

Erik Komendera

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Professional Experience

- 8/2014-
Present **Research Aerospace Engineer**
NASA Langley Research Center, Hampton, VA.
- 8/2011-
8/2014 **NASA Space Technology Research Fellow**
Department of Computer Science, University of Colorado, Boulder, CO.
- 8/2010-
8/2011 **Research Assistant**
Department of Computer Science, University of Colorado, Boulder, CO.
- 5/2007-
7/2010 **Engineer**
FAAC Incorporated, Ann Arbor, MI.

Research Interests

Autonomous assembly and construction; Space robotics; Field robotics; Perception, mapping and state estimation for precise and accurate robotic operations in large workspaces; Multi-agent motion planning and control; Collaborative manipulation; Machine learning for detection, classification, and correction of off-nominal events in field robotics applications.

Education

- 11/2014 **Ph.D. in Computer Science**
Department of Computer Science, University of Colorado, Boulder, CO.
Title: Precise Assembly of Truss Structures by Distributed Robots.
Committee: Nikolaus Correll (chair), Sriram Sankaranarayanan, Tom Yeh, Eric Frew, Daniel Scheeres.
- 5/2012 **M.S. in Computer Science**
Department of Computer Science, University of Colorado, Boulder, CO.
GPA: 4.0.
- 5/2007 **B.S.E. in Aerospace Engineering**
Department of Aerospace Engineering, University of Michigan, Ann Arbor, MI. GPA: 3.7, *magna cum laude*.

Journal Articles

- J1.2015 **Komendera, E.** and Correll, N., 2015. Precise Assembly of 3D Truss Structures Using MLE-Based Error Prediction and Correction. *The International Journal of Robotics Research*, 34(13), pp.1622-1644.
- J2.2015 **Komendera, E.**, Garland, J., Bradley, E. and Scheeres, D.J., 2015. Efficiently Evaluating Reachable Sets in the Circular Restricted 3-Body Problem. *IEEE Transactions on Aerospace and Electronic Systems*, 51(1), pp.454-467.
- J3.2014 **Komendera, E.**, Reishus, D., Dorsey, J.T., Doggett, W.R. and Correll, N., 2014. Precise Truss Assembly Using Commodity Parts and Low Precision Welding. *Intelligent Service Robotics*, 7(2), pp.93-102. Extends [C8.2014].

Conference Papers

- C1.2017 **Komendera, E.E.**, Adhikari, S., Glassner, S., Kishen, A., and Quartaro, A., 2017. Structure Assembly by a Heterogeneous Team of Robots Using State Estimation, Generalized Joints, and Mobile Parallel Manipulators. In *IEEE/RSJ Conference on Intelligent Robots and Systems* (p. TBD), Vancouver, BC.
- C2.2017 **Komendera, E.E.** and Dorsey, J., 2017. Initial Validation of Robotic Operations for In-Space Assembly of a Large Solar Electric Propulsion Transport Vehicle. In *AIAA SPACE and Astronautics Forum and Exposition* (p. 5248), Orlando, FL.
- C3.2016 Belvin, W.K., Doggett, W.R., Watson, J.J., Dorsey, J.T., Warren, J., Jones, T.C., **Komendera, E.E.**, Mann, T.O. and Bowman, L., 2016. In-Space Structural Assembly: Applications and Technology. *SCITECH 2016*, (p. 2016-2163), San Diego, CA.
- C4.2015 **Komendera, E.E.**, Doggett, W.R., Dorsey, J.T., Debus, T.J., Holub, K. and Dougherty, S.P., 2015. Control System Design Implementation and Preliminary Demonstration for a Tendon-Actuated Lightweight In-Space MANipulator (TALISMAN). *AIAA SPACE Conference and Exposition*, Pasadena, CA.
- C5.2014 **Komendera, E.** and Correll N., 2014. Precise Assembly of 3D Truss Structures Using EKF-Based Error Prediction and Correction. Published in: *Hsieh M., Khatib O., Kumar V. (eds) Experimental Robotics. Springer Tracts in Advanced Robotics, vol 109. Springer, Cham*, (p. 507-521), Essaouira, Morocco.

- C6.2014 **Komendera, E.**, Dorsey, J.T., Doggett, W.R. and Correll, N., 2014. Truss Assembly and Welding by Intelligent Precision Jigging Robots. In *2014 IEEE International Conference on Technologies for Practical Robot Applications (TePRA)*, Woburn, MA.
- C7.2014 McEvoy, M., **Komendera, E.** and Correll, N., 2014. Assembly Path Planning for Stable Robotic Construction. In *2014 IEEE International Conference on Technologies for Practical Robot Applications (TePRA)*, Woburn, MA.
- C8.2014 **Komendera, E.**, Reishus, D., Dorsey, J.T., Doggett, W.R. and Correll, N., 2014. Precise Truss Assembly Using Commodity Parts and Low Precision Welding. In *2014 IEEE International Conference on Technologies for Practical Robot Applications (TePRA)*, Woburn, MA. Extended by [J3.2014].
- C9.2012 Dorsey, J.T., Doggett, W.R., Hafley, R.A., **Komendera, E.**, Correll, N. and King, B., 2012. An Efficient and Versatile Means for Assembling and Manufacturing Systems in Space. *AIAA SPACE 2012 Conference and Exposition, AIAA SPACE Forum*, Pasadena, CA.
- C10.2012 **Komendera, E.**, Bradley, E. and Scheeres, D., 2012. Efficiently locating impact and escape scenarios in spacecraft reachability sets. In *AAS/AIAA Astrodynamics Specialist Conference* (pp. 1-15), Minneapolis, MN.
- C11.2012 **Komendera, E.**, Scheeres, D., and Bradley, E., 2012. Intelligent Computation of Reachability Sets for Space Missions. In *Proceedings of the Twenty-Fourth Innovative Applications of Artificial Intelligence Conference*, (p. 2299-2304), Toronto, ON.

Workshops

- W1.2017 **Komendera, E.E.**, 2017. Addressing Communication Lapses During Collaborative Manipulation in Autonomous Assembly and Deployment. *Robotics: Science and Systems (RSS 2017)*, Workshop: Robot Communication in the Wild, Cambridge, MA.
- W2.2017 **Komendera, E.E.**, 2017. Autonomous In-Space Manipulation and Assembly with Task Distribution, Parallel Manipulation, and Error Correction. *Robotics: Science and Systems (RSS 2017)*, Workshop: Bridging the Gap in Space Robotics, Cambridge, MA.
- W3.2016 Adhikari, S., Glassner, S., Kishen, A., and **Komendera, E.E.**, 2016. Robotic Assembly of Solar Array Modules: Hardware Verification. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Late Breaking Result Submission, Daejeon, Korea.

W4.2015 **Komendera, E.E.**, Doggett, W.R., and Dorsey, J.T., 2015. Tendon Actuated Lightweight In-Space MANipulator (TALISMAN). *IEEE International Conference on Robotics and Automation, Workshop: The Next Generation of Space Robotic Servicing Technologies*, Seattle, WA.

Invited Talks

2017 An Approach to Autonomous In-Space Assembly. Seminar, Ann and H.J. Smead Aerospace Engineering Sciences, University of Colorado Boulder.

2017 An Approach to Autonomous In-Space Assembly. Seminar, Department of Robotics, Cornell University.

2017 Autonomous Assembly of Space Structures by a Team of Robots: Recent Research at Langley. BIG Idea Challenge Invited Talk, NASA Langley Research Center.

2015 Intelligent Systems for Assembly. In-Space Assembly: Applications and Operations Autonomy Workshop, NASA Langley Research Center.

2014 Autonomous Assembly by Intelligent Precision Jigging Robots. Seminar, Intelligent Systems Group, NASA Ames Research Center.

Competitive Grants as Lead

2015- Present **Principal Investigator**
\$402,500 Autonomous Assembly of Solar Array Modules by a Team of Robots. NASA Center Innovation Fund / Internal Research and Development.

2011- 2014 **Research Fellow**
\$268,000 Autonomous Assembly of Structures in Space. NASA Space Technology Research Fellowship.

Competitive Grants as Contributor

2016- Present **Assembly Lead**
\$9,000,000 Commercial Infrastructure for Robotic Assembly and Servicing. PI: John Dorsey.

2016- Present **Assembly Robot Specialist**
\$2,000,000 Robotic Assembly of Modular Space Exploration Systems. PI: William Doggett.

Teaching

2012 Guest Lecturer. Introduction to Kalman Filters, for Cyber Physical Systems.

2010 Teaching Assistant. Introduction to Robotics, University of Colorado Boulder.

Advising and Mentoring

Research Collaborator for NASA Space Technology Research Fellows

2016- Present Kyle Doyle, Cornell University. Advisor: Mason Peck.

2015 Kristina Hogstrom, Caltech. Thesis: Robotically Assembled Space Telescopes with Deployable Modules: Concepts and Design Methodologies. Advisor: Sergio Pellegrino.

Advisor and Mentor for NASA Students

2016- Present Samantha Glassner, Northeastern University.

2017- Present William Chapin, Germanna Community College.

2017- Present Eduardo Andrade, California State University.

2017- Present Iok Wong, Rhode Island School of Design.

2017- Present Ryan Ernandis, University of Maryland.

2017- Present Rounak Mukhopadhyay, University of Maryland.

2016- 2017 Amy Quartaro, University of Texas at Austin.

2016- 2017 Shaurav Adhikari, University of Michigan.

2017 Hermann Kaptui Sipowa, University of Maryland.

2017 Chirawat Sanpakit, University of California Riverside.

2017 Holly Everson, California Polytechnic State University.

2017 Erik Loscalzo, Dartmouth College.

2016 Ashwin Kishen, University of Pennsylvania.

Professional Service

Technical Committees

2017- Present AIAA Space Automation and Robotics Technical Committee.

Program Committees

2017 Workshop: Robot Communication in the Wild. Robotics: Science and Systems, Boston, MA.

Other Committees

2015 NASA Langley Emerging Professionals Committee.

2011- 2014 Graduate Committee, Computer Science, University of Colorado.

2011- 2014 Social Committee, Computer Science, University of Colorado.

Grant Referee

2016- Present NASA Space Technology Research Fellowships.

2016- Present Small Business Innovation Research.

2015- Present NASA Early Career Faculty.

Session Chair

2017 Session: Assembly and Automation. IEEE/RSJ International Conference on Intelligent Robots and Systems, Vancouver, BC.

Publication Referee

2017 Journal of Field Robotics

2017 Workshop: Robot Communication in the Wild.

Recurring IEEE International Conference on Robotics and Automation.

Recurring IEEE/RSJ International Conference on Intelligent Robots and Systems.

Competition Judge

2017 Breakthrough, Innovative, and Game-changing (BIG) Idea Challenge.

Press

8/30/2017 Orbital ATK Supports Ground Testing on CIRAS at NASA's Langley Research Center. NASA.gov.

4/6/2017 NASA Langley Intern Amy Quartaro Plays Vital Role in CIRAS Project. NASA.gov.

8/10/2016 "NASA Langley Interns Talk About What They Learned – and Built – This Summer. NASA.gov.

Awards, Fellowships, and Scholarships

2017 Center Achievement Award, NASA Langley Research Center.

2014 First NASA Space Technology Research Fellow to earn Ph.D.

2014 Outstanding Research Award, Computer Science, University of Colorado.

2012 Harvard Visiting Fellow.

2012 Second Place, Mobile Manipulation Challenge, 2012 IEEE International Conference on Robotics and Automation.
2011- 2014 NASA Space Technology Research Fellow.
2011 Ford Foundation Predoctoral Research Fellow.
2003- 2007 Ralph E. and Victoria L. Reins Full Tuition Scholarship.
2003- 2007 University of Michigan Engineering Dean's List, seven times.
2006 Edward A. Stalker Aerospace Research Fellow

Additional Information

Member of Sault Ste. Marie Tribe of Chippewa Indians.

References

Nikolaus Correll, Ph.D.

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W. Keith Belvin, Ph.D.

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William Doggett, Ph.D.

In-Space Assembly PI and Chief Engineer, Various Projects
Langley Research Center
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Daniel J. Scheeres, Ph.D.

University of Colorado Distinguished Professor
A. Richard Seebass Chair Professor
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Lynn Bowman

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