ABSTRACTS
of the 2nd International Symposium
Space & Global Security of Humanity

Riga, Latvia. 5-9 July 2010

Abstracts of the 2nd International Symposium "Space & Global Security of Humanity", 5–9 July 2010, Riga, Latvia.

The abstracts of papers included in this book will be presented at the Second International Specialized Symposium "Space and Global Security of Humanity". The Symposium will consider basic issues tackled within International Global Monitoring Aerospace System (IGMASS): structure of the created system, building up the orbital systems group, new technological solutions that can be used in the construction of space vehicles, onboard special equipment and support systems.

Theoretical issues and applied case-studies, presented at the Symposium, will range from academic theories to industrial applications.

All abstracts are reviewed by members of the Programme Committee.

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THE EUROPEAN STUDENT MOON ORBITER PROJECT IN LATVIA: CRAFTING AN IMAGER FOR THE LUNAR SPACESHIP

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Our team of students and their tutors has taken up a challenge which ordinarily is commensurate with the abilities of experienced spacecraft engineers. To wit, we are part of a mission that will eventually launch a space vehicle to the Moon by 2014 to carry out various experiments in its orbit.

Isn't it incredible? The clue is not far to find. The European Space Agency, with which Latvia concluded an agreement in 23 July, 2009 opens various education possibilities to students in its Member States and Co-operating States. The entry requirements of these projects are reduced compared to the ordinary industry scale.

Soon after the conclusion of the co-operation agreement between Latvia and ESA the Education Office of the European Space Agency put forward a proposal of Latvian participation in the European Student Moon Orbiter, which was enunciated in a seminar in Riga on November 5, 2009.

ESMO, the European Student Moon Orbiter is a hands-on experience for students in designing and planning a Moon mission. With a budget around 4 mln Euro and about 20 European universities involved it aspires to create and launch a spacecraft in the lunar orbit that will do these important tasks:

- take images of the surface of our home planet's unrelenting companion
- test communications for a would-be lunar base in the future
- measure the radiation background in the Moon's environs
- make radar measurements of the invisible side of the Moon
- test the dielectric properties of the Moon's regolith

Our team in Latvia is entrusted to make the narrow angle camera, one of the most important orbiter's instruments. We are confident to accept this particular offer because the Institute of Astronomy of the University of Latvia has long-standing experience in designing and making various sorts of optical systems. The breakdown of our work includes the following work-packages:

- designing the optical system, i.e. the system of lenses and mirrors the will bend light rays to achieve the desired focusing and magnification
- designing the thermal compensation that will offset the deforming effects of rapid and intense variations in temperature

- designing the camera electronics that will read data from the optical sensor and transmit them to ESMO's data recorder
- designing the camera's hardware
- prototyping, manufacture and testing of the camera.

At this particular moment we have made good progress in various analytical work components, namely:

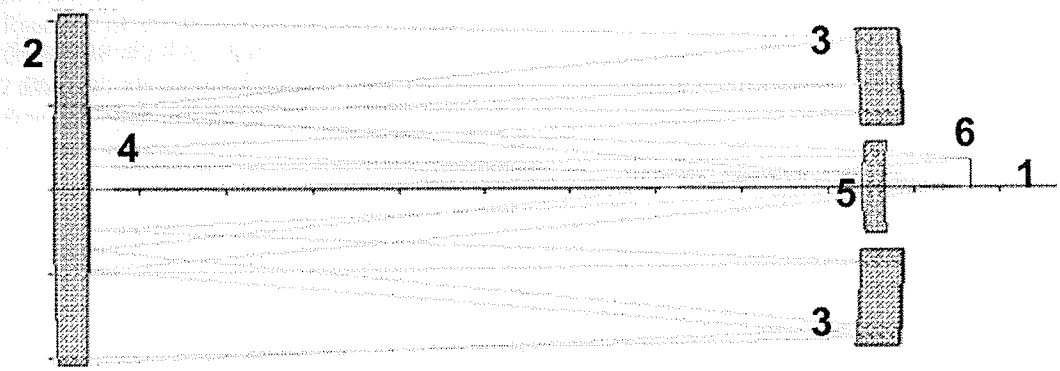
- the optical system (see attached picture) has been modelled and its performance has been analysed
- the thermal compensation system and the camera hardware have now been designed.

Our team members are also ready to start the design of the camera electronics as soon as we receive the required details on ESMO's on-board data recorder.

We are also interested to include other students in our team and to co-operate with companies, which might be interested in our experience in designing the camera, as well as with sponsors.

A lot of interesting experiences and challenges are awaiting us down the road as we prepare the ESMO spacecraft for its eventual journey to the Moon.

Illustrative figure. The proposed Cassegrain optical system for the narrow angle camera for ESMO spacecraft



1) the optical axis
2) objective lens
3) concave spherical back silvered primary reflector
4) planar front silvered secondary reflector
5) focusing lens
6) optical sensor at the focal plane.

The diffraction limit of this system varies from 1.8 to 3.8 arc seconds depending on the wavelength. The aberration of the optical system will be less than the diffraction limit.