Ivan Ogloblin — Curriculum Vitae

Education

Bachelor of Science in Computer Science and Software Engineering   **Sept 2019 - July 2023**
Saint-Petersburg State University

Master of Science in Mathematics   **Sept 2022 - April 2025**
Pontifical Catholic University of Rio de Janeiro

Related Coursework:

- C++
- Kotlin
- Python
- Haskell
- Scala
- Algorithms
- Parallel programming
- Math logic
- Machine learning
- Unix
- Operating system
- Algebra
- Mathematical Analysis
- Random Process Theory
- Discrete Mathematics
- Statistics
- C#
- Data Bases
- Quantum Computing
- Quantum Information
- JavaScript
- HTML and CSS
- Networks
- Quantum mechanics

Work Experience

QC Design consultant   **February 2024 - current**
Work in a startup company on developing software for simulating quantum computing models in Python. Worked on optimizing performance of the codespace simulator, which involved understanding of the algorithm and implementing optimizations mostly based on manipulating data structures. Currently work on the Xpauli simulator project to make our software the fastest in the world.

Huawei Assistant Engineer, Developer   **October 2021 - January 2022**
Worked on backend C#/.netASP/EntityFramework/Autofac + frontend 3js/react/VR. Developed system of package communication with no delay, that alternates between http and signalR requests.
Did research work on handwriting recognition using convolutional network under "Human Computer Interactions". Got familiar with CNN, RNN and LSTM structures.

Yandex Developer Intern   **July - Sept 2021**
Worked in two teams on backend C++/Python/SQL. Developed support system for training scripts to work with an optimized structure for storing variable logs. Wrote tests for components that were used to prepare data for a neural network that makes recommendations. Got acquainted with the concepts of services and levers. Dove into the intricacies of communication between services and systems for transmitting information with errors for debugging.

Developer Projects

Strawberry fields composer   **2023**
Created a website dedicated to simulation of linear and non-linear optics for quantum computation models. Used Django, bootstrap and Strawberry fields. Strawberry fields is a base for research directions. Right now it is hosted on an external free service, please wait while it loads! (website) (github)

Archiver   **2019**
C++ Used Huffman algorithm in implementation for data compression and decompression (github)

Vacanter   **2019**
The Vacanter is a mobile application for matching employers with potential employees. I provided database and backend system for the application using postgreSQL, python, Datagrip. (github)

Earlier achievements

ICPC   **2020**

- 41 Place, Northwestern Russia Regional Contest St.Petersburg, October 26, 2019
- Honorable Mention, Northwestern Russia Regional Contest St.Petersburg, 14 November, 2020

Programming skills

- C++, Python, C#, C, Java, JavaScript, HTML, CSS, Kotlin, Haskell, Scala, SQL, Lean
- ASPnet, EntityFramework, Microsoft SQL Express, React, three.js, postgreSQL, Django, Bootstrap
- Git, Linux, Unity3D, SVN, Blender(3d modeling), protobuff, Shiny, Docker

Academic experience

Simulation of photonic quantum computing   2023

Developed web service dedicated to simulation of linear and non-linear optics for quantum computation models using Python and Django. Used Strawberry fields as an underlying engine. As it has a lot of components for non-linear optics, the simulation can take a while. During this work I got familiar with basic quantum optics notations and basic quantum computation models using non-linear optics. Right now it is hosted on an external free service, please wait while it loads! (website) (github)

Undergraduate Thesis   2022-2023

As my thesis I did research on optimal schemes of entangling transformations in linear quantum optics using genetic algorithm. I wrote genetic algorithm using GPUs on Python (Pytorch) to search for new entangling schemes. New schemes were obtained for finding the maximum entangled state, as well as for implementing gates equivalent to CX. Although it was not possible to improve the probability of operation, it was hypothesized that in the schemes in the KLM protocol it is impossible to find a scheme that implements the transformation, which would not be a perfect entangler, or at least not equivalent to CX. You can see presentation in this repository.

Study of the Effect of Noise on Efficient Quantum Search Algorithms   2022

Semester project on the topic "Study of the Effect of Noise on Efficient Quantum Search Algorithms". In this project I was to implement improved quantum search algorithms for unstructured DB. They are based on the Grover's algorithm and are described in this article. The results of testing algorithms for a problem of no more than five qubits are shown. My task was to dig further into the limits of quantum search algorithms. First, I implemented improved search algorithms with Qiskit. Secondly, I created an environment for testing algorithms with different noise models and different numbers of qubits. Finally, I explored the impact of noise on variations of the algorithm. In my experiments I used thermal relaxation noise model and coupling map from a real device: "Melbourne". As a result I understood how to run such experiments in order to obtain estimates of the noise parameters for feasible operation of the algorithm. You can find details in this presentation or in this repository.

Quantum Algorithms for VRP and VRPTW Problems   2021

A semester project on the topic "Quantum Algorithms for VRP and VRPTW (Vehicle Routing Problem with Time Windows) Problems" with application to the real case problems of building the routes for drilling machines for oil production in collaboration with GazpromNeft. I was directly assigned the task of studying current best practices for solving logistics problems on classical computers. The next step was to study current results on solving this problem by quantum and quantum-inspired algorithms. I found a reduction of this problem to QUBO (quadratic unconstrained binary optimization) and a solution using quantum optimization algorithms such as VQE and QAOA. Then I was to develop a simple solver for the multi-traveling salesman problem for small-scale problems (toy problem, up to 7 qubit). It can run locally on a simulator with Qiskit.
(unfortunately I cannot share any code because of the privacy regulations of GazpromNeft)

Teacher Assistant   2023

I worked as a Teacher Assistant creating homework and complementing course notes on the course "introduction to quantum computation", for prof. Sergey Tikhomirov. Broke down Shor's algorithm into sub-tasks and learned to explain concepts from basic to HHL.

Qiskit Global Summer School 2022 - Quantum Excellence   2022

I participated and excelled at Qiskit Global Summer School 2022 which was dedicated to quantum simulations. The main task was to find new ways to simulate hamiltonian for a particular physical system. I successfully solved it and earned a badge on Credly.

Quantum Computing and Quantum Information via NMR   2022

I participated and excelled at the 6th Advanced School of Experimental Physics of CBPF (Brazilian Center for Physics Research) and earned a certificate. I had experience operating a real NMR device and running experiments with encoding and entangling two qubits.

Languages

Russian (Native), English (Fluent), Portuguese (Speaking)