Researchers Invent “Acoustic-Assisted” Magnetic Information Storage

Oregon State University

CORVALLIS, Ore. – Electrical engineers at Oregon State University [1] have discovered a way to use high- frequency sound waves to enhance the magnetic storage of data, offering a new approach to improve the data storage capabilities of a multitude of electronic devices around the world.

The technology, called acoustic-assisted magnetic recording, has been presented at a professional conference, and a patent application was filed this week.

Magnetic storage of data is one of the most inexpensive and widespread technologies known, found in everything from computer hard drives to the magnetic strip on a credit card. It’s permanent, dependable and cheap. However, long-term reliability of stored data becomes an increasing concern as the need grows to pack more and more information in storage devices, experts say.

“We’re near the peak of what we can do with the technology we now use for magnetic storage,” said Pallavi Dhagat, an associate professor in the OSU School of Electrical Engineering and Computer Science. “There’s always a need for approaches that could store even more information in a smaller space, cost less and use less power.”

That can be possible, scientists say, if the magnetic materials are temporarily heated, even for an instant, so they can become momentarily less stiff and more data can be stored at a particular spot. This has proven difficult to do, because the heating tends to spread beyond where it is wanted and the technology involves complex integration of optics, electronics and magnetics.

With the new approach, ultrasound is directed at a highly specific location while data is being stored, creating elasticity that literally allows a tiny portion of the material to bend or stretch. It immediately resumes its shape when the ultrasound waves stop. The data can be stored reliably without the concerns around heating.

It should also be possible to create a solid state memory device with no moving parts to implement this technology, researchers said. Unlike conventional hard-disk drive storage, solid state memory would offer durability.

These advances were recently reported at the 12th Joint MMM/Intermag Conference in Chicago.

“This technology should allow us to marry the benefits of solid state electronics with magnetic recording, and create non-volatile memory systems that store more data in less space, using less power,” said Albrecht Jander, also an associate professor of

electrical engineering and collaborator on the research.

This approach might work with materials already being used in magnetic recordings, or variations on them, the investigators said. Continued research will explore performance, materials and cost issues.

Advances in data storage are part of what has enabled the enormous advance in high technology systems in recent decades.

A disk drive at the dawn of this era in the 1950s had five megabyte capacity, cost today’s equivalent of $160,000, weighed about a ton, had to be moved with a forklift and was so big it had to be shipped on a large cargo aircraft. Experts at the time said they could have built something with more storage capacity, but they could not envision why anyone would want it, or buy it.

A system today that stores 500 gigabytes, or 100,000 times as much information, is found routinely in laptop computers that cost a few hundred dollars.

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