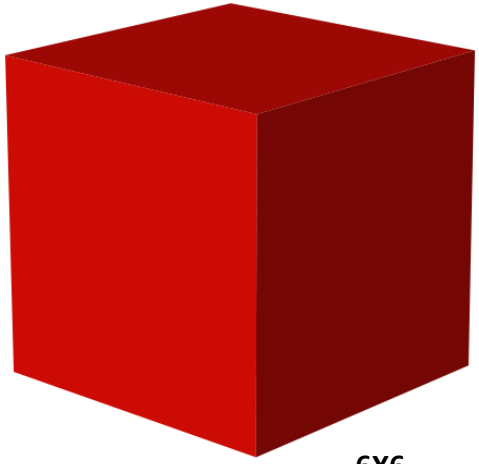




4X4



5X5



6X6

ADVANTAGES

- This can be used in the small scale industries.
- The cost is less.
- The objects can be varied from different geometrical figures.

DISADVANTAGES

- The model cannot be depended upon.
- Its not compitable for large scale industries.

REFERENCES

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http://csweb1.cs.umt.edu/~dougr/PattRec_files/PattRecProjEdgeDet.htm

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http://csweb1.cs.umt.edu/~dougr/PattRecFiles/projects/edgeDetection/edgeDetectionFuncs.R

THANK YOU