

# Joshua Vander Hook

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CONTACT INFORMATION	NASA JPL: Robotics and Mobility Systems MS 198-219 4800 Oak Grove Drive Pasadena, CA, 91101, USA <a href="http://www-robotics.jpl.nasa.gov/">www-robotics.jpl.nasa.gov/</a>	<i>Work:</i> +1-626-616-5074 <i>Mobile:</i> +1-507-381-1295 <i>E-mail:</i> <a href="mailto:hook@jpl.nasa.gov">hook@jpl.nasa.gov</a> <i>Web:</i> <a href="http://josh.vanderhook.info">josh.vanderhook.info</a>
OVERVIEW	A robotics research technologist at the NASA Jet Propulsion Laboratory, working on multi-robot systems for environmental monitoring, space exploration, and defense. US Citizen.	
EDUCATION	2015 Ph.D. Computer Science, <a href="#">The University of Minnesota</a> , Minneapolis, MN <ul style="list-style-type: none"><li>Thesis: Active Target Localization and Tracking with Application to Robotic Environmental Monitoring</li></ul> 2010 B.S. Computer Science <i>Cum Laude</i> , <a href="#">Minnesota State University</a> , Mankato, MN <ul style="list-style-type: none"><li>Thesis: Experimental Verification of Costless-Merge Pairing Heaps</li></ul>	
RELEVANT EXPERIENCE	<ul style="list-style-type: none"><li>Advanced technical communication including grant editing and writing</li><li>Hands-on experience with all aspects of mobile robot development, from firmware and sensor design to development of high level path planning algorithms, state estimation, and target tracking.</li><li>C,C++,Python programming for a variety of embedded, web, and desktop environments, including the Robot Operating System (ROS), Windows, Linux</li><li>Strong analytical skills in the areas of path optimization, estimation, target tracking, and algorithm design</li><li>Experience in small and large team environments including leading research projects, mentoring students, and working in industry</li></ul>	
AWARDS	2017: JPL Team Award (Mars 2020 Rover): For effective and efficient enhancement to the Mars Rover navigation algorithm 2016: JPL Team Award (Swarm II): For designing, developing, and demonstrating state-of-the-art multi-agent autonomy for ONR 2014: Winner of the Honeywell Urban Autonomous Navigation Challenge 2014-2015: Doctoral Dissertation Fellowship 2014-2015: Sigma Xi ( $\Sigma\Xi$ ) Dorothy and Charles Andrew Bird Award 2013-2015: ARCS Foundation Scholarship, 2013-2015 2010: Chuck Sherwood Scholarship 2008-2010: National Science Foundation Scholarship 2007-2010: Minnesota State CS Dept. Scholarship 2007-2010: Minnesota State University Scholarship	
RELEVANT PROJECTS	2015-Present: NASA Jet Propulsion Laboratory Mission autonomy and coordinated behaviors for teams of heterogeneous autonomous vehicles operating in unstructured environments. <ul style="list-style-type: none"><li>Task-allocation and adaptive coordination algorithms</li><li>Adaptive formation control</li><li>Informative path planning algorithms</li><li>World modeling, sensor data processing, systems development</li></ul> 2011-2015: Thesis work at the University of Minnesota Robotic Sensor Network for Monitoring Invasive Fish, a system of mobile robots (autonomous boats and autonomous rovers) which can track radio-tagged invasive carp in Minnesota lakes.	

- C++ for Robot Operating System, C for Arduino Firmware
- C++ for multi-agent path planning, state estimation, and target tracking
- C++ for convex optimization, batch estimation algorithms
- Sensor design, API design, real time software design

SELECTED PUBLICATIONS

- J. Vander Hook, P. Tokekar, V. Isler. **Algorithms for Cooperative Active Localization of Static Targets with Mobile Bearing Sensors under Communication Constraints** *Transactions on Robotics*. 31 (4) 2014. pp 864-876.
- J. Vander Hook, P. Tokekar V. Isler. **Cautious Greedy Strategy for Bearing-Only Active Localization: Analysis and Field Experiments** *Journal of Field Robotics*, pp 296-318, 31(2), April 2014.
- J. Vander Hook, V. Isler. **Pursuit and Evasion with Uncertain Bearing Measurements** Accepted to: *Canadian Conference on Computational Geometry*.

TEACHING

- 2010-2015: University of Minnesota, Minneapolis
- Homework design, office hours, lectures, and grading for several courses
  - Sample reviews and feedback available at [josh.vanderhook.info/teaching](http://josh.vanderhook.info/teaching)
  - CSCI 5551: Introduction to Intelligent Robotic Systems
  - CSCI 4041: Algorithms and Data Structures
  - CSCI 2021: Machine Structures and Organization
- Minnesota State University, Mankato
- Homework design, office hours, and grading for several courses
  - CS 311: Algorithms and Data Structures
  - CS 210: Machine Structures and Programming
  - CS 111: Introduction to C++ Programming

INDUSTRY HIGHLIGHTS

- 2015-Present: NASA Jet Propulsion Laboratory
- Robotics Technologist in the Decision, Control, and Estimation Group (347E)
  - Research, develop, and support system and algorithm development for space exploration and defense work
  - Managed teams of 3-5 developers
  - Several successful military demonstrations
  - Proposal and Grant writing
- Summer 2009: MTS Systems, Software Engineering Inter, Aerospace Division.
- C++ for MFC/COM Windows development.
  - Real time data acquisition, display, and file system drivers
- 2009-2010: FPX, LLC, Software Engineering Contractor
- Java / J2EE, Struts for Server-side optimization and data management
  - AJAX / Javascript for responsive client-side data display
- 2007-2008: VTek Inc
- C, PLC, and Labview for industrial automation platforms

VOLUNTEER AND OUTREACH

- Pro bono development
- 2015-Present Computer Science Curriculum lead developer for Mind Makers. See: [Mind Makers Project](#)
  - 2012-Present Robotics Stack Exchange: <http://goo.gl/SEIt98>
  - 2014 John Howard Association, PHP development. See: <http://www.thejha.org/mission>
  - 2014 Hope Academy Concord, Wordpress. See: <http://www.hopeacademyconcord.org/about-our-school/>
  - 2013 Earth Day Fair at Cannon River STEM School
  - 2008-2015: Volunteer judge for the Minnesota science fair, high school level
  - 2011 Math, Science, Engineering Family Fun Day (U of M Open House)
  - 2009 IEEE 24 hour programming competition (We finished second in the region)