Enhanced MIMO Framework for Optimized Wireless Communications (#7343)

An innovative K-best detection method that improves efficiency and lowers complexity

This invention is a practical solution for implementing *K*-best detection in multiple-input and multiple-output (MIMO) data signal transmission techniques. *K*-best detection is a highly effective, tree-search-based strategy that is both high performing and flexible. Its level of complexity is unaffected by noise or type of channel. Georgia Tech researchers have improved the *K*-best method by modifying it with a scalar list detector that utilizes a slicing operation to reduce the complexity of large alphabets. With this novel algorithm, the processing delay does not increase at the same rate as the modulation order, thereby achieving a higher data rate and preserving performance. The resulting framework is a highly efficient, low-complexity MIMO solution with a competitive error rate.

Benefits/Advantages

- **Innovative**: Overcomes the efficiency and complexity challenges of conventional detector frameworks
- **Independent**: Has a fixed complexity that remains unaffected by noise
- **Sophisticated**: Combines the high performance of *K*-best detection with the low-complexity scalar list detector

Potential Commercial Applications

- Wireless communications systems
- Radio
- Power line communications systems

Background/Context for This Invention

The demand for higher spectral efficiency in MIMO communications systems and standards is leading to an increase in the number of antennas and alphabet size. With new 5G cellular networks using carrier frequencies above 6 gigahertz, increased spectral efficiency also increases the complexity of the MIMO detector at the receiver. This Georgia Tech innovation supports enhanced MIMO receivers to significantly improve wireless communications systems overall.

Dr. John R. Barry

Professor - Georgia Tech School of Electrical and Computer Engineering

Dr. Sangwook Suh
Former Postdoctoral Research Scholar - Georgia Tech

More Information

U.S. Patent Issued - [10,374,772](#)

Publications

[*Reduced-Complexity MIMO Detection via a Slicing Breadth-First Tree Search*](#), IEEE Transactions on Wireless Communications, March 2017

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/enhanced-mimo-framework-optimized-wireless-communications

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot