

Dear TUM friends and associates,

The word “digitalization” may sound technical and even impersonal, but it’s actually one of the most people-focused technologies out there. For technology to provide workable solutions supporting the vast spectrum of human needs and abilities, digital solutions are essential – making this a core field for us as a technical university. New disciplines such as bioinformatics pave the way for personalized medicine, for instance. Equally, digitalized industrial systems harness mass-production methods to deliver individual items tailored to our personal preferences. Meanwhile, computer scientists are developing tools to turn the massive streams of data generated by digital technologies into useful and individualized information. And mathematical models help us understand and manage the dynamics of social interactions.

This edition of our magazine introduces scientists from the most diverse disciplines – all of whom have one thing in common: digital technology lies at the heart of their work.

Hans-Werner Mewes is a pioneer in the field of bioinformatics. Here, the focus lies on how to harness the gigantic data volumes generated by biology and medicine. In his interview, Hans-Werner Mewes traces the development of this discipline from its origins right through to the present day. Meanwhile, bioinformatician Burkhard Rost, one of our Humboldt professors, examines the evolution of human DNA to enable predictions about the function of specific proteins in individual people.

Augmented reality (AR) is a technology that provides us with highly contextualized digital information. Gudrun Klinker is investigating tools to optimize the way we interact with AR. At the same time, Nassir Navab is bringing this technology into the operating theater. He has developed a system that provides surgeons with additional information in real time as they operate – for instance displaying the precise location of a tumor within their field of vision.

Frank Diermeyer is looking at autonomous driving from a fresh angle. Convinced that driver assistance systems alone will not be able to deal with every possible traffic scenario, he has developed a solution where another human intervenes remotely if the driver and digital assistants have reached their limits.

Batch size one is industry’s holy grail. For automation engineer Birgit Vogel-Heuser, the key to achieving this lies in self-aware modules, able to act autonomously and organize themselves thanks to uniform semantics.



Massimo Fornasier applies mathematical modeling methods and the laws of physics to analyze social dynamics. He is investigating how crowds of people can be rapidly and safely directed in evacuation scenarios, for instance, and how public opinion can be influenced. Shaping social dynamics also preoccupies Simon Hegelich from the TUM School of Governance and the Bavarian School of Public Policy in Munich. His research focuses on bots engaging in automated mass-messaging on social networks. Needless to say, this is now highly topical – particularly against the backdrop of the US presidential race and the upcoming parliamentary elections in Germany.

So as abstract as digitalization concepts may initially appear, an encounter with our researchers well and truly brings them to life.

My hope is that all of these articles will give you fascinating new insights into the fast-paced progress of technical science today.

*Wolfgang A. Herrmann*

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