



Goddard's HHT Shows Promise for Radio Frequency Communications



BCG Wireless has licensed NASA Goddard Space Flight Center's Hilbert-Huang Transform (HHT) technology to help improve signal reception capability in radio frequency (RF) communications. Initial testing at Goddard indicates that applying HHT to degraded RF signals can significantly improve the detected signal, enabling better reception and more accurate signal transmission. BCG Wireless is exploring the applicability of this HHT capability for devices including radio frequency identification (RFID) chips and cellular communications systems.

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Benefits of Technology Transfer

- BCG Wireless may be able to significantly improve the performance of a variety of RF devices, helping to establish a competitive position by offering software and hardware that improves the usability of existing RF systems.
- Consumers may benefit from RF products with improved reception and longer battery life.
- Companies may benefit from improved RFID technology, enabling them to implement more efficient shipping, receiving, inventory, and item-identification processes.
- NASA may be able to use enhanced RF capabilities to benefit its own radiometers, telescopes, satellites, and other space program technologies.

tech transfer success

On the Record

"This license agreement is a key asset to BCG Wireless, and our relationship with the Office of Technology Transfer has developed into a true partnership. From the earliest days of our work together, they invested the time and energy to get to know us and to thoroughly understand our strategy. One of the barriers that small companies face is forging a solid working relationship with larger organizations. Not only does the OTT understand that dilemma but they find creative ways to solve it. I can say with complete candor that without the OTT we would not be on the threshold of our own commercial success." - *Jack Barse, CEO, BCG Wireless*

"This agreement is a great example of how NASA technology can jump start commercial development, and the resulting commercial technologies can benefit NASA. As BCG uses HHT technology to improve RF applications such as RFID, those improvements will then go on to benefit NASA sensing and logistical applications for Moon and Mars exploration." - *Tom Flatley, innovator, NASA Goddard*

"It is always satisfying to find new uses for Goddard technologies beyond their original application. And in this case, support from the Emerging Technology Center and the Maryland Technology Development Corporation is helping fuel growth for a small start-up company with the potential to impact the RF device market." - *Joe Famiglietti, Technology Transfer Manager, NASA Goddard*

About BCG Wireless

BCG Wireless LLC is a small start-up company affiliated with the Emerging Technology Center (ETC), a technology incubator in Baltimore, Maryland. Based outside Baltimore, the company also receives support from the Maryland Technology Development Corporation (TEDCO).

Technology Origins

A revolutionary, adaptive set of signal-analysis algorithms, HHT was developed at Goddard in 1995 by Dr. Norden Huang as part of oceanic wave research. Unlike precursor technologies, HHT provides an effective method for analyzing nonlinear and nonstationary signals while improving the accuracy of linear- and stationary-signal analysis. The technology's first application within NASA was analysis of wing-flutter tests and the next generation of aircraft design at NASA Dryden Flight Center. The technology has also contributed to Shuttle mission safety by testing the tiles that insulate the Shuttle in space for the Shuttle Return to Flight Project following the Columbia accident.

Finding a New Use

Research conducted at Goddard at the request and with the support of BCG Wireless indicated that HHT may be very beneficial for RF signal analyses. Using a simple RFID kit, researchers introduced noise that degraded the RF signal. When the

researchers then introduced the HHT algorithm, they were able to extract the signal, despite the noise. This testing validates that HHT can be used to improve signal reception for RF devices, which may also help preserve battery life and improve usability.

The Transfer Process

Collaboration between Goddard and BCG Wireless began in 2004 when the company was part of ETC. ETC made BCG Wireless aware of HHT and its capabilities. After evaluating the technology, BCG Wireless suggested that HHT may be applicable to RF devices, and collaborated with Goddard to conduct research to validate this hypothesis. This research was conducted as part of a reimbursable Space Act Agreement (SAA) signed in January 2005. Based on the positive findings, BCG Wireless submitted a license application and worked with Goddard's Office of Technology Transfer (OTT) to finalize the agreement, which was signed in July 2006.

Looking Ahead

With a license in place, BCG Wireless is initially working to apply HHT to RF applications such as RFID and cellular systems to improve reception, battery life, and usability. Given the success of initial research with Goddard, the company is also considering further collaborative research with NASA.

For More Information

If you would like additional information about Goddard's technology transfer opportunities, please contact:

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