

Fully automated controller synthesis for UAV missions

Description:

Abstraction-based controller synthesis is a relatively recent approach whose key advantage over classical synthesis methods is that it permits to solve control problems for nonlinear continuous-state plants described by ordinary differential equations in a fully automated, correct-by-construction fashion, even for rather complex control objectives and in the presence of uncertainties and disturbances. The approach relies on finite-state approximations ("abstractions") of continuous-state plants described by ordinary differential equations. These abstractions are used as substitutes of the original plants in the synthesis process, to reduce the synthesis problem to the solution of an auxiliary, purely discrete synthesis problem. The stipendiary is expected to advance both theory and computational methods to facilitate the practical applicability of the approach to the synthesis of controllers enforcing temporal logic specifications on UAVs. The focus is on synthesis algorithms that are both efficient and formally correct, and on the reduction of the complexity of the resulting controllers. The project involves theoretical work, algorithm and software development, and, on a small scale, experimental work.

Required Qualifications:

- MSc degree (or equivalent, giving access to doctoral studies) in Electrical Engineering, Computer Science, Mathematics, or a related field. Students about to complete their MSc will also be considered.
- Excellent academic record.
- Strong theoretical background, and a strong interest in dynamical systems and control.
- Proficiency in programming (C or Ada).
- Excellent communication skills in English.

In addition, experience in one or more of the following fields would be a plus: Modeling and control of UAVs; nonlinear dynamical systems; formal methods in control; reactive synthesis; set-valued or validated numerics; dynamic programming; game theory; professional-grade software development.

The monthly scholarship is 1575 € (tax-free) and is generally awarded for a three-year period. The stipendiary is entitled to participate in training and courses at the Graduate School at Technical University Munich, or through the Graduate Program at the National Aeronautics and Space Research Center (DLR). Additional funding for technical equipment, conferences or publications as well as for rent and public transport can be granted in the amount of 6100 € per year. No teaching duties; stipendiary is expected to do research full time.

Your complete application consists of the following documents, which should be sent as a single PDF file to the email address given below (deadline: July 15, 2016):

CV with photo; one-page cover letter clearly indicating available start date, relevant qualifications, experience and motivation; university certificates and transcripts (both BSc and MSc degrees); English language certificate; contact details of up to three referees; possibly a list of publications.

All documents should be in English, with the exception of university certificates and transcripts, which may also be in German.

Contact:

Priv.-Doz. Dr. habil. Gunther Reissig
Email: gunther2014@reiszig.de, Subject: PhD ref 1986
Web: www.reiszig.de/gunther/

University of the Armed Forces Munich
LRT-15, Institute of Control Engineering
D-85577 Neubiberg (Munich), Germany