

Dear TUM friends and associates,

With painstaking precision and devotion to detail, good scientists challenge accepted ideas – bit by bit. They are motivated by the desire to improve the world around us and our everyday lives. In this edition of Faszination Forschung, we invite you to discover how years of work by TUM researchers can result in truly groundbreaking findings.

History was made on June 12, 2014, at the opening ceremony of the soccer World Cup in Brazil, when a paraplegic man took the first kick of the tournament using the power of his mind. Gordon Cheng, head of the TUM Institute for Cognitive Systems and an expert in robotics, worked with colleagues in the US to develop the “exoskeleton” that made this dream a reality.

On May 28, 2014, TUM Chair of Proteomics and Bioanalytics Bernhard Küster published one of two initial comprehensive maps of the human proteome. This achievement is on a par with the first complete sequencing of the human genome by Celera Genomics and the Human Genome Project in 2001. Mapping the proteome – in other words, all the proteins in the human body – is a second crucial key to unlocking the mystery of human life.

With her new research showing that it may be possible to cure hepatitis B, Ulrike Protzer has achieved a scientific breakthrough. Over 250 million people suffer from persistent hepatitis B infections. Until now, doctors were able to treat only the symptoms of this chronic viral infection, which can cause severe liver damage. Through her work in virology, Protzer has found a way to destroy the DNA of the hepatitis B virus, opening up new therapeutic possibilities.

The European Space Agency’s GOCE satellite mission provided the most precise measurements of the Earth’s gravitational field established to date. The satellite orbited the Earth 27,000 times, collecting more than five terabytes of data. Geodesist Roland Pail, coordinator of the GOCE Gravity Consortium, used the data to create today’s most precise gravity model of Earth. Researchers from a wide range of fields – from oceanography and climate studies through geophysics and geology to construction and civil engineering – can apply the GOCE data to their work.



There has long been a demand in industry for affordable gas sensors suitable for mass production. Paolo Lugli, Chair of Nanoelectronics at TUM, has come up with a solution using carbon nanotubes as sensors. He has developed a cost-effective process that allows these sensors to be sprayed or printed onto both small and large surfaces.

In his latest book on calculating the world, renowned philosopher and scientific theorist Klaus Mainzer explores the world of big data – where processes are used to comb through large amounts of data to establish contextual relationships. He also looks at the risks and restrictions associated with these processes. In an interview in this publication, Mainzer explains his main theses, based on many years of research into algorithms.

Big data is also important in networking technical systems that communicate with one another. Georg Sigl is responsible for uncovering security gaps in these systems and developing technologies to close these loopholes. As an IT security expert, he focuses mainly on controllers in machinery or industrial equipment – an area increasingly targeted by hackers.

In this issue you will discover more about our researchers and their ongoing search for the solutions of tomorrow. Enjoy!

Wolfgang A. Herrmann

Prof. Wolfgang A. Herrmann