

Thin drives -- the next generation of portable memory

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First prototype of DSI's thin hybrid hard disk drive implemented with the new axial field motor design

Tablets are fast becoming the media device of choice nowadays for work and play, particularly with the advent of iPads and the Samsung Galaxy Tab into the mobile device market. With a volume of 19.5 million of media tablet sold in 2010, and the sales volume is projected to reach over 200 million units by 2014. As media tablets seem to be an emerging trend and continues its expansion into mass consumer market, there is a lot of potential to improve the performance of the media tablet, especially in the area of memory and storage.

Although the current memory and storage of choice for tablets is Flash memory, the A*STAR, Data Storage Institute (DSI) believes that moving forward, thin hybrid drives would provide a good alternative to



Flash memory due to the scaling and performance limitations of Flash memory. Additionally, hybrid drives could potentially lessen <u>power</u> <u>consumption</u>, reduce costs and increase storage capacity. Currently, the thinnest hard disk drive in the market for a 2.5 inch form factor is about 7 mm. However, in order to break into the media <u>tablet market</u>, the ideal thickness of a hard disk drive should be 5 mm or less.

Researchers at DSI aim to produce a hard disk drive thin enough to fit into a tablet, taking the thickness of the current iPad2 (which is at 0.34 inch or 8.8 mm) as the benchmark target. The DSI also proposed a <u>hybrid architecture</u> in order to mitigate the issues of portability, reliability of data, and power consumption. Compared to Flash or solid state drives (SSD), hybrid drives can provide a larger storage capacity, and performances at a significantly lower cost; whilst compared to hard disk drives, hybrid drives can reduce power consumption by about 30%.



Overall thickness of the first prototype of DSI's thin hybrid hard disk drive is 5mm.

One of the main challenges faced in scaling down the thickness of a hard disk drive is the ability to scale the thickness of the current spindle



motor while maintaining the <u>motor performance</u> such as the nonrepeatable run-out (NRRO). DSI has designed an axial field motor (the current motor is based on a radial field design) that is 4 mm thick, and can spin at 5400/7200 revolutions per minute (rpm). The axial field design eliminates cogging torque and unbalanced magnetic pull that in turn helps to reduce friction loss of the bearing, vibration and acoustic noise. This novel and slim spindle motor will be demonstrated in DSI's thin drive with a 5 mm thickness.

"DSI is very excited about the direction that we are taking. We strongly believe there is an opening in the market for thin drives. We are capitalising on our years of R&D experience in hard disk drive and data centre technologies and are working passionately to make the concept of thin <u>hard disk drive</u> into reality," said Dr. Pantelis Alexopoulos, Executive Director of DSI.

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