

# Jonathan Afzali

## Engineering Portfolio

# Contents

This presentation has been drafted with ITAR compliance in mind. All content and information are sourced from public domain, and are cited throughout.

Projects are ordered starting from the most recent projects. Additional Links and clarifying content can be found in the backup slides as needed.

Should there be any questions or need for clarification, you may find my contact information at the end of this powerpoint. Additionally, you can find more information and background on each project, along with a Resumé, at <https://www.jonathanafzali.com/>.

1 Professional Background 

2 Orbital Ops Astraeus Satellite 

3 Over-The-Horizon Missile Launching System (OTH-MLS) Program 

4 Mine Countermeasures Mission Package (MCM MP) 

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7 FSAE Internal Combustion Intake 

8 FSAE Electric Vehicle Control System 

# Professional Background

- (2015-2019) **Highlander Racing (UC Riverside FSAE)**
  - Torque Vectoring / Business Lead
  - Intake Design Engineer
- (2019) **Falcon Enclosures Consulting**
  - Engineering Consultant (ME and Civil)
- (2020 / 2025) **SGB Enterprises Inc.**
  - Mechanical Design Engineer
- (2020-2022) **Mine Countermeasures Mission Package (MCM MP)**
  - Test Engineer / Project Officer
  - Combat Systems Lead Engineer
- (2022-2025) **Over-The-Horizon Missile Launching System (OTH MLS)**
  - Mechanical Engineer
  - In-Service Engineering Agent
  - Test & Evaluation Lead
  - Foreign Military Sales Lead
- (2025-Present) **Orbital Operations**
  - Engineering Consultant
- Certifications
  - EIT
  - PE (In-Progress)

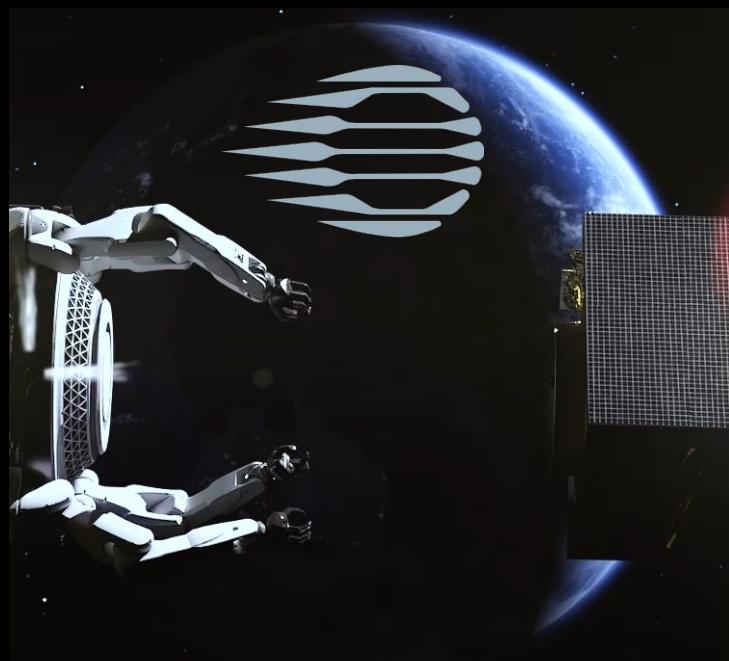
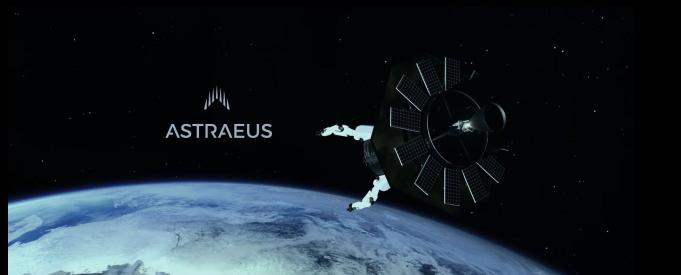


<https://www.dvidshub.net/image/8870895/uss-tulsa-lcs-l6-visits-naval-surface-warfare-center-port-hueneme-division-combat-systems-assessment>

# Astraeus Satellite

## Orbital Operations

- Engineering Consultation focuses:
  - Optimization
  - Documentation
  - Training Development and Qualification
  - Test and Evaluation
  - Integration
- Test and Evaluation:
  - Conduct operational and developmental testing at each stage of design and integration
  - Develop Procedures and Criteria for both Civilian and Governmental applications
- Stakeholder / Executive Operation Support
  - Supporting Discussions / Negotiations
  - Working within Client Constraints and Governmental project compliance



# OTH MLS Program

Naval Sea Systems Command (NAVSEA)

- In-Service Engineering Agent (ISEA) focuses:
  - Sustainment
  - Optimization
  - Documentation
  - Event Execution
  - Training Development and Qualification
  - Test and Evaluation
  - Integration
- Test and Evaluation Lead:
  - Serve as Test Engineer and Director for several large scale multi-division events
  - Develop Procedures and Criteria
- Foreign Military Sales (FMS) Lead
  - FMS Integration
  - Working within Client Constraints



# OTH MLS Program

Naval Sea Systems Command (NAVSEA)

- Accomplishments:
  - Built the OTH MLS Laboratory and Test Stand for operational Testing and Troubleshooting
  - Successfully established the Combat System Assessment Team Test Event documentation and procedures, improving procedures and completion rates following each event.
  - Developed OTH MLS Training Qualification Standard for Engineers
  - Unified Multi-Division Data Structures and Communications with significant reduction to Fleet-wide system downtime.
  - Established groundwork for large scale test events and various FMS cases.
  - Improved system supply chains and part readiness for fleet and onboard testing.
  - Rapid expansion of assets deployed.



● <https://www.navy.mil/Press-Office/News-Stories/Article/3943075/navy-warfare-center-drives-first-over-the-horizon-install-naval-strike-missile/>

■ <https://gdmissionsystems.com/articles/2019/09/26/news-release-general-dynamics-enhances-lcs-10-with-new-missile-system>

# MCM MP IOT&E

## Naval Sea Systems Command (NAVSEA)

- Mission Module Breakdown:
  - Ocean Faring: RMH, UMS, BMS
  - Airborne: NSD, AMN, MH-60S, COBRA
- Planning the Test Event
  - ~2 year planning timeline with overlapping events
  - Pre-event Actions
  - Event Execution
  - Post Event Actions
- Test Engineer vs. Combat System Lead Engineer
  - Underway testing
  - Shore based testing
  - Shore Support
- 7 Test Events Conducted
  - Certified for full production in IOT&E
  - Certification complete by OPTEVFOR



<https://www.navsea.navy.mil/Media/News/Article-View/Article/3380673/navy-declares-initial-operational-capability-of-mine-countermeasures-mission-pa/>

● <https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2167535/littoral-combat-ships-mine-countermeasures-mission-package/>

■ <https://gdmissionsystems.com/-/media/general-dynamics/maritime-and-strategic-systems/pdf/maritime-knifefish-uuv-datasheet.ashx>

# MCM MP IOT&E

## Naval Sea Systems Command (NAVSEA)

- Planning Roles and Responsibilities:
  - Represented Testing and Engineering Feasibility during Planning Process
  - Coordinated with Project Leads, Program Stakeholders, Engineers and Contractors
  - Arranged Test Site conditions
  - Lead Engineer during active testing
  - Active Role in Engineering Failure Analysis
- Accomplishments:
  - Optimized Surface Tow Cable (STC) Designs, decreasing critical failure exponentially.
  - Improved MCM MP Planning Timeline Procedures, increasing proficiency by 10% following each event.
  - Successfully completed 7 large scale events, leading to full Initial Operational Capability



<https://www.navsea.navy.mil/Media/News/Article-View/Article/3380673/navy-declares-initial-operational-capability-of-mine-countermeasures-mission-package/>

# Integrated Trainer Design

SGB Enterprises Inc.

- Design Philosophy
  - Ground up design focusing on manufacturability and scalable iterative and modular design
  - Multidisciplinary Engineering Coordination
  - Drafting for Sub-Assembly Manufacturing, Testing, Integration and Assembly
  - Sustainment of deployed product through onsite consultation and further hardware improvement
  - Documentation: Support Iterative Design through use of Product Data Management (PDM)
- Accomplishments
  - Successfully Designed several electrical panels, optimizing weight and size with each iteration
    - Panel shown reduced weight & size by 40%
  - Develop Engineering, Training and Qualification Standards for future Engineers



# Engineering Consulting

## Falcon Enclosure Consulting

- Design Goals:
  - In conjunction with architects and building designers, team focused on:
    - Constructability
    - Long-Term Performance
    - Maintenance Ease
  - Onsite attentive assessment and testing using architectural requirements
  - Architectural drawings for enclosure layers drafted in AutoCAD, and compiled into final reports upon construction completion.
- Accomplishments:
  - 1500 Mission, San Francisco, CA
    - Consult on complex enclosure transitions, overseeing their construction and progress
  - 1001 Van Ness, San Francisco, CA
    - Design development direction, recommendations, detailing
  - Waverly Condominiums, Santa Monica, CA
    - Testing/Investigation, with recommended design/repair



# FSAE IC Intake Manifold

Highlander Racing (FSAE UCR)

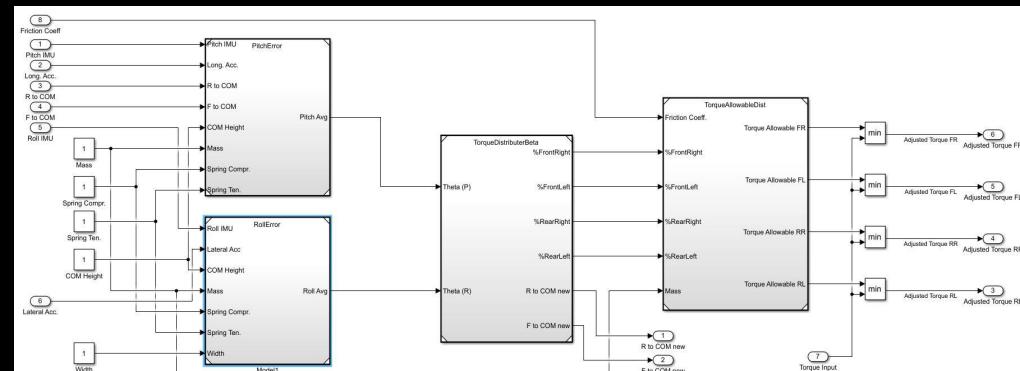
- Goal:
  - Design and improve as an iterative design from the 2015 model for the 2017 IC car.
- Design Approach:
  - To improve volumetric flow rate, a differing internal geometry was utilized, with conical chosen for air pocket avoidance and maximize intake efficiency
  - SLS 3D printed with glass filled Nylon.
- Testing:
  - After testing both intakes at operating conditions, the new design saw an efficiency increase of 12.96%



# FSAE EV Torque Vectoring System

Highlander Racing (FSAE UCR)

- Goal:
  - Design a control system for synchronous motors, designating torque for each motor based on position and forces.
- Design Approach:
  - Define constraints
  - Design Simulink model for independent logical calculations using the Internal Measurement Unite (IMU) as the basis.
  - SLS 3D printed with glass filled Nylon.
- Testing:
  - Rigorous hand calculation verification.
  - First tested on an RC car to ensure no faulty coding, then tested to scale.



# Thank you

Questions for later?  
Let's talk

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# Backup Slides

# MCM MP Mission Modules

Naval Sea Systems Command (NAVSEA)

- Mission Module Breakdown:
  - Ocean Faring: RMH, UMS, BMS
  - Airborne: NSD, AMN, MH-60S, COBRA
- **Remote Minehunting (RMH) Module** - detects, classifies, and identifies bottom and moored mines utilizing the MCM Unmanned Surface Vehicle (USV) and AN/AQS-20 minehunting sonar.
- **Unmanned Minesweeping (UMS) Module** sweeps influence mines utilizing the Unmanned Influence Sweep System (UISS), which combines the MCM USV and the sweep payload that carries a magnetic sweep cable and towed acoustic generator (modified Mk-104).
- **Knifefish Module** is a medium-class Mine Countermeasure (MCM) Unmanned Undersea Vehicle (UUV) that is designed for deployment from the Littoral Combat Ship (LCS) to detect, identify, and counter mine threats.
- **Airborne Mine Neutralization (AMN) Module** neutralizes moored, volume and bottom mines with the MH-60S helicopter carrying the AN/ASQ-235 Airborne Mine Neutralization System (AMNS).



<https://defensescoop.com/2023/05/02/navys-robotics-enabled-mine-countermeasures-mission-package-achieves-initial-operational-capability/>

● <https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2167535/littoral-combat-ships-mine-countermeasures-mission-package/>

■ <https://www.navsea.navy.mil/Media/News/Article-View/Article/3380673/navy-declares-initial-operational-capability-of-mine-countermeasures-mission-pa/>

# MCM MP Embark

*Naval Sea Systems Command (NAVSEA)*

- Test Event Planning
  - Several Working Groups
  - Regular Coordination
    - Ensured proper test site deployment/preparation
    - Maintained programmatic understanding of each system's repair or upgrade timelines for optimal testing time frame
- Embark Planning
  - Personnel
  - Staging
  - Equipment Coordination
  - Integration
- Follow-on Event Planning
  - Post Event Documentation
  - Post Event Actions
  - Adapting prior data to future events

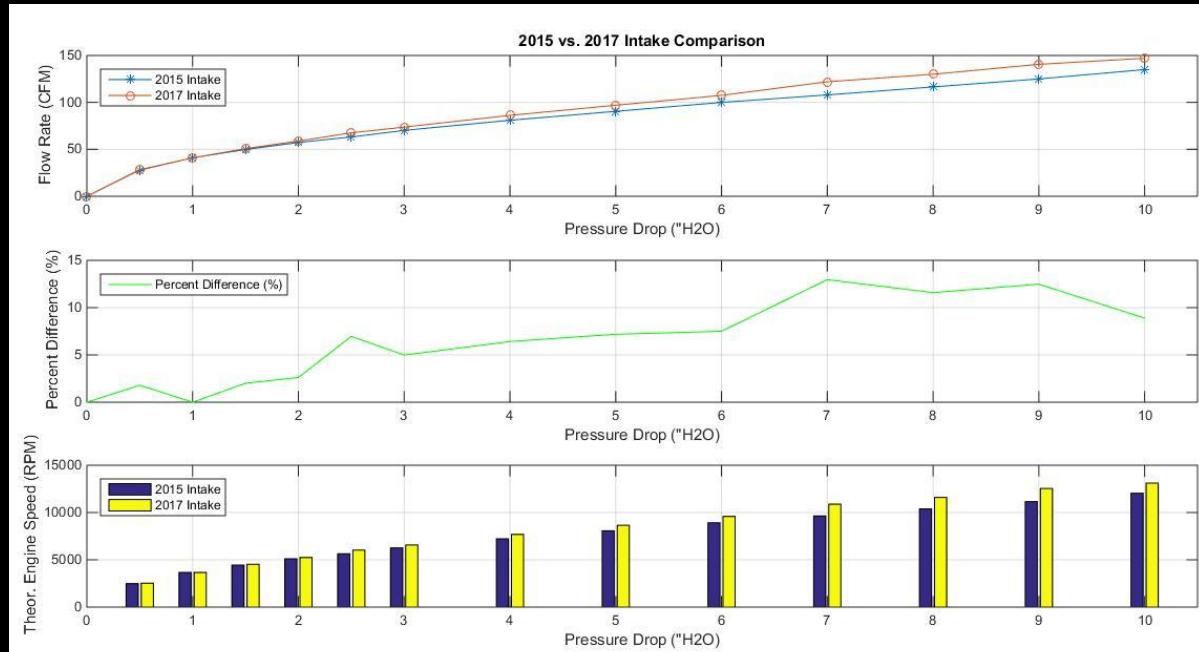


● <https://www.navsea.navy.mil/Media/News/Article-View/Article/3380673/navy-declares-initial-operational-capability-of-mine-countermeasures-mission-package/>

● <https://www.navsea.navy.mil/Media/News/Article-View/Article/3755561/us-navy-announces-first-mine-countermeasures-mission-package-embarked-on-uss-ca/>

# FSAE IC Intake Manifold Testing Validation

Highlander Racing (FSAE UCR)

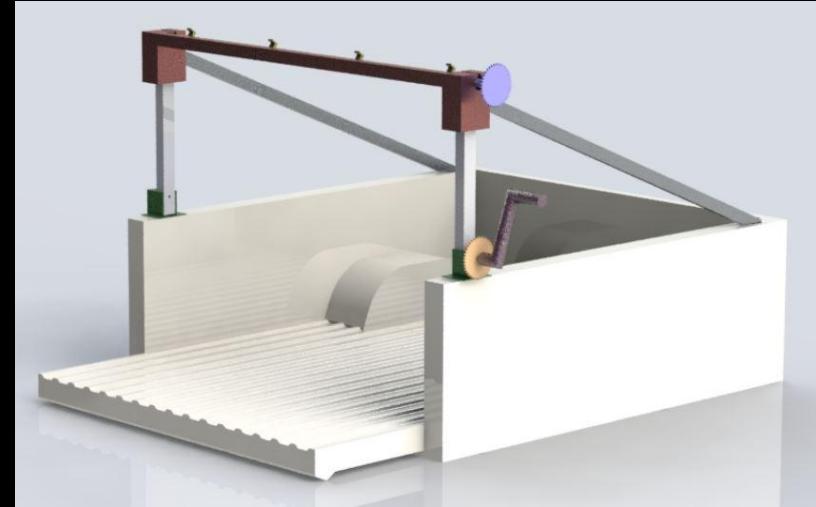


- Testing Conditions:
  - Utilizing Ansys CFD at 8000 rpm and at aFe Power
  - Set pressure drops were tested on each while the volumetric flow rates were measured

# Toyota Tundra Rapid Unloading System

Toyota / UC Riverside Senior Design Project

- Goal:
  - Design a control system for synchronous motors, designating torque for each motor based on position and forces.
- Design Approach:
  - Define constraints
  - Design Simulink model for independent logical calculations using the Internal Measurement Unit (IMU) as the basis.
  - SLS 3D printed with glass filled Nylon.
- Testing:
  - Rigorous hand calculation verification.
  - First tested on an RC car to ensure no faulty coding, then tested to scale.



# Additional Links/References

- Jonathan Afzali
  - <https://www.jonathanafzali.com/>
  - <https://www.linkedin.com/in/jonathan-afzali/>
- SGB Enterprises Inc.
  - <https://sgbent.com/>
- MCM MP
  - <https://gdmissionsystems.com/underwater-vehicles/knifefish-unmanned-undersea-vehicle>
  - <https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2167535/littoral-combat-ships-mine-countermeasures-mission-package/>
  - <https://www.navsea.navy.mil/Media/News/Article-View/Article/3755561/us-navy-announces-first-mine-countermeasures-mission-package-embarked-on-uss-ca/>
  - <https://www.navsea.navy.mil/Media/News/Article-View/Article/3380673/navy-declares-initial-operational-capability-of-mine-countermeasures-mission-pa/>
  - <https://defensescoop.com/2023/05/02/navys-robotics-enabled-mine-countermeasures-mission-package-achieves-initial-operational-capability/>
- OTH MLS
  - <https://news.usni.org/2018/05/31/raytheon-awarded-lcs-horizon-anti-surface-weapon-contract-deal-worth-848m>
  - <https://gdmissionsystems.com/articles/2020/01/09/featured-story-navy-launches-new-anti-ship-missile-from-lcs>
  - <https://www.navy.mil/Press-Office/News-Stories/Article/3943075/navy-warfare-center-drives-first-over-the-horizon-install-naval-strike-missile/>
  - <https://www.dvidshub.net/image/8870895/uss-tulsa-lcs-16-visits-naval-surface-warfare-center-port-hueneme-division-combat-systems-assessment>