

# Kartik Kumar

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## Education

### **Master of Science with Honours, Delft University of Technology**

September 2005 – June 2008: Completed degree in Space Engineering (Astrodynamics & Satellite Systems) at the Faculty of Aerospace Engineering cum laude. Completed honours track program. Degree conferred on 19<sup>th</sup> of June, 2008.

### **Bachelor of Science, Delft University of Technology**

September 2002 – June 2005: Completed English variant of Bachelor of Science degree in Aerospace Engineering. Degree conferred on 8<sup>th</sup> of November, 2005. (Date of accreditation: 1<sup>st</sup> of September, 2002).

### **Propedeutic Diploma, Delft University of Technology**

September 2002 – June 2003: Passed Propedeutic Diploma (first year engineering) in Aerospace Engineering with distinction.

## Conference Papers

### **Stability of Weak Capture Trajectories**

Kumar K., Noomen R.: New Trends in Astrodynamics and Applications V – An International Conference, 30<sup>th</sup> June 2007, 1<sup>st</sup>, 2<sup>nd</sup> July 2008, Milan, Italy [Under Review].

### **Stability of Highly Elliptical Orbits at the Moon**

Kumar K., Noomen R., Delory G.T.: AIAA Astrodynamics Specialist Conference, 18<sup>th</sup>-21<sup>st</sup> August 2008, Honolulu, Hawaii, Paper AIAA 2008-7069.

### **Design of an Infrared Interferometry Satellite: A Technology Demonstrator Mission for DARWIN**

Kumar K., Team IRIS: 58<sup>th</sup> International Astronautical Congress 2007, 24<sup>th</sup>-28<sup>th</sup> September 2007, Hyderabad, India, Paper IAC-07-A3.1.04.

### **Small Spacecraft for Science and Exploration in NASA's Robotic Lunar Exploration Program**

Delory G.T., Lin R.P., Hines J., Yost B., S4P Team: AIAA Space 2007 Conference & Exposition, 18<sup>th</sup>-20<sup>th</sup> September 2007, Long Beach, California, Paper AIAA 2007-6033.

## Scholarships & Awards

### **NvVL (Dutch National Aeronautical Society) Best Graduate 2008**

December 2008: Awarded NvVL Best Graduate prize.

### **Best Graduate Aerospace Engineering 2007-2008**

November 2008: Awarded Best Graduate Student prize for Faculty of Aerospace Engineering by University Fund Delft University of Technology.

### **Study Abroad**

January 2007: Awarded the following scholarships to pursue an exchange program at University of Texas at Austin based on academic record:

- KIVI NIRIA Study and Travel Fund
- University Fund Delft University of Technology
- Vrijvrouwe van Renswoude Foundation
- H.J. van der Maas Foundation
- Stimulating International University Collaboration (STIR) Fund

February 2008: Awarded ERASMUS scholarship to pursue exchange program at Politecnico di Milano.

## University Projects (see also appendix)

### Master of Science Graduation Thesis

September 2006 – June 2008: Graduation thesis entitled: "Stability of Trajectories in the Neighbourhood of the Smaller Primary in the Planar Circular Restricted 3-Body Problem".

### Politecnico di Milano

February 2006 – April 2008: Graduation research at the Department of Aerospace Engineering, as ERASMUS exchange student.

### Small Spacecraft Summer Study Program (S4P)

June 2007 – August 2007: Lunar science orbiter mission concept study, organized by Silver Space Sciences Laboratory (SSL) at University of California-Berkeley.

### University of Texas at Austin

January 2007 – May 2007: Graduation research at the Department of Aerospace Engineering and Engineering Mechanics, as exchange student.

### Design Synthesis Exercise

April 2005 – June 2005: Design of a technology demonstrator for ESA's DARWIN mission.

## Employment

### GMV S.A.

September 2008 – December 2008: Worked in Mission Analysis Division at GMV S.A. Tres Cantos on application of an internal toolbox to generate initial guesses for low-thrust interplanetary trajectories, and on development of a Delta-V Leveraging toolbox.

### Silver Space Sciences Laboratory

June 2007 – December 2007: Worked at Silver Space Sciences Laboratory at University of California-Berkeley on lunar science orbiter mission concept. Studied lunar Weak Stability Boundary transfer trajectories and lunar capture.

## Extra Curricular Activities

### SEDSAT-2

October 2007 – Present: Systems engineer for SEDSAT-2 international student project organized by Students for the Exploration and Development of Space (SEDS).

### Summer School Alpbach

July 2008: Participated in summer school on "Sample Return from Moon, Asteroid and Comets". Worked on multiple asteroid rendezvous sample return mission.

### Summer School: Numerical Methods in Astrodynamics

July 2008: Participated in summer school on "Numerical Methods in Astrodynamics".

### Kiruna Summer & Winter University

Hosted by Department of Space Science at the University of Umeå and Luleå University of Technology in Kiruna, Sweden.

January 2008: Completed Arctic Science course with distinction.

August 2006: Completed Space Science and Technology & Manned Spaceflight courses with distinction.

### Global Trajectory Optimization Competition

November 2006, 2007: Participated in the 2<sup>nd</sup> and 3<sup>rd</sup> Global Trajectory Optimization Competition (GTOC2 & GTOC3) organized by the Advanced Concepts Team at the European Space Agency. Presented results from GTOC2 at workshop in Sedona, AZ in February, 2006.

### Leonardo Times

September 2006 – December 2006: Editor for Leonardo Times, a magazine published by VSV (the society for aerospace engineering students).

## **The ATHENS Programme**

March 2008: Completed one-week course in Operations Research at Instituto Superior Técnico in Lisboa, Portugal.

November 2005: Completed one-week course in Application of Particle Image Velocimetry (PIV) in Fluid Dynamics at Czech Technical University in Prague, Czech Republic.

## **Formula Student Racing**

September 2002 – July 2005: Participated with Delft University of Technology team in various capacities including: Powertrain Division Manager for Class III Racing Team, Powertrain Engineer for Class I Racing Team (Runner Up Design Award), and Powertrain Engineer for the Delft for Class III Racing Team (3<sup>rd</sup> in the overall competition, delivered marketing presentation).

## **TES Newsday Competition**

March 2002: Participated and contributed to “News ISH”. Editor for the Science and Technology section of the news magazine and member of the magazine layout team. Contributed articles on stem cell research and 2002 Australian Formula 1 Grand Prix.

## **Model United Nations**

November 1998 - January 2001: Participated in various roles including: staff for the Youth Employment Summit, reporter for “The MUNINN Magazine”, delegate for The Netherlands on the Economic and Social Council, delegate for the Russian Federation on the Security Council, and delegate for the Russian Federation on the Security Council.

## **ECIS Junior Math Contest**

March 2000, Geneva: Won second prize in the International Team category.

March 1999, Vienna: Participated in individual and team categories.

## **Public Speaking Competition – “May I Have Your Attention Please?”**

March 1999: Delivered speech on “The Gadget of the Ages” for the fifth regional round.

## **International Creative Writing Competition**

June 1997: Participated as a school representative.

## **Languages**

	<b>Reading</b>	<b>Writing</b>	<b>Speaking</b>
<b>English</b>	Fluent	Fluent	Fluent
<b>Dutch</b>	Fluent	Fluent	Fluent
<b>Tamil</b>	Fair	Fair	Good
<b>Spanish</b>	Fair	Poor	Fair
<b>French</b>	Fair	Fair	Poor
<b>German</b>	Fair	Fair	Poor

## **Computer Skills**

### **Operating Systems**

Knowledge of Microsoft Windows and Unix.

### **Engineering**

Knowledge of Mathworks Matlab, Microsoft Excel, Waterloo Maple, AutoCAD, Pro Engineer, CATIA, PATRAN/NASTRAN, Satellite Toolkit (STK), STK/Analyzer, and STK/Astrogator.

### **Documentation and Presentation**

Knowledge of Microsoft Word, LaTeX, Microsoft Powerpoint, Adobe Photoshop and Inkscape.

### **Programming**

Knowledge of PHP, JAVA, MySQL, FORTRAN 90/95 and C/C++.

# Appendix: Student Projects

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## **Master of Science Graduation Thesis**

September 2006 – June 2008: Working on graduation thesis entitled: “Stability of Trajectories in the Neighbourhood of the Smaller Primary in the Planar Circular Restricted 3-Body Problem”. Studying the stability of these trajectories by considering Poincaré Surfaces of Section. Extension of work currently being done by Dr. E. Belbruno (Innovative Orbital Design Inc.), and F. Topputo (Politecnico di Milano).

## **Politecnico di Milano**

February 2006 – April 2008: Performed graduation research at the Department of Aerospace Engineering, as ERASMUS exchange student, under guidance of Prof. F. Bernelli Zazzera and Dr. F. Topputo, in partial fulfilment of Master of Science degree.

## **Small Spacecraft Summer Study Program (S4P)**

June 2007 – August 2007: Participated in lunar science orbiter mission concept study, organised by Silver Space Sciences Laboratory (SSL) at University of California-Berkeley, in fulfilment of internship requirement for Master of Science Degree. Hosted at Advanced Studies Laboratory at NASA Ames Research Centre.

## **University of Texas at Austin**

January 2007 – May 2007: Performed graduation research at the Department of Aerospace Engineering and Engineering Mechanics as exchange student under guidance of Dr. C. Ocampo, in partial fulfilment of Master of Science degree.

## **Design Synthesis Exercise**

April 2005 – June 2005: Design of a technology demonstrator for ESA’s DARWIN mission with nine other students. My contributions included trajectory design, cost estimation, risk analysis, project management, and systems engineering.

## **Second Year Project Part II**

April 2004 – June 2004: Design of a spacecraft attitude controller using JAVA within a group with seven other students. Simulations included analysis of the effect of yaw sensor failure and signal noise.

## **Second Year Project Part I**

September 2003 – November 2003: Design of an aircraft control system using Pro Engineer for Impuls aircraft (designed and manufactured by students at Delft University of Technology) with seven other students. My contributions included analyzing the use of a push-pull rod system to control the horizontal and vertical control surfaces.

## **Introduction to Aerospace Engineering Project Part I**

November 2002 – January 2003: Designed and tested a wing torsion box by analyzing structural load paths with seven other students. Design of wing torsion box based fundamental principles of load analysis for riveted structures. Tested in laboratory to determine failure load.

## **Introduction to Aerospace Engineering Project Part I**

September 2002 – November 2002: Designed and launched a water rocket with seven other students. Design involved determining the centre of pressure and centre of gravity for stability analysis. Team won first prize for best result.