Han LAB.

Measurement, transmission & visualization of underwater info.
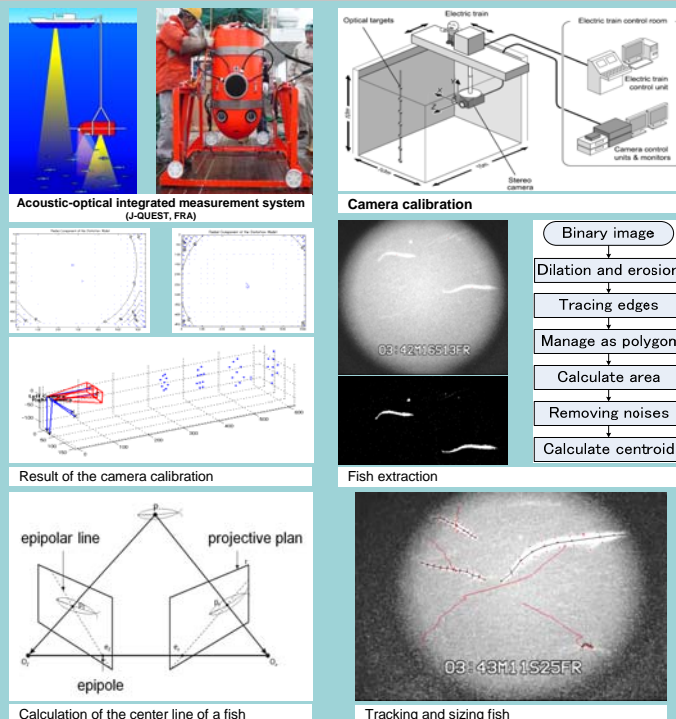
Underwater Technology Research Center

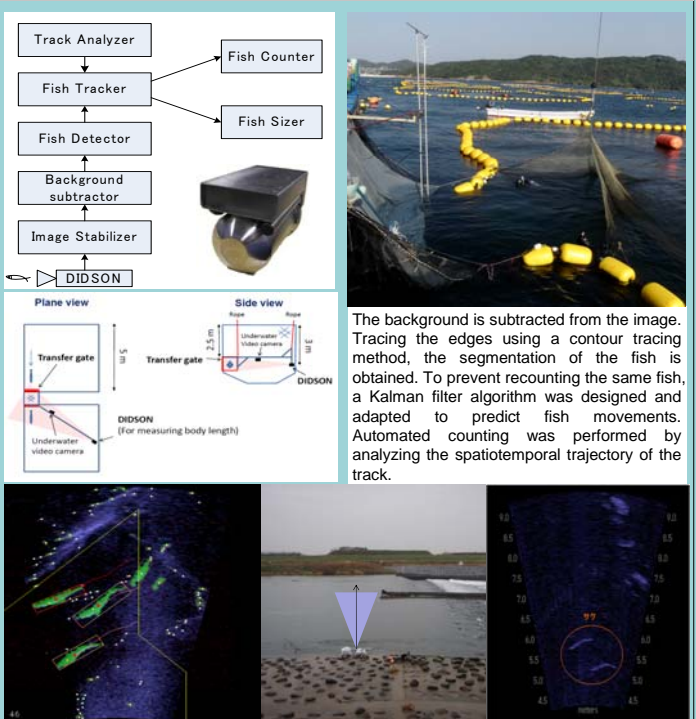http://www.hanlab.iis.u-tokyo.ac.jp

Applied Underwater Information and Acoustic Measurement Systems

- Applications of the acoustic video camera DIDSON in fisheries
- Underwater Acoustic communication and network System
- Automated method for counting and sizing fish using a stereo camera
- visualization of hydrothermal activities and its volume measurement
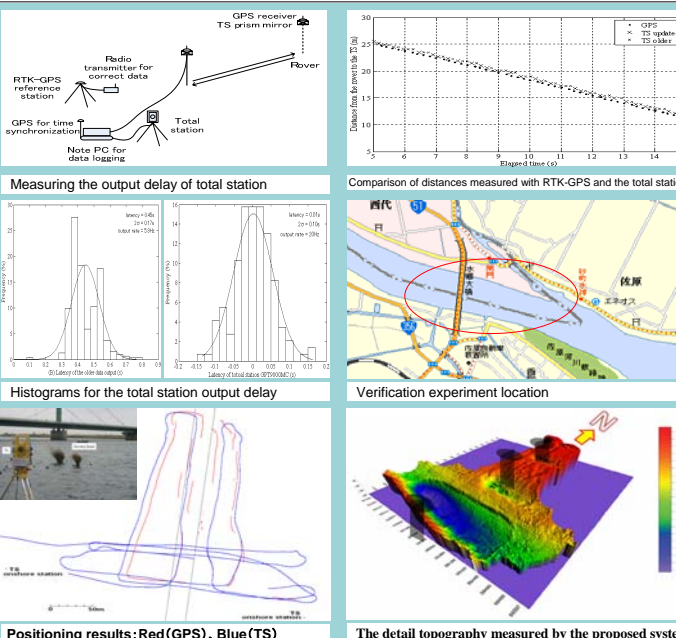
Automated 3D measurement method of *in situ* fish using two cameras

Acoustic-optical integrated measurement system (J-QUEST, FRA)

Camera calibration

Result of the camera calibration

Fish extraction

Binary image → Dilation and erosion → Tracing edges → Manage as polygon → Calculate area → Removing noises → Calculate centroid

Calculation of the center line of a fish

Tracking and sizing fish

Automated method for counting and sizing fish using DIDSON

Track Analyzer → Fish Counter
Fish Tracker → Fish Sizer
Fish Detector
Background subtractor
Image Stabilizer
DIDSON

Plane view / Side view
Transfer gate
Underwater video camera
DIDSON (For measuring body length)

The background is subtracted from the image. Tracing the edges using a contour tracing method, the segmentation of the fish is obtained. To prevent recounting the same fish, a Kalman filter algorithm was designed and adapted to predict fish movements. Automated counting was performed by analyzing the spatiotemporal trajectory of the track.

Development of a new total station synchronized with GPS

GPS receiver TS prism mirror
Radio transmitter for correct data
Rover
RTK-GPS reference station
GPS for time synchronization
Total station
Note PC for data logging

Measuring the output delay of total station

Comparison of distances measured with RTK-GPS and the total station

Histograms for the total station output delay

Verification experiment location

Positioning results：Red(GPS)、Blue(TS)

The detail topography measured by the proposed system

Short Range High Speed Underwater Acoustic Network System

水中音響LAN

PC — LAN — DSP — A/D Amp. / D/A Power amp. — Hydrophone — Acoustic Wave
Acoustic network adapter
Water tank
PC — LAN — DSP — A/D Amp. / D/A amp. — Projector

- **Carrier Frequency : 3MHz/ 1MHz**
- **Modulation   : BPSK**
- **Bit Rate   : 600k/200kbps**
- **RX Bandwidth   : 400k**
- **A/D Converter   : 16MHz**

UDP/TCP → IP → LCP / IPCP / Authentication → AHDLC → Acoustic wave
PPP

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