

The Delft Center for Systems and Control (DCSC) at Delft University of Technology (TU Delft) in the Netherlands has vacancy for

Two PhD Positions in Sparse Data Driven Methods for Prognosis of Electric Vehicles

Background: the introduction of **next generation heavy electric vehicles**, such as electric trucks, is seen as an important contribution to worldwide efforts to curb greenhouse gases emission levels. Still, to deliver their promised performances, such novel electric vehicles should be **robust to faults** and be designed to **optimize their maintenance**.



While advanced diagnosis and prognosis algorithms that are suitable for fleets of complex vehicles are **model-based**, their design, tuning and validation require considerable amounts of data. Large and densely populated data sets, unfortunately, may not always be available, especially during the design phase of such vehicles. The challenge of tuning and validating **diagnosis** and **prognosis** algorithms using **datasets** that are **sparse** over time and over the vehicles' population is precisely the motivation for the two PhD openings.

Project Description: the successful candidates will carry out research as part of the project "*SPARSITY: using data from sparse measurements for predictive maintenance*", which is an academic-industrial collaboration between **Dr. Riccardo Ferrari's group** at Delft Center for Systems and Control (TU Delft, The Netherlands) and **Volvo Group**, a world-leading automotive company based in Gothenburg (Sweden). Research topics will include, but will not be limited to:

- adapting state-of-the-art **system identification** algorithms to use **sparse datasets**;
- **uncertainty quantification** and **propagation** in complex **nonlinear** systems;
- **probabilistic methods** for diagnosis and prognosis **thresholds** design and validation;
- **sensitivity analysis** of diagnosis and prognosis performances with respect to data **sparsity**.

The resulting methodologies and algorithms will be tested against **real use cases** provided by **Volvo**, where the candidates may spend a secondment period.

Requirements: the applicant should have obtained a **M.Sc. degree** in a field related to the project, such as Electrical or Electronics engineering, Systems & Control, Applied Mathematics, Mechanical engineering or Vehicle engineering. A good command of the English language is required. Candidates with a background in fault diagnosis/prognosis, automotive electric powertrains or probabilistic methods such as Polynomial Chaos Expansion or Gaussian Process Regression are especially encouraged to apply.

Conditions of Employment: The position will start on **January 1st 2021**, and run for four years. The successful candidate will be enrolled in the University graduate school. Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities. Candidates actually in the process of obtaining their M.Sc. degree can be considered subjected to the condition of having completed it no later than the agreed starting date.

About Delft University of Technology: TU Delft is an internationally recognized research university with over 20,000 students and 3,300 staff scientists. Its high-quality teaching standards and experimental facilities are renowned, placing it among the **6 top universities in Europe** and top 21 in the world in the **Engineering and Technology field** (Times Higher Education 2020). TU Delft is an equal opportunity employer and committed to increase the diversity of its staff.

Application and More Information: Please send your **application** including a motivation letter, a curriculum vitae, a research statement, a list of publications, transcripts of courses with grades and obtained degrees, contact information for two academic references and up to 3 research-oriented documents (e.g. thesis, conference/journal publication) to application-3me@tudelft.nl. Dr. Riccardo Ferrari (r.ferrari@tudelft.nl) can be contacted for more information about this vacancy. The **deadline** for ensuring full consideration of an application is **October 31st, 2020**, but the position will remain open until filled.