Taipei, Taiwan
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Andrei Petrov

Software engineer

GitHub
LinkedIn

I am a software engineer interested in aerospace, electrical and civil engineering. My past experiences include CubeSat onboard electronics design, flight control software development and mechanical simulations. While working at Sakha Aerospace Systems, I was involved in spacecraft ground infrastructure operations.

My other interests include embedded systems, network engineering and website development. Check out my flagship project: a real-time operating system kernel for 8-bit microcontrollers.

Skills

Tools and Languages	C/C++, Assembly (AVR, x86), CppUTest, Doxygen, Python / Django, Git, HTML/CSS/JS, GnuRadio, KiCad EDA, SolidWorks, pfSense, VMware ESXi, LaTeX, TianoCore EDK II
Communication	English (C1), Russian (Native)
Miscellaneous	CEPT Amateur Radio License (callsign R0QAV), NTU EMI TA certification

Technical Experience

Teaching / Lab Assistant — **Jan 2022 — Present (remote)**
Sakha Junior Science Academy (SJSA) — *Yakutsk, Russia*

- Controlling SJSA ground station as a licensed radio operator, providing technical support.
- Supervising high school students practicing satellite communications (news report in Russian).
- Served as a research advisor for a student who won a silver medal at the Taiwan International Science Fair 2024.
- Helped to organize an international aerospace engineering school (see page 2 and 27) for high school students from Hong Kong; worked remotely as electronics engineering TA.
- Performed duties of flight director & RF communications engineer for a high altitude balloon launch (news report).
- Assisted colleagues from Siberian State Aerospace University, Krasnoyarsk, in receiving telemetry from their CubeSat (ReshUCube, NORAD 53382) via SJSA ground station.

Lead Engineer / SAKHACUBE-CHOLBON CubeSat — **Jul 2021 — Present (remote)**
Sakha Aerospace Systems, LLC — *Yakutsk, Russia*

- Serving as the lead engineer for a CubeSat project; scheduled for launch in **Q4 2024**.
- Developing and maintaining web service infrastructure, see Projects section for details.
- Developing flight software for CubeSat Payloads, C / Atmel AVR.
- Preparing technical documents, reports and specifications with IEEE standards compliance.
- Designed CubeSat payload flight electronics – YKTS-PL-EDU/16 MCU Cluster Module.

Intern / Junior Software Engineer — **Mar 2021 — Jun 2021**
«Sever» Information Security Center, LLC — *Yakutsk, Russia*

- Developed an internal quote generation tool with automated supplier data import, Flask/Python.
- Practiced network engineering, VMware ESXi management.

Intern / Electronics Engineer, Lab Assistant — **Jun 2019 — Nov 2020**
Yu. G. Shafer Institute of Cosmophysical Research and Aeronomy — *Yakutsk, Russia*

- Assembled PCBs for reindeer tracking collars, studied electronics engineering.
- Studied satellite & radio communication basics.
- Taken high-energy particle physics courses.

Education

Undergraduate, *Civil Engineering, National Taiwan University @ Taipei, Taiwan* — 2022 — Present
High School, *V.P.Larionov Physics & Technical Lyceum @ Yakutsk, Russia* — 2012 — 2020

Activities

NTU Civil Engineering TA workshop @ Xitou – Student	Fall 2024
«Step into the Future» International Student Conference @ Moscow – Research Advisor	Summer 2024
GISIT-2024 Geoinformation Systems Project Competition @ Yakutsk – Project Judge	Spring 2024
YKS-HKG Aerospace Engineering School 2024 @ Yakutsk – Teaching Assistant, Organizer	Spring 2024
Taiwan International Science Fair 2024 @ Taipei – Research Advisor	Winter 2024
National Taiwan University EMI TA workshop @ Taipei – Student	Fall 2023
MSU Aerospace Engineering School (RosCanSat competition) @ Moscow – Team Supervisor	Summer 2022
Yakutsk International Research School (YIRS) 2021 @ Yakutsk – Research Advisor	Fall 2021
Space-Oriented Learning for Americans and Russians (SOLAR program) – Finalist	Spring 2020

My Projects

CUSF-Tawhiri Trajectory prediction tool — **Production usage**
Link: `http://tawhiri.stratoflights.yktaero.space` — *Stack: Python, Flask, Jquery*

- Fork of the original CUSF Tawhiri tool, adapted and hosted for Sakha Junior Science Academy.
- New features: custom ascent/descent profiles using time-altilude-rate curves, UI/UX improvements.
- Used to predict the flight path for the SJSA international aerospace school in March 2024.
- Additional work planned on request by STRATONAUTICA, LLC company.

Ground Station Controller - stationctl — **In development**
Internal tool — *Stack: Python, GnuRadio, Skyfield*

- Estimates satellite position in real time using orbital elements.
- Automatically adjusts radio link parameters (data rate, carrier frequency with Doppler shift, etc.).
- Aims antenna rotator to the satellite position.
- Connects to the central server for scheduling and remote control as part of the GSN service.
- Production deployment & usage in Sakha Junior Science Academy.

YktSat EDU/16 Payload Module — **In flight qualifiacation testing**
Link: `https://yktaero.space/projects/item/ykts-pl-edu16-sptx` — *Stack: KiCad, C/C++, Doxygen*

- Expected to be launched in Q4 2024 with the SAKHACUBE-CHOLBON CubeSat.
- Compliant with PC/104, CubeSat, and Sputnix ICD specifications.
- 4-Layer modular PCB, designed from scratch in KiCad.
- Modular firmware written in C & AVR assembly, unit tests with CppUTest, CI/CD supported.
- Single makefile, firmware built and tested with self-hosted GitLab.

YktSat PL-RTOS kernel — **Production usage**
Internal tool — *Stack: C/C++, Doxygen*

- Fully-featured Real Time Operating System (RTOS) kernel for MCUs.
- Currently supports AVR ATmega128 & ATmega2560, ARM Cortex-M4 support planned.
- Experimental task child–parent relationship with batch task operations.
- Mutex priority inheritance and FIFO locking.
- Built-in heap manager with allocation tracking and double free protection.
- Unit tests with CppUTest, Doxygen for documentation.
- Used in YktSat EDU/16 Payload Module firmware.

Sakha Aerospace Systems Datasheet website — **Operational**
Link: `https://docs.yktaero.space` — *Stack: Django, Jinja2, Django REST*

- Provides users with a list of all published technical documents.
- Search, filtering, reordering supported.
- Stores and displays revision history for all documents, provides file downloads for every revision.
- Allows creating new documents and uploading files via administration panel.
- (Planned) GitLab CI integration for LaTeX documents with automated publishing.

Sakha Aerospace Systems server infrastructure — **Operational**
Link: `https://status.yktaero.space` — *Stack: VMware ESXi, pfSense, nginx*

- Various services for team collaboration: Nextcloud, Gitlab, Onlyoffice, Inventree.
- Simple status reporting with GitHub Pages, internal monitoring with Zabbix.
- Single Sign-On for all services using self-hosted Authentik, migration to Keycloak is planned.
- Fully self-hosted & virtualized, proper network isolation with VLANs, secure remote access with OpenVPN.
- Server uses enterprise-grade hardware.

Jfkerman.me server infrastructure — **Operational**
Personal project, link: `https://jfkerman.me` — *Stack: VMware ESXi, pfSense, nginx, Django*

- Multiprotocol VPN for censorship circumvention, self-hosted Matrix server, TeamSpeak and SSO.
- Custom Outline VPN key management solution – `outline.jfkerman.me`, see on GitHub.
- Deployed in 2022 as a response to Russian Wartime censorship law.
- More than 40 active users from my friend circles, 100+ VPN keys issued. Free of charge.

UEFI mods — **Production usage**
Personal project — *Stack: TianoCore EDK II, UEFITool*

- DXE module with secret notes, activated with key combo, written in C with EDK II.
- Patched personal workstation EFI image with my custom DXE module, also added support for NVMe boot.
- Customized logos, UI images, backgrounds and DMI information; updated built-in DXE drivers to latest versions.
- Flashed modded images into hardware, haven't bricked my PC.