Job offer
Royal Military Academy - Patrimony

Research scientist/engineer (M/F/X)

Department CISS
Project CISS-SIREN
Publication: 17 Jan 2024

Job description and associated tasks

In the framework of a research project named SIREN, financed by Belgian Defence in close collaboration with BELSPO, we are looking for a **full-time research scientist/engineer with a master's degree in Mathematics, Physics, Computer Science or Electrical Engineering (Applied Sciences, Engineering Sciences)**.

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. 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 department of CISS of the Royal Military Academy, but in close collaboration with researchers, scientists and engineers from the other consortium partners.

You will conduct scientific research at university level on a project entitled “Ship Intel foR bElgian Navy – SIREN”

The specific research context for this project is defined by naval intelligence gathering, automating the fusion of ship sensor data in the visible, SWIR, and TIR domain with human intelligence, to generate reports on ship identity and signature, detected changes, and ship activity and behaviour. Using computer vision (AI (Artificial Intelligence) driven) to enable real-time automated anomaly detection, this multi-sensor approach will lead to an improved incident management through the existing Maritime Operations Centre or MIK (Maritiem Informatie Kruispunt) digital infrastructure that is already in place. The consortium for this project is composed of four partners: OIP Sensor Systems, IMEC, e-BO Enterprises, and RMA (www.rma.ac.be). It aims at supporting the activities of the MIK (Maritiem Informatiekruispunt) in Zeebrugge. Most of the activities will take place at the RMA, in the CISS department, more specifically in the research unit Laser & Optronics (https://optro.rma.ac.be).

For this project we propose to prototype a ship signature database which continuously integrates visual, SWIR, and thermal data from different sensors through a machine learning process, informed by human intelligence. The system will automate ship identification, and the subsequent detection of configuration changes and anomalous behaviour in the observed ship. This will support data gathering and decision making of the operators at MIK, and significantly increase decrease the response time of the intelligence community to anomalous events.

The expected research outcome of this project can be evaluated at different levels. We expect this project to provide:

- A real-world ship signature database in the visible domain. This involves searching for relevant ship images in online available signature databases and acquiring images captured by the visible cameras of the MIK 2.0 platform, focusing on vessels in various relevant scenarios.

Royal Military Academy
30 av de la Renaissance
1000 Brussels, Belgium

- A real-world SWIR/MWIR/LWIR ship signature database of vessels in relevant scenes. These data are acquired during measurement campaigns with existing sensors and gathered from the SIREN sensor suite. All these data will be used to establish and fine-tune the various processing algorithms for ship signature extraction. In a first phase this development will be focused on data in the visible domain before extrapolating to other spectral domains.
- A behaviour extractor module designed to identify some specific pre-defined events such as close approach, deviation from route, and zone entry. This module will generate a detailed spatial-temporal map that helps us to analyse the ship travel patterns. The primary purpose of this extractor is to enhance the anomaly detection.

Main Tasks

- Literature review;
- Coordination of measurement campaigns;
- Collect, analyse, process and interpret imagery data from various sources;
- Creation of a two ship signature datasets (visible and multispectral);
- Design, develop and implement the machine learning algorithms for the visible domain
- Extrapolating of the algorithms to the multispectral domain;
- Evaluate the performance of the models using a variety of metrics
- Fusion of ML generated virtual track with other track information

Required skills

Technical skills

- The applicant shall have a master's degree in Mathematics, Physics, Computer Science or Electrical Engineering (Applied Sciences, Engineering Sciences).
- Strong foundation in statistics and algorithms Knowledge of pattern recognition
- Good programming skills in Python and other relevant programming languages: C++, MATLAB, Julia
- Experience with data analysis and visualization tools Basic knowledge of IT infrastructure and databases
- Experience in machine learning and image processing is a plus
- Experience with machine learning frameworks such as Tensorflow, PyTorch, or scikit-learn 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 initiatives.
- You are involved and results 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 commit yourself in your job by giving the best of your aptitudes in striving toward the highest quality standards and persevere when needed.

Royal Military Academy
30 av de la Renaissance
1000 Brussels, Belgium

- 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 are capable of writing qualitative technical reports on your work.
- You are capable to manage, direct and assist with the composition of deliverables towards the funding authority.
- You are capable to write and present scientific papers about your work.

Other skills

- The applicant shall have good knowledge of English (oral / written).
- Minimum knowledge of French or Dutch is an added value for collaboration with colleagues.

Specific requirement

- The research scientist/engineer 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.
- Working for the Patrimony, the researcher is required to live in Belgium.

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"
Send by email:

- a motivational letter;
- a CV;
- a scan of your ID card (both sides);
- the filled-out and signed security document: http://www.rma.ac.be/nl/aanvraag-veiligheidsverificatie"

to Mrs Marijke VANDEWAL (marijke.vandewal@mil.be) and to Mrs Helena BRUYNINCKX (erm-deao-rswo@mil.be).

Please mention clearly the reference of the project: **"CISS-SIREN"**.
Application deadline: **09 February 2024.**

A first pre-selection will be conducted based on the received documents. Applicants meeting the requirements will be invited to an interview at the Royal Military Academy, rue Hobbema 8, 1000 Brussels (optional online; in case of a non-Belgian application). The date and time of the interview will be communicated to the preselected candidates.

Miscellaneous

Royal Military Academy
30 av de la Renaissance
1000 Brussels, Belgium

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).
- Wage scale: class A1 (holder of a Master's degree), class A2 (holder of an Ir degree or IT degree). 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;
- Meal vouchers;
- 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

- The usual workplace is the Royal Military Academy, 1000 Brussels (Avenue de la Renaissance 30)
- Occasional travels abroad for scientific conferences and training are possible as well as measurement campaigns off campus and meetings at partner’s premises.

Points of contact

- Concerning the job content: Mrs Marijke Vandewal (marijke.vandewal@mil.be)
- Concerning the recruitment modalities: Mrs Helena Bruyninckx (erm-deao-rswo@mil.be)
- For more information about the Royal Military Academy, see http://www.rma.ac.be
- For more information about the research unit of the RMA in which you will be integrated, see https://optro.rma.ac.be

Royal Military Academy
30 av de la Renaissance
1000 Brussels, Belgium