Wireless Communications for Drone Networks: 3 PhD/Postdoc Positions with focus on Mesh Networking, Localization, and Secure Protocols

The Institute of Technical Informatics at Graz University of Technology, Austria, is looking for motivated PhD students and Postdoc researchers to fill three open positions in the area of "Wireless Communications for Drone Networks" starting from September 1, 2021.

Context and scope. The open positions are linked to an international project focusing on the latest advances in wireless networking, localization, collaborative awareness, and machine learning, towards the development of secure, resilient, and highly-performant wireless mesh networks of unmanned aerial vehicles. The research activities will encompass three main topics, as briefly discussed next.

Research topic 1: Dependable and fault-tolerant mesh networking
- Performance analysis of Wi-Fi and BLE mesh networking solutions;
- Design of attack-resilient and performant Wi-Fi / BLE mesh communication protocols;
- Secure and low-latency communication over mesh-cloud environments;
- Improving mesh performance by exploiting the availability of multiple RF interfaces and different physical layers;
- Design of trusted network fallback mechanisms despite network failures/disruptions;
- Blended authentication, confidentiality and integrity in distributed multi-protocol systems.

Research topic 2: RF-cognitive wireless systems
- Leveraging RF spectrum analysis to reveal malicious behavior and detect jamming attacks;
- Use of machine learning techniques for the detection of jamming attack;
- Design of solutions to enrich UAVs with the ability to autonomously detect and mitigate malicious attacks, network anomalies, and coexistence issues;
- Development of RF spectrum analysis solutions on software-defined radios and off-the-shelf embedded devices;
- Distributed context-awareness, collaborative strategies, and autonomous device reconfiguration.

Research topic 3: Real-time localization of UAVs using UWB technology
- UWB-based localization and communication;
- Secure, privacy-preserving, and scalable UWB localization;
- Real-time localization and tracking of UAV swarms;
- Use of location information to optimize the communication performance of mesh networks;
- Collaborative localization across UAVs.

We expect candidates to have interest in (and, ideally, some prior experience with) some of the aforementioned topics. Knowledge on wirelessly-networked embedded systems (such as Internet of Things, Cyber-Physical Systems, Wireless Sensor Networks) is a must, as well as hands-on experience with the programming of networked embedded systems.

Candidate profile and requirements. Applicants for the PhD position must hold a Master degree in computer science, information/computer/software engineering, information science, telematics, electrical engineering, or related studies (note: a Bachelor degree is insufficient). Applicants for the Postdoc position must also hold a Doctoral degree in the aforementioned areas. Good candidates have:
- solid C programming skills and Linux experience (fluency in other languages such as Python/Matlab is considered an asset);
- very good proficiency in written and spoken English, which is the language of the research group and of external collaborators (knowledge of German is not required, and Graz University of Technology offers German language courses for all its employees);
- high motivation, self-initiative, as well as strong passion and commitment to research;
- ability to work collaboratively in an interdisciplinary and international team with both senior and junior people;
- willingness to do scientific research, publish research results, and complete a dissertation at Graz University of Technology.

Postdoc candidates are additionally expected to show an established research record, including publications in major conferences and journals in research fields related with the aforementioned topics.

TU Graz aims to increase the number of female employees and therefore specifically invites qualified women to apply. Applicants at TU Graz are not discriminated in personnel selection procedures on the grounds of gender, ethnicity, religion, age, sexual orientation.

Research team and working environment. The PhD and Postdoc positions will reinforce and extend the research activities of the "Networked Embedded Systems" group at the Institute of Technical Informatics. The group has a long-standing track record in the area of networked embedded systems, and is one of the leading European groups on low-power wireless networking and IoT research. The high quality of the research output is supported by several awards and by numerous conference papers at prestigious venues ranked CORE A/A*, such as SenSys, IPSN, NDSS, EWSN, ICDCS, INFOCOM, ICNP, and RTSS. Group members have chaired the leading conferences in the field such as SenSys, IPSN, SECON, EWSN. The group also leads the "Dependable Internet of Things in Adverse Environments" research excellence center, and is internationally renowned for its benchmarking infrastructure used to organize a dependability competition quantitatively comparing the performance of low-power wireless protocols (https://iti-testbed.tugraz.at). This infrastructure will also play a crucial role in the international project targeted by this call. The team's activities can be broadly characterized as "systems and application-driven research" at the intersection of wireless networking, embedded systems, and IoT applications. To get a better idea of the type of applied research performed in the group, please browse the publications listed at http://www.carloalbertoboano.com.

Location. Graz University of Technology (TU Graz), with more than 16.000 students and 7 faculties, is a leading technical university which is ranked among the top 25 continental European universities according to the Shanghai subject ranking. Graz is one of a handful of European research hotspots on electronic-based and vehicular systems with numerous leading research centers and companies. Graz is the capital of the federal state of Styria, which is one of the European top research regions with about 5% of the gross regional product being invested in R&D. Graz is also the second largest city in Austria, it is a young and lively city with more than 50.000 students situated at the south-eastern foot of the Alps. It enjoys an almost Mediterranean climate & lifestyle and its medieval old town (one of the largest and best-preserved in central Europe) is a UNESCO world heritage site. The city itself has a very high quality of life, and offers plentiful recreation opportunities.

Contractual details. The PhD and Postdoc positions are remunerated according to the collective contract (Kollektivvertrag) for Austrian Universities. The salary amounts to roughly 41.601€/year before taxes for the PhD position, and to 55.242€/year before taxes for the Postdoc position. This corresponds to approximately 29k€ and 36.2k€ per year after taxes, health insurance, and social security deductions (see https://bruttonetto.arbeiterkammer.at/). The annual salary may increase in case of relevant prior work experience. Note that, compared to other major central-European cities, cost of housing and living in Graz is relatively low. The initial appointment for both PhD and Postdoc positions will be of 24 months and can be renewed for another year. Both positions are available from September 1, 2021.

How to apply. To apply for the available PhD or Postdoc positions, please prepare a single PDF file (max. 15 MB) containing:
- motivation letter;
- curriculum vitae;
- a recent certificate about the level of proficiency in English;
- a copy of your Master or PhD degree;
- a link to the online version or a copy of your Master thesis (respectively PhD thesis for Postdoc applicants);
- any recommendation letters of your former advisor(s);
- additional documents such as a list of publications, transcript of records, and other relevant certificates.

Applications must be submitted electronically using http://lampz.tugraz.at/~dependablethings/. Please follow the instructions provided on the site and note that this is the only way to apply: applications sent via e-mail or through other portals will not be considered. Please also ensure that your application makes a direct reference to this call and to one of the three research topics: generic applications will be desk-rejected. The deadline for submitting an application is 31.07.2021. Applications can, however, still be submitted also after this date.

Inquiries and contact persons. Candidates interested in either positions can contact Prof. Carlo Alberto Boano <cboano(at)tugraz(dot)at> or Prof. Kay Römer <roemer(at)tugraz(dot)at> for further information.