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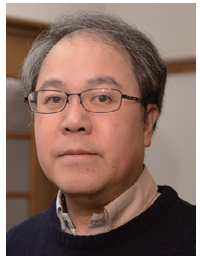
Front-line Researchers

Tomohiro Nakatani, Senior Distinguished Researcher, NTT Communication Science Laboratories



▼Abstract

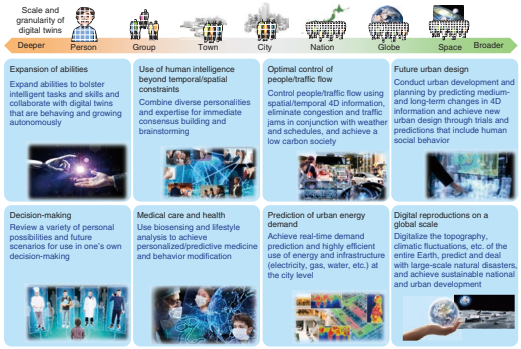
Automatic-speech-recognition technology has developed rapidly and is now commonly used in voice interfaces such as those of smartphones and smart speakers; however, the technology must be further improved to enable smooth interaction between computers and humans. Tomohiro Nakatani, a senior distinguished researcher at NTT Communication Science Laboratories, has been at the forefront of research regarding speech enhancement, which removes ambient noise and reverberation from various sounds and accurately extracts only the sound that the person wants to hear. We asked him about the progress of his research and attitude as a leading researcher.

Feature Articles
Technology Development for Achieving the Digital Twin Computing Initiative

The World Made Possible by IOWN Digital Twin Computing

▼Abstract

Digital Twin Computing (DTC) to achieve future forecasting and optimization by linking the real and digital worlds is now being researched and developed as one of the main pillars of the Innovative Optical and Wireless Network (IOWN) vision targeted by NTT. This article introduces the world under DTC and four grand challenges in making DTC a reality.

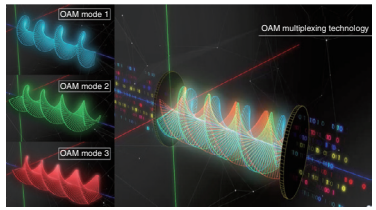


Regular Articles

Experimental Evaluation of High-capacity Wireless Transmission Using Orbital Angular Momentum Multiplexing Technology

▼Abstract

We are researching and developing technology to achieve terabit-class wireless transmission toward six-generation wireless systems. In this article, we present experimental evaluations of high-capacity wireless transmission using orbital angular momentum (OAM) multiplexing on a 40-GHz frequency band with a bandwidth of 1.5 GHz at distances of 100 and 200 m. Our OAM antennas have two uniform circular arrays (UCAs) with the same diameter using different linear polarizations and Butler matrices, which are analog devices for generating and separating OAM modes. OAM beams are generated using a Butler matrix, which is an analog radio-frequency circuit, and radiated from the UCAs. We implemented an OAM multiplexing transmitter (Tx) and receiver (Rx) on the 40-GHz band. The Tx and Rx can generate and separate seven OAM modes (0, ±1, ±2, ±3) and two polarizations (vertical and horizontal), which is a total of 15 streams including the center antenna element to transmit OAM mode 0. Each channel carries a 1.5-Gbaud signal.



(a) Trace of the same phase (b) Concurrent transmission