 **Shreyas Vathul Subramanian**

• 5642 Whitfield Chapel Rd. #102, Lanham, MD – 20706 • 937-581-1586 • shreyasvathul@outlook.com •

**Director of Research at Robust Analytics, Inc.**

**EDUCATION**

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| --- | --- | --- | --- |
| 2012-2015 | **PhD**  (Aerospace Engineering) | Purdue University, West Lafayette, IN | **4.0/4.0** |
| 2011-2012 | **MS** (Mechanical Engineering) | Wright State University (WSU), Dayton OH | **4.0/4.0** |
| 2007-2011 | **BTech** (Mechanical Engineering) | National Institute of Technology Karnataka (NITK), India | **3.91/4.0** |

**EMPLOYMENT HISTORY**

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| **Employer** | **Position Held** | **Start Date** | **End Date** |
| Indian Institute of Science, Bangalore | Research Assistant | 05/01/2010 | 08/01/2010 |
| Flow Simulation Research Group, WSU | Graduate Research Assistant | 08/15/2011 | 09/01/2012 |
| System of Systems Laboratory, Purdue | Graduate Research Assistant | 09/15/2012 | 08/01/2015 |
| First Year Engineering, Purdue | Head Teaching Assistant | 08/25/2014 | 01/01/2015 |
| Robust Analytics, Inc. | Aviation Systems Engineer | 10/01/2015 | 10/01/2016 |
| **Robust Analytics, Inc.** | **Director of Research** | **02/01/2017** | **Present** |

**PUBLICATIONS**

1. **Design of Adaptable Wing Micro Air Vehicle for Higher Endurance**, Symposium on Applied Aerodynamics and Design of Aerospace Vehicles, *Shreyas Vathul, Shashank Mishra, Prashanth Sarathy, Racheet Matai and Vikram Goel,* 2009.
2. **Autonomous Micro Air Vehicle for Coastal Zone Management**, Institute of Engineers (IE) Special Issue on Micro and Nano Air Vehicles, *Pruthviraj U, Shreyas Vathul and Sohan S*, 2010.
3. **Design, Analysis and Flight Testing of a Dynamic Soaring UAV Testbed**, Undergraduate Thesis, *Shreyas Vathul, Riddhiman Roy and Manu Kamin*, 2011
4. **Application of Auto-tracking to the Study of Insect Body Kinematics in Maneuver Flight**, Master’s Thesis, *Shreyas Vathul*, 2012
5. **Hierarchical Complexity Guided Optimization of Systems-of-Systems with Evolving Design Spaces***,* CESUN 2014, *Shreyas Vathul and Daniel A. DeLaurentis.*
6. **A Hybrid Differential Evolution Self-Organizing-Map Algorithm for Optimization of Expensive Black-box Functions,** AVIATION 2014: Multidisciplinary Analysis and Optimization (Emerging Methods), *Shreyas Vathul and Daniel A. DeLaurentis.*
7. **Dual Averaging with Adaptive Random Projection (ARP) for solving evolving distributed optimization problems,** Journal of Optimization Theory and Applications, *Shreyas Vathul, Dengfeng Sun and Daniel A. DeLuarentis*
8. **Self-Organizing Maps based Differential Evolution for Resource Intensive Optimization,** Submitted to Journal of Global Optimization, *Shreyas Vathul, Daniel A. DeLaurentis*
9. **Dual Phase Consensus Algorithms Distributed Sensor Management,** IEEE Transactions on Aerospace and Electronic Systems, *Kartavya Neema, Shreyas Vathul, Daniel A. DeLaurentis*
10. **Hybrid Optimal Control Method for Generating Time Optimal Trajectories for Fixed-Winged Aircraft,** In preparation for AIAA Scitech 2016, *Shreyas Vathul, Kshitij Mall, Michael Grant, Daniel A. DeLaurentis*
11. **Bringing in the World: Internationalizing the Curriculum of a First-Year Engineering Course at a Large Public American University,** ASEE International Forum 2015 (Seattle), *Shreyas Vathul, Jennifer DeBoer*
12. **Dual Averaging with Adaptive Random Projection for Solving Evolving distributed Optimization Problems,** Journal of Optimization Theory and Applications*, Shreyas Subramanian, Daniel Delaurentis, Dengfeng sun*

**RESEARCH PROJECTS**

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| --- | --- | --- |
| **Year** | **Topic** | **Skills Involved** |
| 2017 | IBM Watson based speech-to-text and sentiment analysis of Air Traffic Control (ATC) pilot communication for anomaly detection | Speech-to-text, signal processing, machine learning |
| 2016 | Outdoor and indoor passenger tracking implementation for SMART-NAS Test Bed Use Cases to Improve Passenger Experience (NASA NNA16BD94C) | Technology testing, Systems architecting, Google traffic layer, Network queueing models |
| 2016 | Point of contact for cloud-based flight data retrieval, cleaning and post-processing on Microsoft Azure with Microsoft partners | Cloud architecting, *Hive, Pig,* R*,* local code to cloud translation |
| 2016 | Designed and tested a GUI tool for assessing network cost impact of fleet-wide policy changes in an airline using historical (BTS) data | GUI design, data scraping, SQLite-Python hybrid design |
| 2016 | Created a Hidden Markov Model-based tool for monitoring real-time safety with state-dependent risk models in the terminal airspace | Data Visualization, Probability theory, Markov models, Python |
| 2016 | Helped design and test a custom Electronic Flight Bag solution for a NASA project involving air-ground communications to enable TBO | SE, Architecture design, software testing, Python, UI and UX design |
| 2016 | ATM cost Assessment Tool for NASA (Designed a fast-time Fuel Burn Model for commercial air transport and validated against industry standard software used for real-world flight planning) | Customized algorithms, V&V, Python, Integration |
| 2015 | Pilot Cockpit Display implemented on an Android Tablet for the NASA-Purdue MarsBuggy Team | Android programming, Human-machine interface, Testing |
| 2015 | Agricultural fixed wing UAV for Precision-agriculture with Multispectral Imaging | Design, Manufacturing, Systems Integration, Testing |
| 2014 | Safety Assessment for Separation Assurance in a Distributed Environment using ADSB communication (NASA project) | Agent Based Models, MATLAB, Fault Detection methods |
| 2013 | Aircraft Conflict Detection and Collision Avoidance using convex optimization demonstrated using multiple benchmark problems | Parallel computing, MATLAB programming, Visualization |
| 2012 | Multi-fidelity fidelity 3D modeling, analysis and simulation of Unmanned Aerial Vehicles from publicly available sparse data. | Surrogate modeling, Detailed 3D design, Data Analysis |
| 2012 | Working ADSB-in module under $10 using a TV dongle, and an open-source GNU software defined library for recording Aircraft data | Hardware-software interfacing, Cost effective design, Testing |
| 2012 | Impact of evolving Avionics on NextGen Air Transportation | Predict demand increase due to introduction of new technology |
| 2011 | Quantification of air trapping in lungs via Image-processing and Neural Networks. | MATLAB Image processing, GUI design, Algorithm Development |
| 2011 | Custom Multi-grid CFD solver in Fortran validated using the Driven Cavity benchmark problem. | CFD solver in Fortran from scratch, Multi-grid speed-up |
| 2010 | Construction of a Fully Controllable Single-servo UAV Platform | Design + manufacture of a novel UAV, Aerodynamic analysis |
| 2010 | Fabrication of an Autonomous Micro Aerial Vehicle Capable of Deploying a Video Surveillance Pod onto Exact Spatial Coordinates | Wrote a proposal worth $100K, Unique mission MAV design |
| 2009 | Structural Optimization of the *Sapthami* MAV with the help of CFD Tools followed by Flight Testing and Hardware-in-the loop simulation. | Optimization, Carbon fiber manufacture, Hardware-in-loop |
| 2009 | Design and Construction of an Automatic Irrigation System using the *ATMEGA32* microcontroller with Customized Moisture Sensors and Optical Sensors. | Coding hardware (ATMEGA) in C++, Product design, Product Marketing |
| 2008 | Application of Smoke-Tunnel Flow Visualization to Real World Problems such as Drag Reduction of a Cylinder and Pollution Control. | Wind tunnel and Smoke Tunnel experience, Interpretation of raw data |

| **SOFTWARE SKILLS** | \*\*currently learning |
| --- | --- |
| Microsoft Office / Editing Tools | Word, Excel, Powerpoint, Outlook, Visio, EndNote, Latex, Access\*\* |
| Programming Languages | C, C++, Python, Fotran 95, MATLAB, R, SAS, Java\*\*, Google Go\*\* |
| Web Programming Languages/ Libraries | HTML, PHP, CSS, JavaScript, Drupal, Dojo\*\* |
| Programming IDE | VS 2010/13, Eclipse, Komodo, SciLab, MATLAB, CUDA, SAS, RStudio |
| GUI Builders/ Android | MATLAB GUIDE, QT, Microsoft VS, AppMethod, Android SDK, Pencil |
| Data Visualization/ Plotting | Tecplot, Paraview, OpenGL, Google earth, Plotly |
| Parallel/ Cloud Computing | OpenMP, CUDA GPU, Amazon EC2, Heroku*,* Hive\*\*, Pig\*\*, Spark\*\* |
| 3D Modeling (Professional Suites) | CATIA V5, Pro Engineer Wildfire, AutoCAD 2010, SolidWorks 2012 |
| Structural Analysis | ANSYS Structural, ANSYS Explicit Dynamics, Abaqus, COMSOL |
| Aerodynamic Analysis | Ansys Workbench, Fluent, CFX, Autodesk Falcon, OpenFoam, Palabos, Xfoil direct and inverse airfoil design + wing design, Star CCM+\*\* |
| Control Analysis | Simulink, JSBSim, AVL |
| Meshing Software | enGrid, Meshlab, BlockMesh, SnappyHexMesh, Gmsh, ANSYS Meshing |
| MATLAB Toolboxes | Aerospace, Optimization, Parallel Computing, Image Processing, Statistics, Curve fitting, Simulink, Neural Network, System Identification |
| Optimization Toolboxes | Excel (Simplex, GRG, Evolutionary), CPLEX, Xpress, Arena, OpenMDAO |
| Open Source Libraries | OpenCV, SU2(fluids), Calculix (structural), Impact\*\*(crash analysis) |
| Robotics | AVR Studio, Virtual Cockpit, LogixPro, Kestrel Autopilot API, Android SDK |
| Systems Engineering | Discrete Agent Framework (DAF), Solidworks PLM, IBM Rational DOORS\*\*, Siemens PLM Teamcenter\*\* |
| Aerospace related | XFLR5, CEASIOM, AcBuilder, SimSAC, SUMO, AMB, FACET, ACES |
| Aerospace related(more) | NeoCASS, MotoCalc, DATCOM, FLOPS, SDSA |
| Air Traffic Management Tools | Sabre Flight Explorer, Sabre Flight Direct, Sabre eFM, in-house Electronic Flight Bag, WSI Fusion |

**SKILLS**

* **Manufacturing Skills :** Formal training in woodworking, carving, Sheet-metal, Lathe, Band-saw, Circular Saw, CNC programming, Hydraulic and Pneumatic system design, Carbon Fiber and other composite manufacturing
* **Systems Engineering Skills :** Quality Function Deployment, Pugh's Method, ANOVA, Taguchi's Design of Experiments, Several Linear and Non-linear Optimization Algorithms, System-of-Systems
* **Experimentation :** Low speed wind tunnel (MAV analysis), High subsonic wind tunnel testing in Purdue Boeing wind tunnel (UAV analysis), Smoke tunnel testing, Structural / Impact Analysis (Carbon fiber fuselage testing), Flight Testing and UAV pilot experience (Eight Unmanned Aerial Vehicles, built and piloted), Hardware in the loop simulation.
* **Image Processing skills** - Photoshop, Gimp, Inkskape, Image magic
* **Motion Picture / Editing and Short movies -** Sony Vegas, Movie Maker, Fruity Loops, VirtualDub, LightWorks

**INTERNSHIP EXPERIENCE**

* ***BOEING:*** Everett factory tour – B747, B767, B777, B787 Assembly line & Manufacturing Processes.
* ***Ford F150*:** Assembly line main factory tour
* ***BOSCH:*** One of the 25 people in the nation chosen to participate in On-Tracktraining
* ***HONEYWELL*** Participated in Control Systems and Flight Mechanics Workshop organized by.
* ***EL FORGE*** (Metal forging and forming company that serves major vehicle and automotive component manufacturers and process industries, both domestic and overseas). Studied Complete Manufacturing Cycles of trademark company products such as Light Duty Crankshafts, Connecting Rods, Wheel hubs and Transmission parts.

**PRIZES AND HONORS**

* Multiple awards for academic proficiency and course accomplishment through high school and college
* Won grant of INR 200,000 at a nation-wide competition on Micro Air Vehicle development
* Dean's List - Maintained a 4.0 GPA in graduate school (M.S. and Ph.D.)
* 2015 Estus H. and Vashti L. Magoon Award for Excellence in Teaching

**LEADERSHIP SKILLS AND OTHER INTERESTS**

* Led a team of 10 undergraduate students to teach and manage an Engineering class with 240 students
* Founder and Head of ***Flying Club*** at NITK
* Head of Drive-train Group and Electronics Core Group in the Purdue NASA Mars-Buggy competition
* Head of Aerodynamic Analysis team in the Purdue ASME Human Powered Vehicle Challenge
* Part of judging panel at the AAE RSS technical symposium at Purdue University, Aerospace Department
* Member of ***Music club, Robotics Club and AMES*** at NITK
* Part of high school Volleyball, Ping pong and Football Team
* Performed as a vocalist in South Indian Classical and Light music concerts.
* Member of ***GENESIS***, a voluntary social help club

**PROFESSIONAL AFFILIATIONS**

•**AIAA**•**IEEE**•**SASE** (Society of Asian Scientists and Engineers) •**CISA**(Center for Integrated Systems in Aerospace) •**ASEE** •*Graduate Research Assistant* - **SoS**(System of Systems Laboratory) • **FSRG**(Flow Simulation Research Group)