OT-39

On-board satellites electronics system for on-board data processing

ULPGC Universidad de Las Palmas de Gran Canaria | Fundación Parque Científico Tecnológico
OTRI Oficina de Transferencia de Resultados de Investigación

TYPE OF R+D RESULT

New technology
New product
New service
New knowledge or skill

COMMERCIAL MATURITY LEVEL

Model or conceptual idea
Proof of concept (design)
Validated in a controlled environment
Validated in a real environment
Successfully implanted

PROTECTION LEVEL

Non- applicable
Patent
Software
Know - how
Utility model

Description of the solution. Problem solved

In recent years, space industry has been interested in including high resolution sensors for capturing both hyperspectral images and video among its instruments for monitoring, identification and characterization of the Earth's surface. However, this type of sensors is also being used in exploring missions of Mars and the Moon; therefore, its range of application is estimated to continue growing in the next decade.

Although an increase in the resolution of the sensors provides a higher volume of useful information for several scientific applications; such amount of data is not easy to manage and process on-board of the satellites due to current restrictions related to computing capacity of on-board electronics and bandwidth of such satellites with the ground stations.

As a solution to these problems, the Division of Integrated Systems (DSI) at the Research Institute for Applied Microelectronics (IUMA) of the ULPGC has developed a series of low architectural complexity that are mainly related to data compression, hyperspectral images and video (both panchromatic and RGB) that allow managing, storing and transmission to Earth efficiently of this large volume of data, without altering its quality. These solutions meet the CCSDS standards published for efficient design of electronic systems for on-board processing satellites and they are supported and funded by bodies such as the European Space Agency (ESA), which is considering to use some of these solutions in further space missions, as in the case of the CHIME mission, that will be part of the Copernicus 2.0 programme for Earth observation.

Besides doing an efficient compression of the collected information, the Division has recently developed solutions based on neuronal networks for detecting objectives from satellites, such solutions integrate video sensors for applications such as detection and monitoring of natural disasters of illegal activities, as piracy on the West coast of Africa. This last activity is focused in the European project H2020, denominated VIDEO (Video Imaging Demonstrator for Earth Observation),in which IUMA collaborates with important companies from the space sector such as Thales Alenia Space.

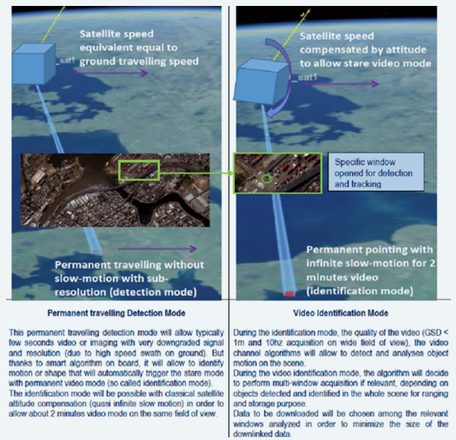

Figura 2: On-board processing needs on the European project VIDEO

Fields of commercial application

These processing data solutions are relevant for those applications where a large amount of data is managed; although it is mainly targeted to aerospace field, and more particularly to satellites for Earth's observation and exploration, enabling monitoring, characterization of surfaces or identifying specific elements remotely.

However, its applicability can be extended to other activities that require data compression and processing in embedded electronic, as it can be precision agriculture or offshore technology. Other possible applications may be environmental surveillance or detection and follow-up in real time of natural events.

Market opportunity

Although these solutions have been designed for applications related to space sector, its use is compatible with other markets linked to applications of Remote Sensing, such as precision agriculture, surveillance by UAVs or any other that has as objective to obtain a large number of data/images in real time.

At national level, future creation of the Spanish Space Agency may represent a clear market opportunity in order to integrate this kind of solutions on-board of possible future space missions.

At local level, currently we are collaborating with prestigious institutions the as IAC (Institute of Astrophysics of Canary Islands) in some space missions for exploring and study of the Sun. In addition to this, these solutions may be interesting for local entities looking to take part in projects as those offered by the ACIISI (the Agency for Research, Innovation and Information Society of the Canary Islands) in fields such as in smart farming or any other that requires massive management in real time of data in embedded electronic systems.

Competitive advantage

Although we can find in the market other solutions based on the on-board compression on satellites, the solution here presented meets all the standards for on-board electronics design, as for example low complexity, processing capacity in real time or robustness against space radiation.

Under certain configurations, it can be used a single solution that is able to compress data from different nature as generic information (for example, from telemetry or status), 2D and 3D images or monochromatic video.

Also, this solution is guaranteed and supported by the European Space Agency.

In addition to the aforementioned, this solution also is able to detect objectives and keep track of them, adding a complementary stage to the chain of on-board processing.

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