HiWi Project on Distributed Optimization of Energy Systems

Karlsruhe Institute of Technology

Interested in parallel and distributed computing?
The Advanced Control (AC) group in the Institute for Applied Informatics (IAI) is currently offering students the opportunity to engage in a research project involving state-of-the-art optimization algorithms on KIT computing clusters. The results of which could be applied to areas such as big data analysis or power grid design and management.

The relatively new Augmented Lagrangian based Alternating Direction Inexact Newton (ALADIN) method has been shown to be an essential tool in the solution of separable non-convex optimization problems. Such problems can arise in nonlinear regression, scheduling of batteries, AC power flow or a number of other areas. ALADIN has a structure that lends itself nicely to parallelization however as the algorithm is still quite new, such an implementation has not yet been attempted.

The proposed project would entail the construction of a MPI (Message Passing Interface) suitable for use with the ALADIN non-convex optimization algorithm. After feasibility has been achieved, speed tests and optimizations of the parallelized optimization algorithm would ensue for a range of cluster sizes. However, even without fully optimized code, a proof of concept would open the door to a much broader range of real world applications of ALADIN than is currently possible.

Duration:	3 - 6 months, 20 - 40 hours/month
Start:	Immediate start possible
Preferable Background:	Computer Science
Required:	Basic understanding of parallel computing in C or Fortran Some experience with Matlab, Python, and/or Julia At least one course on optimization and control
Estimated Work Load:	Study of literature: 10% Theory: 30% Implementation: 60%

If you are interested, do not hesitate to inquire by email, including a cover letter, current transcripts of grades and a resume/CV.

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