

Water quality / bio management system

Basic function design document

Ver1.00

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Functional overview

When breeding living organisms such as fish, crustaceans, shellfish, etc., it is important to conduct appropriate water quality and biological management.

Especially, it is very important to analyze the breeding environment such as water quality in order to identify the causes such as illness, death, growth disorder, etc. of the living body. The same thing can be said in water plants. Therefore, in this document, we believe that the existence and development of a supportive system is essential to keep the breeding environment in the best condition, and describe the basic functions necessary for developing this system. In principle, it is a functional design assuming an artificial breeding environment in freshwater, but aims to be flexible and versatile specifications considering use and application in natural environment and sea water.

Purpose of system development

- ◆ Understand changes in breeding environment.
- ◆ Maintain health of living organisms and aquatic plants. Identify causes such as disease, death, growth disorder.

It is possible to manage information on 1 to n water tanks or breeding environment, and all collected information shall be managed in a centralized manner. The information accumulated in the server can be viewed at any time by an information terminal such as a PC or a smartphone.

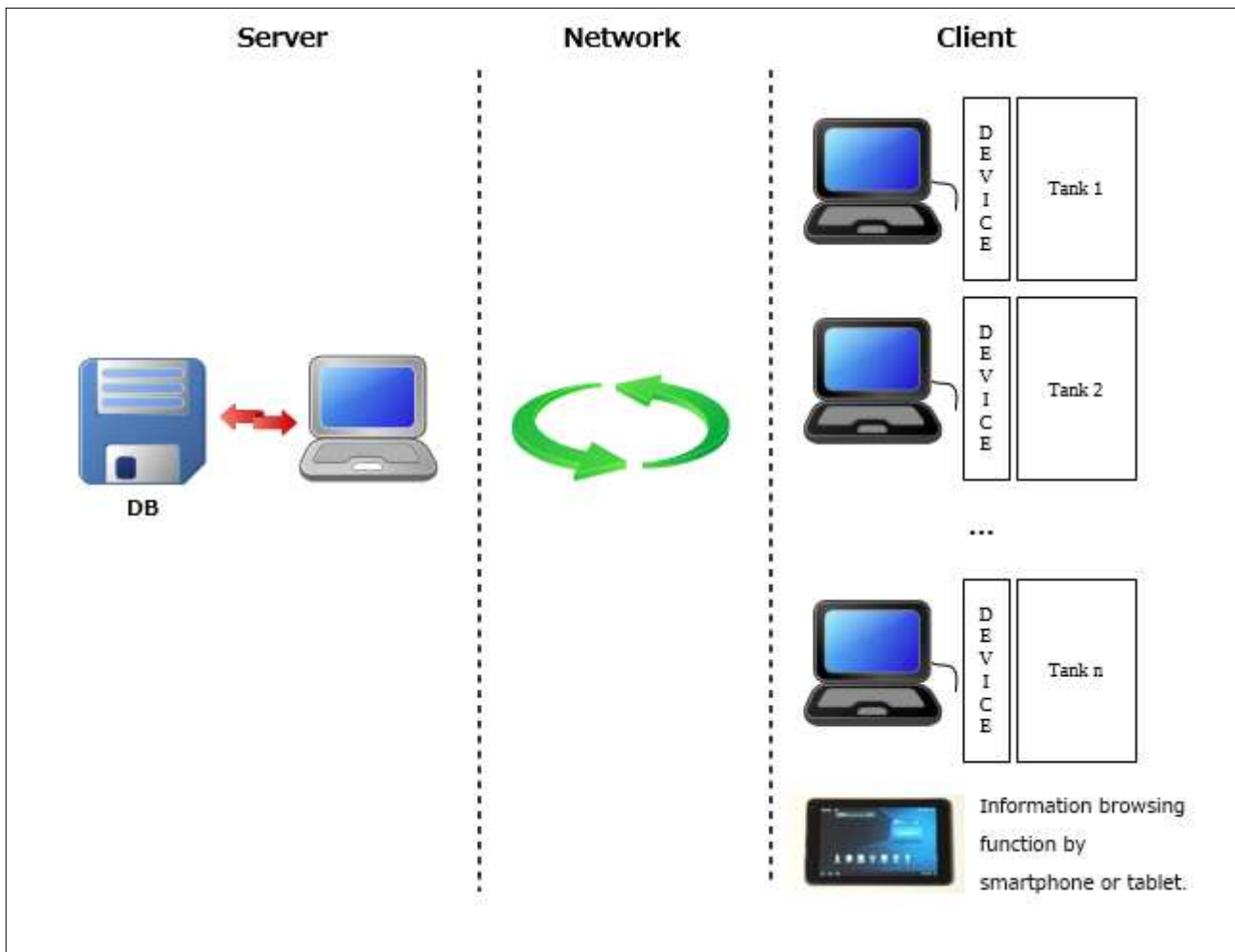


Fig.1 System overview

Water quality management

Water quality inspection function

In order to properly living bodies such as fish in water, it is of course necessary to manage the quality of the water in the living environment of those living beings in an appropriate state. In the following, components that represent water quality, which are considered to be detectable from the viewpoint of growth of a living organism and aquatic plants, are listed. The system shall have a function that can detect these components. Also, all the detected data is stored in the server at regular intervals.

In addition, we think that it is desirable to grasp changes in the breeding environment as soon as possible and to detect and notify abnormalities so that measures can be taken.

Soft water · hard water

Generally, soft water is said to be more suitable for breeding of fish than hard water. Therefore, it is assumed that minerals such as calcium and magnesium, which are contained in hard water in a large amount, can be detected.

- ◆ Calcium
- ◆ Magnesium

Living organism under water

The following factors may be considered as factors that affect the breeding of living bodies. In order to carry out appropriate water quality control, the following components can be detected.

- ◆ PH
- ◆ Water temperature
- ◆ Oxygen
- ◆ Chalk(chlorine)
- ◆ Salinity

Bacterial decomposition activity

The main component of bodily waste such as fish is ammonia. It is a very hazardous substance for living bodies in the breeding environment, but it is decomposed by bacteria in the following order.

Ammonia → Nitrous Acid → Nitrate

Therefore, in order to grasp the activity status of bacteria, that is, the filtration ability of the breeding environment, the contents of ammonia, nitrous acid and nitrate can be detected.

- ◆ Ammonia
- ◆ Nitrous acid
- ◆ Nitrate

Aquatic plants

Nitrogen, phosphorus, potassium, etc. are required mainly for growth of plants including water plants. Also, to promote photosynthesis, the amount of light irradiated to aquatic plants and the amount of carbon dioxide contained in water are very important. In this system, the following components can be detected.

- ◆ Carbon dioxide
- ◆ Light
- ◆ Potassium

- ◆ Nitrogen
- ◆ Phosphorus

Bio management

Functions considered necessary for bio management are described below.

Breeding environment monitoring function

In order to dynamically confirm the situation and abnormality in the breeding environment, the breeding environment can be monitored. Optionally, it is selectable to save monitoring video.

Snapshot function

In order to grasp the situation of the breeding environment statically, it is assumed that snapshot images can be captured while checking the moving picture.

Living body size detection function

The size of the living body can be cited as one index representing the growth and features of the living body. In this system, it is assumed that the size of the living body can be measured.

Data browsing

The data mentioned in this chapter means the ingredient information stored by the water quality test and images / movies saved by the biometrics management function.

Data browsing function

It is possible to check / browse data accumulated in the server and data acquired in real time. Below, describe the image of the viewing screen.

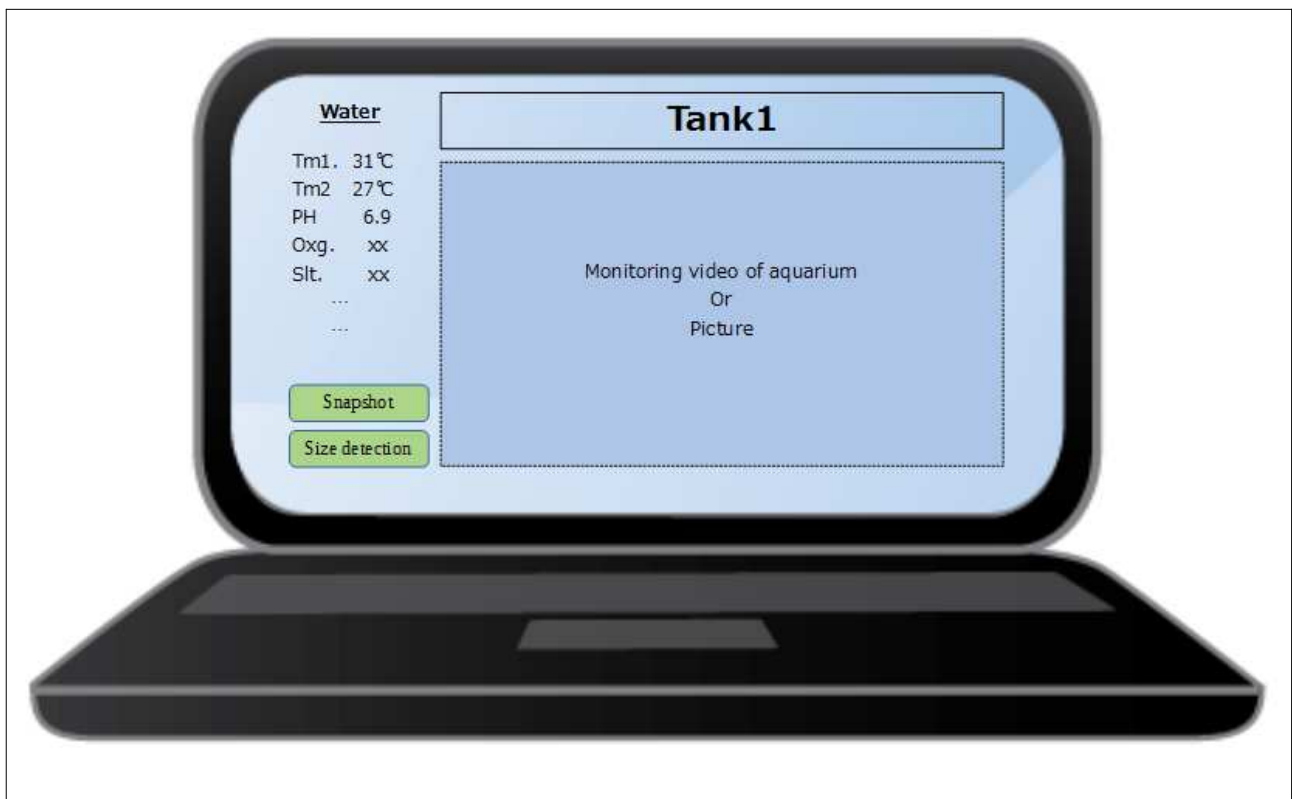


Fig.2 Data browsing screen

Appendix

The physical and logical configuration of the client in the system are shown below.

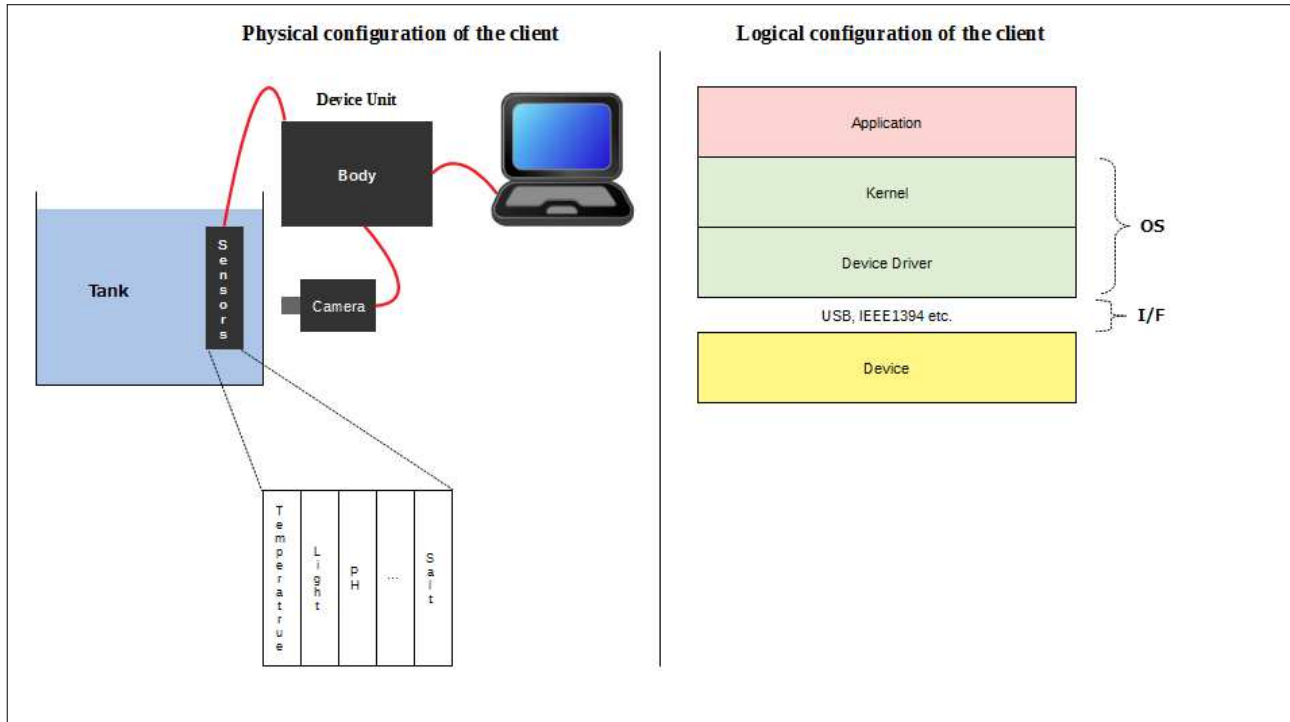


Fig.3 Configuration of the client in the system