Christopher J. Blower

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Aerospace Engineer with a strong background in UAV flight controllers, flight path optimization, real-time computer vision and VR 360 imaging. Currently employed at Queen B Robotics Inc. as CEO and VR System Developer.

EMPLOYEMNT

2014 - Current **Queen B Robotics Inc.** **Berkeley, CA**

Founder and CEO

Role: Design and develop the latest in drone technology to improve accessibility to the consumer market. Performed multiple positions, including engineering, accounting, PR, HR, marketing, legal and system development while running a team of engineers to bring the Exo360, a drone with 360 video capture capability and VR streaming, from the drawing board to the consumer and commercial market.

2014 - 2015 **TechShop Inc.** **San Jose, CA**

Technical Instructor

Role: Educated students in the safe and correct use of heavy machinery for metal and wood working. The courses included training for CNC Machines, Shopbots, TIG and MIG Welding, Lathes, Waterjet and laser cutters, 3D printing and basic electronics.

2007 - 2008 **General Electric Aircraft Engine Services (GEAES)** **Cardiff, Wales**

Commercial Propulsion Technology Engineer

Role: Conducted research in new repair procedures, disassembly techniques, tool design, and fault detection methods for the GE90 and GP7000 High Bypass Turbofan engines.

EDUCATION

2016 **The George Washington University** **Washington, DC**

PhD Candidate, Mechanical and Aerospace Engineering (All But Dissertation)

Specialization: Morphing Airfoil Aerodynamics, UAV Flight Controller System Design and System Optimization and Efficiency

Thesis: *The Development of a Bio-Inspired Gust Alleviation System Using Electromechanical Feathers and a Decentralized Hierarchical Control Scheme*

2009 **Kingston-Upon-Thames University** **Kingston, England**

Masters of Engineering, Astronautic and Aerospace Engineering

Specialization: Orbital Mechanics, Satellite System & Payload Design and Flight Path Optimization

Thesis: *System Design and Optimization for Interplanetary Satellite Development Software*

2007 **Kingston-Upon-Thames University** **Kingston, England**

Bachelors of Engineering, Astronautic and Aerospace Engineering

Specialization: Linear Systems, Electro-Mechanical Control and Vibration Theory

EXPERIENCE

Autonomous Quadrotor with Integrated 360 Video Capture, Stitching and VR Streaming (2014 – Current)

- Performed system trade-off studies and optimization to maximize the vehicle's lift-to-weight ratio, flight time and thrust capabilities in winds greater than 10mph.
- Designed a compact mono-hull quadrotor chassis, offering an uninterrupted spherical view around the vehicle for 360 video and virtual reality applications.
- Implemented testing procedures to ensure the vehicle's flight controller is both robust and reliable when operating in various flight conditions and environments.

- Deployed a multi-vehicle swarm system with GPS tracking to maintain a desired separation distance between several drones when operating in close proximity through a point-to-point wireless network.
- Developed a 360 video platform using Unity and Samsung's SDK to enable users to experience real-time footage while the drone is in flight.

Bio-inspired Gust Alleviation and Maneuverability Enhancement System (GAMES) for UAVs (2010-2016)

- Identified flight at low-altitude in urban environments is unobtainable by traditional aircraft due to structure-induced turbulence and the complexity of navigating through city streets.
- Installed bio-inspired electromechanical feathers along the wing's surface replacing the airfoil skin, allowing manipulation of the inbound airflow through wing profile morphing.
- Generated an adaptive panel method with an integrated boundary layer theory, using MATLAB, to allow the lift, drag and moment coefficients to be calculated for all flap configurations, in reduced computational times in comparison to CFD models.
- Implemented Fluent & Gambit and COMSOL CFD software to validate turbulent wake regions generated by panel method theory to endorse accuracy in the aerodynamic model.
- Applied a hierarchical decentralized control theory with an integrated neural network to enable a real-time operating system to enable the vehicle respond to global and local disturbances while performing maneuvers.
- Validated the multi-body aerodynamic model and the controller's response capabilities through wind tunnel testing.
- Developed customized flight dynamics and simulation software to assess the vehicles ability to minimize flight path deviation in gusting and turbulent flows.
- Integrated LabView, Scantel, PXI and C++ codes to control data acquisition modules and flight controllers.

Teaching Assistantship & Tutoring (2010-2013)

- Produced and delivered weekly recitation lectures to aid the students' understanding in Vibration Analysis Electromechanical Control Theory and Linear System Dynamics.
- Developed hardware and software based examples to enable students to acquire hand on experience with the theories presented.

Hurricane Modeling Theory & Modelling (2010-2011)

- Investigated hurricane and tornado prediction techniques through the improvement of data acquisition and modeling techniques.
- Research was performed to assess the current methods and theories used to predict hurricane growth, structure and course.
- Identified several research opportunities that require further investigation that offer the potential to improve current modeling techniques.

Cube Satellite (CubeSat) Research and Development (2008-2009)

- Performed a feasibility study for the design and development of a cube satellite at the Kingston University engineering facility.
- Designed the manufacturing, construction and testing facilities for the CubeSat program.
- Developed and optimized a fully functional satellite using MATLAB.
- Modeled the satellite design to comply with the European Space Agency launch requirements.
- Presented the project proposal which included component listings and installation processes, software requirements and cost breakdown for the satellite from development to launch.

Preliminary Interplanetary Satellite Optimization Software (2008-2009)

- Developed a MATLAB based software to design satellite configurations for interplanetary missions.
- Integrated a user interface to perform trade off calculations to optimize interplanetary flight paths and orbit configurations, with the necessary fuel burns to change flight trajectories.
- Designed optimization algorithms for power, communications, payload, structure, propulsion, thermal, navigation and CPU subsystems for trade-off studies.

TECHNICAL SKILLS

- Languages: MATLAB/Simulink, C++, Python, Java, MATLAB/Simulink, Mathematica, LabView
- CAD Software: Fusion, Pro Engineer, Solidworks, AutoCAD
- CFD Solvers: Fluent, Gambit, COMSOL, XFoil
- Flight Simulators: X-Plane, JSBSim,
- Hardware: Machining (Metal, Carbon Fiber, Plastics), 3D Printing, Laser and Water Cutters, Injection Molding
- Experimental Systems: Wind Tunnels, Particle Image Velocimetry (La Vision, Prana), Scantel
- Business Tools: Gusto, Xero, inDinero, Google Analytics, Facebook Ads, Trello, GitHub
- Video and Imaging Tools: Photoshop, Illustrator, Premiere, After Effects, Unity, Final Cut Pro

JOURNALS & CONFERENCE PAPERS

Dhruv, A., Blower C.J., and Wickenheiser A.M., 2015, "*A Three Dimensional Unsteady Iterative Panel Method with Vortex Particle Wakes and Boundary Layer Model for Bio-Inspired Multi-Flap Wings*", SPIE, San Diego, CA

Dhruv, A., Blower C.J., and Wickenheiser A.M., 2014, "*A Three-Dimensional Iterative Panel Method for Bio-inspired Multi-body Wings*", SMASIS, Providence, RI

Blower C.J., Dhruv A., and Wickenheiser A.M., 2014, "*A Two-Dimensional Iterative Panel Method and Boundary Layer Model for Bio-inspired Multi-body Wings*", SPIE, San Diego, CA

Blower C.J., and Wickenheiser A.M., 2013, "*The Validation of a Generalized Aerodynamic Model for Multi-body Bio-inspired Wings*", SMASIS, Snowbird, UT

Blower C.J., and Wickenheiser A.M., 2012, "*The Variations in Active Panel Location and Number for a Bio-inspired Aircraft Gust Alleviation System*", SMASIS, Atlanta, GA

Blower C.J., Woody L., and Wickenheiser A.M., 2012, "*The Development of a Closed-loop Flight Controller with Panel Method Integration for Gust Alleviation Using Biomimetic Feathers on Aircraft Wings*", SPIE, San Diego, CA

Blower C.J., and Wickenheiser A.M., 2011, "*The Development of a Closed-loop Flight Controller for Localized Flow Control and Gust Alleviation using Biomimetic Feathers on Aircraft Wings*", SMASIS, Scottsdale, AZ

Blower C.J., and Wickenheiser A.M., 2011, "*Two-Dimensional Localized Flow Control using Distributed, Biomimetic Feather Structures: A Comparative Study*", SPIE, San Diego, CA

Blower C.J., and Wickenheiser A.M., 2010, "*Biomimetic Feather Structures for Localized Flow Control and Gust Alleviation on Aircraft Wings*", ICAST, Penn State, PA

PRESENTATIONS

Blower, C.J. and Wickenheiser, A.M., 2013, "*The Development of a Bioinspired Gust Alleviation and Maneuverability Enhancement System (GAMES) using a Multi-Body Panel Method and Integrated Boundary Layer Theory*", The George Washington University Research and Development Showcase.

Caldwell, K., Kirschmeier B., Blower, C.J. and Wickenheiser, A.M., 2013, "*Analysis of Flow Separation Over a 2D Airfoil for a Gust Alleviation System*", The George Washington University Research and Development Showcase.

Blower, C.J. and Wickenheiser, A.M., 2012, "*The Variations in Active Panel Location and Number for a Bio-Inspired Aircraft Gust Alleviation System*", Proc. SMASIS2012

Blower, C.J. and Wickenheiser, A.M., 2012, "*The Development of a Closed-Loop Flight Controller with Panel Method Integration for Gust Alleviation Using Biomimetic Feathers on Aircraft Wings*", The George Washington Virginia Campus Engineering Showcase.

Blower, C.J., Lee, W. and Wickenheiser, A.M., 2012, "*The Development of a Closed-Loop Flight Controller with Panel Method Integration for Gust Alleviation Using Biomimetic Feathers on Aircraft Wings*", Proc. SPIE, Vol. 8339, 83390I.

Blower, C.J. and Wickenheiser, A.M., 2012, "*The Development of a Biomimetic Gust Alleviation System Closed-Loop Flight Controller with an Integrated Adaptive Panel Method*", The George Washington Research Days Graduate Showcase.

Blower, C.J. and Wickenheiser, A.M., 2012, "*The Development of a Biomimetic Gust Alleviation System Closed-Loop Flight Controller with an Integrated Adaptive Panel Method*", The George Washington University Research and Development Showcase.

Hurley, S. A., Metropoulos, K., Barsky, D., Blower, C.J. and Wickenheiser, A.M., 2012, "*The Development of an Experimental Gust Alleviation System Model for Wind Tunnel Simulation and Analysis*", The George Washington University Research and Development Showcase.

Guidoboni, J., Chan, K., Blower, C.J. and Wickenheiser, A.M., 2012, "*Gust Alleviation System: Design of a Piezoelectric Mechanism*", The George Washington University Research and Development Showcase.

Blower, C.J., 2012, "*Avalanche and Crevasse Survival Equipment – A Smart Material Approach*", The George Washington University Entrepreneur Program Showcase.

Blower, C.J. and Wickenheiser, A.M., 2011, "*The Development of a Closed-Loop Flight Controller for Localized Flow Control and Gust Alleviation Using Biomimetic Feathers on Aircraft Wings*", Proc. SMASIS2011.

Blower, C.J. and Wickenheiser, A.M., 2011, "*Two-Dimensional Localized Flow Control Using Distributed, Biomimetic Feather Structures: A Comparative Study*", Proc. SPIE, Vol. 7975, 79750L.

Blower, C.J. and Wickenheiser, A.M., 2011, "*The Development of a Closed-Loop Based Flight Controller for Localized Flow Control and Gust Alleviation using Dual Trailing Edge Flaps on Aircraft Wings*", The George Washington Virginia Campus Engineering Showcase.

Blower, C.J., Barsky, D., Chan K., Guidoboni, J., Hurley, S., Metropoulos, K. and Wickenheiser, A.M., 2011, "*The Development of an Experimental Gust Alleviation System Model for Wind Tunnel Simulation & Analysis*", The George Washington Virginia Campus Engineering Showcase.

Blower, C.J. and Wickenheiser, A.M., 2011, "*Biomimetic Feather Structures for Localized Flow Control and Gust Alleviation on Aircraft Wings*", The George Washington University Research and Development Showcase.

Blower, C.J. and Wickenheiser, A.M., 2010, "*Biomimetic Feather Structures for Localized Flow Control and Gust Alleviation on Aircraft Wings*", 21st International Conference on Adaptive Structures and Technologies (on CD).

UNIVERSITY SERVICE

- Mechanical & Aerospace Engineering Department Seminar Coordinator (2013-2014)
- GW Baja Project Development Advisor (2012)
- Private Tutor for Fluid Mechanics, MATLAB and Linear System Dynamics (2010-2014)
- Vice President of the GW Triathlon Club (2011-2012)
- Vice President of the United Kingdom Student Education for Development in Space (SEDS) (2008-2009)
- Treasurer of Kingston University Sailing Team (2006-2008)
- Administration Officer for the Kingston University SEDS (2006-2007)

PROFESSIONAL SERVICES

- Student Committee Member, ASME Conference on Smart Materials, Adaptive Strucutres and Intelligent Systems (SMASIS), 2012
- Session Co-Chair, "Sustainability", ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), 2011

PROFESSIONAL AFFILIATIONS

- American Society of Mechanical Engineering (2011-2016)
- The Society of Photo-Optical Instrumentation Engineers (2010-2015)
- American Institute of Aeronautics and Astronautics (2004-)
- United Kingdom Student Education for Development in Space (2004-2009)

AWARDS, HONORS & ACHIEVEMENTS

- Boost Ventures Fellow
- Y Combinator Fellow
- FAA Drone License
- Student Award of Excellence Nominee
- The George Washington University Teaching Assistantship
- General Electrics' Excellence in Engineering Award
- FAA & CAA Certified Private Pilot's License
- NCO Flight Sergeant in the Air Training Corps
- Aviation Studies BTEC Award

OTHER SKILLS & INTERESTS

- Triathlons; Cycling; Surfing; Snowboarding and Mountaineering;
- Video, Photo and VR Editing
- Developer of I.o.T. systems.