

**Opportunity Title:** Space Additive Manufacturing & Robotic Assembly  
**Opportunity Reference Code:** ICPD-2019-09

**Organization** Office of the Director of National Intelligence (ODNI)

**Reference Code** ICPD-2019-09

**How to Apply** **Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

**Complete your application** – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at:  
<https://orise.orau.gov/icpostdoc/index.html>.

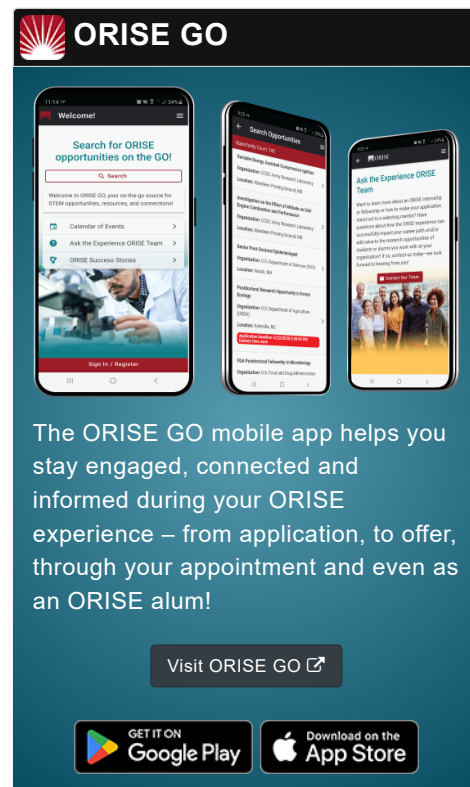
If you have questions, send an email to [ICPostdoc@orau.org](mailto:ICPostdoc@orau.org). Please include the reference code for this opportunity in your email.

**Application Deadline** 3/1/2019 6:00:00 PM Eastern Time Zone

**Description** **Research Topic Description, including Problem Statement:**

- For almost 60 years, space structures have been deployed on orbit after painstaking assembly and kinematic testing on earth. Large structures unfold in space to produce near-perfect collection apertures and other related subsystems such as communications equipment. With the rapid development of additive manufacturing, efficient and reliable power sources, and robotic assembly techniques, space structures no longer need be so kinematically complex. In short, raw materials could be shipped into space for components additive manufacturing and then autonomously assembled by multi-armed robots. Size, weight, and power would be more efficiently employed (less weight reduces cost) while providing a much more precise structure providing a better focus on the operational need.
- This effort will address the required design, analysis, and testing to optimize large space structures delivery, assuming a development continuum between only using on-orbit assembly and the current, detailed kinematic designs. Multi-dimensional optimization methods suggest that a field of "local minima" exist whereby space additive manufactured and robotic assembled structures are efficiently developed. This work will address the mathematics to achieve such optimal solutions. DARPA and NASA have examples of single manipulator arm systems to service spacecraft; but many US Government agencies have envisaged how a "robot crawler" could assemble the next generation space station. This work will address both high-quality, on-orbit, space additive manufacturing and autonomous robotics for assembly.

**Example Approaches:**



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- RSGS: DARPA; geosynchronous orbit robotic spacecraft
- Restore-L: NASA/Goddard, low-earth orbit robotic spacecraft

**Relevance to the Intelligence Community:**

- Rapid assembly/deployment of new capabilities
- Repair, refueling, re-provisioning (i.e., sensors)

**Key Words:** Space Additive Manufacturing, On-Orbit Robotic Assembly, Structural Efficiency; specific strength/stiffness analysis, Structural Interface Dynamic Analysis

## Qualifications

**Postdoc Eligibility**

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program.

**Research Advisor Eligibility**

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

## Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 )
  - **Communications and Graphics Design** (6 )
  - **Computer, Information, and Data Sciences** (16 )
  - **Earth and Geosciences** (21 )
  - **Engineering** (27 )
  - **Environmental and Marine Sciences** (14 )
  - **Life Health and Medical Sciences** (45 )
  - **Mathematics and Statistics** (10 )
  - **Other Non-Science & Engineering** (5 )
  - **Physics** (16 )
  - **Science & Engineering-related** (1 )
  - **Social and Behavioral Sciences** (28 )