



APPOINTMENT OF PROFESSORSHIP

FOUNDATIONS OF DATA SCIENCE WITH
FOCUS ON BIG DATA MANAGEMENT

INFORMATION FOR APPLICANTS – APRIL 2016



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EXECUTIVE SUMMARY

The Department of Computer Science and Biomedical Engineering at Graz University of Technology is seeking applicants for the position of a **professorship for Foundations of Data Science with focus on Big Data Management at the Institute of Knowledge Technologies**.

The Knowledge Technologies Institute is engaged in research in the fields of Cognitive Computing and Big Data Analytics. This call for applications is issued in the context of a BMVIT professorship (www.ffg.at/stiftungsprofessuren) in close collaboration with the **Know-Center** (Austria's Research Center for Data-driven Business and Big Data Analytics, www.know-center.at) and other endowing companies.

We are seeking candidates with demonstrated scientific excellence to represent the area of Foundations of Data Science with a focus on Big Data Management in both research and teaching and who will complement our existing team.

The chosen application domain for this professorship is **Smart Production / Industry 4.0**. Ideally, the candidate will bring relevant experiences in (industrial) Big Data Management and/or interest in research questions about real-time data processing to the table.

GRAZ UNIVERSITY OF TECHNOLOGY

In world-wide competition with comparable institutions, Graz University of Technology pursues top teaching and research in the fields of the engineering sciences and the technical-natural sciences. Knowing about the needs of society and the economy is an integral part of putting together excellent education and training programs. Ultimately, the quality of the education and training at Graz University of Technology is carried by the strength of its knowledge-oriented and applied research.

DEPARTMENT OF COMPUTER SCIENCE & BIOMEDICAL ENGINEERING



Computer science is one of the fastest growing and most innovative sectors. This dynamic is also reflected at the TU Graz. With its **21 professors** and 11 institutes, the Department plays a central role within the university and focuses its research on four research fields: **Intelligent Systems, Visual Computing, Security & Safety** and **Computational Life Sciences**. The Department's scientific achievements are remarkable: apart from employing three of the most cited researchers at TU Graz, it has **brought out three ERC and three START grant recipients** and is represented in major scientific rankings such as the Performance Ranking of Scientific Papers of the National Taiwan University. Moreover, the Department leads a FWF-funded national research network, a Christian Doppler Laboratory, a COMET Competence Center and acquires significant fundery from EU and national sources.

As an innovation engine, the Department significantly contributes to the economy and has tremendous growth potential, with **30 start-ups with more than 1000 employees** to attest to that. The services of the Department have a great impact on TU Graz: its top position in international research and teaching, its visibility and effect on the society, its internationalizing PhD and Master studies, its inter-university cooperation and its industrial networking. The professorship will be primarily anchored in the Department of Computer Science and Biomedical Engineering and will strengthen the competence field „Intelligent Systems.“

www.infbio.tugraz.at

“ **DATA SCIENCE IS REVOLUTIONIZING ALL DISCIPLINES, FROM MECHANICAL ENGINEERING TO BIOMEDICAL TECHNOLOGY. THIS PROFESSORSHIP IS AN ESSENTIAL ELEMENT OF THE SCIENTIFIC AND STRATEGIC ORIENTATION OF TU GRAZ.**”

UNIV.PROF.DIPL.ING.DR.DR.H.C. HARALD KAINZ
RECTOR GRAZ UNIVERSITY OF TECHNOLOGY

UNIQUE RESEARCH ENVIRONMENT

Graz University of Technology offers a unique research environment to conduct research on the outlined challenges. The professorship will be embedded within the Institute of Knowledge Technologies and associated with the Know-Center. The **co-operation with Know-Center** enables the rapid establishment of contacts with numerous companies, which already bring interest in the topic of data management as well as **access to an established Big Data infrastructure** and services.

KTI – KNOWLEDGE TECHNOLOGIES INSTITUTE

The Institute for Knowledge Technologies belongs to the research field „Intelligent Systems“ and consists of the research teams of Prof. Stefanie Lindstaedt (Cognitive Computing), Ass.-Prof. Denis Helic (Network Theory & Web Science) und Prof. Dietrich Albert (Cognitive Science). Together we live an **interdisciplinary research culture**, in which scientists from computer science, psychology and economy solve problems together. We work on machine learning for the analytics of big information spaces (text) and big (sensory) data as well as social network theory and semantic technologies. **Our aim is to combine these intelligent methods according to the cognitive computing paradigm and to create hybrid tools that augment human intelligence.** www.kti.at

KNOW-CENTER

The Know-Center (founded in 2001) is Austria’s Research Center for Data-driven Business and Big Data Analytics. Located directly at TU Graz campus we are home to more than **85 data scientists** and researchers. We have created a potent industry consortium with more than **40 company partners** with which we engage in long-term, strategic applied research projects. Our scientific strategy is to integrate approaches from (big) data analytics with human-centered computing to create cognitive computing systems that will enable humans to utilize massive amounts of data. We pursue this strategy through four scientific areas:

- Knowledge Discovery: machine learning, sensor analytics, and NLP
- Social Computing: graph analytics, (social) recommenders, and user profiling
- Knowledge Visualization: visual analytics, augmented and mixed reality
- Ubiquitous Personal Computing: innovative interaction technologies, contextualization, and personalization



All four areas build upon the scientific achievements and international **network of over 100 scientific institutions**. Together, we generate regional, national and international impact:

- Empower Austrian industry with data-driven business know-how for better strategic decision making based on external market and competitor data, more effective engineering and production processes based on intelligent utilization of internal data, upcoming industrial change processes from traditional industry to data-driven business
- Provide a Data Science Laboratory to Austrian science and industry
- Establish internationally renowned Qualification Programs for Data Scientists
- Develop Software and Services for Data Science and Open Science

Our main three application domains are: **Industry 4.0/Industrial Internet, eHealth and Open Science.** www.know-center.at

BIG DATA LAB

The Big Data Lab at Know-Center enables the implementation and evaluation of Big Data frameworks in order to identify the most appropriate technologies for different domains and applications. Its aim is to act as a first point of contact to companies concerning all aspects of processing and analyzing Big Data.

Currently there are **two server clusters** available: One cluster provides a virtual environment on which application services can be tested in various hardware configurations and in different distribution scenarios. The other cluster provides access to **open-source frameworks** such as Hadoop, Storm, etc, which enables research on processing large amounts of data. Both clusters will be expanded in the future. In addition, it is planned to install more open-source frameworks like Apache Spark and Apache Flink, as well as commercial frameworks like SAP HANA or IBM SPSS Modeler through cooperations with manufacturers in order to make the widest possible choice of technology available. Access to cloud infrastructure and cloud services for Big Data Analytics complement the offered services of the Big Data Lab.

For the professorship, it is planned to install dedicated server equipment – the **Data Storage Cluster** – for fundamental research, which allows to develop new techniques for storage, management and integration of large amounts of data. The professor will benefit in two ways from the Big Data Lab: It acts as a bridge to industry, allowing the validation of research results in real world settings. In addition, it enables the positioning of research results within a complete Big Data Strategy and Data Value Chain.

APPLICATION DOMAINS: INDUSTRY 4.0 & SMART PRODUCTION

The regional economic environment of TU Graz is characterized by the focus on automotive and semiconductor industry as well as on automation technology. These are the industrial sectors which will encounter significant changes in existing value chains through the use of Big Data methods. The endowing companies have already taken first steps to react on these developments. They view the professorship Data Science as central element of a regional Smart Production strategy and also **bring in existing resources**, apart from funding. Moreover, the **Smart Production Initiative** at TU Graz tackles current issues from industry and already consists of another professorship, a **SMART Factory** (www.tugraz.at/institute/ift/startseite-topics/advanced-manufacturing/), a LeanLab and a FabLab.

ENDOWING COMPANIES

AVL LIST



AVL LIST GmbH is the world's largest independent provider of simulation and test systems for powertrain development. It develops solutions for hybrid engines, internal combustion machines, electric drives, transmissions, batteries and many other elements of modern vehicle technology.

As a research-driven company, AVL has promptly taken steps towards the Industry 4.0 initiative. With regard internal processing of enormous amounts of data for analysis, it identified the need for efficient data management. **Relevant data sets and use cases** will be available to the professorship for research purposes.

INFINEON TECHNOLOGIES



Infineon Technologies AG with approximately 30,000 employees worldwide develops semiconductor and system solutions for energy efficiency, mobility and security.

Driven by the market demand tendency towards batch size 1, Infineon has addressed the issue of Industry 4.0 early on and is setting up a **pilot factory**. In this ultra-modern building

complex for research, production and measurement technology, the pilot manufacturing plant will be created based on a cyber-physical system with advanced production control and automation systems, which require maximum data security and integrity. This area is a perfect research environment for the professorship.

MAGNA STEYR



Magna Steyr AG & Co KG has over 100 years of experience in the manufacturing of vehicles. Today, Magna offers its customers worldwide brand-independent engineering and manufacturing services for experimental and mass production vehicles. Magna deals with the topic of Big Data along the entire value chain, from machine tools and robotics (where preventive maintenance and cooperation between man and machines may improve efficiency) to logistics and strategic intelligence at the management level.

In the context of an in-house Industry 4.0 initiative, Magna and its various research partners are on the forefront. Magna can provide the professorship with large amounts of **well- processed data, especially in the robotics and logistics sectors**. Moreover, there are many corresponding practical issue with this regard, addressing which via quantity structures and availability may require new Big Data management approaches.

VOESTALPINE



The voestalpine Group is a global steel-based technology and capital goods corporation. It is one of the leading partners of the European automotive and appliance industry and the global oil and gas industry. voestalpine Stahl Donawitz GmbH is the world's most modern compact LD steel plant, representing a value chain that consistently delivers quality products. The Styrian steel producer with over 125 years of experience has occupied a niche for sophisticated product segments.

With its various research partners, voestalpine has been a driver of the topic Industry 4.0 from early on. voestalpine deals with the topic of Big Data along the entire value chain. In terms of the professorship, the focus is on increasing the quality assurance and process optimization. **Large amounts of data from production** and relevant practical requirements would be available to the professorship for research purposes.



WHY GRAZ?

CULTURAL AND UNIVERSITY TOWN IN THE STYRIAN TUSCANY. WITH PLENTY OF SUN!

CITY OF KNOWLEDGE

GRAZ HAS BEEN A UNIVERSITY TOWN SINCE 1585

Know-how from Graz goes international. Six universities with more than 16 faculties form the basis of the excellent international reputation of Graz as a research and academical location. Research institutions in aerospace and automotive technology, in biotechnology and plant design are located in Graz. The same holds true for private high-tech businesses that export their products worldwide.

CULTURAL CAPITAL

CITY OF CONTRASTS

Graz, the exciting city of culture, and particularly its historic city centre, offers the ideal location to stage seminars, trade fairs or conferences. It is not by chance that Graz is a UNESCO World Cultural Heritage site. For centuries, in the historic city centre around Schlossberg hill, a townscape has been growing that is worthy of protection. Since the Middle Ages, the unique and well preserved architectural styles spanning from Gothic, Baroque, Renaissance, Art Nouveau and, of course, the modern, have not only seen an increase in value but are also indicative of a sense of tradition and art.

In fact, contemporary art and architecture enrich the cultural scene as much as classical culture: the Graz Opera House, theatres and festivals of classical music. In 2003, Graz was also acclaimed European Capital of Culture. "The friendly alien" art centre and the Island in the Mur still bear witness to that year of celebration.

CAPITAL OF CULINARY DELIGHTS

MEET WITH DELIGHT

With Styrian pumpkin seed oil, Käferbohnen beans, Grazer Krauthäuptel lettuce, award-winning wines and a gift for enjoying, Graz people are well ahead of those from other cities. That Mediterranean panache is everywhere.

Sunny spots in cheery beer gardens, promenades in the historic city centre and narrow, atmospheric alleyways, combined with over 2,300 hours of sunshine convey a southern European atmosphere.

CONFERENCE VENUE GRAZ

WHERE SCIENCE MEETS ART, CULTURE AND PASSION

Organisers of scientific conferences in particular have appreciated Graz as a conference destination for many years. Being Austria's second largest city as well as an important research and business location, Graz has, with good reason, evolved into a renowned conference venue that enjoys an excellent international reputation. Every year, approximately 45000 conference guests make use of the historic and modern congress centres. They appreciate the city's easy accessibility, as much as its sophisticated cuisine and famous Austrian hospitality. A variety of supporting programmes and day excursions, served with Styrian delicacies and regional wines, add culinary value to any event. Worth mentioning is the pleasant size of the Styrian capital. In fact, many of the excellent hotels are within walking distance of the conference centres. The rich choice of sights and cultural events is another decisive reason for choosing Graz.

APPOINTMENT OF PROFESSORSHIP

FOUNDATIONS OF DATA SCIENCE WITH FOCUS ON BIG DATA MANAGEMENT

The Department of Computer Science and Biomedical Engineering at Graz University of Technology is seeking applicants for the position of a **professorship for Foundations of Data Science with focus on Big Data Management at the Institute of Knowledge Technologies** (kti.tugraz.at). The successful candidate will hold a §98 UG professorship with a duration of 5 years. After a successful evaluation an unlimited contract is foreseen.

The Knowledge Technologies Institute is engaged in research in the fields of Cognitive Computing and Big Data Analytics. This call for applications is issued in the context of a BMVIT endowed professorship (www.ffg.at/stiftungsprofessuren) in close collaboration with the **Know-Center** (Austria's Research Center for Data-driven Business and Big Data Analytics, www.know-center.at) and other companies.

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RESEARCH TOPICS

Relevant research topics include:

- **Database Technologies** (e.g. NoSQL data bases, stream data bases, high-performance storage)
- **Big Data Management** (e.g. versioning, provenance, and trust)
- **Big Data Integration** (e.g. integration of structured and unstructured data from heterogeneous sources, semantic alignment)
- **Data Science Infrastructures** (e.g. modern distributed, scaleable techniques and architectures such as MapReduce (Hadoop), in-memory computational databases, many-core parallelism, GPGPU, heterogeneous hardware utilization)

“ THE PROFESSORSHIP IS A REINFORCEMENT FOR THE DEPARTMENT OF COMPUTER SCIENCE AND BIOMEDICAL TECHNOLOGY AND IT EMPHASIZES THE RESEARCH EXCELLENCE AT TU GRAZ.”

UNIV.PROF.DIPL.ING.DR. HORST BISCHOF
VICE RECTOR, GRAZ UNIVERSITY OF TECHNOLOGY

APPLY NOW!



- **Data Transformation** (e.g. migration, standardization)
- **Semantic Technologies in the context of Big Data** (e.g. triple stores, reasoning)
- **Big Data Analytics of Sensory Data** (e.g. integration of engineering models and data-driven models).

A specific goal of the professorship is the establishment of several **Data Science/ Data Management teaching modules** in the Master programs of Information & Computer Engineering, Computer Science, and Software Development & Management. Moreover, we expect active participation in teaching at the Bachelor, Master, and PhD level and a willingness to participate in matters of academic administration. Relevant experience in obtaining funding and managing national and international research projects is required.

REQUIREMENTS FOR CANDIDATES

- A national or international university education with a completed doctoral degree.
- Habilitation (venia docendi) or an equivalent qualification in a relevant research field.
- Excellent scientific achievements, documented by internationally recognized publications.
- Excellent didactic skills.
- A readiness to actively collaborate with the Know-Center.
- Proven ability to develop and lead a research group.
- Successful acquisition and management of research grants.
- Integration in the international research community.
- In addition, the rules of the endowing organization BMVIT apply: The candidate must come from outside Austria, that is at the time of grant application the candidate must not have had an active employment contract with any Austrian University for the past 3 years. During the grant period, the candidate must have at least an 80% employment contract with Graz University of Technology. (ffg.at/sites/default/files/downloads/call/il_stiftungsprofessur-2015.pdf)

In order to represent the subject internationally and to teach, excellent knowledge of English is required in both speech and writing. If the candidate does not already know German at the time of employment, the willingness to learn the German language is required.

The transfer of residence to the area of Graz is required.

Graz University of Technology is committed to increasing the percentage of female employees, especially in executive positions and as research staff. We therefore explicitly encourage qualified women to apply. Given applicants with equal qualifications, priority will be given to women.

APPLICATION PROCESS

Candidates should submit their detailed application

- using the TU Graz application form (PDF / Word)
- including the usual documents (copies of diplomas, resume, list of publications, overview of past research and teaching activities, evaluations of teaching activities if available)
- research statement describing the planned research activities
- teaching statement describing the planned teaching activities
- their 5 most important publications
- 2 references

in English and in electronic form at the latest by

20th of June 2016

(date of email)

to the Dean of Computer Science and Biomedical Engineering,
Prof. Frank Kappe, apply-cs@tugraz.at.

For application **documents >4MB** please use the BigMail service of TU Graz:
bigmail.tugraz.at/en/

- Select version 2 of BigMail
- Request a TAN number
- Upload your documents (best as a ZIP folder) and submit to apply-cs@tugraz.at

For questions please contact **Prof. Stefanie Lindstaedt, lindstaedt@tugraz.at.**

The Hearings for this professorship will most probably be held in the week of **September 26.-30., 2016**. Please ensure your availability during this time. The start of the employment is planned for January 2017.



CONTACT:

Candidates should submit their detailed application to the Dean of Computer Science and Biomedical Engineering, **Prof. Frank Kappe: apply-cs@tugraz.at**.

For questions please contact **Prof. Stefanie Lindstaedt: lindstaedt@tugraz.at**



www.know-center.at



www.tugraz.at