PROFESSOR OF DECLARATIVE METHODS FOR COGNITIVE ROBOTICS

There is a vacancy for a full-time academic position (tenured or tenure track) in the Computer Science Department at KU Leuven in the area of declarative methods for cognitive robotics. The vacant position is located at Diepenbeek Campus, which is part of the Faculty of Engineering Technology of the Science and Technology Group at KU Leuven. We are looking for internationally oriented candidates with an excellent research record and with good teaching competence in Computer Science.

DESCRIPTION OF THE ORGANISATIONAL UNIT

At Diepenbeek campus, the research group ACRO (Automation, Computer Vision and Robotics) is experiencing strong growth. Besides the challenges in robotics and mechatronic design, there is a growing need for **software expertise**, both for research-based education, as well as for research and projects in collaboration with industry. In terms of content, your profile lies at the intersection of the DTAI (Declarative Languages and Artificial Intelligence) research group (department of Computer Science) and ACRO (departments of Mechanical Engineering and Computer Science) and is a **strategic surplus** for various parties:

- DTAI is broadening its expertise and strengthening its network:
  - **Geographic:** You will focus both on research output (papers, participation in conferences, patents, ...) and on cooperation with companies on a regional, national and international level. Since you will be working at the Diepenbeek campus, many **regional opportunities** are already available: cooperation with **incubators in Limburg** such as Corda campus (ICT, https://www.cordacampus.com), Drone Port (drones, https://droneport.eu/), Thor Park (energy and manufacturing industry, https://www.thorpark.be/) and by extension with the entire Euregion Meuse-Rhine.
  - **Content:** You contribute to scientific research in the field of Industry 4.0 and robotics by applying Artificial Intelligence and declarative methods.
- ACRO deepens its expertise by integrating facets of machine learning, smart algorithms and declarative, domain-specific languages. After all, **Industry 4.0** can only truly succeed if robots become smarter and more versatile.

The robotics team at Diepenbeek campus is investing heavily in open source software (with hardware drivers, sensor and robot models, communication, synchronization, algorithms for state estimation, real-time control and path planning) to connect and control different components in a robot ecosystem. Well-known examples are ROS - Robot Operating System (https://www.ros.org/) and Orocos - open robot control software (https://www.orocos.org/), the latter created with input from KU Leuven. The most used programming language is C/C++ or Python: the first because one wants to get the most out of the available CPU-power, the second because of its accessibility. However, in the context of cognitive robotics, these languages have many drawbacks: software built in these languages does not scale well due to a lack of appropriate abstraction mechanisms, (formal) testing and debugging is difficult, parallelization is complex, ... Especially within **artificial intelligence**, **declarative programming languages** (both logical and functional) often enable faster, more accurate and more error-proof development of software.

You will provide leverage to the informatics research on the Diepenbeek campus, by further developing the local research group in Diepenbeek in complementarity with the members present.

This vacancy is part of the **new master program industrial sciences: computer science** at the Diepenbeek campus (joint program of KU Leuven and Hasselt University). The vacancy also responds to the **increasing demand for support** for ICT and AI in all existing master programs at the Diepenbeek campus.

We are looking for internationally oriented candidates with an excellent [interdisciplinary] research record and with teaching competence in Computer Science, with strong emphasis on the research area of robotics that is currently accelerating because of (1) migration to assistive/collaborative robots (2) use of more and more flexible robots that can perform a set of heterogeneous tasks and (3) introduction of smart robots that make decisions based on an interpretation of their dynamic and unstructured environment. The successful applicant will be appointed in the Department of Computer Science.

The faculty has an extensive national and international network both in academia and in the corporate world.

The ACRO research group already has a solid research infrastructure, an extensive international network, connections with businesses and non-profit organizations, a stable supply of talented doctoral students, and a supportive work environment.

More information can be found at https://iiw.kuleuven.be/onderzoek/acro

DUTIES

RESEARCH

You will develop a research program of international level in cognitive robotics. The context of cognitive robotics offers you various opportunities, which will give you the space to develop your own profile based on your own experience and interests. Amongst others, but not limited to:

- Development of a **functional control system** for robots that eliminates the shortcomings aforementioned: steps have already been taken within the international research community, but the breakthrough has not yet occurred.
- Application and deepening of **functional reactive programming**. This approach allows asynchronous data streams of various types of data and various sources to be processed efficiently and elegantly, something that robots must increasingly be able to do.
- Development of application software using declarative programming languages. This can be done both in the form of generic functional programming languages as well as in the form of **domain-specific languages** (DSL).
- Application of hybrid programming forms such as **probabilistic** or **differentiable programming**. Here, a program is partly manually coded, and partly learned. This allows seamless integration of model-based approaches with recent developments such as deep learning.

The focus of the applicant should be on the development of robotic software (systems), with industrial valorisation in mind. Within ACRO and DTAI many theoretical concepts are studied and developed with great potential towards concrete applications. However, often a lot of additional research is needed to integrate and implement these concepts into commercially usable robots. You can respond to this, but the selected candidate is also expected to bring in own expertise and build a network of companies in symbiosis with the other members of ACRO and DTAI. You will build this network of companies for the

valorisation of research results and to carry out industrial services, with the aim of strengthening industrial innovation.

You engage in targeted scientific research, resulting in PhD's and publications that meet international standards and lead to broad international recognition.

As part of your research programme, you develop international partnerships, within the academic world as well as with industrial partners.

You acquire competitive funding, both project-based government funding as well as industrial funding.

You strive for excellence and thus contribute to the reputation of the research group and the faculty.

You pay attention to the technology transfer and application of the results of your research in industry/government/society.

EDUCATION

You will provide high-quality education to both undergraduate and graduate students within the domain of both specialized courses around Artificial Intelligence and robotic software, and within more general areas of computer science: object-oriented programming, software engineering and cloud computing. This with a clear commitment to the quality of the educational programme. All professors are expected to teach a few basic undergraduate courses.

You contribute to the faculty's and the university's pedagogical project through the supervision of student projects (for example bachelor's and master's theses) and by acting as a supervisor of PhD students.

You develop your teaching in accordance to KU Leuven's views on activating and researched-based education and make use of the possibilities for educational professionalization offered by the faculty and the university.

Your teaching duties are determined in agreement and are based on your specific profile. The scope is limited in the first years of your appointment. In your further career, the faculty will also pay a great deal of attention to the balance between research and teaching time.

SERVICES

You are prepared to provide services to the scientific community, to society and to the university in function of the needs and your personal interests.

You will carry out applied research projects in collaboration with industry and government and create a network of industrial partners.

You will involve actively in promoting the Faculty of Engineering Technology to future students and participate in the information and promotional activities of the faculty.

PROFILE

You have a PhD in Computer Science or an equivalent degree, and you have research experience in a field related to declarative methods and/or cognitive robotics.

You have a strong research track record in the discipline, evidenced by your publications or by your research experience in industry. You have the ambition to contribute to the valorisation of research in industry and in society. International experience is an important advantage.

You have verifiable qualities related to academic education. Teaching experience is an advantage.

You possess organisational skills and have a cooperative attitude. You also possess leadership competencies in a university or industry context.

A good command of English is required. KU Leuven provides courses in academic English.

The official administrative language used at KU Leuven is Dutch. If you do not speak Dutch (or do not speak it well) at the start of your employment, KU Leuven will provide language training to enable you to take part in meetings and to acquire the level of Dutch that is required for tenure.

Before teaching courses in Dutch or English, you will be given the opportunity to learn that language to the required standard.

OFFER

We offer a full-time employment in an intellectually challenging environment.

KU Leuven is a research-intensive, internationally oriented university that carries out both fundamental and applied scientific research. Our university is highly focused on interdisciplinary and multidisciplinary research and strives for international excellence. In this regard, the university actively works together with research partners in Belgium and abroad and provides its students with an academic education that is based on high-quality scientific research.

You will work at the KU Leuven Campus in Diepenbeek, near Hasselt, a green, dynamic and lively city located in the East of Belgium, about one hour from Eindhoven, Aachen and Brussels, the capital of the European Union, and about three hours from Paris, London and Amsterdam.

Depending on your record and qualifications, you will be appointed to or tenured in one of the grades of the senior academic staff: assistant professor, associate professor, professor or full professor. In principle, junior researchers are appointed as assistant professor on the tenure track for a period of 5 years. At the end of this period and a positive evaluation, they are permanently appointed (or tenured) as associate professor.

INTERESTED?

For more information on the description of this vacancy, please contact:

- Prof. dr. ir. Stefan Vandewalle, departmental chair of the Department of Computer Science (Stefan.Vandewalle@kuleuven.be , +32 16 32 76 54)
- Prof. dr. ir. Johan Baeten, campus chair of Diepenbeek (Johan.Baeten@kuleuven.be , +32 11 75 17 04)

You can submit your application until *October 12, 2021*, only through our online application system. If you have problems submitting your application online, please send an email to solliciteren@kuleuven.be.

Add to your application following documents in English (more information is available on the KU Leuven job site):

- your <u>biosketch</u> in which you indicate your added value as an academic for research, education and service to society of your past career and of your future activities (maximum 2 pages);
- a <u>file on your five most important publications or realizations</u>;
- an <u>extensive cv</u> including a full publication list and if applicable a portfolio of your realized projects;
- your <u>research plan</u> with focus on the development of your research line and research team in relation with the colleague-researchers of the entity of employment (maximum 4 pages);
- your <u>vision on academic education</u> and its organization (maximum 2 pages);
- your <u>contribution to society</u> by outreach and public communication on science and technology, internal representation in boards and councils and service activities directly in relation to your developed expertise (maximum 1 page);
- your <u>vision on leadership</u> (maximum 1 page).

KU Leuven is committed to creating a diverse environment and is therefore an equal opportunity employer. It explicitly encourages candidates from groups that are currently underrepresented at the university to submit their applications.