

New research suggests changes in underwater data communications

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An NJIT professor, who has discovered new communication channels in underwater environments and invented a technique to communicate data through these channels, will be honored later this month by the New Jersey Inventors Hall of Fame. His work will eventually allow multiple users and underwater vehicles and instruments to communicate information and data faster and more reliably in complex underwater environments. The National Science Foundation has supported this research.

Ali Abdi, PhD, associate professor in the department of electrical and computer engineering at NJIT will receive on Oct. 23, 2008, the 2008 New Jersey Inventors Hall of Fame Innovators Award. The organization will also honor NJIT President Emeritus Saul F. Fenster, PhD, professor of mechanical engineering, as a founder of the group.

Underwater communication systems use acoustic pressure channels. Abdi's invention differs from existing systems because his uses acoustic particle velocity channels for data communication. These channels would be able to provide new and extra canals for data communication.

There are obvious advantages to increasing the number of canals. Not only would they increase the speed and reliability of data reception, but more importantly, by going to Abdi's system manufacturers could shrink the size of the receiver receiving the data.

"Today existing receivers rely upon separated pressure-only sensors that

are spaced far apart," Abdi said. "Needless to say, array size can be a serious limitation in many situations, including the modern applications of small, autonomous and unmanned underwater vehicles. My new receiver would allow for a smaller, more nimble and easier- to-use product."

In the 15th century, the celebrated artist and scientist Leonardo da Vinci conducted the first underwater communication trial. By hearing the sound of distant ships, Da Vinci discovered the possibility of long-range underwater sound propagation. The first practical implementation of an underwater wireless system was delayed until 1945, when a single sideband underwater telephone was developed. It is well known that water is a better medium for sound propagation than the air. With a nominal speed of 1500 meters per second, acoustic waves propagate faster in water, when compared to how they propagate 330 meters per second in air. In addition, acoustic waves can travel more than thousands of kilometers in oceans.

"This invention offers a new way to communicate data in underwater channels," said Abdi. "I see it making a major impact on the commercial and naval underwater acoustic communication systems." Potential users include meteorologists monitoring environmental changes in oceans, especially those linked to hurricanes; off-shore oil-drilling companies overseeing underwater work sites; fisheries who make their business from the water; underwater surveillance operators for homeland security and more.

Source: New Jersey Institute of Technology

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