Student Intern: Electrical Ice-Breaking Data Analysis

Join ABB and work in a team that is dedicated to creating a future where innovative digital technologies allow greater access to cleaner energy.

General information

In the Marine Software Development Center (MSDC) in Krakow, we have a need for analyzing the time-series type data gathered from ships that use electrical propulsion, more specifically ABB Azipod® systems, to break ice in polar conditions, typically in the High Arctic trade routes and corridors.

You will learn about how and why electrical propulsion is an optimal choice for economic and green ice-breaking, and what are the challenges that the ice-breaking regime puts in front of the electrical propulsion systems. You will learn about the engineering measures and dimensioning of all parts of the electrical-mechanical conversion system, as well as of the onboard island grid generation and distribution technology, which allows electrically moved propellers to efficiently, safely, and continuously break ice with high thickness ratings. You will also learn about control system / digital / algorithmic advances that control multiple steady-state (based on transistors / semi-conductor technology; like frequency converters) and rotating (motors) electrical machinery, which contribute to the capacity, safety, and greenness of the electrical ice-breaking solution from ABB. You will learn about different time-series data that is collected as part of the remote diagnostic system and process enabled by ABB's RDS4Marine™ digital service that reflects, and can be analysed, for judging, measuring, and benchmarking the performance of electrical ice-breaking.

You will work under the dual supervision of the Digital Twin Product Owner, Michal Smolana, and the Propulsion Automation Libraries Senior R&D Engineer, Krzysztof Goldon, but also in close collaboration with engineers, operational and R&D, that are part of the RDS4Marine™ organization.

Your responsibilities

- Maintain an open, learning-focused attitude and use appropriate time, energy, focus, and resources to study up on subjects that will come up during the internship, and that you are not yet familiar with.
- Develop your orientation to detail, meticulousness, precision, and clear thinking from problem to solution. Learn to use visual and other learning aids, like sketches, plans, charts etc. to develop this skill.
- Develop your ability to take increasingly active participation in technical discussions and help knowledge, information, ideas, and positive work attitude spread throughout the team.
- Learn by doing, and exercise in a progression of scenarios and toy problems, from less to more complicated, the specifics of various data analysis techniques performed on diagnostic time-series from the electrical ice-breaking processes.

- Raise up your voice and maintain transparent and honest communication, including feedback about whether the pace of work and assimilation of new information is appropriate, towards your supervisor.
- Focus on doing more simple exercises and implementation rather than trying for a very complicated magnum opus and overshooting your internship deadline.

Your background

Must-haves

- Pursuing a B.Sc or M.Sc degree in natural sciences or technical sciences
- Demonstrable skill and background knowledge equivalent to late year students of the above can substitute, for students of other disciplines
- Strong and error-free, detail-oriented university-level capability in linear algebra, as well as with vectorized numerical operations (vector / matrix multiplication vs. element-wise multiplication, etc.) in different environments, like Matlab, R, SAS, or Python, on tall arrays or long vectors (many more rows, representing samples, than columns, representing distinct physical variables recorded)
- Strong and error-free, detail-oriented university-level understanding of the modern tall array/long vector computational tool-box including tools like cumulative sums, 1-, 2- or multiple-step differences, cumulative maximums, or scripting simple functions that produce an element-for-element long vector output after ingesting a long vector input
- Strong and error-free, detail-oriented university-level understanding of the principles of interpolation and extrapolation, at least on simplest levels (linear splines or low order polynomials)
- Ability to communicate in writing, on chat, or in teleconference calls clearly, concisely, and politely in English

Nice-to-haves

- Ability and interest to continue with a student placement / student job until end of 2021 is very welcome, and a priority
- Familiarity with filters and map-reduce mechanisms is a plus, but not required
- Familiarity with practical methods for generalized curve-fitting by least-squares (or other criteria) is a plus, but not required
- Practical skill and intuitive understanding of logical indexing of tall arrays or long vectors (simplified filtering) is a plus, but not required
- Practical skill and intuitive understanding of invoking native or package functions that operate on tall n-dimensional arrays, and the understanding of what dimesion is operated on vs. retained in the output, is a plus, but not required
- Practical skill and intuition in using transposes and n-dimensional dimension permutation, as well as appropriate concatenation / stacking, and slicing of n-dimensional tall arrays, is a plus, but not requried
- Familiarity with Python, and especially the scipy, numpy, and pandas packages is a plus, but not required