



2 PhD positions (m/f/d) on analysis of 5G network parameters for real-time wireless communication

Job-ID: 4054/22 | Department: Wireless Systems | Salary: as per tariff TV-L | Working time: 40h/week (part-time work option) | Limitation: initially 2 years with option of extension for three more years | Starting Date: as soon as possible

IHP is an institute of the Leibniz Association and conducts research and development of silicon-based systems and ultra-high-frequency circuits and technologies including new materials. It develops innovative solutions for application areas such as wireless and broadband communication, security, medical technology, industry 4.0, automotive industry, and aerospace. IHP employs approximately 350 people. It operates a pilot line for technological developments and the preparation of high-speed circuits with 0.13/0.25 μm -SiGe-BiCMOS technologies, located in a 1500 m² cleanroom that meets the highest industrial nanotechnology requirements.

The position:

As a member of the research group Elastic Computing within the department Wireless Systems you will contribute to research into the latest development in real-time wireless communication. Your tasks will include the theoretical and experimental analysis of wireless communication in various use cases. The overall goal is to investigate innovative means to assess the current state of the network and to allow its prediction for short and midterm future. This also includes research and development of appropriate mitigation means. An international team of 4 scientists including very experienced scientists as well as PhD students is looking forward to you. Flat hierarchies and mutual support are important to us. We see diversity of perspectives as a great advantage and we strive for a balanced gender mix in our team.

Currently we focus on two fields of application, in which you will get involved:

- Communication within drone swarms. The challenges in this scenario stem from changes in the quality of the communication network as well as from the mobility of the drones. The solution to be investigated needs to be capable to deal with such changes in very short time intervals and shall be capable to predict changes at least in the network quality.
- Environmental monitoring with drones in 5G-networks. The challenge is to determine where to execute time and processing intense algorithms e.g. image processing. Depending on the network quality this may be done on the drones or at a ground station. In addition, techniques such as transcoding shall be considered. In order to allow timely processing, predictions of the network quality shall become possible.





Your PhD project:

Depending on the field of application into which you will be involved, you'll be invited to pursue a doctorate with one of the following working titles:

- “Real-time wireless communication in adverse environment”. Within your doctorate, it is intended to develop concepts for reliable real-time wireless communication for autonomous missions of drone swarms. In recent years the research community started to apply artificial intelligence means to networking issues, which is highly innovative and promising. The core of your PhD project is researching and implementing novel means to adapt the communication in real time networks according to changing parameters e.g. available communication links etc. This includes assessing those changes and their prediction.
- “Secure and reliable communication for extreme mobile environments”. Within your doctorate, it is intended to develop a concept for innovative wireless communication for drones. In this scenario the drones are used as mobile sensors for evaluating the sensor data depending on the network status. So here a holistic approach to cope with network issues needs to be investigated. This includes adapting the data flow to the available connections depending on parameters such as bandwidth, as well as transcoding and/or migrating processes within the network.

The doctorate is supported by an experienced supervisor and accompanied within the framework of a supervision agreement. We aim together for a completion within 3-5 years. After one and a half years, the topic will be finally defined and the contract duration will be adjusted accordingly by mutual agreement to the foreseeable doctoral period.

Your qualifications:

You hold a Master's degree in Computer Science or Telecommunications or a comparable study area. You are already experienced in wireless communication fundamentals (medium access control and routing protocols), Artificial Intelligence methods, load balancing and software implementation (Python, C). Experience in programming of embedded devices is a plus.

You are also a strong team player. We are looking for a team member, who is able to structure his or her own work and to bring a well-organized and systematic way of working into the cooperation with creative minds. You are an ideal match for this position, when you have experimental, analytical and problem-solving skills, very strong communicative skills and the ability to quickly learn how to operate the latest technical equipment including various software. It is necessary that you confidently handle the English language. Knowledge of the German language is welcome. The consolidating of German language skills is expected and highly encouraged, for example in in-house language courses and intensive courses.

Our Offer:

Conduct research in a challenging, multinational environment giving you excellent career opportunities. You will have the chance to establish international reputation at the edge of top-notch technologies. An orientation guide will help you to quickly integrate into the institute and to familiarize yourself with the field.

It is important to us to support the individual career developments (e.g. conferences, advanced trainings) as well as the personal needs of our employees by offering flexible working hours and the possibility to work off-site. The compatibility of work and family is highly valued. More information about our scientific excellence and the working environment at IHP can be found on our website.





IHP is TOTAL E-QUALITY-certified for equal opportunities for women and men at work and actively pursues the equality of all gender and all groups of people. We promote the professional development of women and strongly encourage them to apply. Disabled applicants, qualified according to the above criteria, will be given preference over other candidates with equivalent relevant qualifications.

Your application:

Have we sparked your interest? Then we look forward to receiving your application until **May 31, 2022** via our [online application form](#).

For further information regarding the position please contact Dr. Marcin Brzozowski:
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