NASA ARC Innovation Fund Award 2010

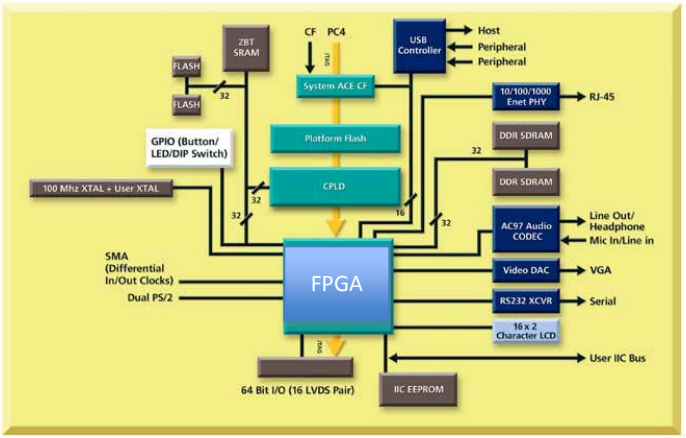
FPGA-based Plug and Play Technologies for Embedded Spaceflight Applications

PI: Elwood Agasid Code RD

Project Description and Objectives

Objectives of this research:
Evaluate a commercial off-the-shelf Field Programmable Gate Array (FPGA) development system as a potential platform from which to develop an Space Plug and Play Avionics architecture for spaceflight applications. Such a system would advance the capabilities of nanosatellites for future NASA space missions, enable more low cost high return space missions, expand STEM/Outreach opportunities and expand commercial business development.

FPGA Implementation as Spacecraft Controller



Significance

This project demonstrated the feasibility of using an FPGA system as a platform for developing spacecraft avionics and payload control systems that will conform to the Space Plug and Play Avionics (SPA) Architecture. Developing spacecraft and payload systems to the standards such as SPA would allow for rapid development of space systems and take advantage of the growing subsystems and components that are currently under development by Air Force Research Laboratories, Universities and commercial entities.

Project Participants

Ames: E. Agasid; G.Defouw; A. Schooley
Air Force Research Lab: Dr. J. Lyke
Santa Clara University: Dr. C. Kitts

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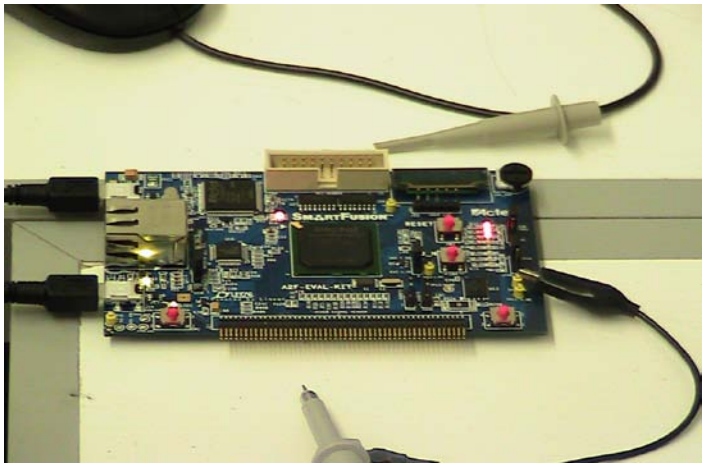
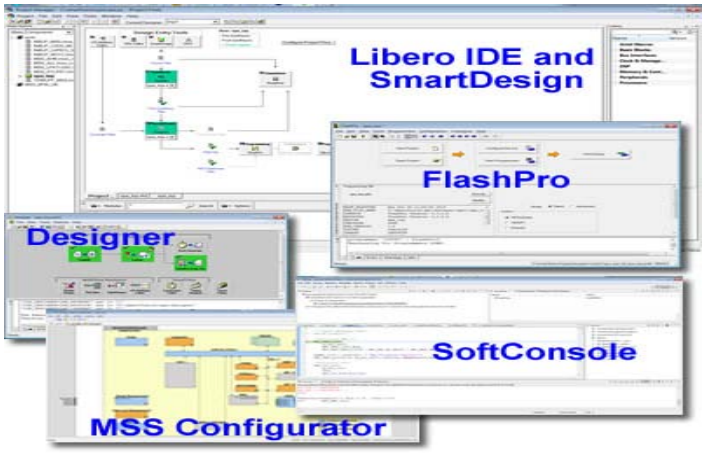
Actel Smart Fusion Evaluation Board and the Smart Fusion Integrated Development Environment





Actel evaluation system was utilized to rapidly develop a Plug and Play demonstration Application. Circuit design and control code developed in the integrated development environment.

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Demonstration of Plug and Play technology. Master controller recognizes smart sensors that are plugged in on right. Sensors pass device type and operational parameters to master controller and enables integration into overall system.