Training Opportunity for Portuguese Trainees

Reference	Title	Duty Station
PT-2020-TEC-SWT(2)	Big Data and Artificial Intelligence for space systems engineering	ESTEC

Overview of the Unit missions:

The Software Systems division has the responsibility in domain of software engineering for flight and ground software systems. It is supporting all ESA satellite projects in the related technologies, covering Software engineering technologies, methods, tools, architectures, and standards. Specific interest goes into the aspect of System-software co-engineering over the entire development life-cycle, starting from requirements engineering and modelling, design methods, to automatic code and test generation, including the required languages and compilers. Modelling and Simulation is used to support system engineering and testing and verification.
Advanced SW technologies as Artificial Intelligence, Big Data and Data Warehousing are investigated for their potential to improve future systems capabilities and their way to develop them.

Overview of the field of activity proposed:

Within the domain of Software Systems division, the Software Technology Section offer a training opportunity within **Big Data and Artificial Intelligence for embedded space engineering:**

Big Data and Artificial intelligence are widely used in Ground space applications. One main domain of application concerns Machine Learning. In this domain, applications able to identify elements of interest on space images are already developed and new ones are being developed. The application of these technologies could bring benefits to the space system engineering by exploiting data collected among the system development life cycle and in particular way during the verification and validation activities (such as during AIT and AIV). During these activities, the generated data are typically used only for verification and validation purposes, whilst this data could be furtherly exploited for providing feedback to the full system engineering.

Applying Big Data and Artificial Intelligence techniques can provide effective benefit to reveal new correlations and new findings on the system behaviours. The main purpose is to discover anomalies and system behaviours that are not traced by the TM/TC data and that are actually generated during the AIT/AIV activities, such as spied data on the 1553 communication bus.

During the proposed activity, the candidate shall:
- Analyse the 1553 bus protocol and specify the Conceptual Data Model required to acquire, organize and analyse the data;
- Evaluate the existing Big Data and Artificial Intelligence systems, identify their needs in term of processing and select one of them;
- Define the Big Data framework required to pre-processed the data (i.e. acquire, prepare and organize the input data);
- Define the Artificial Intelligence models to analyse the pre-processed data;
- Develop a proof of concepts demonstrator.

Required Education:

Applicants should have just completed, or be in their final year of a University course at Masters Level (or equivalent) in a technical or scientific discipline.
Applicants should have good interpersonal and communication skills and should be able to work in a multi-cultural environment, both independently and as part of a team.
Applicants must be fluent in English and/or French, the working languages of the Agency.