Stefan-Aleksandar Kyumyurdzhiev

Aerospace engineering student. I design rocket motors, build sensor systems, and build the software that ties them together.

Aerospace Engineering, TU Sofia · Sofia, Bulgaria

Open to: propulsion, aerospace and defence R&D engineering roles, and summer 2027 internships. Available now, open to relocation.

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Awards

1st place — European Defense Tech Hackathon (EDTH) Sofia — Oct 2026
3rd place — Kapital Regional Defence & Security Summit, Sofia — 21 Oct 2026

Experience

Propulsion Lead · SCAE rocket club · 2026 – present
Lead a 4-person team that designs and manufactures the club's solid rocket motors.

R&D Mechanical Engineering Intern · Mator Bulgaria · Aug – Nov 2026
Drawing packages and CAD assemblies for industrial machines, plus lathe work and support on manufacturing processes.

Aircraft Engineer · European Air Charter · Mar – Jul 2026
Aircraft engineering at a charter airline, supporting the maintenance of its fleet.

Skills

SolidWorks · OpenMotor · MATLAB & Simulink · Python · LabVIEW

High-Altitude Balloon Reconnaissance

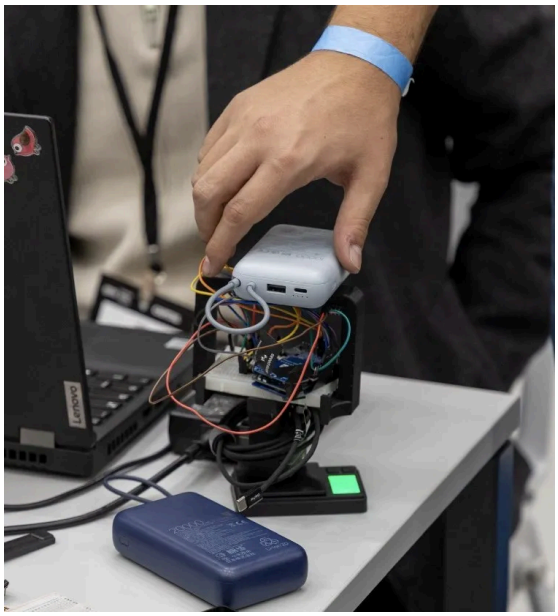
Oct 2026 – present

`In progress · Proof of concept done`

1st place — European Defense Tech Hackathon (EDTH) Sofia — Oct 2026

3rd place — Kapital Regional Defence & Security Summit, Sofia — 21 Oct 2026

> Restricted project. Technical details aren't public. I'm happy to talk about my part in person.



The sensor pod prototype at EDTH Sofia 2026.

My role

I was responsible for the electrical system and for integrating the hardware and software into a working demo. I also worked on the communications and researched balloon trajectories and tracking.

Skills: Electronics integration: flight controller, sensors and payload · Hardware–software integration into an end-to-end demo · Communications, including a live demo with map and navigation · Trajectory and tracking research

D-1 Solid Rocket Motor

Jun 2026 – present

`In progress · All parts machined, next: static test`

Objective

Design a motor for the club's rocket. The D-1 had to deliver about 113 N·s of total impulse (G-class) to reach a target apogee of about 200 m. It also had to be built from materials we could source in Sofia.

My role

I lead SCAE's 4-person propulsion team, which designs and manufactures the club's rocket motors. For the D-1, I did the calculations, the design and CAD, the material and seal selection and the grain inhibition, and wrote its documentation and drawings. The igniter was a team effort, and the parts were machined by others. I also mentor team members and review their simulation work.

What I did

- Did the motor calculations and designed it around a KNDX BATES grain, sized for about 113 N·s (G-class).
- Modelled the full motor in SolidWorks and produced the D001 assembly drawing (A2, 1:1).
- Selected the materials (6082 aluminium casing, S45C steel nozzle and top cap, M5 bolts) and the seals (Viton O-rings in standard AS568 sizes).
- Designed the nozzle joint: threaded retention and O-ring sealing, with a check against galling in the aluminium threads.
- Designed the grain inhibition: an epoxy and fibreglass wrap on the outer surface of each grain.
- Designed the igniter together with the team.
- Wrote the motor's 41-page design document.
- Reviewed teammates' simulation work, including OpenMotor grain simulations and a Simulink 6-DOF flight simulation.
- Started the D-2 revision: a hanging nozzle that moves the bolts and O-rings aft, so both nozzle and casing need less material.

Results

- Design complete, with a 41-page design document and the full assembly drawing.
- All parts machined; the team is preparing for the static test.
- Grain inhibition and igniter designs finished.

Challenge

For the next revision, the goal is a lighter motor without weakening the joints. In D-2, the nozzle's divergent cone hangs outside the casing, so the bolts and O-rings move aft and both the nozzle and the casing need less material. The nozzle stays steel; the forward bulkhead switches to aluminium. Lesson: where you place a joint decides how much material the parts around it need.

Next

- Instrumented static test to measure thrust and chamber pressure and check the design
- First flight about two weeks after the static test
- Finish the D-2 revision
- Write up the static-test campaign as a paper

Tools: SolidWorks · OpenMotor

Credits: Igniter designed as a team effort; machining by others.

SRM Casing Calculator

May 2026 – present

`In progress · Motor and casing engine live, next: flight prediction`

Objective

The casing is the safety-critical part of a solid motor: it has to hold the peak chamber pressure. The calculator takes a few inputs (propellant, grain and nozzle geometry) and designs the motor and its casing, down to a bill of materials. The long-term goal is to enter a target apogee, rocket mass and maximum diameter, and get the full motor design.

My role

I derived and verified all of the physics and set the design rules. The code was written with Claude Code from my specifications, and I audited every result before accepting it.

What I did

- Derived the physics formula by formula: propellant properties, internal ballistics, thick-wall (Lamé) casing stress, closures, bolts and O-ring grooves.
- Checked the KNDX propellant data against Richard Nakka's primary sources.
- Ran a verification-first process: hand-derived answer keys, blind double calculations and independent audits before any code was accepted.
- Sized the casing from the true peak chamber pressure, not the starting pressure.
- Built a material library from MIL-HDBK-5J data.

Results

- The verified motor-and-casing engine is live at srm-calculator.vercel.app.
- 149 automated tests at the engine-v1 release.
- A separate audit pass on v1 found 0 critical, major or minor issues.

Challenge

An audit of the first version found that it underestimated the peak chamber pressure, which is the number the casing is sized from. It also used the wrong burn-rate coefficients for KNDX. Instead of patching it, I rebuilt the engine from scratch and checked every equation before it went into the code. Lesson: for safety-critical numbers, verify the physics before writing the code, not after.

Next

- Flight prediction: simulate the rocket's flight to predict its apogee, then work backwards from a target apogee to the motor design

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Tools: React · TypeScript · Vite · Vercel · Claude Code

Credits: Code written with Claude Code from my specifications; the physics derivations and verification are mine.

Live app: https://srm-calculator.vercel.app