CONTACT

✉ jacob.crabill@gmail.com
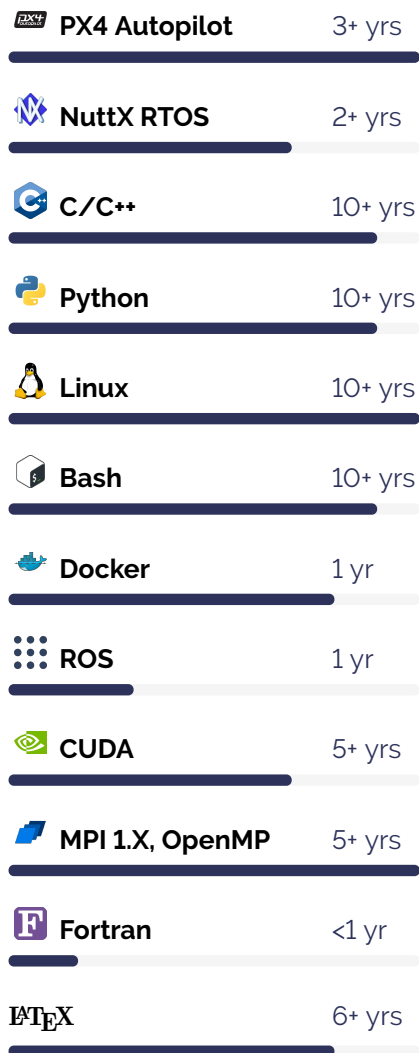
○ JacobCrabill

in jacob-crabill-b2046910

▲ Jacob Crabill, Bend, OR

SKILLS

PX4 Autopilot	3+ yrs
NuttX RTOS	2+ yrs
C/C++	10+ yrs
Python	10+ yrs
Linux	10+ yrs
Bash	10+ yrs
Docker	1 yr
ROS	1 yr
CUDA	5+ yrs
MPI 1.X, OpenMP	5+ yrs
Fortran	<1 yr
LaTeX	6+ yrs

JACOB CRABILL, PhD

Software, Robotics, and Scientific Computing Expert

HIGHLIGHTS

Excellent track record of collaborative engineering and communication

Broad domain knowledge from bare metal to cloud computing

Specialities: PX4 ecosystem; High-performance computing (CPU + GPU)

PROFESSIONAL EXPERIENCE

Staff Software Engineer
Shield AI

Aug '22 - Present
Bend, OR [Remote]

- Mission Autonomy team (Planning and Controls group)

Director of Software Engineering
Volansi

Nov '21 - July '22
Bend, OR [Remote]

- Functional manager for the software engineering department

Chief Engineer of Software and Avionics
Volansi

Mar '21 - Present
Bend, OR [Remote]

- Responsible and accountable for the technology roadmap, technical direction, architecture, and execution of all software and avionics subsystems at Volansi

- Projects range from autopilot and other embedded systems to test and simulation tools to GCS development to cloud infrastructure

- One of two Chief Engineers on the Volansi side for the FTUAS program with our industry partners

Embedded Systems Team Lead
Volansi

Jan '20 - Aug '21
Concord, CA

- Developed a custom Volansi fork of the PX4 Autopilot

- Developed, integrated, and tested PX4 drivers for new hardware such as fuel-injected engines

- Implemented custom PX4 behavior for payload-delivery missions

- Designed, implemented, and deployed a custom satellite-based communications system

- Maintained a custom fork of QGroundControl with custom widgets, custom MAVLink messages

- Hired, mentored, and led a team of engineers to develop all aspects of Volansi's embedded software, SITL/HITL, and communications systems

PUBLIC PROJECTS

PX4 Autopilot

github.com/PX4/PX4-Autopilot

Active contributor to PX4, including peripherals like the NuttX RTOS

Contributed STM32H7 FDCAN driver for use with UAVCAN v0 (now DroneCAN)

Contributed to UAVCAN v1 (now OpenCyphal) support in PX4

Overset Grid Research

github.com/JacobCrabill/tioga

Developed novel algorithms for moving overset grid connectivity on many GPUs

CFD on GPUs

CPC Journal Paper

Part of a small team which developed a high-order GPU-based CFD solver in C++ / CUDA with novel capabilities

Published in Computer Physics Communications

From-Scratch 2D/3D High-Order CFD Solver

jacobcrabill.github.io/FlurryPP

Developed a 2D/3D unstructured high-order overset-capable Flux Reconstruction solver in C++

HiFiLES Solver Development

github.com/HiFiLES/HiFiLES-solver

Implemented several moving-grid capabilities into the Aerospace Computing Lab's previous open-source high-order code, HiFiLES

Lead Aircraft Engineer
Volansi
| Jul '18 - Jan '20 |
| San Francisco, CA |

· Developed a suite of system performance estimation and analysis tools

· Performed the aerodynamic design and VTOL system design of the C20 vehicle (later evolved to the M20)

Ames Affiliate - Aeromechanics
Science and Technology Corporation
| Jan '15 - Jul '18 |
| NASA Ames |

· Contractor for the US Army Aeroflightdynamics Directorate

· Ph. D. research into applying high-order finite element-style numerical methods to complex moving overset grid simulations

Engineering Intern
Aerovironment
| Summer 2013 |
| Simi Valley, CA |

· Initiated, planned, and executed wind-tunnel testing program for a small-scale aircraft (Switchblade)

· Gained insight into aircraft behavior through linear analysis techniques

Manufacturing Engineer / Engineering Liaison
Pratt & Whitney
| 2007 - 2012 |
| Lansing, MI |

· Co-Op position during my time at Kettering University

· Provided engineering support & oversight to composite layup and assembly employees

· Trained other engineers in work instruction creation & layup design for manufacturability

Research Assistant, Mech. Eng. Department
Kettering University
| 2011 |
| Flint, MI |

· Performed a variety of calibration and supplemental tasks for department wind tunnel

EDUCATION

Ph.D. - Aeronautics & Astronautics
Stanford University
| 2014 - 2018 |
| 3.77 GPA |

· Research into high-order numerical methods for computational fluid dynamics (CFD) on moving overset grids

· Focus on large-scale GPU-based computing clusters

· Thesis: 'Towards Industry-Ready High-Order Overset Methods on Modern Hardware'

M.S. - Aeronautics & Astronautics
Stanford University
| 2012 - 2014 |
| 3.633 GPA |

B.S. Mechanical Engineering
B.S. Engineering Physics
Kettering University - Flint, MI
| 2007 - 2012 |
| 3.89 GPA |

· Double major with additional Aerospace concentration

PUBLICATIONS

- Crabill, J. *Towards Industry-Ready High-Order Overset Methods on Modern Hardware.* PhD thesis, Stanford University, 2018. **(PDF)**

- Romero, J., Crabill, J., Watkins, J. E., Witherden, F. D. and Jameson, A.: *ZEFR: A GPU-accelerated high-order solver for compressible viscous flows using the flux reconstruction method.* Computer Physics Communications, doi: 10.1016/j.cpc.2020.107169, 28 January 2020. **(PDF)**

- Crabill, J., Witherden, F. D. and Jameson, A.: *High-order computational fluid dynamics simulations of a spinning golf ball.* Sports Engineering, doi: 10.1007/s12283-019-0300-y, 20 February 2019. **(PDF)**

- Crabill, J., Witherden, F. D. and Jameson, A.: *A parallel direct cut algorithm for high-order overset methods with application to a spinning golf ball.* Journal of Computational Physics, doi: 10.1016/j.jcp.2018.05.036, 04 August 2018. **(PDF)**

- Crabill, J., Jameson, A. and Sitaraman, J.: *A High-Order Overset Method on Moving and Deforming Grids.* AIAA 2016-3225, doi: 10.2514/6.2016-3225, AIAA Aviation, AIAA Modeling and Simulation Technologies Conference, 13-17 June 2016, Washington, DC. **(PDF)**

- Lopez-Morales, M. R., Bull, J. Crabill, J., Economon, T. D. Manosalvas, D., Romero, J., Sheshadri, A., Watkins, J. E., Williams, D. M., Palacios, F. and Jameson, A.: *Verification and Validation of HiFiLES: a High-Order LES unstructured solver on multi-GPU platforms.* AIAA Paper 2014-3168, 32nd AIAA Applied Aerodynamics Conference, 16-20 June 2014, Atlanta, GA. **(PDF)**

OTHER LINKS

- PX4 "Meet the Contributors" Article: px4.io/meet-the-contributor-jacob-crabill/

- Volansi "Meet the Team" Article: volansi.com/meet-volansi-team-member-jacob-crabill/

- Overview of my past PhD research activities: jcrabill.weebly.com/research.html

References available upon request