**Master's thesis at the Department of Aerospace Engineering,
Institute for Flight Systems, on the topic
"Building a Mission Planner for Forest Rangers to Fight against
Illegal Poaching in Conservation Games"**

Technical supervisor: Jane Jean Kiam (University of the Bundeswehr Munich, Germany)
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The research project CHIP-GT is a German-French (DFG-ANR) collaboration. The objectives of CHIP-GT are:

- Applying techniques designed for noncooperative stochastic games to determine strategies to be adopted by the planning agents;
- Consideration of stochasticity in the dynamics of the system;
- Coping with multiple optimization criteria;
- Using Reinforcement Learning (RL) for a more flexible deployment,;
- Illustration of the applicability and usability with use cases of Green Security Games (GSG), which are framework for fighting illegal poaching in conservation areas.

Research partners involved in CHIP-GT are the Research Group "Applied AI for Dynamic Systems" of the University of the Bundeswehr Munich (in Munich, Germany), INRAE (in Toulouse, France) and ISAE-SUPAERO (in Toulouse, France). The University of the Bundeswehr Munich will host the Master candidate for the duration of the Master's thesis (which should ideally start in Q1 2023 and end by September 2023).

The Master's thesis on the topic "Building a Mission Planner for Forest Rangers to Fight against Illegal Poaching in Conservation Games" will establish the foundation of a PhD-thesis that will take place starting from Summer/Fall 2023. The Master's thesis will focus on building a validation platform using GIS (Geographic Information System) data and basic scenarios of illegal poaching. The platform will interface with a game-theoretical module and a planning module, with which executable plans will be derived and tested on the validation platform.

More concretely, your tasks are:

- Design and develop a validation platform using GIS data of a conservation area in which animals on the brink of extinction are to be protected
- Include basic illegal poaching scenarios (obtained from discussions with conservation experts) into the validation platform
- Understand and implement game theoretical methods[1] (used for deriving strategies that are considered Nash equilibria) and AI-planning methods[2] (used mainly for obtaining executable actions from the high-level strategies)
- Present and analyse validation results

Pre-requisites:

- Solid experience in programming with Python
- Some experience in manipulating GIS data using tools such as ArcGIS, QGIS, GeoPandas etc.
- Some knowledge in AI-methods for decision making (e.g. Markov Decision Process, automated planning, etc.)

What else are expected?

- An inclination for teamwork and appreciation of the opportunity to work in an international research group
- Enthusiasm in scientific reasoning and discussions with fellow researchers

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[1] Methods available on libraries such as gtnash or gambit.

[2] E.g. Hierarchical Task Network planners, PDDL planners and motion planners

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- Proactive scientific supervision and guidance to enable the completion of your Master's thesis
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- Opportunity to continue working on the topic in a PhD-thesis

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Upon submitting your application, you agree that your personal data may be stored, processed and forwarded to the departments involved in the application process for the purposes of the application. You can find more information on data protection under the following link: https://www.unibw.de/home/footer/datenschutzerklaerung

We are looking forward to your application!