WATER POLLUTION LEVEL MONITORING SYSTEM

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ABSTRACT

The development of sensors and control and command modules capable of extracting environmental data has made it possible to build an underwater drone for monitoring and collecting water samples from hard-to-reach areas. In this paper we present the project that focuses on the fundamental challenges related to communication, control but also the analysis of water parameters in real time.

Figure 1 A photo with sistem on the water

SYSTEM DESCRIPTION

The drone control system basically consists of a remote control and a receiver. The receiver controls the engines that help move the boat, the pumps, and the lights. It also contributes to the control of the engine that drives the vertical movement of the underwater camera. Another special function of the receiver is to control and operate the motor that moves the terrestrial camera that guides us in real time on the water, also contributing to the control of the functions of the underwater camera.
The water analysis system is based on a microcontroller, Arduino Mega, to which are attached 3 sensors that determine the following water parameters: pH, turbidity, water purity using a TDS meter (Total Dissolved Solids) and a mini-Ethernet modules .
The drone's communication system consists of a network of 3 routers, one on the ground and two on the boat. The ground router communicates with one in the boat via the bridge configuration, and the two in the boat communicate via the Ethernet protocol.
The underwater video system consists of a transmitter that is connected to the underwater camera and a receiver connected to a ground monitor.

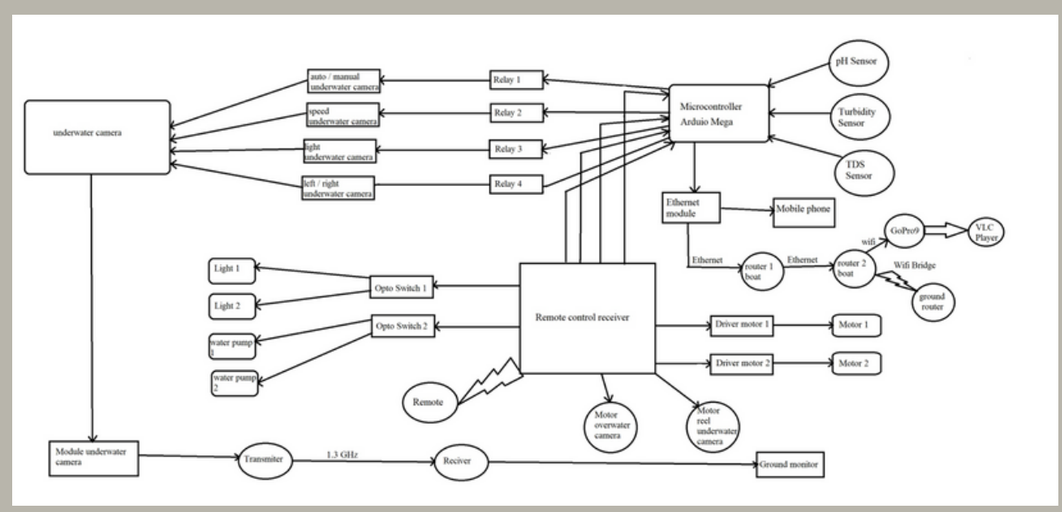

Figure 2 The bloc diagram of the water monitoring system

Analysis

For the experimental determination of the water parameters, three cases were considered, namely: drinking water, lake water that is fresh and sea water, salt water.
For each of these types of water, the monitoring system was used and the following parameters were determined: pH, turbidity and water purity.

Coordinates	pH	Turbidity [NTU]	Purity [ppm]	Distance from shore [m]
(44,216434;28,617770)	7,72	77	554	100
(44,216483;28,618335)	7,78	80	570	15
(44,216447;28,617961)	7,621	75	568	50
average	7,707	77,33	564	-

Tabel 1. The values of the parameters obtained after the analysis of the lake water

Coordinates	pH	Turbidity [NTU]	Purity [ppm]	Distance from shore [m]
(44,182193;28,655525)	8,37	67	603	15
(44,128174;28,655628)	8,4	61	598	50
(44,182196;28,655681)	8,38	52	571	100
Media	8,38	60	590,6	-

Tabel 2. The values of the parameters obtained after the analysis of the sea water

	pH	Turbidity [NTU]	Purity [ppm]
Average form lake water	7,707	77,33	564
Average from sea water	8,38	60	590,6
Drinking water	7	3	150

Tabel 3. The comparation between three waters (lake, sea and drinking water)

Figure 3 Monitoring system collecting data from the lake

Conclusion

Within this project we developed a remotely controlled mobile system, able to take information about certain parameters in the water (pH, turbidity and water purity), which provides real-time images from the underwater environment but also images from above the water. At the same time, this system collects water samples for a much more detailed analysis in a specialized laboratory. The system monitors water pollution at a low cost; it is no longer necessary to travel with a large boat to the sea to take the water samples and to visualize the state of water pollution at the surface but also under water up to a depth of 15 meters.

Acknowledgement

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