Accurate Monitoring of Algal Blooms in Key Nearshore Zones of Lakes and Reservoirs Using Binocular Video Surveillance System

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Table S1. Parameters of binocular image acquisition system()

Parameter	Value
Sensor	OV9732
Focal distance	8.0mm
Monitoring distance	5~20M
Form	MJPG
Resolution ratio	1280×480
Size	80×22×251
Focus method	Manual focus
Output	USB2.0
Support system	Win XP/Win7/Win8/Win10/MAC OSX/Linux
Working temperature	-20℃~70℃
Manufacturer	Shenzhen Taiwei image Co., Ltd (China)

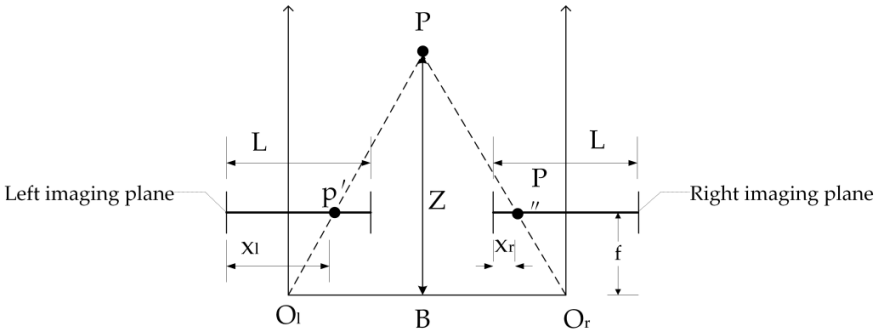


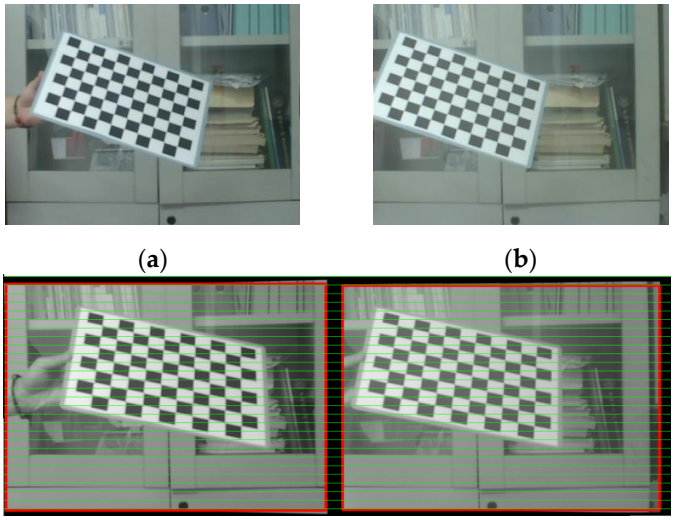
Figure S1. Basic principle of binocular stereo vision.

Table S2. Description of the camera calibration parameters.

Parameter	Representation	Explain
Internal parameters	$\begin{bmatrix} f_x & 0 & c_x \\ 0 & f_y & c_y \\ 0 & 0 & 1 \end{bmatrix}$	f_x, f_y are the number of pixels per unit distance on the u-axis and v-axis of the image plane, (c_x, c_y) coordinates of the main point of the image.
Distortion parameter	k_1, k_2, k_3, p_1, p_2	k_1, k_2, k_3 are the first-order, second-order, and third-order radial distortion parameters, p_1, p_2 are the first-order and second-order tangential

		distortion parameters.
Rotation parameters	$R = \begin{bmatrix} r_{11} & r_{12} & r_{13} \\ r_{21} & r_{22} & r_{23} \\ r_{31} & r_{32} & r_{33} \end{bmatrix}$	The rotation matrix R and the translation vector T describe the position and orientation of the camera in the world coordinate system.
Translation parameters	$T = \begin{bmatrix} t_1 \\ t_2 \\ t_3 \end{bmatrix}$	

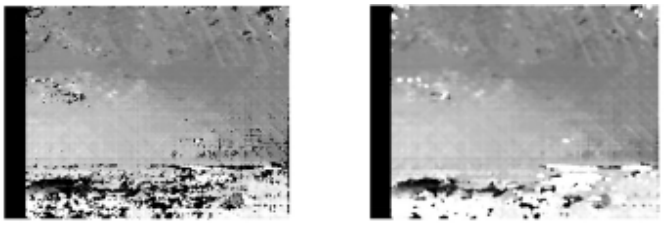
*The RMS error is less than 1, and the average error is as small as possible



(**a**) (**b**)

(c)

Figure S2. Image correction. (a) Correction front left image; (b) Correction front left image; (c) Left and right binocular image pole line correction.



(**a**) (**b**)

Figure S3. Disparity image optimization. (a) Cavity fill front disparity image. (b) Cavity fill disparity image.