ALEXANDER DERKATSCH

Em: ai.derkatsch@gmail.com | C: (609) 815-0257

SKILLS & COMPETENCIES

- **Systems Engineering & Aerospace**
  Systems Engineering lifecycle (SLS Block 1B, Artemis 4+), Requirements Management (DOORS, NASA/MIL specs), Human Systems Safety & Risk Assessment, Agile/Scrum method workgroup, International Collaboration, Process Improvement, T&E, CFRP knowledge, MBSE, SysML.

- **Software Development & AI**
  Full-stack development (React, Node.js), AI/LLM integration (Grok, Prompt Engineering), Firebase Suite (Firestore, Auth, Cloud Functions), NoSQL Database Design, API Scaling, CI/CD, Python, MATLAB.

- **Operations & Pilot**
  Private Pilot License, Fleet Coordination, Airport Business Operations, Interpersonal Communication

EMPLOYMENT

BEYOND GRAVITY

Aerospace Systems Engineer – Huntsville, AL (full time) 2022-2025

- Systems Engineering lifecycle for SLS Block 1B (Artemis 4,+) subsystems: Maintained Risks Issues Opportunities and agile method workgroup (scrum), resolved qualification directed requirements integration and verification, system performance & test campaigns, and resin system designs for production for the Universal Stage Adapter (USA).
- Authored and updated human systems safety & risk assessments documentation, navigating Army/Space-Force (DoD) requirements, tracing hazards to verifiable records in DOORS, and validating closure through test artifacts for thes for the USA.

- Operated as a technical lead and program-level deputy, performing as the sole systems engineer and IPT lead for the United States site. Duties include performing compliance assessments and system readiness in accordance with NASA, MIL, specifications. Supported SOW/specifications from a systems safety perspective, supplying measurable safety requirements, verification methods, and acceptance criteria.
- Travelled internationally for NASA/Dynetics SLS Payload Separation System (Exploration Upper Stage subsystem). Spent 12 weeks in Linköping, Sweden site to resolve NASA-standard compliance deadlock with Leidos-Dynetics prime.

- Uncovered areas for production lifecycle improvements like material choice process and fastener torquing methodology. Piloted a study for lowering the time-to-customize clamp band separation systems for different spacecraft to increase production rate. Heavy use of python for engineering products.
- Reviewed incident/fielding data, determined user risk levels, and coordinated mitigations (hardware/software updates), closing hazard records; as well as change, waiver, and exemption requests for payload adapter clamp band assembly, assessing safety implications, updating the hazard log, and recommending acceptance/mitigation dispositions
- Developed a rate-plan for a tiger-team initiative on an alternate production line, set to achieve a two-week takt time on Vulcan's aft skirt heatshield.
- Balanced requirements for human rating and manufacturability. Encompassed tests, product development opportunities, project milestones, and impacts between other trades. Worked production flow across portfolios, contributing to organization-wide internal product development, and CFRP knowledge generation

EMPLOYMENT

PRINCETON AIRPORT
Flight Coordinator – Princeton, NJ (40+ hours per week) 2016-2017; 2013-2014

- Facilitated the creation and revision of internal accounting and financial tracking documents to streamline airport business operations (cash drawer, fuel ordering, fees & other services).
- Exercised strong interpersonal communication to deliver instructions to students and maintenance technicians regarding fleet maintenance, aircraft operational parameters, and airport process improvements.
- Directed near and long-term fleet coordination for over 60 active student pilots and 100 aircraft renters, optimizing assignments based on aircraft model, operational capability, and time constraints.
- Monitored base and transient air & ground traffic while concurrently operating Jet-A and 100LL fuel pumps for fixed-wing and rotorcraft, requiring rapid task switching under aggressive deadlines.
- Managed pilot shop operations to drive sales, processing accounting data and executing inventory planning.
- Administered company social media accounts (Twitter, Facebook, and Instagram), resulting in a 25% increase in online traffic and engagement.

EDUCATION

2014-2021 **CALIFORNIA POLYTECHNIC STATE UNIVERSITY** San Luis Obispo, CA
B.S. Aerospace Engineering

2008-2017 **PRINCETON FLYING SCHOOL** Princeton, NJ
Private Pilot License, AUGUST 2017

SPECIAL PROJECTS

bigBespoke LLC 2024-present
Founder – Huntsville, AL (nights and weekends)

- Architected and developed www.copapp.ai, a human behavior and decision-making platform for de-escalation training aligned with ICAT and PERF guidelines.
- Leveraging frontier LLMs (including Grok), simulations are designed for realistic, insightful training to enhance pressure response and cogency, validated through hundreds of hours of testing with police officers.
- **Deep Applied AI / LLM integration:** Executed custom prompt engineering (thousands of words), multi-step reasoning chains, generative media, and conversation context management.
- Demonstrated rapid acquisition of full-stack development skills: architecting, coding, and debugging a large-scale React + Node.js codebase.
- Mastered the Firebase suite (Firestore, Authentication, Cloud Functions, Hosting) for building scalable, secure, multi-tenant serverless architectures with hardened security rules and CI/CD.
- Designed a scalable, multi-tenant document data model (Mongo/Firestore-style) with granular authorization rules and mitigation of hot partitions via sharded counters.
- Scaled APIs and optimized p95 latency by moving heavy LLM/media jobs to queues (Pub/Sub/Tasks), implementing circuit breakers, retries with jitter, and strategic caching/index tuning.
- Engineered end-to-end cloud payment solutions with Stripe Checkout + Webhooks, including complex subscription lifecycle logic.

Practical Research Domain Expert Summers 2020-2022
(Cal Poly Aerospace) (40+ hours per week) (40+ hours per week)

- **AIAA and INCOSE Publications**: Authored and presented papers on managing complexity in high-reliability organizations at prestigious conferences (AIAA SciTech 2022 paper #2022-0994 Managing Complexity through Quantifying Communication in High Reliability Organizations, paper #129 Managing Complexity through Collaborative Intelligence INCOSE Detroit Int. Symposium). Papers focused on quantifying communication and collaborative intelligence, underlining novel approaches to enhancing operational efficiency in aerospace environments, including numerical methods and natural language programming theories.
- **Systems Engineering Research**: Conducted in-depth studies on systems engineering practices within private and government aerospace sectors. Developed frameworks and system concepts aimed at reducing faults and elevating process improvement by revolutionizing communication strategies for development and manufacturing using SysML and other requirement languages
- **Innovative Research Methods**: Excelled in defining research scopes, synthesizing between sparse sources, and integrating granular details into overarching concepts. Specialized in creating connections between theoretical research and practical applications in aerospace engineering. Familiar with MBSE, SML, DOORS
- **Mathematical Modeling for High-Reliability Organizations**: Innovated a unique mathematical modeling philosophy to integrate principles of high-reliability organizations into teams and workforces. The goal is to find deep patterns in language and behaviour that enable positive control of emergent properties in design.