Anton Karazeev
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EDUCATION

Master of Science	Moscow Institute of Physics and Technology	**September 2019 — July 2021 (expected)**

- M.Sc. in Computer Science and Physics, Department of Innovation and High Technologies
- Applied Mathematics and Physics

Bachelor of Science	Moscow Institute of Physics and Technology	**September 2014 — July 2019**

- B.Sc. in Computer Science and Physics, Department of Innovation and High Technologies
- Coursework for the state qualification exam in Physics at MIPT: "Molecular Dynamics" [Code]
- Intermediate Coursework: "Advanced Parser for Biomedical Texts" [Poster at MCCMB'17]
- Undergraduate Coursework: "Development of a mechanism for anomaly detection" [Presentation] [Code]

EXPERIENCE

Technical Support	360dialog GmbH	**July 2020 — Present** Berlin, Germany (remotely)

- Responsible for submitting clients and partners for WhatsApp Business Account (WABA) via Facebook Business Manager (FBM).

Machine Learning Researcher	Laboratory for Digital Business	**March 2019 — Present** Moscow, Russia (remotely)

- Responsible for research on Anomalies and Outliers Detection.
- Found and fixed a bug concerning model based on Generative Adversarial Active Learning (GAAL) in PyOD toolkit for outlier detection.
- Developed a system for anomaly detection. Used Flask and SQLAlchemy frameworks.
- Participated in organization of Digital Capabilities for Business section for WorldSkills 2020. Responsible for Blockchain & Smart Contracts.

Quantum Software Engineer Intern	QuTech	**September — November 2019** Delft, Netherlands

- Delft University of Technology.
- Professor Stephanie Wehner Group, development of Quantum Internet.
- Participated in development of an embedded firmware for Hercules LaunchPad microcontroller platform to control quantum physical setup via connected ADwin-Pro (to implement Physical Layer as described in "A Link Layer Protocol for Quantum Networks").
- Participated in organization of Quantum Internet Hackathon which was held in six nodes across Europe: Delft, Dublin, Geneva, Padua, Paris or Sarajevo. Repository.
- Developed a Reinforcement Learning based system to control setup of lasers during the experiments with NV-center in diamonds.

ML Engineer Intern	3-shake	**August — September 2019** Tokyo, Japan (remotely)

- R&D audience extension.
- Analysis of Japanese text data with Natural Language Processing.

Machine Learning Researcher	OCRV	**July — August 2019** Sochi, Russia

- Laboratory of Artificial Intelligence and Neural Networks.
- Employee Turnover Prediction. EDA and implementation of ML systems in different fields of interest of Russian Railways.
- Responsible for Natural Language Processing, processing of legal documents.

Machine Learning Researcher   **ChatFirst**   **September 2018 — April 2019**

Moscow, Russia

- Implementing different deep learning models to improve performance of chatbots, reading papers on related topics.
- Responsible for Natural Language Processing.
- Used BERT model to improve performance of production system in multiple aspects. Fine-tuned the model for downstream tasks.

Quantum ML Researcher   **Russian Quantum Center**   **January 2018 — March 2019**

Moscow, Russia

- Responsible for Quantum Computing, Machine Learning.
- Developed a series of seminars concerning Quantum Computing. They include jupyter notebooks with basics of linear algebra, quantum mechanics and also work with QISKit (IBM), pyQuil (Rigetti) and Q# (Microsoft) was demonstrated.
- Supervised research student's bachelor degree diploma "Precision-Guaranteed Single-Qubit Process Tomography".
- Became a member of IBM Qiskit on GitHub.
- "Revealing quantum chaos with machine learning" — arXiv preprint.

Teaching Assistant   **Laboratory of Neural Networks**   **March — December 2017**
                                          and Deep Learning

Moscow, Russia

- Responsible for preparing practical and theoretical assignments for the course of Reinforcement Learning and theoretical assignments for the course of Natural Language Processing with the number of 100+ enrolled students each.

Research Assistant   **Laboratory of Functional**   **June 2016 — December 2017**
                                    analysis of the Genome

Moscow, Russia

- Research on protein function analysis.
- Text mining, Natural language processing, Keyword extraction, Machine learning algorithms. As an intermediate result the new method of keywords extraction using Information Theory proposed (ResearchGate).
- Participated in development of NLP package SciLK which was designed specifically for text-mining in natural sciences like biology and chemistry.

Data Scientist Intern   **Sberbank-Technology**   **August — October 2017**

Moscow, Russia

- Responsible for Natural Language Processing projects.
- Participated in preparing the datasets and building baselines for competition Sberbank Data Science Journey which is based on SQuAD.
- Developed an analogue of Amazon Mechanical Turk to improve experience of colleagues who evaluated the quality of collected datasets (Python, Flask).

ML Engineer Intern   **HiQE Group**   **March — June 2017**

Saint-Petersburg, Russia (remotely)

- Negotiated with IBM engineers and applied some of the IBM Watson's services in tasks of signal processing.
- Audio signal processing using machine learning methods. The system of baby cry recognition was built.

TECHNICAL EXPERIENCE

Projects
- **API for Online Shop** (2020). Set of API methods to realize basic logic of online shop.
- **Service for Reading** (2019). Service has a web interface and an application for Android. It helps to read texts in foreign languages and easily add unknown words to the wordlist to further studying.
- **Quantum Computing Bot** (2018). Monitoring the load of IBM Q processors from IBM Quantum Experience. Bot is already available inside QISKit workspace in Slack (https://github.com/akarazeev/qiskit-slack-bot).
- **Quantum Keypad** (2018). This keypad allows to easily compose quantum circuits of different kinds. Besides keypad itself, Quantum Keypad consists of a power bank and Raspberry Pi Zero W. As a simulator I used QISKit package for Python. Inspired by Model Q.
- **Reverse Engineering in Dispersion Engineering** (2018). With a student at EPFL we developed a project on Dispersion Engineering. Our model predicts parameters of resonator system's simulation.
- **Frontopolar** (2017). Applied Reinforcement Learning for Stock Trading. State-of-the-art results were reached. Different approaches were tested including Q-learning and Recurrent Reinforcement Learning.

Contributed to Open source
- **PyOD** - PR #108
- **QISKit** - PR #366
- **pyQuil** - PR #371
- **SimulaQron** - PR#90
- **Gensim** - fixed issue #671
- **yandexdataschool/Practical_RL** - PR #12
- **Projects on GitHub**

SKILLS

- **AI:** Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Reinforcement Learning, System Deployment
- **Programming languages:** Python, C/C++, bash, R, SQL; experienced with JavaScript, HTML and CSS
- **Python libraries:** numpy, scikit-learn, pandas; **for NLP:** NLTK, Gensim; **for Deep Learning:** PyTorch, TensorFlow; **for Quantum Computing:** QISKit, pyQuil, Q#; **for Web:** Flask; **for databases:** peewee, SQLAlchemy
- **DevOps:** containers (Docker), cloud computing (AWS, GCP), code testing, source control (git)
- **Russian:** native, **English:** fluent (TOEFL iBT: 86/120), **German:** basics (A2)
- Experimented with RaspberryPi and Arduino. Projects
- Founded "MIPT Deep Learning Club" to discuss and share ideas on deep learning topics. Led a few seminars on topics such as "Introduction to bayesian methods"
- Experienced with **3D modeling** (FreeCAD, Blender) and **3D printing** (Ultimaker Cura, Ender 3)

TEACHING

Blockchain & Smart Contracts   **August 17 — 21, 2020**
Lecture at WorldSkills, Digital Capabilities for Business

Programming Existing Quantum Computers   **May 8, 2018**
Cryptography course at Yandex School of Data Analysis

Deep Reinforcement Learning   **October — December 2017**
course at MIPT, based on rll.berkeley.edu/deeprlcourse/
Practical assignments

Deep Learning in Natural Language Processing   **March — December 2017**
course at MIPT, based on cs224n.stanford.edu
Practical assignments

PUBLICATIONS

"Revealing Quantum Chaos with Machine Learning"   **February 5, 2020**
APS Physics, arXiv preprint

"Neural Network Quantum State Tomography"   **July 30 — August 3, 2018**
Superconducting Quantum Technologies (SQT)
Poster (based on https://github.com/RQC-QApp/NNQST)

"Precision-guaranteed quantum process tomography: **May 21 — 25, 2018**
Application to IBM Quantum Experience"
Central European Workshop on Quantum Optics (CEWQO)
Poster

"Generative Adversarial Networks (GANs): Engine and Applications"   **August 2017**
Medium Story

"Advanced Parser for Biomedical Texts"   **July 27 — 30, 2017**
Moscow Conference on Computational Molecular Biology (MCCMB)
Poster, Thesis

ADDITIONAL EDUCATION

"Quantum Computing" course at Skoltech	**Quantum Computing**	**February 1 — March 16, 2018**

● Final Project - Quantum walks and Variational algorithm for 3- and 4-level systems.

"Summer school on Bayesian Methods in Deep Learning"	**DeepBayes Summer School**	**August 26 — 30, 2017**

"Big Data in Bioinformatics"	**Bioinformatics Summer School**	**July 31 — August 5, 2017**

● Participated in a hackathon during the school. Project.

"Natural Language Processing" course (based on cs224d.stanford.edu)	**DeepHack Lab**	**September — December 2016**

● Accepted a proposal to become a Teaching Assistant after the end of the course.

"Supercomputer technologies for atomistic modelling" course	**Igor Morozov (IHED RAS)**	**September — December 2015**

● Final Project - Molecular Dynamics is a program written in C using OpenMP framework for parallel computing. Used VMD for visualisation.

MOOCs
● **AI for Medical Treatment** by deeplearning.ai (2020)
● **AI for Medical Prognosis** by deeplearning.ai (2020)
● **AI for Medical Diagnosis** by deeplearning.ai (2020)
● **Sequence Models** by deeplearning.ai (2019)
● **Convolutional Neural Networks** by deeplearning.ai (2019)
● **Improving Neural Networks: Hyperparameter tuning, Regularization and Optimization** by deeplearning.ai (2019)
● **Full Stack Deep Learning** (2019)
● **Neural Networks and Deep Learning** by deeplearning.ai (2019)
● **Mathematics and Python for Data Analysis** by MIPT & Yandex (2017)
● **Molecular Biology and Genetics** by Bioinformatics Institute (2016)
● **Neural Networks** by Bioinformatics Institute (2016)

HACKATHONS

EPFL, Lausanne	**LauzHack**	**November 16 — 17, 2019**

- Challenge by SOPHiA Genetics, "Pathogen Identification Service"
- Project, Devpost
- Python, Biopython, BLAST, Voilà

CERN, Geneva   **Quantum Futures Hackathon**   **October 19 — 21, 2019**

- "QML-QEC", Presentation
- Developed an alternative approach for quantum error mitigation of noisy quantum hardware, inspired by variational algorithms such as QVECTOR
- Python, Qiskit, Project

Kraftwerk Accelerator, Bremen   **Hackathon Bremen**   **September 20 — 22, 2019**

- Won in nomination Best Implementation
- Technologies used: Arduino UNO, Fusion 360 (for 3D modeling) and Node.js (for representing values received from device)

Kasárne/Kulturpark, Košice   **Hack Kosice**   **March 30 — 31, 2019**

- Efficient and Faster Care challenge
- Implemented healthcare system using Zebra wristband printer and QR code scanner to identify patients easily
- Reduced the amount of time needed to register a new patient
- Presentation

Aalto University, Helsinki   **Junction**   **November 23 — 25, 2018**

- Applications with Bluetooth Mesh challenge
- Worked with Zephyr RTOS and reel board that has built-in Bluetooth transceiver
- Developed simple Industrial Internet of Things (IIoT) project which demonstrates the advantage of Bluetooth Mesh network

Tochka Kipeniya, Moscow   **Space Apps Challenge**   **October 20 — 21, 2018**

- Firefighter Bot for Telegram
- Implemented during Space Apps 2018 Challenge using data from NASA including Active Fire Data by NASA
- Python, python-telegram-bot
- Presentation

Volkshotel, Amsterdam   **Quantum Internet Hackathon**   **October 13 — 14, 2018**

- Worked with framework for Quantum Internet called SimulaQron
- Contributed to the SimulaQron project on GitHub
- Implemented quantum leader-election algorithm

Skoltech, Moscow   **Quantum Hackathon**   **May 18, 2018**

- 1st place
- There were problems on (1) quantum process tomography and (2) solving 3-SAT problem with QAOA
- Python, Quantum Information Toolkit (QIT)

Aalto University, Helsinki   **Junction**   **November 24 — 26, 2017**

- LegalEngine - website/telegram chat-bot/email notification system, "qqmbr" team member, challenge by Castrén & Snellman
- Our solution makes the client-attorney interaction easier with the use of telegram chat-bot and email notifications, the attorney's work and billing more transparent to the client
- Python, Flask library, html, css

EPFL, Lausanne   **LauzHack**   **November 11 — 12, 2017**

- 1st place in challenge by <u>SGS</u>, "NN:Nerds" team member, <u>Presentation</u>
- Solution allows quick access to the main concepts found in documents
- Responsible for development of telegram-bot and processing documents using IBM Watson service for Natural Language Understanding. <u>Devpost</u>
- Python, IBM Watson API, Telegram API

Phystechpark, Moscow **<u>mABBYYlity</u>** **October 7 — 8, 2017**

- 4th place, "App in the Restaurant" iOS application, <u>Demo</u>, <u>Presentation</u>
- App allows to recognise entities from restaurant menus using smartphone's camera and translates them. ABBYY Real-Time Recognition SDK, ABBYY Lingvo API and Spoonacular API were used.
- Python, Flask library

Skolkovo Moscow School of Management, Moscow **<u>Neurocampus</u>** **September 22 — 24, 2017**

- 2nd <u>place</u>, <u>@SenseOfSpeech_bot</u> telegram-bot, <u>Presentation</u>
- Solution allows to extract emotions from user's recorded speech. Also it helps to train selected emotion with samples from TED talks
- Speech Emotion Recognition (SER) module by <u>Vokaturi</u> was used as a core for telegram-bot based system to help users improve speech during performances.
- Python, Telegram API

MIPT, Moscow **<u>Bioinformatics Summer School</u>** **August 3 — 4, 2017**

- "Prediction of Experimental Metadata from Gene Expression"
- Used Machine learning algorithms to predict phenotype by gene expression. Distinguish with high accuracy samples of male and female tissues of <u>Mus musculus</u> organism. Datasets from Gene Expression Omnibus were used. <u>Project</u>

ITMO, Saint Petersburg **<u>BioHack</u>** **March 3 — 5, 2017**

- Text Mining, parsing the records from <u>PubMed</u> and <u>UMLS</u>
- Analysis of research trends of chemical compounds and diseases during period of 1990-2015 using parsed information from PubMed database. <u>Project</u>
- Python

Wanha Satama, Helsinki **<u>Junction</u>** **November 25 — 27, 2016**

- Used a python wrapper around the Twitter API and Topic Modeling of tweets (gensim)