International Journal of ChemTech Research
CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555
Vol.10 No.14, 396-402, 2017

Smart Aquatic Fish Monitoring Using IoT Rescue system for fishermen

G.Umamaheswari(1*), V.Vaijayanthi(2), B.Vaishnavi(3) , K.Sastibalan(4), M . Babykala(5)

Engineering Programme ,Dept. of Electronics and Communication Engineering, K.S.Rangasamy College of Technology, Tiruchengode, 637 215, India.
(5)Assistant Professor, Dept. of Electronics and Communication Engineering, K.S.Rangasamy College of Technology, Tiruchengode, 637 215, India.

Abstract: Harassment against fishermen are increasing drastically daily. The existing constrains and technology do not allow them for fishing to fulfill their live hood. In this project image processing techniques are used to identify the fishes near the boat and sending the density of fishes in that particular area using Internet of things as a communication medium. Underwater images are of paramount importance in underwater scientific mission for applications such as monitoring sea life and assessing geological or biological environment. The detection system should have underwater camera. The main objective of underwater image processing object detection system is to recognize objects which are in the form of fishes without any human intervention. This is done by extracting a boundary information and reducing noise. So this project helps the fishermen to return soon to the shore by easily finding the fishes. The future scope of this project is to find many valuable objects.
Keywords: Image processing, Fishermen, Internet of Things and object detection.

Introduction

The problems of Indian and Sri Lankan fishermen in the Palk Bay are everlasting. Indian fishermen are being prevented from fishing, facing harassment and being arrested by the Sri Lankan Navy (SLN), and also nearly 200 deaths. Indian fishermen are usually arrested on charges of trespassing. In this project image processing technique is used to identify the fishes near the boat and sending the density of fishes in the particular area using Internet of things as a communication medium**.** Underwater images are of paramount importance in underwater scientific mission for applications such as monitoring sea life and assessing geological or biological environment.

The Internet of Things (IoT) is an developing topic of practical, communal, and financial significance. Now a days phone, vehicles, sensors and other everyday objects are being connected with Internet connectivity and powerful data analytic capabilities which assure to transform the way we work, live, and play. Impact of IoT on the Internet and economy are remarkable, with some anticipating as many as 100 billion connected IoT devices and a global economic impact is expected to be more than $11 trillion by 2025.

In spite of it's excellent features however, the Internet of Things raises substantial challenges that could stand in the way of realizing its potential benefits. Hacking of Internet-connected devices, surveillance alarms, and

privacy fears are the most eye catching headlines that have already caught public attention. Technical challenges remain and new policy, legal and development challenges are emerging.

Digital image processing is always an interesting field as it gives improved pictorial information for human interpretation and processing of image data for storage, transmission, and representation for machine perception. Image Processing is a technique to enhance raw images received from cameras or sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-to-day life for various applications. This field of image processing significantly improved in recent times and extended to various fields of science and technology. The image processing mainly deals with image acquisition, image enhancement, image segmentation, feature extraction, image classification etc.Image processing also refers to optical and analog image processing. This project proposal apply all the techniques. Imaging is the acquisition of images (producing the input image in the first place) In modern sciences and technologies, images also gain much broader scopes due to the ever growing importance of scientific visualization (of often large-scale complex scientific or experimental data). Examples include microarray data in genetic research, or real-time multi-asset portfolio trading in finance.

Concept

Monitoring aquatic creatures is of great interest to the ecosystems, marine life, human health, and water transport. This project presents the design and implementation of Smart Aquatic Fish monitoring system. Unfortunately, the current technology does not offer guaranteed and fast networking due to many losses and varying delays of the communication.

Block Diagram

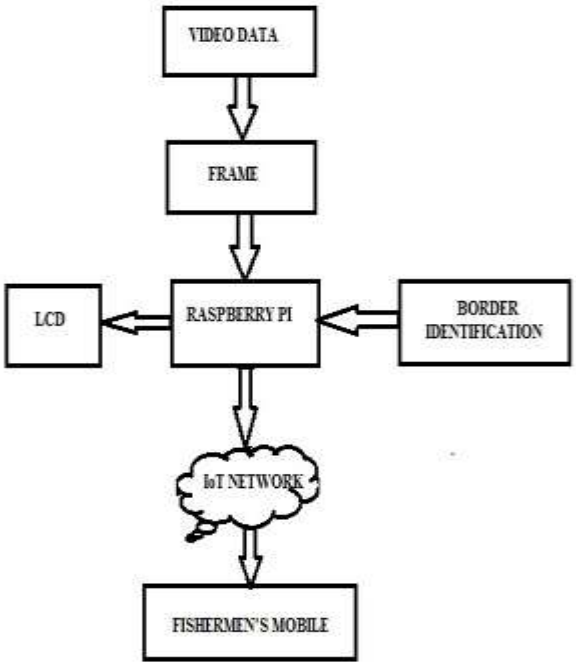

Fig: 1 Block Representation of Smart aquatic fish monitoring

Construction:

The hardware kit consist of two rectifier circuits & transformer, Raspberry Pi, LCD display, Wi-Fi module. The purpose of transformer is to step down the voltage from 230V to approximately 5V. The full wave rectifier converts both polarities of the input waveform (alternating current) to pulsating DC (direct current), and yields a higher average output voltage. Raspberry pi model v3 is used as an IoT platform to send the output to the cloud and retrieve it. A 16 x 2 LCD display is used to display the output.

Working

Mat lab Software version 2012 is used for simulation output. First a sample image is given as an input to the matlab. The sample image is adjusted to the desired aspect ratio and then converted to gray image. A two dimensional median filter is applied to gray image. The image is then subjected to dilation process and erosion process. The required image is then obtained by the process of image subtraction of the diluted image and the eroded image. The required region of interest is then extracted. The output of the matlab is then transferred from the serial port of the laptop at the baud rate of 9600 to Raspberry pi. This output is send via cloud using WiFi Module ESP8266 to the fishermen's mobile and browser.

Results and Discussion

MATLAB is a well-known and user friendly language for technical computing. It assimilates computation, picturing, and software design in an easy-to-use environment where problems and solutions are in familiar mathematical form. Typical uses include Math, computation and Algorithm development. Matlab is used to analyze and design the system.

A matlab code was simulated to find out the movement of fishes in the given feasible region by finding the difference between two ranges.

A) Simulation Output

The simulation output shows four outputs. Figure 2 shows a group of images. Figure 3 shows the gray converted image. Figure 4 shows extracted image of the object by the process of image extraction, background subtraction. Figure 5 shows the output after removing the extra pixels.

Fig: 2 Sample Image

Fig: 3 Gray converted Image

Fig: 4 Extracted image

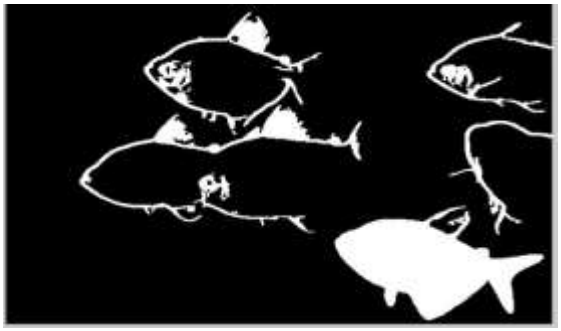

Fig: 5 Required Region of Interest

B) Hardware Output

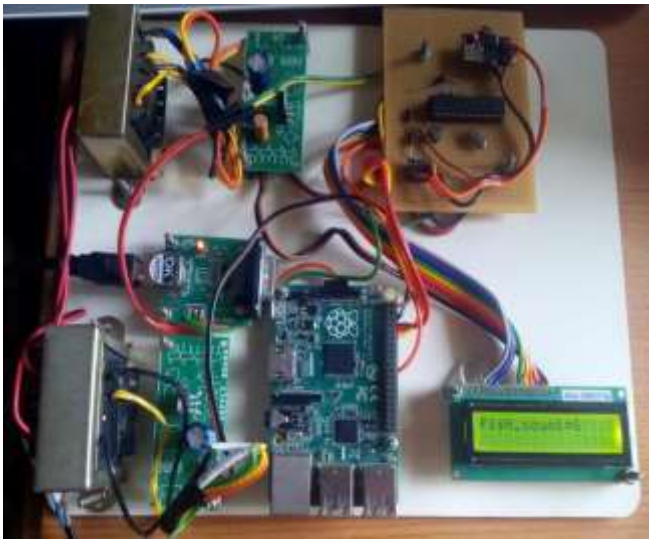

Fig: 6 Fish Count

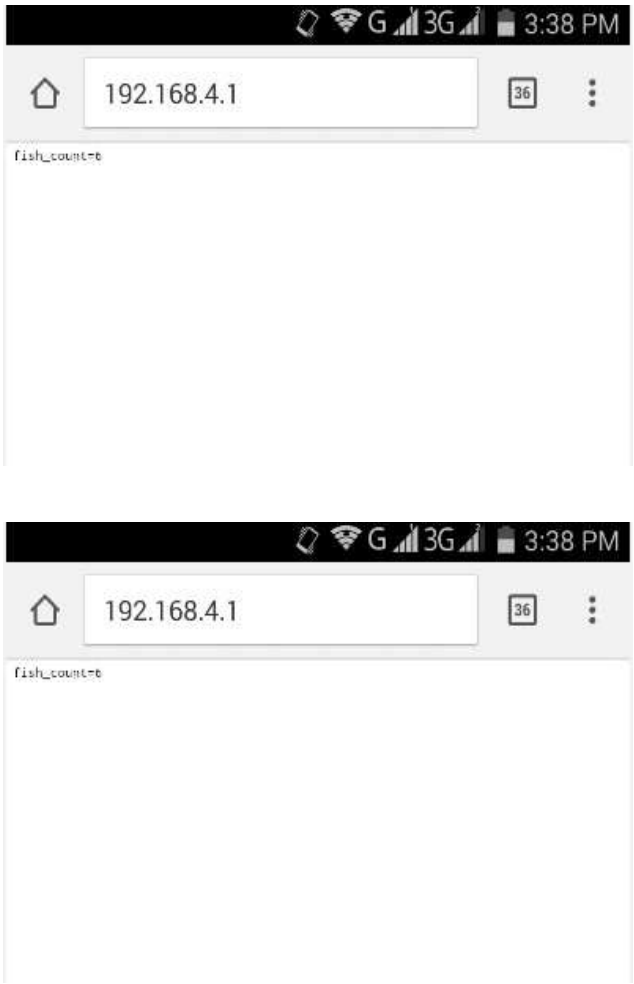

Fig: 7 Output Display to Fishermen using IoT

Fig: 8 Border Detection

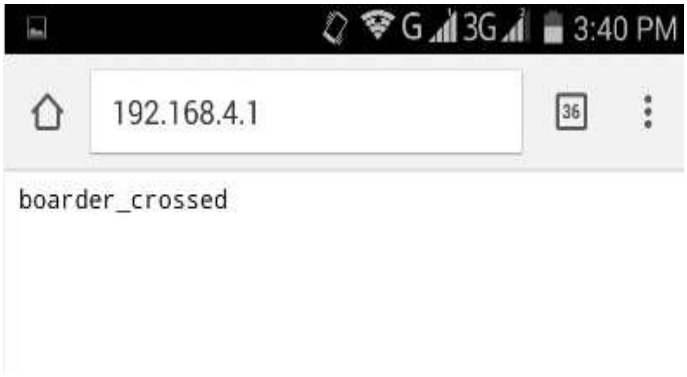

Fig: 9 Output Message to Fishermen using IoT

Conclusion and Future Scope

Smart Aquatic Monitoring System is used to reduce the manual work of fishermen for finding the fishes near them easily. As a result of this not only the time gets reduced but also the safety of fishermen from crossing the Palk Bay is improved to a great extent. Testbed experiments and extensive simulations based on a prototype system shows that it provides robust fish detection performance, meets the real-time requirement and efficiently covers the sporadic fish arrivals. This project addresses the problem of underwater image processing object detection system. The matlab coding which is a well-known and user friendly language for technical computing was created to extract the region of interest. Finally the information of density of fishes in that particular area and the alert message is send to the fishermen's phone from cloud.

In our future work, we plan to deploy this in an inland lake and evaluate it under various conditions like fishes flow speed. Moreover we will develop it to identify many valuable things like pearl, Medicinal plants which are found to cure sinus problems. Marine snails can be detected to cure chronic pain. LoRa Technology instead of Internet of Things as a communication medium.

References

1. T. Gandhi and M. Trivedi, "Pedestrian protection systems: issues, survey, and challenges," IEEE Trans. Intell. Transp. Syst.,vol. 8, no. 3, pp. 413–430, 2013.
2. M. Jadaliha and J. Choi, "Environmental monitoring using autonomous aquatic robots: Sampling algorithms and experiments," IEEE Trans. Control Syst. Technol., vol. 21, no. 3, pp. 899–905, May 2013.
3. L. Pan and S. Yang, "An electronic nose network system for online monitoringof livestock farm odors," IEEE/ASME Trans.Mechatronics, vol. 14,no. 3, pp. 371–376, Jun. 2011.
4. B. S. Cook and A. Shamim, "Inkjet printing of novel wideband and high gain antennas on low-cost paper substrate," IEEE Trans. AntennasPropag., vol. 60, no. 9, pp. 4148–4156, 2012.
5. Youngtae Noh, Member, IEEE, Uichin Lee, Member, IEEE, Saewoom Lee, Student Member, IEEE, Paul Wang, Member, IEEE, Luiz F. M. Vieira, Member, IEEE, Jun-Hong Cui, Member, IEEE,Mario Gerla, Fellow, IEEE, and Kiseon Kim, Senior Member, IEEE DOI 10.1109/TVT.2015.2395434, IEEE Transactions on Vehicular Technology,2013.
6. Yu Wang, Rui Tan, Guoliang Xing, Jianxun Wang, and Xiaobo Tan IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL. 13, NO. 4, APRIL 2014.
7. Jeffrey Laut, Student Member, IEEE, Emiliano Henry, Oded Nov, and Maurizio Porfiri, Senior Member, IEEE IEEE/ASME TRANSACTIONS ON MECHATRONICS, VOL. 19, NO. 5, OCTOBER 2014.
8. Meng-Che Chuang, Jenq-Neng Hwang, Fellow, IEEE, Kresimir Williams, and Richard TowlerEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, VOL. 25, NO. 1, JANUARY 2015.
9. Carrick Detweiler, Member, IEEE, Marek Doniec, Iuliu Vasilescu, Member, IEEE, and Daniela Rus, Fellow, IEEE/ASME TRANSACTIONS ON MECHATRONICS, VOL. 17, NO. 1, FEBRUARY 2012.
10. Ayoung Kim, Student Member, IEEE, and Ryan M. Eustice, Senior Member, IEEE, IEEE TRANSACTIONS ON ROBOTICS, VOL. 29, NO. 3, JUNE 2013.
11. Meng-Che Chuang, Jenq-Neng Hwang, Fellow, IEEE, Jian-Hui Ye,Shih-Chia Huang, Senior Member, IEEE, and Kresimir Williams IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS: SYSTEMS , JUNE 20142014.
12. Junzhi Yu, Senior Member, IEEE, Feihu Sun, De Xu, Senior Member, IEEE, and Min Tan DOI10.1109/TIE.2015.2466555, IEEE Transactions on Industrial Electronics IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS 1.

*****