Keynote Talk

From Sensors to Smarter Solutions with Physical Analytics

Hendrik F. Hamann
IBM T. J. Watson Research Center
Yorktown Heights, NY, USA
hendrikh@us.ibm.com

ABSTRACT

While in the past most information on the internet was generated by humans or computers, with the emergence of the Internet of Things, vast amount of data is now being created by sensors from devices, machines etc, which are placed in the physical world. Here we present a series of example applications enabled by such sensor data and what we call “Physical Analytics”, which provides the underlying intelligence using a combination of physical and statistical models.

The smarter solutions, which are being presented in this talk, range from active energy management and optimization, environmental sensing and controls, precision agriculture to renewable energy forecasting. All these different applications have been built using a single platform, which is comprised of a set of “configurable” technologies components including ultra-low power sensing and communication, big data management technologies, numerical modeling for physical systems, machine learning based physical model blending, and physical analytics based automation and control.

Categories and Subject Descriptors

C.3 [Special-purpose and Application-based Systems]:
Real-time and embedded systems

Keywords

Big data; IoT; Sensors; Controls

BIO

Dr. Hendrik F. Hamann is a Research Manager in the Physical Sciences Department at the IBM T.J. Watson Research Center, Yorktown Heights, NY. He received his PhD from the University of Goettingen in Germany. In 1995 he joined JILA (Joint institute between the University of Colorado and NIST) as a Research Associate in Boulder, Colorado. During his tenure at JILA he developed novel near-field optical microscopes to study single molecules at high spatial resolution. Since 2001 he is leading the Physical Analytics program in IBM Research, first as a Research Staff Member and currently as a Research Manager. Between 2005 and 2009 he worked on energy management all the way from the device level to large scale computing systems. His current research interest includes sensor networks, sensor-based physical modeling, renewable energy, precision agriculture, energy management and system physics. He has authored and co-authored more than 80 peer-reviewed scientific papers and holds over 90 patents and has over 70 pending patent applications. Dr. Hamann is an IBM Master Inventor and has served on governmental committees such as the National Academy of Sciences and as an industrial advisor to Universities. He is a member of the American Physical Society (APS), Optical Society of America (OSA), The Institute of Electrical and Electronics Engineers (IEEE) and the NY Academy of Sciences.

<http://researcher.watson.ibm.com/researcher/view.php?person=us-hendrikh>

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

Copyright is held by the owner/author(s).

SenSys '15, November 01-04, 2015, Seoul, Republic of Korea

ACM 978-1-4503-3631-4/15/11.

<http://dx.doi.org/10.1145/2809695.2823463>