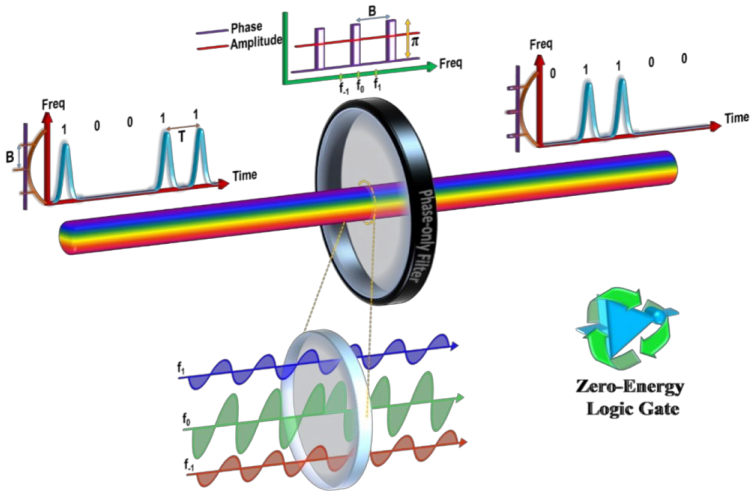
Technical Intern (unpaid)

Long title: Technical Intern at Optii Corp, in collaboration with the Institut National de Reserche et Sciences (INRS)

Short description: Technical intern will aid the INRS research team to develop a novel passive component NOT gate for use in Optii Corp's existing fiber-optic setup. This technical internship is an unpaid role, where the intern will benefit from experience and training in a research environment.

Duration: 6 months, part-time basis
Location: Institut National de Reserche et Sciences (INRS) in Montreal
Start date: April 2019 (subject to approval of the NSERC-ENGAGE grant).

Please send cover letter and CV to the following email: **dwilliams@optii.ca**.



I. About the Project

Photonic computing is currently being developed for a number of different applications. One such interest is to overcome the “Moore’s problem” and overheating concerns of current electronic computers. Another advantage of all-optical computing is immunity to electromagnetic (EM) radiation and the creation of a computer which can carry out computational function during electromagnetic (EM) warfare, while maintaining excellent electrical efficiency.

Signal loss is a concern for fiber-optic technologies in general. The passive nature of the proposed NOT gate will make it a “zero energy” component in the fiber-optic logic gate system of Optii Corp. The technical and engineering advances of creating a “zero-energy” logic gate will allow it to operate without any external energy contribution.

The approaches based in nonlinear optics in optical fibers also have the drawback of having a low speed of transmission, as they are limited by the nonlinear response of the optical medium. Because of its linear all-optical nature, this NOT gate could be exploited at Tb/s data rates, significantly boosting the speed of transmission in Optii Corp's setup.

To overcome the drawbacks of current technologies, the Institut National de Reserche et Sciences (INRS) will develop a novel passive component NOT gate in a fiber-optic setup, through the novel techniques of linear phase filtering, for implementation into the existing setup of Optii Corp's all-optical logic gates technologies.

II. The Internship Role

The technical intern at Optii Corp will work with the Institut national de la recherche scientifique (INRS) research team to complete a six-month project to create a novel passive component NOT gate. The research team includes:
- Professor José Azaña, Research Chair in Ultrafast Photonic Signal Processing
- Postdoctoral researcher Luis Romero Cortes
- PhD student Saket Kaushal

Tasks will include theoretically modeling, desgining and experimentally demonstrating an all-optical logic NOT gate using a purely passive linear process, i.e., linear phase filtering, thus inherently preserving the energy of the processed signal, approaching the "zero-energy" paradigm.

Duties and Responsibilities:

- Participate in the project by performing the theoretical calculations, design, and experimental testing of the optical NOT gate.
- Provide support to the INRS team to aid in the conception and construction of the optical NOT gate.
- Carry out calculations and test of the optical NOT gate, as needed.
- Review scientific literature and apply key concepts to the project.
- Brainstorm new approaches to the project and employ problem-solving techniques.
- Participate in discussions with the Optii Corp technical advisory board on the progress of the optical NOT gate construction.
- Writing progress reports and communicating results to the Optii Corp management team.

Preferred Qualifications:

- Bachelor or Masters in Physics, Electronics Engineering or related-field.
- Experience in optics and photonics-related projects.
- Self-motivated and able to work with minor supervision.
- Able to complete projects in a timely manner and document the results.
- Enjoys working in a cross-functional team.
- Strong diagnostic, analysis, troubleshooting, problem-solving skills.
- Good command of English communication skills (reading, writing, and speaking).
- Able to occasionally work irregular hours as required.
- Experience working in a hi-tech start-up company is an asset.