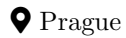


Šimon Hudínek

Profile



Prague



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R&D Engineer with a strong background in Cybernetics and Applied Physics, specializing in mathematical modeling and Python development. Experienced in building physics-based simulation tools (thermodynamics, fluid dynamics) and validating them against experimental data. Skilled in High-Performance Computing simulations and bridging the gap between theoretical models and real-world automotive applications.

Education

MSc, Sensorics and Cybernetics in Chemistry

UCT Prague, 2024–2026 (expected)

BSc, Nano and Microtechnology in Chemical Engineering

UCT Prague, 2021–2024

- Thesis: Efficient 1D Models of Filtration in Catalytic Filters for Air Protection.
- Focused on physics-based modeling of porous media and aerodynamic filtration efficiency.
- Achieved top grades in Process Control, System Identification, and Numerical Simulation.

Experience

R&D Intern – Simulation & Modeling, Škoda Auto

Mladá Boleslav 2025

- Developed a mathematical model in Python (NumPy, SciPy) to simulate humidity transport and thermodynamic behavior within the Constant Volume Sampler (CVS) system.
- Implemented mass and energy balance equations to predict dew point and condensation risks based on driving cycles (WLTP) and engine parameters.
- Engineered a predictive desktop application (Tkinter) for test operators, enabling proactive optimization of dilution ratios and preventing costly test failures.
- Validated the model against PEMS experimental data, devising an algorithm to derive exhaust humidity from CO2 concentration with high accuracy.

Researcher & Data Analyst, UCT Prague

2022–2025

- Conducted advanced research on Diesel Particulate Filters (DPF), focusing on the physical modeling of soot layer accumulation and uneven gas flow distribution.
- Improved standard 1D filtration models by introducing a new flow heterogeneity parameter (χ), validated against computationally intensive 3D CFD simulations.
- Restored and automated a legacy laboratory testing rig, integrating NI-DAQ hardware with custom Python/LabVIEW control logic.

Selected Projects

Digital Twin & Control System (Python/MPC)

2025

- Designed a real-time control architecture using Python and NI-DAQ, bridging high-level control algorithms with physical actuators.
- Implemented non-linear Model Predictive Control (MPC) and validated system performance against a Digital Twin simulation.
- Coordinated technical integration within a team of 8 engineers, ensuring synchronization between hardware and software development branches.

IoT Smart Bottle (Connected Device Prototype)

2023

- Developed a full-stack IoT solution (ESP32 + C++) simulating a telemetry scenario with real-time sensor data acquisition.
- Implemented robust Wi-Fi communication logic to transmit data to a cloud backend (Firebase) and optimized power management for extended battery life.

Technical Skills

Modeling & Simulation: Physical Modeling (1D/3D), Thermodynamics, Fluid Dynamics, System Identification

Development: Python (Advanced: NumPy, SciPy, Pandas, Tkinter), MATLAB, C++ (Embedded)

Tools & Cloud: Git, Linux, NI-DAQ, Firebase, High-Performance Computing (HPC) basics

Languages: English (Professional/B2+), German (A2)

Additional

Driving Licence: Class B (active driver). **Soft Skills:** Strong analytical thinking, ability to explain complex physical concepts to cross-functional teams, proactive problem solving.