

Ivan Ogloblin — Curriculum Vitae

Education

Saint-Petersburg State University

Sept 2019 - July 2023

Bachelor of Science in Computer Science and Software Engineering

Pontifical Catholic University of Rio de Janeiro

Sept 2022 - July 2024

Masters degree in Mathematics

Related Coursework:

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

Programming Experience

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.

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.

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 postgresSQL, 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

Open olympiad

2018

- Top 60 out of 1100 in "Open olympiad in Mathematics" 2018 and 2016
- Top 174 out of 1404 in "Open olympiad in Mathematics" 2017
- Top 109 out of 1103 in "Open olympiad in Physics" 2018

International scientific school conference "XVIII Kolmogorov Readings"

2019

- I took [third place](#) in the discipline of computer science and mathematical modeling

Programming skills

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

Quantum computing experience

Simulation of photonic quantum computing

2023

Developed web service dedicated to simulation of linear and non-linear optics for quantum computation models. 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. 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" under the supervision of Sergei Borisovich. 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. Secondly, I created an environment for testing algorithms with different noise models and different numbers of qubits. Finally, I conducted a set of experiments and 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

I did 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 – one of Russia's major oil companies. 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. As with many optimization problems, it turned out to be possible to reduce this problem to QUBO (quadratic unconstrained binary optimization) and solve it 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. During this work, I perfectly understood the intricacies of launching and testing quantum algorithms using simulators at IBM Cloud system and how to look for quantum-inspired algorithms and test their applicability.

(unfortunately I cannot share any code because of the privacy regulations of GazpromNeft)

Assistant professor

2023

I worked as an assistant professor 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 (Upper-Intermediate), Portuguese (Speaking)