ENCQOR 5G — Academic Technology Development Program

Anchor Firm	**ciena**
Challenge Statement	The Smart Factory

Challenge Launch Date	January 20, 2020
Deadline for Open Call Applications	February 28, 2020
Challenge Statement	5G is promising to enable new forms of wireless communications, namely internet-of-things (IoT) devices and new machine-to-machine (M2M) communications. Ciena is enabling this ecosystem with our networking equipment. To be competitive in this space, Ciena needs to modernize its manufacturing facilities and has a goal towards achieving a "smart factory" – a highly automated manufacturing facility, with AI processes used to continually monitor the manufacturing line and adjusting the processes to increase efficiencies. With this in mind, this project aims to devise mathematical approaches to automate data analysis and optimize our manufacturing facilities. The first challenge is to understand what data is being collected by our manufacturing facilities and then understand what kind of AI techniques can be applied to increase efficiencies.
Project Partner	Ciena Canada
Timeline	18 months [NOTE: Projects must be completed by March 31, 2022, no extensions will be available beyond this timeline].
Available funding	Up to $150,000 CDN
Applicant Type	Ontario based university
Location	Ontario
Project Details	Ciena has made a large investment into a world-class manufacturing data lake and is now looking for ways to reap manufacturing efficiencies with it. The data lake tracks manufacturing of optical components and their assembly into network cards and network elements. At each step of the process partially completed components are tested and the results of their tests are stored in our data lake. Ciena has a large data science team looking into this data for correlations and outliers and would now like to take us to the next level. Ciena is looking for an academic partner to perform data science, operational research and machine learning research that would help us improve efficiency in our manufacturing processes, based on the data stored in this data lake. It is foreseen that the project may proceed in three phases: 1. Exploration of the data in our data lake in collaboration of our domain knowledge experts in how our equipment is being manufactured and tested. 2. Devising statistical and machine learning tools to go from correlations to decisions. 3. Devising methods to optimize the manufacturing processes, based on the machine learning decisions.

	Our manufacturing facilities contain many manufacturing processes and sub-processes, so the scope of the project can be adjusted, for example to repeat steps 1,2, and 3 for each sub-process.
Project Goals/ Outcomes	The project's goal is to explore Ciena's dataset and to find efficiencies in their manufacturing processes. As such the expected outcomes to be achieved are as follows: 1. Big-data scripts and software codes that explore the manufacturing datasets. 2. Reporting recommendations on where the manufacturing bottlenecks are and where the improvements can be made. 3. Machine learning, or other kinds of algorithms, that can automate manufacturing process adjustments. The project is expected to consume the time of several graduate and post-graduate level researchers over a period of 18 months, working on very innovative solutions to improve our manufacturing plants. As such, we expect this research to result in both several conference abstracts and/or journal publications. If the project is successful, it is Ciena's intention to commercialize the above and we intend to work closely with the academic partner to achieve this.
Applicant Capabilities	Applicants should be able to assign any intellectual property discovered during this project to Ciena. The below mentioned capabilities by graduate level include, but are not limited to: Post-doctoral Candidate[s] • Strong knowledge of statistical methods • Experience with operational research (optimization) • Experience with big-data tools • Experience with machine learning Graduate student[s] • Ability to code in python • Knowledge of big-data tools is a plus Principal investigator[s] • Comprehensive understanding of business goals • Some experience in operational research, especially applied to manufacturing • Understanding of AI & Machine Learning • Experience applying machine learning algorithms • Data mining and data analytics

Launched in 2018, the ENCQOR 5G Academic Technology Development Program partners Ontario based researchers with ENCQOR 5G Anchor Firms on 5G technology development projects. Areas of research interest are defined by Challenge Statements submitted to OCE by the ENCQOR 5G Anchor Firms and posted to the OCE website on a rolling basis.

If you are interested in developing an expression of interest, please visit the program guidelines for information on next steps.

For any questions about new Challenge Statements or the ENCQOR 5G Academic Technology Development Program, please contact Jennifer Moles at Jennifer.Moles@oce-ontario.org.