

Mikhail^{*} Matrosov

C++ developer

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C++ jedi. Create software and know what teamwork is. Solve problems and optimize everything. Good at communicating with people and love to teach people. Can bring order to your messy code base.

* Letter “k” is not pronounced in my name, it is [mʲɪxɐ'ɪl], like Gorbachev.

Skills

Programming languages

primary **C++**: high-performance low-latency multi-threaded applications, 3D-graphics, image processing applications, GUI with Qt and MFC; internal and public technical talks and seminars.

Python: all sorts of scripts ranging from text parsing and json manipulation to automatic AWS EC2 instances set up and TCP congestion window control

secondary **Matlab, C#, JavaScript, SQL**

Libraries and technologies

primary **STL, boost, boost.asio, OpenCV, Intel IPP**

secondary **clang-tidy, Microsoft ConcrT, Intel MKL, OpenSceneGraph, CGAL, ASP.NET, Qt, MFC, jQuery**

Applications and systems

Ubuntu, VS Code, conan, AWS, Git, Jenkins, Windows, Visual Studio, Bamboo, SVN

Scientific and fundamental knowledge

Image processing [1], color theory [2], computer vision, computer graphics, algorithms, data structures, software design.

Productivity

Touch typing in both English and Russian layouts.

Experience

- from 2020/12 **Pinely (former Aim High Tech)**, *Senior developer*.
Develop high-performance low-latency multi-threaded trading platform for high frequency trading on crypto exchanges. Create a system searching for the the best route between hosts and seamlessly switching websocket connections to the best one. Implement a component for redistributing REST requests among several network interfaces and exchange accounts to respect rate limits. Set up and maintain AWS EC2 instances. Bring some order into development chaos: create a sanity check testing system and introduce a number of unit tests for critical components, create design diagrams for the most complicated parts of the system, refactor a lot of code manually and with help of clang-tidy, introduce metrics for TCP retransmissions and congestion window size.
- from 2019 **Higher School of Economics**, *Lecturer*
till 2020 Practical lessons on C++ within the “Introduction to Programming” course of the “Applied Mathematics and Information Science” bachelor’s programme on the Faculty of Computer Science.
Basic language concepts (supplementary to the lectures) and best practices. Discussion of homework and Q&A.
- from 2020/02 **Align Technology Inc**, *Expert developer, TPE team*.
till 2020/09 Integrate unit testing into development workflow. Create instructions and guidelines, give talks, communicate with different teams, implement helper utilities, regularly attend code reviews.
Create a comprehensive formal documentation for a large obscure part of the application, make the software behavior consistent. Documentation is stored as a code in AsciiDoc format and is automatically converted to Word with help of Pandoc.
- from 2019/01 **Align Technology Inc**, *Expert developer, BMS team*.
till 2020/01 Extract a part of a monolith application developed by our team into a web service. The service is hosted in AWS and runs on Linux. The monolith application runs locally on Windows. Implement cloud logging with Splunk.

- from 2018/02 **Align Technology Inc**, *Expert developer, 3D platform team.*
till 2018/12 Continue work in 3D platform team. Improve management of C++ third-party libraries: switching from a custom solution to Conan package manager. Technical guidance and mentoring of a team of junior developers working on cross-platform support for a subset of applications. Upgrade compiler from Visual Studio 2013 to Visual Studio 2017.
- from 2017/01 **Align Technology Inc**, *Technical manager, 3D platform team.*
till 2018/02 Switch completely to global software problems, affecting all developers. Migration to 64-bit platform. Support for localization. Support for Unicode. Unification of code formatting. Architectural rework: model/view separation. Vision of the future software evolution. Plus enhancement of development process as before.
- from 2016/02 **Align Technology Inc**, *Technical manager, BMS team.*
till 2016/12 Business analysis: gathering of requirements for new features from all positions including software end users and doctors. Cross-command communication for successful integration of features in all components. Company promotion: public talks and blog posts. Plus all the same as before.
- from 2014/12 **Align Technology Inc**, *Senior developer, BMS team.*
till 2016/02 Developing CAD-application for orthodontic treatment planning. Managing development of features to enter teen segment of the market. Enhancing development process: code review, Git workflow, coding standards, static analysis. Geometric algorithms on solid 3D bodies. Code base modernization.
- from 2013/10 **OctoNus Software Ltd, Digital Microscope project,**
till 2014/10 *Developer.*
Prototyped virtual navigation system through a number of photographs of an object, system has six degrees of freedom. Developed color correction algorithm, based on a color space continuous transform through a number of pivots. Did development and support of Qt-based application for visualization and processing of video-stream from network cameras. Elaborated plugins system and SDK. Improved application components interaction.

- from 2008/08 **OctoNus Software Ltd, Developer**
 till 2013/09 Analysis of problems in a jewelry images acquisition software. Image processing algorithms development and integration. Effectively implemented in C++ using Intel IPP and Microsoft ConcRT a number of algorithms of tone mapping, extended depth of field, color correction, image-based 3D-reconstruction and 3D-models stitching. Developed lens breath compensation algorithm. For all the algorithms collected relevant data from partners, analyzed state of the art methods, prototyped solutions in Matlab. Implemented algorithms work in real time and are used in jewelry industry for quality control tasks.
- from 2009/10 **Graphics and Media Lab, CMC MSU, Researcher**
 till 2013/10 Member as a PhD student, research activity in OctoNus projects (see above).
- from 2011/02 **CMC MSU, Lecturer**
 till 2011/05 C++ laboratory course for students.
- from 2004 **Summer Informatics School, Lecturer, Counselor**
 till 2006 Theoretical and practical courses for group C.

Public talks

Talks marked with ★ symbol deserve to be highlighted. Talks with captions in English were given in English.

- 2021/11 **C++ Russia 2021**
 “Разговор в студии о C++ в HFT ”
- ★ 2020/07 **C++ Russia 2020**
 “Как объявить константу в C++? ”
- ★ 2019/11 **C++ Russia 2019 Piter**
 “Спецификаторы, квалификаторы и шаблоны”
- ★ 2019/04 **C++ Russia 2019 Moscow**
 “Как мы апгрейдили компилятор и поддерживали кроссплатформенность”
- ★ 2018/10 **SECR 2018**
 “Как не потонуть в пучине легаси”
- 2018/02 **C++ Russia 2018**
 “Versatile C++ applied”
- ★ 2017/10 **SECR 2017**
 “Reverting a merge”
- ★ 2017/09 **CppCon 2017**
 “Refactor or die”

- 2017/04 **SECON 2017**
“Повседневный C++: алгоритмы и итераторы”
- ★ 2017/02 **C++ Russia 2017**
“Повседневный C++: алгоритмы и итераторы”
- 2017/02 **C++ CoreHard Winter 2017 Conference**
“Повседневный C++: алгоритмы и итераторы”
- ★ 2016/02 **C++ Russia 2016 Conference**
“Повседневный C++: boost и STL”
- 2016/02 **C++ Corehard Conf 2016**
“Повседневный C++: boost и STL”
- 2015/10 **Conference CEE-SECR 2015**
“Повседневный C++”
- ★ 2015/02 **C++ Russia 2015 Conference**
“C++ without new and delete”
- 2014/10 **Meeting of C++ User Group, Russia**
“C++ без new и delete”

Personal projects and contributions

- from 2019/04 **conan**, *Contributor*
Author of a number of pull requests
- from 2019/02 **Основы разработки на C++: чёрный пояс**,
till 2019/05 *Coauthor*
A coursera course created together with Yandex. Fifth out of five in the specialization *Искусство разработки на современном C++*. In my block I teach about undefined behavior and go through a big training problem of creating a spreadsheets engine (like Excel and backend for Google Spreadsheets).
- from 2018/09 **Основы разработки на C++: коричневый пояс**,
till 2018/12 *Coauthor*
A coursera course created together with Yandex. Fourth out of five in the specialization *Искусство разработки на современном C++*. Has 5.0 rating in three month after the launch. In my block I teach about Smart Pointers.
- 2017/05 **DllDispatcher**, *Author*
The tool that allows to associate dll files with different applications based on dll bitness. One application for 32-bit dlls and another for 64-bit dlls. Designed for associating dlls with corresponding versions of Dependency Walker.

- 2015/03 **boost.python**, *Contributor*
 Pull request #15. Fix #11100 and #8058: binary compatibility and leaked file handle in `exec_file()`.
- 2014/10 **KeysRemapper**, *Author*
 When CapsLock is switched on, this utility turns a part of alphabetic keyboard into navigation buttons: arrows, Ins, Del, Home, End, etc. Such a simplified Vim, but working in the entire OS, not in text editor only.
- from 2012/06 **NativeViewer**, *Author*
 till 2013/07 A Visual Studio extension for visualization of OpenCV images during debug of native C++ applications. Opposed to Microsoft Image Watch, works with Visual Studio versions starting from 2003.
- 2012/02 **OpenCV**, *Contributor*
 Patch #1641. Discrete Voronoi diagram: returning closest pixel instead of connected component in `distanceTransform`.
- from 2010/01 **StackOverflow**, *Contributor*
 Over 19k reputation, over 90 accepted answers.
 Top 10% for tags `c++`, `algorithm` and `image-processing`.
 Top 20% for tags `matlab` and `opencv`.

Trainings and certificates

- 2020/02 **SOLID Principles of Object-Oriented Design and Architecture**
 Link to the certificate.
- 2019/04 **The Bits and Bytes of Computer Networking**
 Networking basics from Google. Link to the certificate.
- 2014/06 **An Overview of the New C++ (C++11/14)**
 Intensive technical training by Scott Meyers.

Education

- from 2009 **Moscow State University**
 till 2012 Computational Mathematics and Cybernetics department
PhD student.
- from 2004 **Moscow State University**
 till 2009 Computational Mathematics and Cybernetics department
Student, specialist.
 Graduation work [1]. Won admission without matriculation because of I degree diploma in XVI Russian Olympiad in Informatics.

from 2001 **Summer Informatics School**
till 2003 *Student of groups C and A.*
Studying a variety of algorithms and data structures.

Languages

English Advanced.
Russian Native speaker.

Publications

- [1] Михаил Матросов. Методы построения изображений расширенной глубины резкости. *Сборник тезисов лучших дипломных работ ВМК МГУ 2009 года*, pages 12–13, 2009.
- [2] Mikhail Matrosov, Alexey Ignatenko, and Sergey Sivovolenko. Locally adapted detection and correction of unnatural purple colors in images of refractive objects taken by digital still camera. In *Transactions on Computational Science XIX*, volume 7870 of *Lecture Notes in Computer Science*, pages 117–130. Springer Berlin Heidelberg, 2013.