

Labnet Labnet International, Inc.  **Labnet High Speed Microcentrifuges** Refrigerated and air-cooled options available

-Search- Search [Register](#) [Submit News](#) [Blogs](#) [Protocols](#) [Forum](#) [Groups](#) [Shop](#)

 **LabSpaces**
Join the discussion

News [Blogs](#) Email [Log In](#)
Forgot password? Not a member?

[All](#) [Health](#) [Bioscience](#) [Physical Science](#) [Environment](#) [Space](#) [Tech](#) [Life](#) [Origins](#) [Misc](#)

Login

Press Release

Simplify Molecular Cloning - Gene Construction Kit®
"GCK is the most user-friendly software for routine plasmid cloning."
Mention "Nova" - Save \$150 **FREE DEMO DOWNLOAD**
www.textco.com 

TWIPS -- sonar inspired by dolphins

Wednesday, November 17, 2010

Scientists at the University of Southampton have developed a new kind of underwater sonar device that can detect objects through bubble clouds that would effectively blind standard sonar.



Dolphin Credit: NASA

Just as ultrasound is used in medical imaging, conventional sonar 'sees' with sound. It uses differences between emitted sound pulses and their echoes to detect and identify targets. These include submerged structures such as reefs and wrecks, and objects, including submarines and fish shoals.

However, standard sonar does not cope well with bubble clouds resulting from breaking waves or other causes, which scatter sound and clutter the sonar image.


Professor Timothy Leighton of the University of Southampton's Institute of Sound and Vibration Research (ISVR), who led the research, explained:

"Cold War sonar was developed mainly for use in deep water where bubbles are not much of a problem, but many of today's applications involve shallow waters. Better detection and classification of targets in bubbly waters are key goals of shallow-water sonar."


Leighton and his colleagues have developed a new sonar concept called twin inverted pulse sonar (TWIPS). TWIPS exploits the way that bubbles pulsate in sound fields, which affects the characteristics of sonar echoes.

"To catch prey, some dolphins make bubble nets in which the best man-made sonar would not work. It occurred to me that either dolphins were blinding their sonar when making such nets, or else they have a better sonar system. There were no recordings of the type of sonar that dolphins use in bubble nets, so instead of producing a bio-inspired sonar by copying dolphin signals, I sat down and worked out what pulse I would use if I were a dolphin," said Leighton.

As its name suggests, TWIPS uses trains of twinned pairs of sound pulses. The first pulse of each pair has a waveform that is an inverted replica of that of its twin. The first pulse is emitted a

 **LabSpaces.net** on Facebook
[Like](#) [You like Page](#) [You like Page](#) [Confirm](#)

1,172 people like **LabSpaces.net**. 1,171 people like this page.

 Facebook social plugin

Featured Blogs

Hippocampus (or should I say, elephant-campus)



Author: **Jordan Gaines** | Comments: 0

Goodbye, sun. Hello, confused suprachiasmatic nucleus!



Author: **Dangerous Experiments** | Comments: 0

What do the OWS protesters and Chimps have in common?



Author: **Psycasm** | Comments: 0

How film makers are using your own imagination to scare you



Author: **Dangerous Experiments** | Comments: 2

Poking a barking dog with a big stick.



Author: **GirlPostdoc** | Comments: 6

[View more Blog articles](#)

fraction of a second before its inverted twin.

Leighton's team first showed theoretically that TWIPS might be able to enhance scatter from the target while simultaneously suppressing clutter from bubbles. In principle, it could therefore be used to distinguish echoes from bubble clouds and objects that would otherwise remain hidden.

In their latest study, the researchers set out to see whether TWIPS would work in practice. Using a large testing tank, they showed experimentally that TWIPS outperformed standard sonar at detecting a small steel disc under bubbly conditions resembling those found under oceanic breaking waves.

Encouraged by their findings, they next conducted trials at sea aboard the University of Southampton's coastal research vessel the RV Bill Conway. They compared the ability of TWIPS and standard sonar to discern the seabed in Southampton Water, which handles seven per cent of the UK's entire seaborne trade. The seabed in this area varies in depth between 10 and 20 metres.

"TWIPS outperformed standard sonar in the wake of large vessels such as passenger ferries," said co-author Dr Justin Dix of the University of Southampton's School of Ocean and Earth Science (SOES) based at the National Oceanography Centre, Southampton.

Possible future marine applications for TWIPS include harbour protection and the detection of bubbles in marine sediments and manufacturing. Technologies based on the same basic principles could be used in medical ultrasound imaging, which was already using pairs of inverted pulses to enhance (rather than suppress) contrast agents injected into the body. The TWIPS principle would work with other sensors such as in Magnetic resonance imaging (MRI), and Leighton has proposed TWIPR (Twin Inverted Pulse Radar) for the detection of improvised explosive devices or covert circuitry.

But what about the original inspiration for the research – do dolphins and other echolocating animals use TWIPS?

"Key ingredients of a TWIPS system appear in separate species but they have never been found all together in a single species," said Leighton. "There is currently no evidence that dolphins use TWIPS processing, although no-one has yet taken recordings of the signals from animals hunting with bubble nets in the wild. How they successfully detect prey in bubbly water remains a mystery that we are working to solve. I have to pay credit to the team – students Daniel Finfer and Gim-Hwa Chua of ISVR, and Paul White (ISVR) and Justin Dix of SOES. Our applications for funding this work were repeatedly turned down, and it took real grit and determination to keep going for the five years it took us to get this far."

###

National Oceanography Centre, Southampton (UK): <http://www.noc.soton.ac.uk>

Thanks to National Oceanography Centre, Southampton (UK) for this article.

This press release was posted to serve as a topic for discussion. Please comment below. We try our best to only post press releases that are associated with peer reviewed scientific literature. Critical discussions of the research are appreciated. If you need help finding a link to the original article, please contact us on twitter or via e-mail.

This press release has been viewed 79 time(s).

SPROUTNOVA

The ad network created specifically for scientific research, education and products.

Write. Publish. Earn cash.

Up to 50% of ad revenue could be yours today!

Learn more at SproutNOVA.com

More Technology

Mask-bot: A robot with a human face



Source: Technische Universitaet Muenchen | Comments: 0

Is that a robot in your suitcase?



Source: Queensland University of Technology | Comments: 0

'Protein microarrays' may reveal new weapons against malaria



Source: Walter and Eliza Hall Institute | Comments: 0

Video: Scientists reach the heights with gecko-inspired tank robot



Source: Institute of Physics | Comments: 0

Relief from 'parking wars'



Source: American Friends of Tel Aviv University | Comments: 0

Computer scientist cracks mysterious 'Copiale Cipher'



Source: University of Southern California | Comments: 0

Taking the pulse of charge-separation processes



Source: Ludwig-Maximilians-Universität München | Comments: 0

Video: Researchers build transparent, super-stretchy skin-like sensor



Source: Stanford University | Comments: 0

From the Web

Robotic Guide Dog Leads The Way

The Microsoft Kinect helps create a robo-pooch with a female voice and wheels instead of paws.

Robotics | Source: Discovery Channel News | Views: 41 | Comments: 0



Friends



Facebook



Carver College of
Medicine



Twitter



LabX.com



LabManager.com



ADVANCE
Magazine



BioKM
FOR YOUR RESEARCH
BioData.com



Adamson Studios



Drew Curtis' Fark



MicrobeWorld



NYAS

CrimsonBase

[About](#) [Labs](#) [Users](#) [Groups](#) [RSS Feeds](#) [Link to Us](#) [Terms of Service](#) [Privacy Policy](#) [Member Use Agreement](#)
[Contact Us](#)

© 2005-2011. LabSpaces Productions, LLC. All rights reserved.