

Telecommunications in the spotlight – Johann-Philipp-Reis-Prize 2023 goes to expert in coding theory and cryptography

- **One of the goals of basic research by prize winner Professor Antonia Wachter-Zeh is secure telecommunications systems of the future**
- **Protection against data manipulation is just as central to this as the reliable storage of constantly growing volumes of data**
- **Jury emphasizes importance of data security for economy and society**

(Friedrichsdorf/Frankfurt am Main, November 9, 2023) Every two years, the Johann-Philipp-Reis-Prize is awarded to young scientists for significant innovations in telecommunications. Yesterday, prize winner Prof. Dr.-Ing. Antonia Wachter-Zeh was honored with this award in Friedrichsdorf. Dr.-Ing. Werner Mohr, one of the prize judges, was impressed by the clear economic benefits of her work: "In our modern world, data and its security are absolutely vital. It is becoming increasingly important to protect critical infrastructure from data manipulation and to be able to reliably store growing volumes of data. Professor Antonia Wachter-Zeh's research makes a key contribution to this." The €10,000 prize is sponsored by the municipalities of Gelnhausen and Friedrichsdorf in Hesse, which were home to the inventor Reis, who the prize is named after, as well as by Deutsche Telekom AG and the Information Technology Society within VDE.

Code-based cryptography ensures security

From online banking to secret government documents or communication between power utilities, transmitted data must be protected as best as possible against unauthorized access and manipulation in order to combat criminal activity. Today, traditional security protocols, which are constantly being further enhanced, are used for this purpose in information processing on the Internet. In the field of post-quantum cryptography, Wachter-Zeh is working on procedures that are secure even when quantum computers are used. The expert in coding theory and

cryptography explains: “Quantum computers could be a reality in 20 to 30 years. They will certainly not be widely used at first. But those who have them will be able to break the encryption mechanisms currently in use within seconds. That’s why we’re developing cryptographic signatures, for example, that will still ensure beyond doubt that communication is only between the people authorized.” Two of the methods developed by Wachter-Zeh and her team have now been submitted for standardization to the National Institute of Standards and Technology.

Long-term data archiving using DNA memory

A second key area of Wachter-Zeh’s research is long-term data storage. Due to the constantly growing volume of data, it is becoming increasingly important to find solutions for archiving information compactly, securely and for long periods of time. One promising approach is to store the data in a molecular biological system that replicates the way genetic material is stored in DNA. “If a mammoth bone is found somewhere, the DNA is still readable,” Wachter-Zeh points out. “Today’s data carriers are good, but they still cannot match their natural counterparts. With DNA memory, we’re working toward being able to store information on synthetically created strands of DNA and retrieve it flawlessly via efficient codes.”

To further develop the technology, the professor of coding for communications and data storage at the Technical University of Munich is currently cooperating with a team of biologists and chemists as part of an EU project.

About the prize winner

Prof. Dr.-Ing. Wachter-Zeh completed her Master’s degree in Communications and Systems Technology at the University of Ulm in 2009 before going on to complete her PhD there and at the University of Rennes (France) in 2013. After three years of postdoctoral research at the Technion, the Israel Institute of Technology in Haifa, she was appointed to the professorship of Coding for Communications and Data Storage at the Technical University of Munich in 2016. An expert in coding theory and cryptography, she has already received several awards, including the ERC Starting Grant and the Heinz Maier Leibnitz Prize of the German Research Foundation. In 2019, Prof. Dr.-Ing. Wachter-Zeh was listed as a TOP25 researcher at TU Munich.

About the Johann-Philipp-Reis-Prize

Johann Philipp Reis was born in Gelnhausen in 1834 and died in Friedrichsdorf in 1874. The physicist and inventor is considered a pioneer of the telephone thanks to his system for transmitting sounds via electrical lines. The Johann-Philipp-Reis-Prize has been awarded regularly every two years since 1986. Scientists up to the age of 40 are eligible for the prize, which is awarded for significant innovations in telecommunications that have had or are

expected to have an impact on the national economy. The prize winners are selected by the experts from the Information Technology Society within VDE.

About the Information Technology Society within VDE (VDE ITG)

The Information Technology Society within VDE (VDE ITG) is the national association of all people working in the field of information technology in business, administration, teaching and research and science. Its objectives are to promote the scientific and technical development and evaluation of information technology in theory and practice. Founded in 1954 as the Nachrichtentechnische Gesellschaft, it is the oldest professional association in the VDE. Its nine technical divisions, to which more than 80 technical committees are assigned, represent the entire spectrum of information technology. Around 10,000 VDE members have assigned themselves to the ITG, and more than 1,000 experts work voluntarily in the committees.

For more information, visit www.vde.com/itg

About VDE

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Our passion is the advancement of technology, the next generation of engineers and technologists, and lifelong learning and career development “on the job”. Within the VDE network more than 2,000 employees at over 60 locations worldwide, more than 100,000 honorary experts, and around 1,500 companies are dedicated to ensuring a future worth living: networked, digital, electrical. Shaping the e-dialistic future.

The VDE (VDE Association for Electrical, Electronic & Information Technologies) is headquartered in Frankfurt am Main. For more information, visit www.vde.com

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