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Author: Mr. M.Rizwan Mughal
Politecnico di Torino, Italy, muhammad.mughal@polito.it

Prof. Leonardo M. Reyneri
Politecnico di Torino, Italy, leonardo.reyneri@polito.it

INTER SATELLITE COMMUNICATION MODULES FOR ARAMIS SMALL SATELLITES

Abstract

The AraMiS design approach aims to build modular satellites configurable in different shapes and sizes. Each module is independent from the other and capable of working in stand-alone mode when plugged or integrated. The communication among the panel bodies, known as tiles, takes place through proper buses. Each module has a specific role and can work alone or together with other modules to improve the performance of the system.

This work presents the idea to develop a constellation of such satellites able to communicate with each other; exchange generic messages; measure the distances inside the constellation and modify the distance according to the user needs. A constellation made of two satellites is considered for initial phase. Based on the modular design philosophy, the communication satellite takes magnetometer, magnetic actuator and a solenoid module from the AraMiS project and modifies the telecommunication subsystem according to inter-satellite design requirements. One surface houses the radio frequency electronics, whereas the other one contains solar cells to supply power to the satellite subsystems.

The communication module is based on CC2510 system on chip transceiver, power amplifier and antenna for transmission. A similar transceiver is used for reception on the receiving satellite. The system uses the simpliciTI protocol for communication purposes.

One of the purposes of the system is to measure the distance between two satellites. This is achieved using receive signal strength indicator (RSSI) measurement technique and magnetic field measurement techniques (generation and measurement of magnetic field). Another important purpose of the system is to control the distance between two satellites in orbit. The general structure of the system is completely described and documented by using Unified Modelling Language (UML). This work will elaborate the use of UML design technique at hardware/ software level for the communication subsystem.