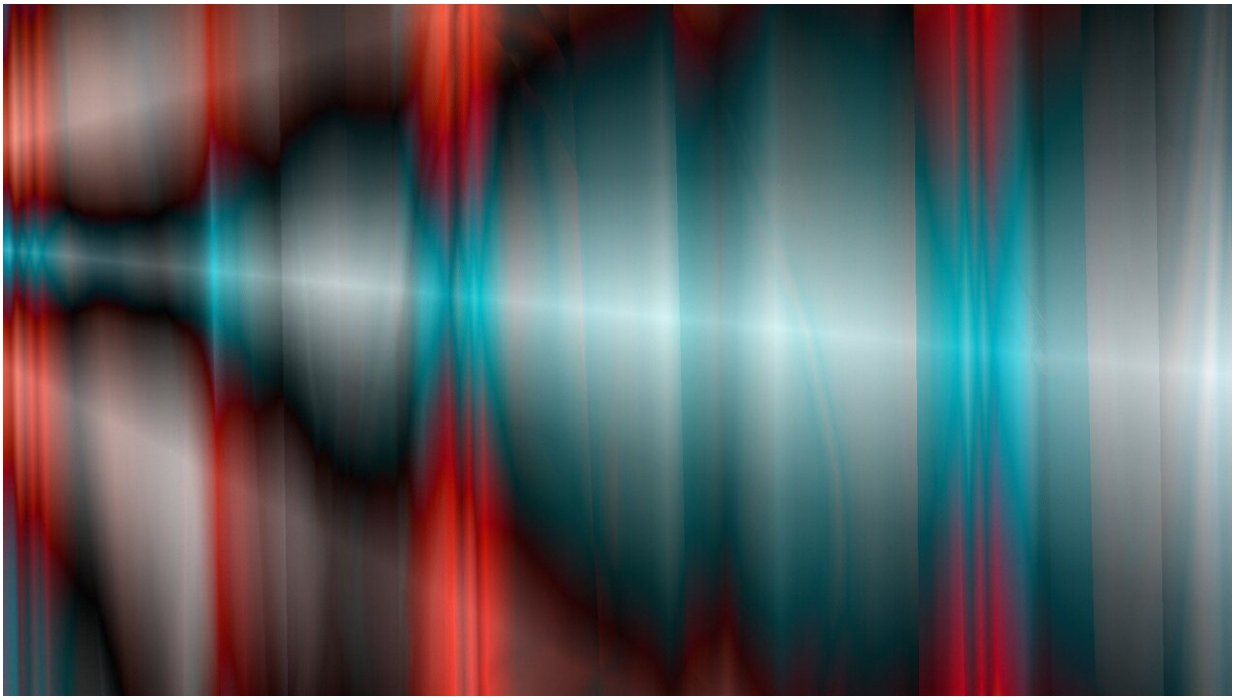
# Underwater acoustic wireless communication using TCP/IP

March 1 2023, by David Bradley



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Acoustic communication through water is well known in many species of sea creatures—whales, dolphins and other cetaceans, perhaps being the best known examples. But, crustaceans and fish also often communicate through water with sound. People have used sonar, sound navigation and ranging, since the time of Leonardo da Vinci who first described an acoustic listening technique in 1490. Modern, active sonar

methods are, of course, far more sophisticated than his passive technique.

Now, research in the *International Journal of Intelligent Internet of Things Computing* discusses an acoustic communications system akin to sending an underwater email. Md. Aktarul Hasan and Shen Wei of the School of Informatics at Zhejiang Sci-Tech University, Hangzhou, China, and colleague Yubo Peng of the Zhejiang Province E-commerce Promotion Center demonstrate proof of concept for an acoustic communications device based on based on Arduino controllers.

In their system a piezo-electric transducer acts as a speaker to produce a low-frequency signal. At the receiver end of the "channel" the same type of piezo-electric transducer is used as a microphone to detect the incoming signal. The team has shown that within a 1 to 3 kilohertz (kHz) band, they can transmit and receive information at a rate of 200 bits per second acoustically through water and were able to send the requisite information from a web page, converted into Morse code, through the water that could then be decoded and the information used to display the page on a computer at the receiving end.

The system is built on the TCP/IP internet protocol. The working distance between transmitter and receiver can be be up to 25 meters with the current setup. The team adds that improvements in the technology could increase the range of their system considerably making it much more useful.

The team suggests that their battery-powered system could be run from a small boat. They point out that the basic demonstration of transmitting a web page suggests that simple "wireless" telemetry and remote control of underwater devices should now be possible.

**More information:** Wei Shen et al, Underwater Wireless

TechXplore

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