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## Researchers invent world's smallest antenna for ultra-wideband communications

By [Susan Trulove](#)

BLACKSBURG, Va., September 23, 2008 -- Virginia Tech researchers have developed an efficient compact ultra-wideband antenna (CUA) for a range of home, automotive, medical, and military applications. The antenna has achieved a near optimal performance for size and bandwidth, according to Inventor Taeyoung Yang.

Yang, an electrical and computer engineering Ph.D. student with the Wireless@Virginia Tech group, presented the theory for making an ultra-wideband antenna as close as possible to the theoretical limit on antenna size and performance, plus the design for one such antenna, at the XXIX General Assembly of the International Union of Radio Science in Chicago in mid-August 2008. The project is part of his dissertation. Co-inventors are electrical and computer engineering professors W. A. Davis and W. L. Stutzman.

Ultra-wideband (UWB) antennas are designed for low energy, short-range transmission of lots of data. Wireless transmission of data from a cell phone or digital camcorder to one's computer is one potential use. A smaller antenna that can send large movies is easily appreciated. Wireless transmission from a DVD to a high-definition television (HDTV) offers a boon to room décor.

There are also complex and critical applications for such technology, said Yang. Examples are pulsed radar systems to prevent collisions between cars; medical imaging systems to detect tumors; and military applications, such as unmanned aircraft.

"To our best knowledge, our invented antenna is the world's smallest with more than a 10:1 bandwidth. It has more than 95 percent efficiency for signal transmission, and a fairly constant omni-directional radiation pattern," said Yang.

The inventors' strategy to reduce the size and increase the adaptability of the antenna was to configure it as a structure that can be printed on the inner side of the protective housing, which can be light plastic.

The design also makes it cheap and simple to produce. "The required material expense is low, the fabrication process is simple, and it is versatile for mounting on curved surfaces," said Yang. "It is convenient to install and disassemble."

Yang received the best paper award from Commission B (fields and waves) at the 2008 General Assembly of the International Union of Radio Science. He has received a number of awards for his research and is a 2008 Torgersen Graduate Student Research Excellence Award Recipient at Virginia Tech.

[Learn more about the invention online](#) or contact [John Talerico](#) at Virginia Tech Intellectual Properties Inc. at (540) 951-9376.

IMAGE INFORMATION: >(Top) Yang (right) received the Best Paper Prize in the fields and waves category at the 2008 General Assembly of the International Union of Radio Science. William Davis (left) is co-author. The paper was "The Design of Ultra-Wideband Antennas with Performance Close to the Fundamental Limit," by Yang, Davis, and W.L. Stutzman. (Bottom) The compact ultra-wideband antenna is shown without its radome (protective housing).

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## Event Calendar

Today is Monday November 30

All day

[Course Registration for Spring 11/30/09-1/25/2010](#)

All day

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11:00 am

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