Job offer
Royal Military Academy - Patrimony

Researcher in Robotics for demining (M/F/X)
Department of Mechanics
Project MECA-CONVOY
Publication: 15 September 2023

Job description and associated tasks

In the framework of the study CONVOY on the development of unmanned ground vehicles for hidden threat detection, we are looking for a full-time researcher with a PhD. degree in Applied Sciences / Engineering / Physics / Computer Science / Informatics and experience in the field of Robotics & Artificial Intelligence (AI). The Royal Military Academy (RMA) is strongly committed to promoting diversity and gender equality. Therefore, female candidates are strongly encouraged to apply.

Context:

The Royal Military Academy of Belgium (RMA) is a military institution responsible for the basic academic, military and physical training of future officers, and for the continuing advanced training of officers during their active career in the Belgian Defense department (www.rma.ac.be). It is fully recognized as a university, fulfilling the same criteria as civilian universities. The Royal Military Academy is also conducting scientific research at university level for projects funded by the Belgian Defense department or external sources.

You work within the multi-national research cell 'Robotics & Autonomous Systems' - RAS (https://mecatron.rma.ac.be/) of the department of Mechanical Engineering of the Royal Military Academy and together with a large consortium of research institutes and companies in the context of a collaborative European research project. You conduct scientific research at university level on a European Defence Fund project entitled CONVOY.

Study:

The CONVOY (ClOud iNtelligent explosiVe detectiOn sYstem) project has been prepared to participate in a challenge organised by the European Defence Call in order to develop the best possible Unmanned ground and aerial systems for hidden threats detection. This means that an optimal robotic solution needs to be designed to detect threats like Improvised Explosive Devices, land mines, unexploded ordnance, etc.

Such a solution is urgently needed, as threats such as Improvised Explosive Devices (IED) and landmines are one of the major causes of casualties of EU defence forces and countering these hidden threats is essential to protect not only soldiers, but also vulnerable citizens after conflicts are over. Indeed, it is thoroughly documented that particularly children are very often victims of IEDs and land mines post conflict, as they lack the risk aversity and training to stay clear of these life-threatening dangers.

CONVOY proposal is based on the development and integration of a multi-agent robotic demonstrator that will evolve through the participation in four evaluation campaigns. The CONVOY demonstrator will consist of a set of different integrated components based on the following guidelines:

- **Multi-sensor approach**. CONVOY will be combining eight different sensor technologies: GPR, metal detector, UGV Autonomy sensors, THZ Sensor, LIDAR, IR-Laser Sensor, Quantum Magnet., EO/IR Camera.

- **Multi-platform approach**. CONVOY will be deploying those networked sensors on different platforms on the battlefield including two unmanned aerial systems, one medium and five small size unmanned ground systems, and a manned ground vehicle.
- **Artificial Intelligence and Information fusion**. CONVOY will integrate all the information collected by this sensory network using building blocks providing information fusion powered by Artificial Intelligence. Artificial Intelligence will be also used for Mission Planning and Platform Tasking.
- **Integration into/with Command and Control Systems.** CONVOY will integrate both the Battle Management System (BMS) for the Squad and the Dismounted Soldier System (DSS) C2 for the combatants.
- **Tactical Cloud:** The best environment to facilitate CONVOY approach for integration of different components, subsystems and building blocks, is the CONVOY Tactical Cloud which will provide a shared service space across federated platforms by distributed micro service architectures.
- **Open Architecture and Standards.** The proposed architecture establishes interoperability and standard interfaces as a design principle ensuring the modularity of the components (sensors, platforms, AI building blocks…) and the support to the scalability of the global solution. This in turn allows to integrate existing components and supports the incorporation of components not developed by CONVOY consortium.

The CONVOY solution will be validated on-the-field using 4 individual trials and 4 large-scale field trials across Europe, to ensure that the system is able to operate in different conditions. The set-up that will be established by the challenge will be an excellent framework for innovation, cooperation and to increase Europe's competitiveness and autonomy. To take full advantage of that, CONVOY will follow an open architecture and standards to facilitate the potential cooperation and integration of components with other consortia also participating in the challenge.

The main contribution of RMA (and thus also the work that will be required for this position) is in the design of the multi-platform system and the validation of this system on the terrain.

Main Tasks
- Develop the CONVOY multi-agent demining solution, based on existing swarming robotic platforms
- Assist with the field trials of the robotic threat detection systems
- Act as Principal Investigator for RMA in the European project CONVOY. This entails:
  - Organize the work to be done at RMA (steer and lead junior researchers) in the framework of the project
  - Perform reporting duties (deliverables, …) in the framework of the study.
  - Represent RMA in the General Assembly of the EU project CONVOY
  - Documentation of the performance of the hidden threat detection system as recorded during the trials
- Ensure active co-creation and co-development with end users (mainly the DOVO team)
- Integrate on the robotic system a detection capability able to optimally detect the most common types of treats
- Integrate an autonomous mobile navigation capability for the singular robotic assets
- Develop an optimal fleet / multi-agent coordination to reach the area clearance objective as soon & safe as possible
- Follow-up of master thesis students on subjects related to your study

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Required skills

Technical skills

The applicant shall have a PhD-degree in Applied Sciences / Engineering / Physics / Computer Science / Informatics and experience in the field of Robotics & Artificial Intelligence (AI).

- Training or experience in robotics & AI is required;
- Experience in programming is required (Python is required, C/C++ is highly recommended);
- Training or experience in unmanned ground systems is required;
- Knowledge of ROS (https://www.ros.org/) is highly recommended;
- Training or experience in Perception is recommended;
- Training or experience in Sensor integration is recommended;
- Training or experience in Control Engineering is recommended;
- Proficiency in technical documents production is recommended;
- Proficiency in project management is recommended;
- Experience with complex software architectures assemblies, deployment and testing (e.g. Docker, Conda), Virtual Machines is recommended;
- Knowledge of software engineering life cycles, Agile methodologies and Scrum experience is an added value;
- Knowledge of deep learning algorithms is an added value;
- Training or experience in applied research and or design is an added value;

Personal skills

- You conduct scientific research in an independent and upright way within a multidisciplinary environment
- You think in an innovative and creative way.
- You communicate your results in a clear, concise and precise manner.
- You take initiative.
- You are involved and result oriented.
- You are honest, loyal toward the institution and respect confidentiality.
- You plan and manage proactively your self-development, while being critical to your own functioning and striving to your self-improvement.
- You improve the team-spirit and solve interpersonal conflicts.
- You solve problems autonomously and find alternatives or solutions.
- You behave in a respectful way toward the others, their ideas and opinions as well as toward procedures and instructions.
- You are flexible for change and adapt yourself.
- You commit yourself in your job by giving the best of your aptitudes in striving toward the highest quality standards and persevere when needed.
- You will be working very closely together with industrial partners and will get insight in their proprietary intellectual property. Moreover, you will be working very closely together with the Belgian Armed Forces and will get insight in their modus operandi. Confidentiality is therefore an absolute must.

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Other skills

- The applicant shall have very good knowledge of English (oral & written), which will be tested during selection
- Minimum knowledge of French or Dutch is an added value for collaboration with peers.

Specific requirement

- The researcher may be exposed to classified information and will therefore have to obtain the required security clearance. The candidate must consent with the background check required to obtain this clearance, which will be executed by Belgian Defense.
- The researcher will be working within the context of an European Defence Fund project. Due to this project framework, this position is **only open for NATO / EU citizens**.
- Working for the Patrimony requires living in Belgium for the duration of the study.

Application

You will be working in a military environment. That is why everyone is expected to undergo a security verification. Please add to your application the filled out document. The form can be downloaded from: http://www.rma.ac.be/nl/aanvraag-veiligheidsverificatie (Dutch) or https://rma.ac.be/sites/default/files/2021-03/Demande%20d%27Avis%20de%20S%C3%A9curit%C3%A9_F.pdf (French).
There is unfortunately no English version of this document.

Send by email:
- a motivational letter;
- a CV
- a scan of your ID card (both sides);
- the filled out security document

to Mr. Geert DE CUBBER (geert.de.cubber@mil.be) & Mr. Emile LE FLECHER (Emile.LeFlecher@mil.be) and to Mrs. Helena BRUYNINCKX (erm-deao-rswo@mil.be).

Please clearly mention the reference of the project: **"MECA-CONVOY".**
Application deadline: 8/10/2023.

After the application procedure, an initial shortlist of candidates will be selected. Those candidates will be invited for an (online) interview. In the unlikely case that we would hold in-presence interviews, then these would take place at the Royal Military Academy, Hobbemastraat 8, 1000 Brussels. The date and time of the interview will be communicated to the preselected candidates.

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Miscellaneous

Contract

- Probable date of recruitment: As soon as possible, in consultation with the applicant.
- Status: Full-time employment based on an open-ended contract with the Patrimony of the Royal Military Academy (you will not be a civil servant).
  To be very clear: your contract will be open-ended, but the financing of the contract will be tied to the funding project, which end in November 2027. The financing of your contract beyond that period is therefore not 100% guaranteed. However, the RMA-RAS unit has a policy to keep the good elements on board and the research focus of this job offer fits within our core research activities, so there is a very high chance that we will be able to offer you follow-up projects beyond that date if you decide to stay.
- Wage scale: class A1 (holder of a PhD degree in Science or equivalent), class A2 (holder of an PhD degree or equivalent Master's in Engineering Sciences, doctor's degree in the same area of expertise). RMA-Patrimony applies a merit-based research career track, allowing researchers to advance in wage scale based upon annual evaluations.
- Holiday pay.

Extra-legal benefits

- Possibility to benefit from a bilingualism allowance (Dutch/French) following a SELOR test;
- End-of-year bonus;
- Free DKV hospitalization insurance. Possibility of additional affiliation for one or more persons living under the same roof: spouse, child(ren) (50% of the price per additional member);
- Bike allowance / Free public transport (home-work commute);
- Free access to campus sports facilities outside working hours;
- On-campus restaurant and cafeteria with democratic prices (discount on the daily menu);
- Flexible working hours within the 38-hour week;
- Teleworking possible with allowance;
- Holidays:
  - 26 days holiday / year from the 1st year of contract (then from 45 years: +1 day holiday every 5 years)
  - + 3 extra days-off / year of "service dispensation" offered by the department
  - + 1 week OFF every year between Christmas and New year's Eve (independent of the annual balance of holidays).
- Advantages and interesting offers thanks to the Benefits@work card (discounts, vouchers...);
- Entitlement to services offered by the 'Office Central d'Action Sociale et Culturelle de la Défense' (OCASC): among others holiday centres, discount on travel organised by the tour operator...;
- Possibility of benefiting from the nursery funded by Belgian Defence (subject to availability).

Workplace

- Royal Military Academy, Avenue de la Renaissance 30, 1000 Brussels;
- Occasional travels abroad for scientific conferences, field trials, etc.

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Points of contact :

- Questions concerning the research project: to Mr. Geert DE CUBBER (geert.de.cubber@mil.be) & Mr. Emile LE FLECHER (Emile.LeFlecher@mil.be)
- Questions concerning the recruitment modalities: Mrs. Helena BRUYNINCKX (erm-deao-rswo@mil.be).
- More information about :
  - the Royal Military Academy, see http://www.rma.ac.be
  - The RAS (Robotics and Autonomous Systems) research unit: https://mecatron.rma.ac.be/

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