# Sebastian Czyrny

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## Skills

| | |
|---|---|
| **Programming** | C, C++, C#, Java, Python, Javascript, Typescript, Matlab |
| **Web & Database** | HTML & CSS, Bootstrap, SQL, MS SQL Management Studio, MongoDB, Amazon Web Services, Microsoft Azure, Google Cloud |
| **Frameworks** | ASP.NET MVC Core (IIS), RESTful Interfaces, Entity Framework, Identity Framework, Git, AngularJS, React, ExpressJS, PyTorch, SciKit learn, Numpy, Springboot, Langchain, Streamlit, LlamaIndex, Intel VTune |
| **Environments** | Microsoft Visual Studio, Visual Studio Code, Netbeans, Eclipse, Windows, Linux |
| **Hardware & Digital Systems** | Verilog, Intel Quartus Prime for FPGA Development, ModelSim, De1-SoC FPGA board, Keil uVision5, STM32 Nucleo-F446ZE Microcontroller, STM32 Cube IDE |

## Education & Interests

### University of Toronto

*Bachelor of Applied Science:* Computer Engineering — **CGPA: 3.96**
*Master of Applied Science: Electrical and Computer Engineering* — *Expected Completion: Sept. 2026*

### Interests

Reconfigurable systems, CAD for reconfigurable systems, FPGAs, CGRAs, front- & back-end web development, collaborative software/hardware projects, large-scale software systems, digital and embedded systems

## Research

**CGRA-ME,** *University of Toronto* — Fall 2024 - Present
*Graduate Research Assistant*

- **Research Focus:** Modeling and Exploration of coarse-grained reconfigurable array (CGRA) architectures and algorithms for mapping applications onto them

**"RAAP-CGRA: Placement for CGRAs with Restricted Routing Architectures"**, *Co-author*

- **Modeled** three increasingly restrictive CGRA architectures within CGRA-ME's C++ framework
- **Demonstrated** that CGRA mapping algorithms that are made aware of the routability of the architecture can significantly improve application mappability for restricted routing architectures over algorithms that are indifferent to it.
- *Accepted to the CGRA4HPC'25 workshop*

**"Scalable CGRA Mapping via Parallelization and Memoization"**, *Author*

- **Developed** an enhanced CGRA mapper that significantly improves runtime performance without degrading mapping quality.
- **Explored** various parallel programming strategies—both coarse and fine-grained—and demonstrated that a memoization-based approach yielded the most substantial runtime gains. Results showed further speedup with increased CGRA size through deterministic fine-grained parallelization.
- **Employed** Intel VTune to profile performance and identify computational hotspots for targeted optimization.
- **Achieved** a runtime reduction proportional to the size of the dataflow graph (DFG), maintaining full functionality across diverse CGRA architectures.
- *Under review for ASP-DAC'26*

# Work Experience

**University of Toronto, Digital Systems, Computer Organization –** *Teaching Assistant* *Fall 2024 - Present*

- **Facilitated** lab sessions for second-year computer engineering courses on Digital Systems and Computer Organization, providing hands-on guidance and support to students.
- Graded assignments, midterms, and lab reports, ensuring **timely** and **constructive** feedback to enhance student learning.
- **Collaborated** with other teaching assistants and faculty members in regular meetings to discuss student progress and course improvements.

**Sunnybrook Health Sciences Center, MyChart™ Program –** *Student Web Application Developer* *2022-2025*

- **Learned** about computer programming (writing software applications in a multitude of programming languages), computer security (how to make websites secure), computer networks (making HTTP requests and handling HTTP responses), and software architecture (designing scalable and responsive software applications).
- **Developed** and managed the front-end of a health care information services provider using Javascript, HTML & CSS, and AngularJS, as well as a back-end using the Java Springboot framework, ColdFusion Web Development Suite, and connected with a Microsoft SQL Server
- **Collaborated** alongside a small team of senior software engineers and business anaylsts to design and integrate web pages into the MyChart application
- **Improved** usability through intuitive table filters and pagination, PDF viewing, and data load indicators
- **Communicated** progress on software development through daily meetings and Scrums

# Design Teams

**Blue Sky Solar Racing Team –** *Array and Electromechanical Sub-Teams* *Oct 2021- July 2022*

***Array*: Light curve tracing, Electroluminescent image rating algorithm** (Python). Designed a Python script to analyze and compare the brightness of solar cells. Images of solar cell electroluminescence were analyzed using the Python Image Library and run & tested in Visual Studio Code. The analysis allowed optimize placement of solar cells on a solar car such that the car receives a maximum power input.

# Collaborative Experience

**Team Leader, *LLM Agent For Shareholder Report Generation,* Capstone Project U of T** *Sept 2023 – April 2024*

"A Large Language Model Agent for quick & efficient analysis of shareholder reports"

Source Code  Demo Video

- **Collaborated** with a team of 4 to produce an application that utilizes LLMs (both OSS and API Inference) to chat with shareholder reports.
- **Concluded** that no prompting strategy dominates over any other and each has its own use case. The Re-Ranker retrieval strategy performs almost identically to OpenAI's ADA Embeddings Model©
- Underwent rigorous **Testing** of the LLM Agent accuracy through the comparison of human-generated responses with those of the LLM Agent under different prompting and retrieval strategies.
- **Innovated** current state-of-the-art prompting strategies with our very own Multi-Stage Prompting.
- **Researched** the Natural Language Processing pipeline and incorporated workflow into application.
- **Prepared** meetings by organizing an agenda beforehand, and completed each task for the meetings
- **Coordinated** meetings by following pre-planned agenda, ensuring the participation of all team members, and initiating discussions, through the inquiry of team members' work status

**Team Leader, *Occasional (Web Application),* Software Engineering U of T** *Fall 2023*

"Web Application for UofT Event discovery"

Source Code  Demo Video  Website

- **Collaborated** with a team of 6 to produce a responsive web app using Python Flask and MongoDB.
- **Performed** Unit, Performance, Regression, and End-To-End Tests to benchmark the application
- Design was **determined** through structured brainstorming and creating wireframes in Figma
- **Researched** UI/UX design principles and incorporated them into app.
- **Administered** MongoDB Cloud Database for data persistency.
- Implemented web **Security** via Bcrypt for password hashing.