Paolo Racioppa

EXPERTISE

Aerospace engineer

Many years of experience in radio science experiments onboard deep space exploration missions.

Areas of competence: Orbit Determination, Tracking Systems, Deep Space Missions, Astrodynamics, Satellite Communications, Signal Processing, Space Environment, Planetary Science, Time and Frequency Transfer

WORK EXPERIENCE

[Sep 2006 – Current]   **Research Collaborator/Engineer**

Sapienza Università di Roma   https://web.uniroma1.it/cras/

Address: Via Eudossiana 18, 00184, Roma, Italy | **Email:** infocras@uniroma1.it | **Name of unit/department:** Center for Aerospace Research (CRAS)

- Development of a multi-arc filtering tool for orbit determination with batch processing or very large data sets, stochstic process noise, and multi-mission support;
- Orbit determination and radio-metric data analysis of the Cassini And Juno missions for the measurements of Titan, Saturn and Jupiter gravity fields.
- Definition of requirements, simulation and performance assessment of the radio science experiments onboard the Veritas (proposal), Cassini, Juno, Bepi Colombo, and Juice missions;
- Error budget and link budget analyses, implementation of a breadboard signal simulator and correlator with spread-spectrum modulation for the ESA/ESOC contract: "Improvement of Delta- DOR performances for 1 nrad accuracy for precise landing support".
- Error budget analysis of current Doppler, Range and Delta-DOR tracking system at ESA, Error budget validation with navigation data of currently flying missions, definition of a tracking system with one order of magnitude improved performances for the ESA/ESOC contract: "Interdisciplinary study on enhancement of end-to-end accuracy for spacecraft tracking techniques".
- Development of a planetary rotation model including polar motion, precession, nutation, and libration effects, link budget analysis for Mars and Moon landers with direct-to-earth communication capability in X-band and Ka-band, support for development of an end-to-end mission simulator for the ESA/ESTEC contract "Radiocomm signals: A new way of probing the surface of planets".
- Analysis of Mars environment effect and system architecture definition for a GNSS on Mars employing small satellites under the ESA/ESTEC contract "Investigation of Key Technologies for a Mars Positioning and Communication System using Small Satellites - EXPRO+"
- Analysis of advanced orbit determination techniques and algorithms for a GNSS constellation on Mars based on small spacecrafts under the ASI contract "Autonomous Orbit Determination System for a Smallsat Constellation"
- Analysis of advanced orbit determination techniques, algorithms and development of a software simulator for a lunar navigation system under the ESA/ESTEC contract "Fundamental techniques, models and algorithms for a lunar radio Navigation system"
- Development of a time transfer simulator for ground-to-ground and ground-to-space applications using Earth and lunar orbiters.

[Jan 2006 – Jul 2006]   **Trainee**

European Space Operation Centre

City: Darmstadt   **Country:** Germany

- Support for the test, validation and performance analysis of the software correlator for the ESA Delta-DOR tracking system at the Operations-Ground Segment and Signal processing (OPS-GSS) section.

HONOURS AND AWARDS

Group Achievement Award to Cassini Radio Science Team Awarding institution: NASA

For outstanding contributions leading to the success of the Cassini Radio Science investigation at Saturn.

EDUCATION AND TRAINING

[26 Sep 2024] **PhD in Aeronautical and Space Engineering**

Sapienza Università di Roma - Department of Mechanical and Aerospace Engineering

Address: Via Eudossiana 18, 00184, Roma, Italy   **Field(s) of study:** Aerospace Engineering   **Thesis:** Precise orbit determination of a deep space constellation of small satellites by Same Beam Interferometry

Orbit Determination, Tracking Systems, Deep Space Missions, Satellite Navigation, Satellite Communications

[26 May 2006] **M.Sc. in Astronautical Engineering**

Sapienza Università di Roma - School of Aerospace Engineering

Address: Via Eudossiana 18, 00184, Roma, Italy   **Field(s) of study:** Aerospace Engeneering   **Final grade:** 110/110 summa cum laude.   **Thesis:** Angular position determination of interplanetary spacecrafts by means of VLBI techniques

Orbit Determination, Tracking Systems, Deep Space Missions, Astrodynamics, Satellite Communications, Signal Processing

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C1   **READING** C2   **WRITING** C1

SPOKEN PRODUCTION C1   **SPOKEN INTERACTION** C1

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user

DIGITAL SKILLS

My Digital Skills

Specialized Software

Expert user of MONTE | Expert user of DPTRJ-ODP | Expert user of NAIF-SPICE | Proficient user of GODOT

Programming

Expert user of Python | Expert user of FORTRAN 90952003 | Proficient User of MATLAB | Proficient user of bash

Other

Debian Linux | Latex Software | Microsoft Office