

Fish Freshness Sorter

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Abstract—The project aims at developing a non invasive fish freshness sorter that is based on image processing technique. Current methods are invasive and time consuming. The project based on utilizing the robotics and image processing technique in MATLAB to monitor major parameters that indicates the color of the eye, skin and gill. The web camera that has been interfaced with MATLAB captures the real time images of the fish under evaluation. From the image the eye of the fish detected and cropped, according to redness of the eyes the fish is sorted to various classes. The main advantage of the project is that it reduces undesired wastage of the food material.

Index Terms—MATLAB, robotics, Web camera, Non invasive

I. INTRODUCTION

Most of the fish sorting mechanism is invasive method. The invasive method means purely chemical method. Samples are taken and tested in the laboratory so it is time consuming and tedious process. Incorporating image processing with robotics gives a successful sorting mechanism for fish. This sorting mechanism is purely noninvasive i.e., no samples are taken for testing, and also real time. Robotics in sense to reduce the effort. Main reason for sorting is reduce human labor and increase the efficiency and output.

Sorting is used in many industries for increasing quality of the object. Industries that use sorting mechanism are food processing industry, pharmaceutical industry, automotive and agriculture industries. Robots are used for ease of operation in domestic industrial and military purposes. Redness of the eyes in fish indicates the what percentage the fish is pure. This concept is utilized measure freshness of the fish. A conveyor system also present .The method is cost efficient and reduce spoilage of food material to a extent.

II. RELATED WORKS

RGB method is the main technique to extract redness from images. In fire prone areas the technique used to detect fire is RGB method. The algorithm for RGB consist of several stages. First stage to convert RGB frame to Greyscale image then subtract the image from original one the we will get the red dominated area [1]. Another method to detect freshness is electronics plus chemical method e tongue. In this method an array of chemically modified screen printed electrode used. Redox reactions are take place and observing redox peaks freshness is predicted. [2]. Based on color and shape the object is sorted. For this light intensity to frequency converter method is used [3]. Object sorting based on the shape mainly introduced to reduce human efforts. The system works using ARM7 and detection of shape is using image processing in MATLAB. The sorting is based on shape of the object [4].

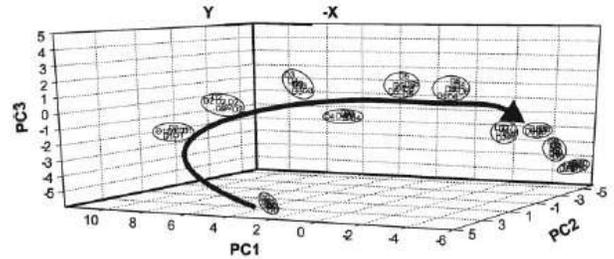


Fig.1.Fish freshness monitoring using sensor array

III. PROPOSED SYSTEM

In proposed system two main parts are there one is image processing part other is based on image processing sorting part. In image processing RGB method is used. For sorting percentage of redness value is used.

A. Image processing

RGB method is used for process the image. Using the web cam RGB frame of the fish is captured. By using the RGB color space to create a lookup table (LT) with 256×256×256 entries. From the histogram analysis of segmented images. The captured image frame then converted into gray scale image. Then subtract the gray frame from red frame .Here we get only different shades of black and white. Using filter filter out the unwanted noise using match filter .Then again converted in to binary image to get exact black and white spots. For the conversion of gray to binary threshold values are used. The values obtained are taken and put for blob statics analysis.

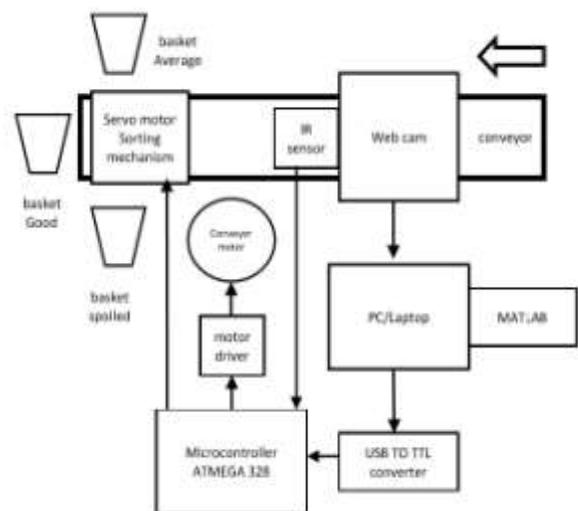


Fig. 2.Block diagram

B.IR Proximity sensor

The IR Sensor Module is used to identify the presence of fish under the camera. The main concept is that, the IR led keeps transmitting IR infrared rays up to some range (for which there is a potentiometer with the help of which the range can be altered). When the fish comes in the (IR) infrared range, the IR waves hits the fish and comes back at some angle, The Photo diode next to IR led detects that IR infrared rays which got reflected from the fish and hence works as a proximity sensor.

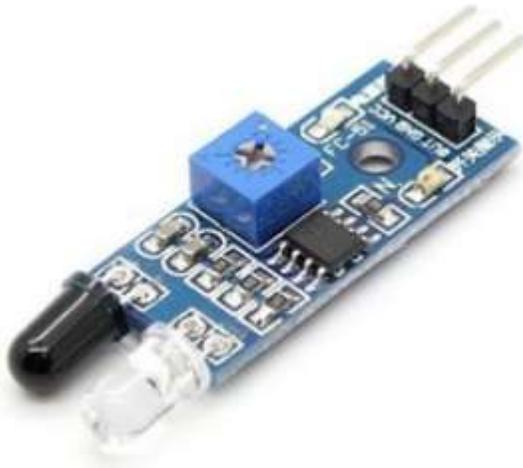


Fig.3. IR Proximity sensor

C.ATmega328

8 Bit high performance micro controller, here controller is used for signaling the conveyor and give sorting characters to servo motors. After image processing values or characters corresponding to good and bad or average given to micro controller .



Fig.4. ATmega328 micro controller

D. Servo motor

Servo motor are working based on the PWM from the controller. In the project servo motor used for sorting according to PWM signal generated from controller the servo motor put the fish to corresponding basket. Servo motor has angle to rotate from 0 to 180 degree.



Fig.5. Servo motor

E. Motor driver IC L293D

Typical dc motor driver IC used to drive dc motors. Here it is used in conveyor belts controlling dc motors. In this two H bridge based working is take place.



Fig.6. L293DMotor DRIVER IC

IV. SOFTWARE REQUIREMENTS

MATLAB Programming for image processing and programming controller Arduino is needed. The project mainly utilizes the image processing technique to evaluate fish freshness from their captured images. Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.

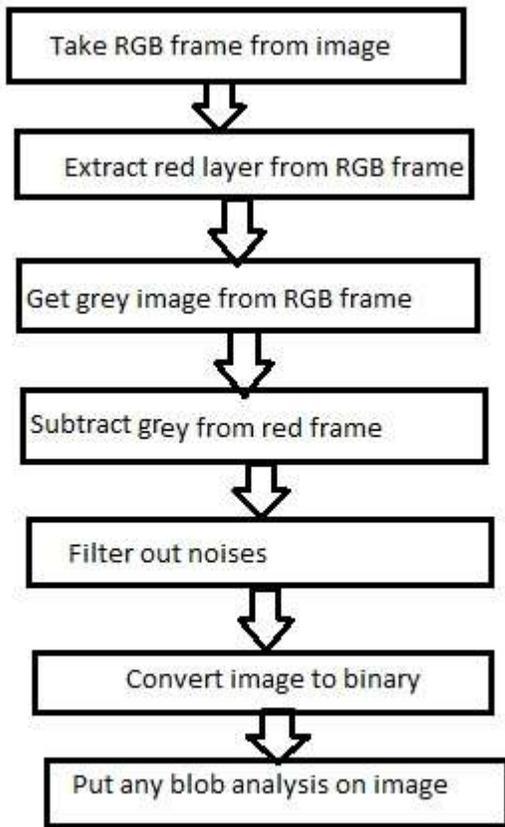


Fig.7. Flow chart.

V. CONCLUSION

In this paper we present robotic method to sort fish. In this proposed method image processing methods are used along with robotics. Proposed method is a efficient method which is

noninvasive and also prevent wastage of food material. It also gives the advantage that real time and less time consuming method for checking freshness of fish.

VI. RESULT AND ANALYSIS

The product developed for fish freshness evaluation was successful in sorting the fishes into varying freshness classes: fresh, average and spoiled. The threshold values for feeding into the algorithm were determined through actual taking of photographs of fish caught from harbors, every twenty four hours.

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REFERENCES

- [1] Bruno Miguel Nogueira de Souza, and Jacques Facon, "Colomness Index Strategy for Pixel Fire Segmentation," 2017 IEEE .
- [2] Irina Mirela Apetrei, Maria Luz Rodriguez-Mendez, I.S. Jacobs and C.P. Bean, "Fish Freshness Monitoring Using an E-Tongue Based on Polypyrrole Modified Screen-Printed Electrodes," IEEE Sensors Journal, vol. 13, July 2013.
- [3] Aneesh. A1 Dileep. T.N Joji Kuriakose, Kevin Varghese, Jinto Chacko "Object Sorting Robotic Arm based on Colour and Shape Sensing," IJSRD - International Journal for Scientific Research & Development, Vol. 4, Issue 01, 2016 |.
- [4] Priya Vinayak Garad , "Object Sorting Robot Based On the Shape," IJARIT, Volume 3, Issue 5, 2017 .
- [5] Ahmad Rateb Al-Najjar ,Design and the mechanism of controlling a robotic arm ,Syrian Private University ,August 2015 .