Dr. Rafał Noga



Control and optimisation engineer, freelance — computed measurements, control for difficult systems, numerical optimisation

Waldstr. 3, 94149 Koesslarn (Lower Bavaria), Germany · +49 175 617 6792 · rafal@noga.es · noga.es · linkedin.com/in/rnoga

Availability on request · freelance or temporary agency work · remote and on site across Europe

PROFILE

I make plants, machines and flying systems do what their measurements and hand tuning cannot: I compute quantities that are not measured, design control for systems that are hard to control, and optimise how they run. I have done this since 2007, from the helium cooling of the world's largest particle accelerator at CERN to large wind turbines at IAV and power kites at SkySails. My work starts from physics and the data a plant already has, and ends with models, controllers and documentation. Since 2024 I work freelance, so far for clients in manufacturing, machine building, drone development and logistics optimisation. The same methods serve any plant, machine or fleet that is hard to measure, control or plan: process industry, food and beverages, energy and utilities, water and wastewater, aerospace and research, across Europe.

WAYS TO WORK

Form	What it means
Fixed-price remote diagnosis	EUR 4,500 net, 5 working days, remote: one-page summary for management, technical report, results meeting
Freelance project work	Service or work contract, remote or on site; day rate EUR 900 net
Temporary agency work	Through a staffing agency (Arbeitnehmerüberlassung in Germany, Arbeitskräfteüberlassung in Austria)
Free first call	30 minutes, booked at calendly.com/rafal-noga/30min

Rights: models, code and documentation stay my property; the client receives a licence to use them. Buying the rights outright, other arrangements and exclusivity are possible, as are confidentiality and non-compete agreements. Availability on request.

CORE COMPETENCES

- **Computed measurements and estimation:** state estimation and observer design, nonlinear and optimisation-based estimation (unscented Kalman filter, moving-horizon estimation), sensor fusion, soft sensors, virtual flow measurement, diagnostics from operating data.
- **Control:** feedforward and feedback design, loop shaping, control-structure design, supervisory control, model predictive control including nonlinear and economic predictive control, closed-loop validation and performance assessment.
- **Optimisation:** nonlinear programming, mixed-integer linear programming, parameter and trajectory optimisation (including 3-D flight paths), online and offline optimisation, scheduling and operating plans.
- **Modelling and simulation:** first-principles and thermo-hydraulic models, linear and nonlinear dynamic models, system identification support, validation against field and plant data, hardware-in-the-loop simulation.
- **Software and tools:** Python, MATLAB/Simulink, C/C++ (embedded context), CasADi, acados, ACADO, Ipopt, PuLP, Mathematica; Git, SVN; Siemens WinCC OA; UML and Sparx Enterprise Architect; LaTeX.
- **Engineering practice:** requirements engineering, functional analysis, control architecture, field-test planning and analysis, technical documentation, agile teams, publicly funded research projects.

EXPERIENCE

2024–today · Freelance engineer, control and optimisation — self-employed, Lower Bavaria

- Fixed-price remote diagnoses and project work for clients in manufacturing, machine building, drone development and logistics optimisation: control-system reviews, feasibility of predictive control and optimisation, estimation and soft-sensor concepts, diagnostics tooling.

2020–2024 · Developer, flight automation — SkySails Power GmbH, Hamburg (airborne wind energy)

- Developed the flight automation of large power kites: linear and nonlinear dynamic models, simulations, state estimators, feedback control loops and 3-D flight-path optimisation.
- Planned, ran and analysed field tests in rough weather; validated control against real flight data; technical documentation and publications.

2017–2020 · Control engineer — IAV GmbH (large wind turbines)

- Concept and software development of wind-turbine control: requirements, functional analysis, control architecture, dynamic models and simulation.
- Economic nonlinear predictive control, nonlinear state estimation, parameter optimisation and on-board diagnostics; the work led to a commercial IAV control product.
- Publicly funded research collaboration; agile team.

2015–2016 · Software developer — evosoft GmbH (Siemens)

- Software for the Siemens Simatic WinCC OA control system used to operate and monitor plants; operator interfaces.

2014–2015 · Founder and engineer — Soft-Sensor

- Data-fusion applications for clients; development of a paraglider variometer with sensor fusion.

2007–2013 · Researcher and doctoral student — CERN, Geneva; University of Valladolid; Osaka University

- Economic nonlinear predictive control for the superfluid-helium cooling of the Large Hadron Collider, with first-principles thermo-hydraulic models and optimisation-based estimation of unmeasured states.
- Tested at CERN: after a disturbance the plant returned to its setpoint about ten times faster, without violating the safety limit.

2012–2015 · Official guide — CERN — hundreds of public talks for thousands of visitors, in several languages.

Earlier: 2006 intern at ATENA Engineering (Assystem), hardware and software for hardware-in-the-loop simulation of the A400M turbine engine; 2004–2005 working student at the University of Karlsruhe, software for a data-mining system.

OWN DEVELOPMENTS

- **Virtual flow meter:** flow through valves computed from valve position, pressure and temperature, without a flow meter in the pipe.
- **Paraglider variometer:** fuses air pressure, motion sensors and satellite position into a fast, calm climb signal.
- **ParaDoc** (noga.es/paradoc): exhaust-temperature alarm for paramotors; engine diagnostics from sound and vibration (speed without a sensor, misfire, knock, wear) are in development.

EDUCATION

- **PhD, Process and Systems Engineering** — University of Valladolid, research at CERN (2007–2013): economic nonlinear predictive control of a large cryogenic process.
- **Engineering degrees (master's level) in control engineering and related fields** — Grenoble Institute of Technology; University of Karlsruhe (KIT); Gdańsk University of Technology.
- **Technician in electronics.**

Publications from CERN, IAV and SkySails are listed at noga.es.

LANGUAGES AND MORE

- **Languages:** Polish (native); German, English, French and Spanish (all C2).
- **Pilot:** over 1,200 hours on paragliders, over 200 hours on paramotors and over 500 hours on sailplanes — first-hand feel for the vehicles I control.
- **Based in** Koesslarn, Lower Bavaria: close to Passau, Landshut, Munich and Upper Austria.