

Portable Video system for Farm Growth Monitoring System

Mi-jeong Park*, Eung-kon Kim*

Department of Computer Science, Sunchon National University,
255 Jungang-ro, Suncheon-si, Jellanam-do, Republic Of Korea

mj21@sunchon.ac.kr, kek@sunchon.ac.kr

Abstract—Various marine lives are mainly cultured from fish farms. This study focused on the abalone among many marine lives to research on the underwater monitoring system which monitors its growth and development and the amount of sludge. The insufficient feeding in the farm causes growth inhibition of abalone and over feeding causes contamination. The portable video system to monitor farm culturing proposed in this study would make scientific contribution to reduce cost and contamination by controlling the feeding according to the growth status of abalone.

Keywords—Image acquisition system, Monitoring facilities, Image processing, Smartphone, Nursery, PTZ, Augmented Reality.

I. INTRODUCTION

Overcrowded farming and over feeding exceeding appropriate facility volume increase organic loading in the surroundings and bottom of farm. Even its impact is limited only to fish farm, but equivalent to the impact of waste water disposed in the land.[1] Fishing nursery in our country is being seriously contaminated by contamination from the land and fish farm. Due to serious contamination because of aged farm and bottom materials caused by repeated cultivation, the productivity becomes lower. Therefore, it is urgent to improve bottom materials in the surroundings of farm and management of environment. Due to bottom materials and contamination of ecological environment, the mortality rate of abalone reached about 50%. Therefore, it is urgently needed to make efforts to improve ecological environment of its surroundings. [2]

Technology and product to monitor the degree of contamination is highly required but the current technology to monitor marine ecological environment should be installed directly in the farm which requires initial installation fee and high maintenance cost. As it is difficult to install in the current operating farm and has blind spot where it cannot monitor, it is not practical. [3]

This study focused on the abalone farm among the farms. As most of current underwater monitoring system is fixed type, it is easily eroded by salt and difficult to maintain because of high maintenance cost. However, using abalone growth monitoring system, appropriate feeding can be made

according to the growth status while increasing the production. In addition, appropriate feeding control would reduce environmental contamination[4].

II. PORTABLE VIDEO SYSTEM FOR MONITORING FARM CULTURING

This study focuses on the underwater video system to monitor growth environment of abalone farm. Figure 1 shows system concept diagram.

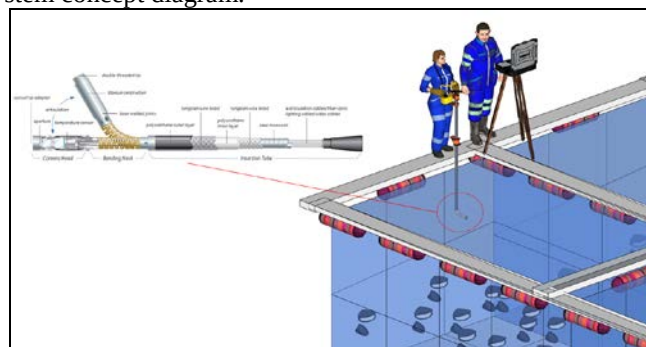


Figure 1. System diagram of portable video system

This system is portable and can monitor even the blind spot. And it is practical as it can perform monitoring periodically if necessary.

Figure 2 shows system configuration of underwater video system of abalone farm growth monitoring.

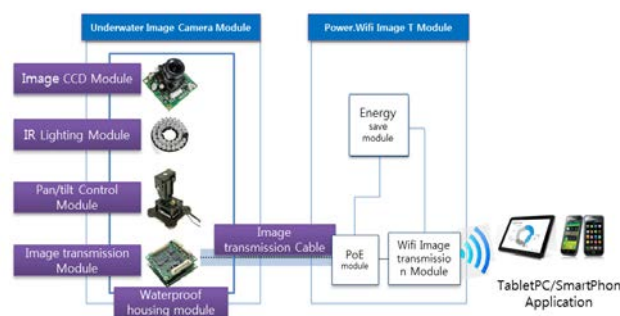


Figure 2. System configuration of underwater video system of abalone farm growth monitoring

This system comprises video CCD module, IR Led light, Pan/Tilt control module, Video transmission module and water proof housing module. It consists of energy saving module which transmits the video captured by the underwater video camera module and wireless video transmission module. This video system can be displayed and controlled by smartphone or tablet PC

III. UNDERWATER VIDEO CAMERA SYSTEM

Video camera with 2M pixels can monitor the growth status of abalone in 5~10 meter in depth. It is designed with LED with lower illumination not to interfere ecological environment. And the underwater cable module was made to transmit the video from the camera to workers in the sea. Cable is designed to perform video transmission and support camera location.

TABLE 1. KEY MODULE SPECIFICATION OF UNDERWATER VIDEO CAMERA

Module	Specification	
Video CCD Module	Sensor	CMOS
	Resolution	2Mega Pixel
	Codec	MJPEG, H.264, MPEG4
	EEL	4.3mm
	DC volt	DC 12V
	Power	7W
Video Transmission Module	Network protocol	HTTP, TCP/IP,
	Speed	100Mbps
Energy Saving Module	Input power	12V
	Output power	12V, 5V Dual
	Capacity	1000mA
Wireless Transmission Module	CPU	Mediatek RT5350
	Consuming power	5W
	Standard	IEEE802.11n
	Wireless RF	2.4GHz
	Transmission speed	150Mbps
	Transmission power	16dBm $\pm$ 2dB
	Access Method	CSMA / CA
	Transmission method	DSSS, OFDM, Half Duplex

A. Pan/Tilt control module and waterproofing housing module

PTZ camera was used which can acquire 4 directions video. To avoid blind spot, Pan, Tile function were mounted. Table 2 shows its specification.

TABLE 2. FONT SIZES FOR PAPERS

Description	Specification	
Pan	Rotating angle	335°
Tilt	Rotating angle	-30° ~ 90°
Protocol	HTTP	

As the abalone growth monitoring system shoots underwater, it should be well waterproofed. It endures max 10 meter depth with 10kg weight of stainless housing module.

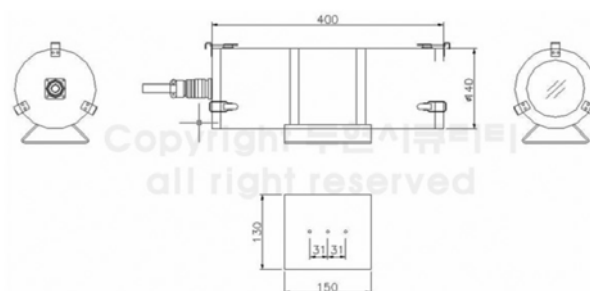


Figure 3. Stainless housing module

B. Power and wireless video transmission module

Power and wireless video transmission module consists of underwater camera, infrared LED, Pan/Tilt module, energy saving module which is supplied from wireless video transmission module, wireless video transmission module which transmits video to smartphone and table PC, PoE and other switches. The housing of power and wireless video transmission module was made

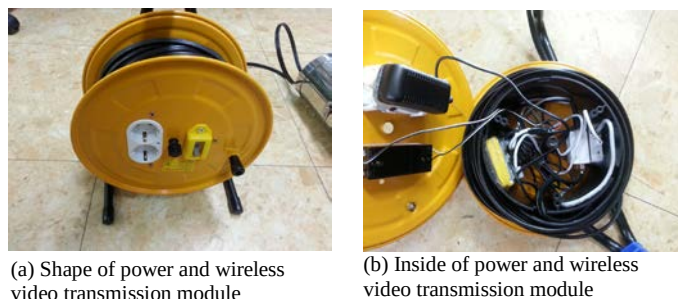


Figure 4. Power and video transmission module

C. Development of application

Android based smartphone application was made to visualize the video transmitted from the underwater video system. Most of android smartphone released in the country are compatible.

Once the application is executed after connecting to WIFI which belongs to SSID of video transmission module, the video is transmitted simply.

It supports both the table PC and Smartphone without purchasing any other special terminal, which reduces the product price.

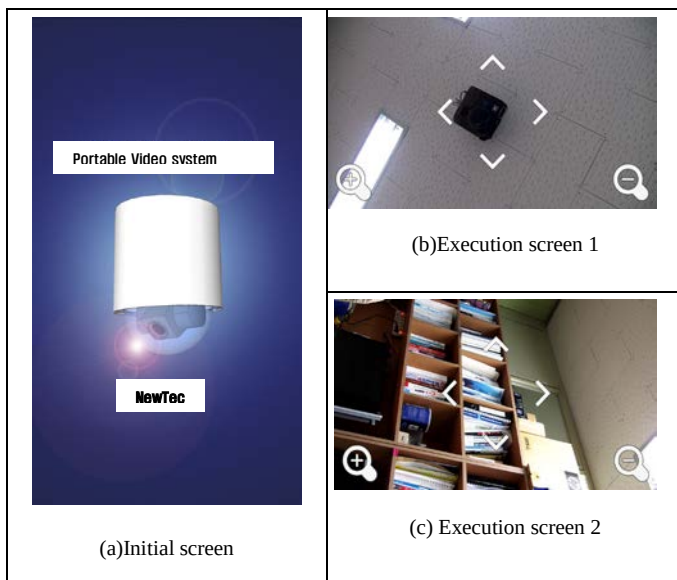


Figure 5. Application execution screen

D. Produced monitoring system

The farm growth monitoring system made with technology developed through this study is as following.



Figure 6. Developed farm growth monitoring system

IV. CONCLUSIONS

A conclusion may review the main points of the paper. Please do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

The abalone farm in Haenam was selected as a subject to develop the portable underwater video monitoring system for growth monitoring. It is a system to control the growth environment of abalone and feeding amount and it is a system which detects the degree of contamination and amount of sludge at the bottom due to over-feeding. This system has advantage to monitor the blind spot which is disadvantage of

fixed type. As it is portable, it covers wide range of farm for monitoring.

By performing appropriate feeding amount according to the growth status of abalone using this system, the production of abalone can be increased. By controlling the feeding amount according to the growth status not by experience based feeding, it is expected that the cost and contamination would be reduced. Not limited to the abalone farm, the future research should be made on the system which can monitor in most of farms which can protect serious contamination, red tide or group perish by mounting various sensors.

ACKNOWLEDGMENT

"This research was financially supported by the Ministry of Education (MOE) and National Research Foundation of Korea(NRF) through the Human Resource Training Project for Regional Innovation (No. 2013H1B8A2032217)."

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Mi-Jeong Park

Mi-Jeong Park received the B.S. degree from Korea, Gwangju University, Gwangju, Korea, in 2004, She is M.S degree from department of computer science, Sunchon National University, Korea, in 2012, She is currently a Ph.D. student in computer science at the Sunchon National University, Korea, Her current research interests

include augmented reality, image processing, computer graphics.



Eung-kon Kim

Eung-kon Kim received the B.S. degree from Chosun University, Gwangju, Korea, in 1980, his M.S degree from department of electronics, Hanyang University, Seoul, Korea, in 1987, his Ph.D. degree from Chosun University, Gwangju, Korea, in 1992. His current research interests are computer vision, virtual/augmented reality, image processing, and computer graphics. Currently he is a professor in department of computer

engineering, Sunchon National University, Korea.