Denis Pleshkov

Senior C++ Developer

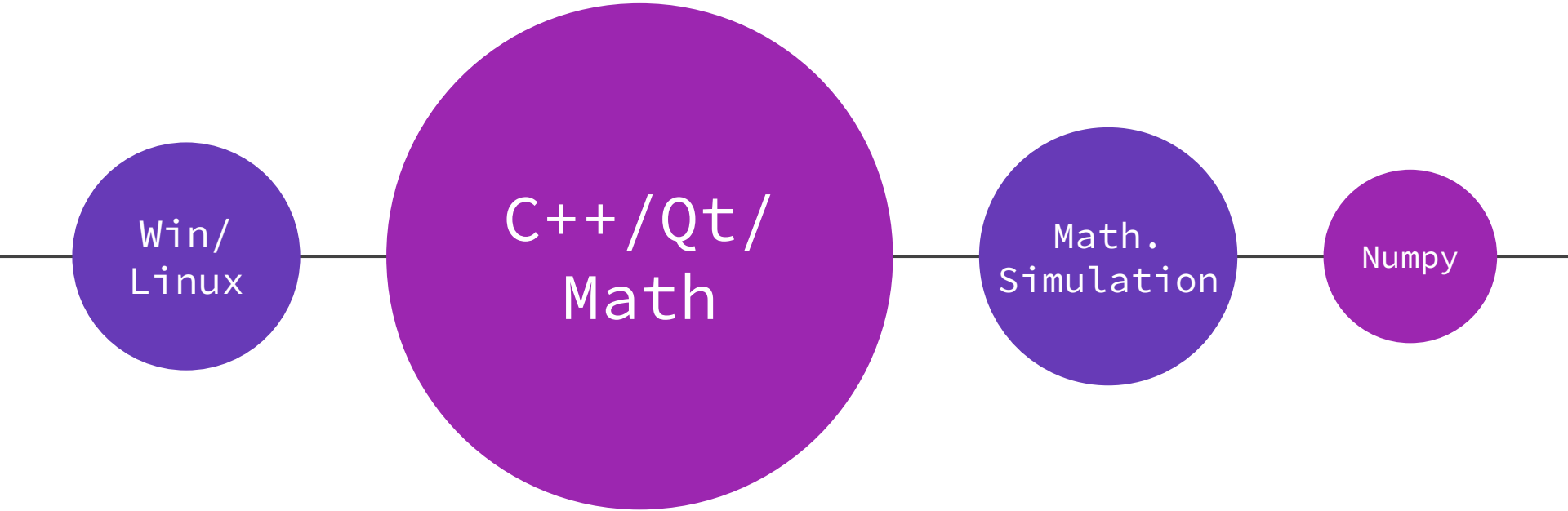
About me

I do love designing and implementing a cool/complex things that could simplify mine job and others’. Negotiate and implement.

More than 10 years of production experience with C++/Qt.

Hobby: Linear Algebra, Linear ODE, FEA, Vibration Theory, bike riding, Control Theory, Rubik's cube, drum playing

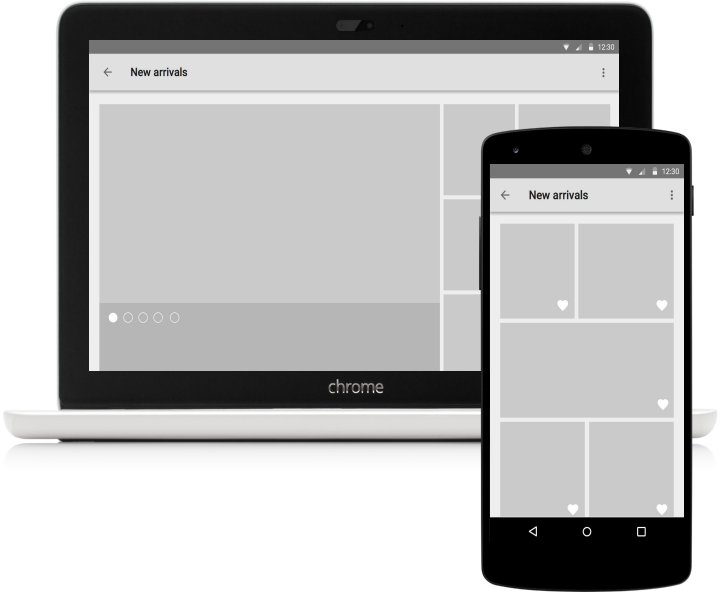
Knowledge



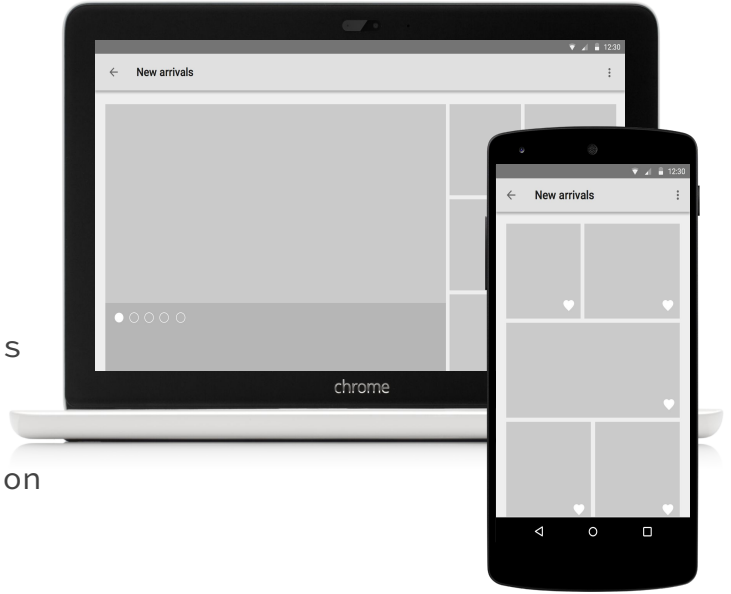
AD for OEM from Munich

Project name: NDA (Feb2023-now)

- Software for dentist
- 3D computational geometry, quaternions, vector algebra
- in contact with QA and stakeholders: implement new features, bug fixing
- calculate ‘optimal’ plane and provide rich GUI to edit/show this plane
- Tech. stack: C++17/Qt/OpenGl, cmake, VisualStudio2020/ReSharper, MeshLab



Project name: NDA (Aug2021-now)

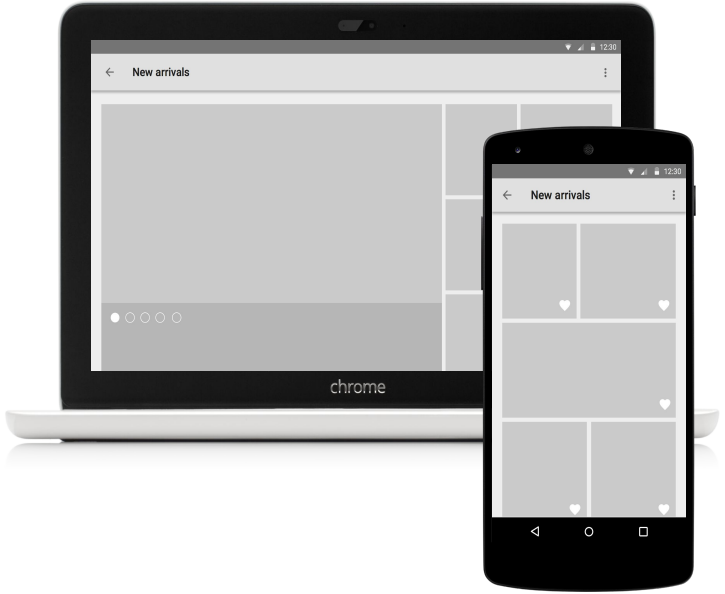


- Low level functionality for data transfer between ECU’s and HeadUnit (FrancaIDL/AutoSAR)
- Math.Library: Common Wrapper, Linear Algebra, Optimization, Kalman Filtration, Rectangles Intersection in 2D
- Found error in Intel AdLib (https://en.wikipedia.org/wiki/Hungarian_algorithm)
- Tech. stack: C++14/Python (Numpy, Jupyter), Bazel/FrancaIDL/Blaze/AdLib, vsCode

HMI for OEM from Stuttgart

Project name: NDA (Jan2016-Aug2021)

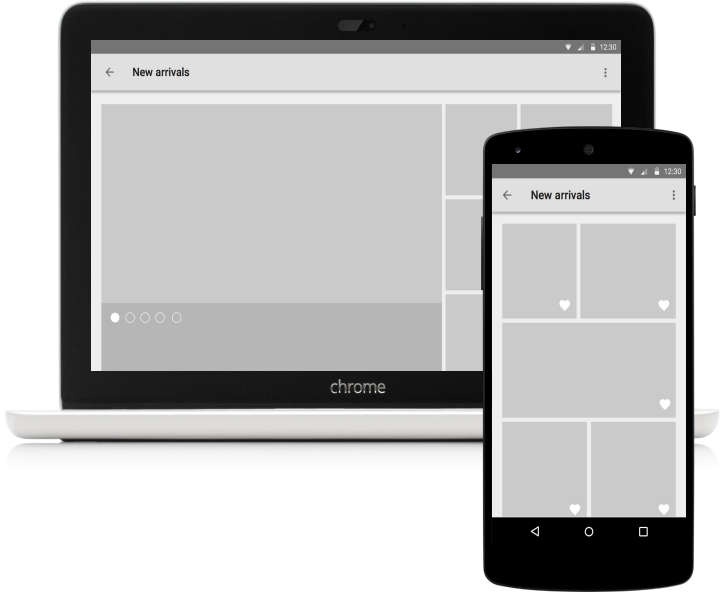
- Rich GUI for HMI/Navigation
- Instrument Cluster display (no simulator, no debug, only dlt-logs)
- Virtual keyboard
- Check translation files (Kotlin)
- Tech. stack: C++14/Qt/Qml/C#/cmake/dlt-viewer, Qt Creator



TeamCenter’s plugin

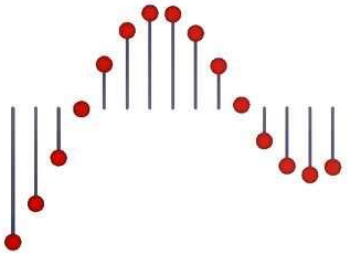
Project name: Digital signature (Dec2013-Dec2015)

- Secured document flow with digital signature
- Plugin for TeamCenter
- Tech.stack: Java, JNI, C++, Qt, QtCreator/Eclipse
- 3rd-party Crypto-Lib

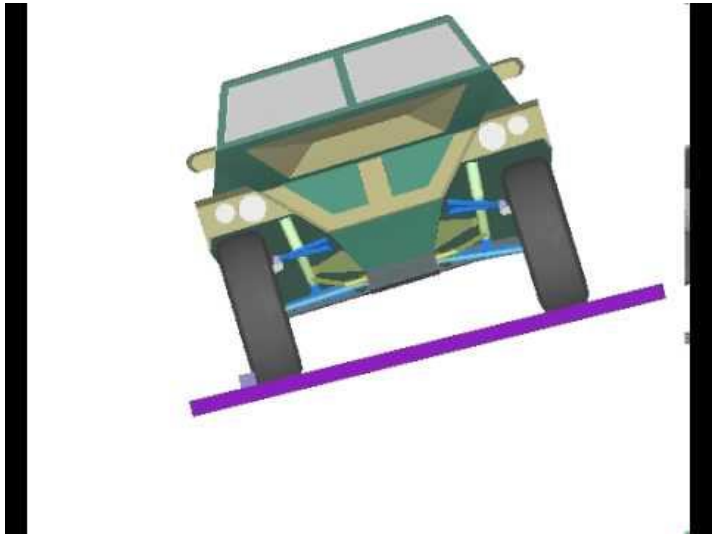


Dynamic simulation

Project name: Euler, roboTester (Sep2006-Dec2013)



- http://www.euler.ru simulate vehicle dynamics https://www.youtube.com/user/EulerCAE/videos
- improve simulation core
- interface to Simulink WorkShop
- Node remuneration for Sparse Matrix representation
- Craig-Bampton (https://en.wikipedia.org/wiki/Dynamic_substructuring)
- Export data from CAD (NX, SolidWorks, Autodesk Inventor)
- DSL for list comprehension
- Tools for create custom Application
- Tool for auto testing
- CI-pipeline via bat-files
- Fork boost::tuple, QDialog
- Tech.stack: C++03/11, Boost, Qt, VS/QtCreator

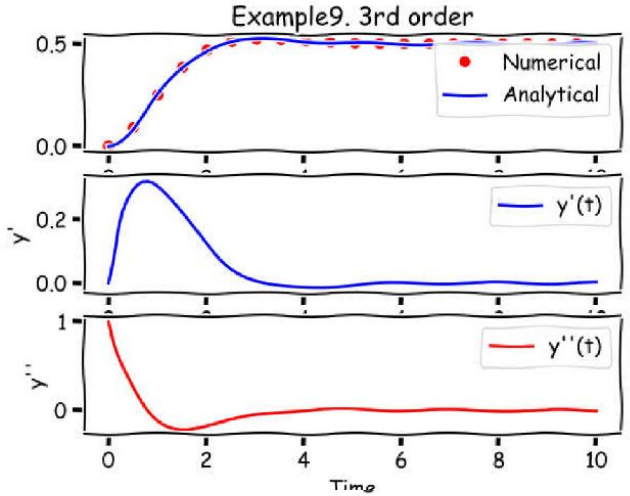


FEA

- Finite Element Analysis of an Inverse Problem Static/Dynamics
- Direct problem: find x from [K]{x}={P}
- Inverse problem: having [K] and x_i, find {x} and P_i
- same for dynamics problem
- Transient analysis
- Steady state response
- Sensitivity analysis

Control theory

- Calculate transfer function by Adjacency Matrix
- Transient analysis for input with Dirac delta function



Due to $[A]$ is lower-triangle matrix and $\{d\} = \{0, 0, \ldots, b\}$

$$\begin{cases} L_n(\{a\}, y) = b\delta(t) \\ IC_0 \end{cases} \equiv \begin{cases} L_n(\{a\}, y) = \mathbf{0} \\ IC_0 + [\mathbf{A}]^{-1}\{\mathbf{d}\} \end{cases} \equiv \begin{cases} L_n(\{a\}, y) = 0 \\ IC_0 + \{0, 0, \ldots, b/a_0\}^{\mathsf{T}} \end{cases}$$

Courses & Certificates

- Coursera
  - Math
    - Calculus (1Functions, 2Differentiation, 3Integration, 4Application)
    - Mathematics for Engineers Specialization: Matrix Algebra for Engineers, Vector Calculus for Engineers, Differential Equations for Engineers
    - Math for AI beginner part 1 Linear Algebra
  - Digital Signal Processing 1: Basic Concepts and Algorithms
  - Mastering Data Analysis with Pandas
  - Rigid Body Dynamics, Mastering Statics
  - Computer Vision
    - Computer Vision Basics
    - First Principles of Computer Vision Specialization: (in progress)Camera and Imaging
  - Writing Secure Code in C++ Specialization (Introduction to C++, C++ Interacting with the World and Error Handling)
  - Object Localization with TensorFlow, Deep Learning with PyTorch
- Matlab Onramp,
- Youtube courses
  - 3Blue1Brown: Lockdown Math, Essence of linear algebra, Essence of calculus, Differential equations
  - Math for Game Devs (part1)
  - [RU] Магистерский курс C++ (МФТИ, 2022-2023), Цикл лекций о великих математиках, матан|Борис Трушин, Линейные системы автоматического управления
- Oct22, C++ online test
- 2022 AUTOSAR Classic MATLAB, Multithreading fundamentals in C++, C++17 Fundamentals Part I, Adaptive AUTOSAR Basics, C++ Code Refactoring for C++, Haskell fundamentals

Which science topics I’m into

- CLI for editing/simulation/analysis of model
- State Equation (Observability/Controllability)
- Transient analysis (Free response, Impulse response, nonZero IC
- Transfer function
- Parallel Sparse direct Solver
- Inverse problem: find parameter value delivering expected characteristics
- Sensitivity analysis
- Optimization problem
- Model reduction
- Krylov subspace projection
- Structure preserving reduced order
- Craig-Bampton analog

Contact

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