
ALEXANDER BALGAVÝ, M.SC.

SOFTWARE ENGINEER – SPACE APPLICATIONS SERVICES

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PROFILE

I am a Slovak citizen; I grew up in the Czech Republic, and am now working in the Netherlands. I also spent a semester abroad in Boston, USA. I can speak/write Slovak, Czech, and English with native/bilingual proficiency, Spanish with professional working proficiency, Dutch with elementary proficiency, and speak Russian and German with elementary proficiency. I am interested in the fields of software development, cybersecurity, and astrophysics.

EXPERIENCE

SOFTWARE ENGINEER

SPACE APPLICATIONS SERVICES (SEPTEMBER 2023-PRESENT)

- I am designing and developing a new data management infrastructure for the Columbus module on the International Space Station. I am working in close cooperation with the European Space Agency as a contractor at ESTEC, as well as with CGI, ALTEC, and the Columbus Control Center, building critical flight and ground components. Key technologies: Rust, Ansible, Atlassian product suite.
- I have demonstrated the team's work to various stakeholders (e.g. end users, design reviewers) at the Columbus Control Center and the European Astronaut Center. I have also written official documentation for the ESA critical design review.
- In 2024, I co-authored a paper about the project, and presented it at the International Astronautical Congress in Milan, the largest conference in the space industry.
- Further, I am part of the Yamcs development team. I implemented authentication and encryption for space-to-ground data links in the Yamcs core, and a plugin to store user data in Amazon S3-compatible object storage. Key technologies: Java, Python, Protobuf.
- I have also actively participated in business development, writing proposals for industry partners.

INTERN IN THE LOW EARTH ORBIT EXPLORATION GROUP

EUROPEAN SPACE AGENCY, ISS GROUND SEGMENT SYSTEMS TEAM (MARCH 2023-AUGUST 2023)

- I developed, reviewed, and assessed components of the Columbus Data Management Infrastructure for the ISS, both in-flight and on-ground, such as the primary software responsible for maintaining communication links. Technologies: Rust, Atlassian product suite.
- I led a Rust programming workshop for 17 engineers from different domains (e.g., ISS ground segment, ColKa, IT Infrastructure) and operations managers. Participants came from ESA (ESTEC, European Astronaut Center) and contracting organizations (CGI, Space Applications Services).
- I designed and prototyped a system for open work management, for use by approx. 200 people in the planning of ISS expeditions. I collaborated with mission managers and engineers at the Columbus Control Center in Germany. Technologies: Office 365 (SharePoint, Power Automate, Teams).
- I created software tools to extract, process, and import large amounts of engineering requirements for the operation and development of the Columbus module on the ISS. Technologies: Rust, Python, Atlassian product suite.

TEACHING ASSISTANT

VRIJE UNIVERSITEIT AMSTERDAM (2018-2021)

- Responsibilities included leading exercise classes, preparing for each lesson, assisting during practicals, answering questions via email, and grading assignments/exams. Taught subjects: Operating Systems (in C), Computer Networks (in C++), Computer Programming (in C++), Advanced Programming (in Java), Introduction to Programming (in Python), Web Technology (HTML & CSS, JavaScript, SQL, Python, Go), and Programming for Economists (in Python).

JUNIOR MALWARE ANALYST (INTERNSHIP) ESET (JULY-AUGUST 2020)

- I reverse engineered several kinds of malware using industry-standard tools (IDA Pro, OllyDbg). I wrote detailed reports on the behavior of malware.

PUBLICATIONS

- The Columbus Data Management Infrastructure: A cloud above the sky on the ISS. Published in the proceedings of the International Astronautical Congress (IAC) 2024. Co-authored with other members of the CDMI team.
- FirmLine: a Generic Pipeline for Large-Scale Analysis of Non-Linux Firmware. Published in the proceedings of the Workshop on Binary Analysis Research (BAR) 2024. Co-authored with Marius Muench.

EDUCATION

M.SC. COMPUTER SYSTEMS SECURITY

VRIJE UNIVERSITEIT AMSTERDAM & UNIVERSITY OF AMSTERDAM, THE NETHERLANDS (2020-2023)

- I wrote a Master's thesis with VUsec, the university's Systems and Network Security Group. I developed *FirmLine*, a generic pipeline for firmware analysis, and conducted a large-scale analysis of non-Linux firmware, including a security assessment.
- As part of the committee for the development of the curriculum of the Computer Science Bachelor's programme, I guided the future direction of the programme.

HONOURS B.SC. COMPUTER SCIENCE (CUM LAUDE)

VRIJE UNIVERSITEIT AMSTERDAM, THE NETHERLANDS (2017-2020)

- Academics: I graduated Cum Laude and with Honours, earning 218 EC. I wrote a Bachelor's thesis with VUsec, on the topic of the application of formal methods to the development of filesystems. I completed an Honours project with the Distributed Systems Group, creating a characterisation of cloud service failures, and presented it at a research meetup.
- Activities: won first place at the Amsterdam Algorithm Programming Preliminaries contest and finished first from the university at the Benelux Algorithm Programming Contest, qualifying for and competing in the Northwestern Europe Regional Contest.

B.SC. COMPUTER SCIENCE (EXCHANGE)

NORTHEASTERN UNIVERSITY, BOSTON, MA, USA (2019 FALL SEMESTER)

- I completed a semester abroad with a 3.75 GPA, awarded the Dean's List. My studies were supported by the GLOBE Scholarship, which I received as a top-ranking student among hundreds of applicants.

INTERNATIONAL BACCALAUREATE DIPLOMA, ELEMENTARY, MIDDLE & HIGH SCHOOL

INTERNATIONAL SCHOOL OF PRAGUE, CZECH REPUBLIC (2004-2017)

- Honour roll for all four years of high school. Subject honours in Computer Science for both years of the course. Received the International Baccalaureate Diploma with 39 points, on 31 July 2017. Courses include Higher Level Computer Science, Higher Level Physics (Astrophysics option), and Higher Level Mathematics (Statistics option).
- Presented school projects at two Apple Education Leadership Summits, in Prague (2010) and in Geneva (2012). Grade 11 Student Council Representative. Technician (lights, sound) for upper school theater productions, as well as for ISP's first two TEDx Youth conferences (2015, 2016). Programmer and later team leader of the school's Robotics team, winning two awards (Inspire, Control) and competing in the FTC World Championship in St. Louis, USA, in 2016.

OTHER INTERESTS & ACTIVITIES

- **Technology:** I am proficient with Linux server administration (I host my own website and services), and have contributed to open source projects (e.g. Searx, RSS-Bridge, Homebrew).
- **Music:** I play guitar, piano, drums, and violin. I passed the ABRSM examinations with merit, at Grade 7 in piano and Grade 6 in violin. I digitally record, mix, and master songs; I've amassed thousands of views and listens on online platforms. I compose my own music and DJ.
- **Film:** I attended a summer film camp for three years, and my films were selected as the best for two consecutive years. I have an Apple Certification in Final Cut Pro.