

Manan Arya

Curriculum Vitæ

Contact Information

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United States of America

Education

- 06/2016 **PhD in Space Engineering**
[Graduate Aerospace Laboratories](#)
[California Institute of Technology](#), Pasadena, California
- 06/2012 **Master of Science in Space Engineering**
Graduate Aerospace Laboratories
California Institute of Technology, Pasadena, California
- 06/2011 **Bachelor of Applied Science in [Engineering Science](#)**
Major in Aerospace Engineering
[University of Toronto](#), Ontario, Canada
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Experience

- 08/2016 - present **Technologist**
[Jet Propulsion Laboratory](#)
California Institute of Technology

I develop technologies to enable the next generation of deployable spacecraft structures. Currently, I work on both large structures such as [starshade](#) and small structures such as antennas for CubeSats.

10/2011 - 06/2016

Graduate Student

Supervisor: Professor [Sergio Pellegrino](#)
[Space Structures Laboratory](#)
California Institute of Technology

I designed novel breakthrough schemes for the packaging and deployment of large, thin space structures such as photovoltaic arrays, solar sails, reflectors, and sunshields. I performed experiments on scale test articles, and developed analytical models to capture observed behavior. I applied these methods for the preliminary design of a large spacecraft for a space solar power station. As a side project, I developed and supervised the fabrication of an engineering model of an optical camera for a mission to demonstrate key technologies for a reconfigurable space telescope.

05/2011 - 08/2011

Patent Agent's Assistant

[Hill & Schumacher](#)
Toronto

I drafted and prosecuted patents for a variety of clients, both industrial and academic, in the fields of space robotics, polymer chemistry, organometallic chemistry, medical devices, and others. I submitted and prosecuted applications in the United States Patent Office (USPTO), Canadian Intellectual Property Office (CIPO), and the European Patent Office (EPO).

09/2010 - 04/2011

Undergraduate Thesis

Supervisor: Professor [Chris Damaren](#)
[University of Toronto Institute for Aerospace Studies](#)

I examined the dynamics of solar sails, in particular the coupling between the sail membrane dynamics and the attitude control system. I modelled the dynamics of the solar sail, and designed an attitude controller to reduce sail membrane deflections. Numerical simulations demonstrated a fivefold reduction in peak sail deflection during test slew manoeuvres.

05/2010 - 09/2010

Undergraduate Research Student

Supervisor: Professor [Craig A. Steeves](#)
[Multifunctional Structures Laboratory](#)
University of Toronto Institute for Aerospace Studies

I analysed the propagation of acoustic waves in three-dimensional periodic lattice structures using finite element methods and Bloch-Floquet principles. I used this analysis to create schemes for the design of lattices with desired acoustic frequency bandgaps. Fur-

ther, I implemented a C++ computer program to perform such analyses for three-dimensional lattices with arbitrary topologies.

05/2009 - 09/2009

Lab Assistant

Supervisor: Dr. Reza Emami

University of Toronto Institute for Aerospace Studies

I designed the mechanical system for a mechatronic device intended for patenting and commercialisation. I integrated the mechanical design with the electrical and computer systems of the device. I used CAD tools to model the mechanical system. I also created several working prototypes of the device as proof-of-concepts.

05/2008 - 09/2008

Research Assistant

Supervisor: [Mr. Steve Engels](#)

[Department of Computer Science](#), University of Toronto

I assisted with the development of a video game design course. I tested software tools for video game design, and evaluated them on the basis of accessibility and usability.

Publications

08/2017

M. Arya, et al., “Starshade mechanical design for the Habitable Exoplanet Imaging Mission Concept (HabEx)”, Proc. SPIE 10400, Techniques and Instrumentation for Detection of Exoplanets VIII, 104001C, 2017.

2017

C.A. Steeves, G.D. Hibbard, **M. Arya**, and A.T. Lausic, “Dynamics of Nanolattices: Polymer-Nanometal Lattices” in *Dynamics of Lattice Materials*, A.S. Phani and M.I. Hussein, eds, Chichester, United Kingdom: John Wiley & Sons, Inc., 2017.

03/2017

M. Arya, N. Lee, and S. Pellegrino, “Crease-free biaxial packaging of thick membranes with slipping folds”, *International Journal of Solids and Structures*, vol 108, pp 24-30, March 2017.

06/2016

M. Arya, “Packaging and Deployment of Large Planar Spacecraft Structures”, PhD Thesis, California Institute of Technology.

01/2016

M. Arya, N. Lee, and S. Pellegrino “Ultralight Structures for Space Solar Power Spacecraft”, *3rd AIAA Spacecraft Structures Conference*, January 2016, San Diego CA

01/2015

M. Arya, N. Lee, and S. Pellegrino “Wrapping thick membranes with slipping folds”, *56th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, January 2015, Kissim-

- mee FL
- 01/2014 **M. Arya** and S. Pellegrino “Unfolding mechanics of highly compacted thin membrane structures”, *55th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, January 2014, National Harbor MD
- 06/2011 **M. Arya** and C.A. Steeves “Bandgaps in octet truss lattices”, *23rd Canadian Congress of Applied Mechanics*, June 2011, Vancouver

Scholarships and Awards

- 06/2015, 06/2014 Charles D. Babcock Award
from GALCIT for contributions in teaching
- 05/2011 [Ontario Graduate Scholarship](#) (declined)
- 09/2010 John M. Empey Scholarship
from the University of Toronto for academic excellence
- 05/2010 [Undergraduate Student Research Award](#)
from the [National Science and Engineering Research Council](#)
- 09/2009 Shaw Design Scholarship
from the University of Toronto for academic excellence
- 05/2008 - 05/2011 Dean’s Honour List
Faculty of Applied Science and Engineering, University of Toronto
- 09/2007 University of Toronto Scholars Program
- 09/2007 - 09/2010 Queen Elizabeth II Aiming for the Top Scholarship
- 05/2007 [Governor General’s Academic Medal](#)
- 05/2007 Summa cum laude, [International Baccalaureate Program](#)

Teaching Experience

- 02/2016 - 03/2016 **Instructor**
Space Origami Engineering
[Esteban E Torres High School](#)

I developed and taught a five-session course for high school seniors on the mathematics of origami and the application thereof to the engineering of spacecraft structures. Theoretical material was supplemented by hands-on construction of relevant origami and structural models. This activity was sponsored by the [Huntington Library](#).

10/2013 - 06/2015 **Teaching Assistant**
Ae105abc - Aerospace Engineering
California Institute of Technology

I held weekly office hour sessions. I graded homeworks and midterms. I managed the class website. I rectified accidental misunderstandings about course material.

Community Involvement

09/2014 - 06/2016 **Vice President, Secretary**
[EXPLiCIT \(EXtracurricular PLayers at the California Institute of Technology\)](#)

As Vice President, I supported the President. As Secretary, I took notes at meetings and maintained the club Constitution.

07/2012 - 06/2013 **Vice President**
[Students for the Exploration and Development of Space \(SEDS\)](#)
Caltech Chapter

I organized various events relating to space, space exploration and astronomy. The mandate of SEDS is to share our enthusiasm for space with the broader community.

09/2008 - 05/2009 **Secretary, Executive Council**
[Innis Residence Council](#)
University of Toronto

I was a member of the executive of the student government of Innis Residence. I was responsible for calling, managing and presiding over council meetings, as well as managing the internal and external communications of the Council.

09/2007 - 05/2008 **Yearbook Editor**
Innis Residence
University of Toronto

I organised and lead a team of 25 individuals to produce a digital yearbook. I was responsible for the overall design, production, marketing and sales of the yearbook.

References

Available upon request

Pasadena, August 26, 2018