Air Force SBIR

Transition

An example of Air Force supported SBIR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.

Company Name:
EDAptive Computing, Inc., Dayton, OH

Project #1 – PAUSE Phase II

SBIR Topic Number:
AF99-138

Title:
Porting Tool Kit for A ULSI Synthesis Engineering Environment

Contract Number:
F33615-00-C-1744

Technical Project Office:
Embedded Information Systems Branch, AFRL Information Directorate

Project #2 – ESSENCE Phase II

SBIR Topic Number:
AF01-226

Title:
Electronic Sensor System Engineering and Capture Environment

Contract Number:
F33615-02-C-1163

Technical Project Office:
Multi-Chip Integration Branch, AFRL Sensors Directorate

Project #1 and #2

SPO Transition Office/Contact:
Aeronautical Enterprise System Program Office, Aeronautical Systems Center, WPAFB, OH

Application of System-Level Design Languages to Upgrade/Improve Complex Electronic Systems

- **Shortcomings in current upgrade process of legacy avionics systems are a limiting factor in sustaining warfighter capability.**
- **An important aspect in any innovative solution is the ability, to partition legacy designs so that they can be re-implemented using new technology.**

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Air Force Requirements

The Air Force is seeking innovative techniques and tools to effectively design and upgrade complex electronic systems (avionics). The cost, time, and design shortcomings existent in the current legacy avionics upgrade process has become a limiting factor in sustaining and enhancing warfighter capability. New tools and methods are needed to address a myriad of issues driving these cost, timing and performance factors. The Air Force has funded several initiatives to address the electronic parts obsolescence problem with legacy weapon systems. These initiatives have included research in the area of applying system-level design languages to improve design quality and reduce verification time in the face of increasing systems complexity.

One aspect of the problem of systems complexity is the need to effectively partition legacy designs such that they can be re-implemented using new technology. This is particularly useful when a design must be retargeted for space applications that require radiation hardening. This problem was addressed under the Porting Tool Kit for A ULSI Synthesis Engineering Environment *(PAUSE)* SBIR Phase II project sponsored by the Air Force Research Laboratory's (AFRL) Information (IF) Directorate, Embedded Information Systems Branch. A second aspect of this problem is the need to conduct precise component and system-level design trade-offs for RF systems (e.g. radar) early in the design process to improve design quality and decrease design cycle time. This problem was addressed under the Electronic Sensor System Engineering and Capture Environment *(ESSENCE)* SBIR Phase II project sponsored by AFRL's Sensors (SN) Directorate, Multi-Chip Integration Branch.

SBIR Technology

EDAptive Computing's (ECI) approach to meeting these Air Force requirements was met through the development of the EDA*STAR!*™ ("Enhanced Design Automation by Specification and Testing Against Requirements") tool suite and through the development of a design methodology that addresses these issues. The EDA*STAR!*™ tool suite is the result of multiple inter-related SBIR Phase II projects which follow the system development life cycle, and greatly aid the system designer at every step of the system development process – specification, design, development, and verification. As mentioned above, the ***PAUSE*** project addressed electronic design partitioning (design step), and the ***ESSENCE*** project addressed design capture and trade-off analysis (specification and design steps), two core features of the tool suite. Specific features of the tool suite include the ability to:

- Unambiguously capture specifications in high-level specification (computer) language
- Perform design trade-offs and simulate designs using these specifications
- Implement designs based upon these specifications
- Automatically generate tests from the specifications
- Apply tests to the new implementation to validate compliance with requirements
- Reuse specifications for future upgrades or new designs.

Air Force Technology Payoff

PAUSE and *ESSENCE* have transitioned as components of the EDA*STAR!*™ tool suite, to a Phase III project entitled Advanced Technology into Legacy Avionics Systems ("ATLAS") funded and managed by the Aeronautical Enterprise System Program Office (ASC/AAI). This effort is intended to further develop and deploy the tool suite within the Enterprise Knowledge Management system (EKM). This project will demonstrate the viability and benefits of the EDA*STAR!*™ *PAUSE* and *ESSENCE* tools. The goal of this Phase III effort is to advance the maturity of these tools from a semi-operational setting, Technology Readiness Level (TRL) 5, to TRL 7 while demonstrating cost, time and design quality improvement in an actual Air Force test case.

Company Impact

ECI was able to develop the EDA*STAR!*™ tools using SBIR funding in synergistic ways. Over $6.5M of multi-agency funding has gone into the development of the component features, and current ongoing development activities. The synergistic use of SBIR funding has resulted in a growth-oriented company that has expanded operations from a core of 5 people in 2000 to a current staff of 14 in 2004 and resulted in sales growth from $800,000 to over $2 million in 2003. Initial commercialization results include application by a large prime contractor in a military setting, and the award of a five-year Navy (NAVAIR) delivery order contract with a ceiling of over $45 million entitled Competent/COTS Upgrade Recertification Environment (CURE).

ECI has grown by applying their core competencies of research, development, electronic systems design, and systems engineering excellence in the pursuit of synergistic technologies and product development. ECI's focus on developing integrated products and techniques has largely been facilitated by successfully leveraging the SBIR program. Since FY 2000 ECI applied their core competencies to 18 Phase I SBIR contract awards resulting in a 50% transition to Phase II contracts. The SBIR program office provided venture capital that enabled ECI to develop and apply their core competencies to overcome electronic technical barriers and challenges that apply to DoD as well as private industry without having to seek outside investment. Winning a SBIR in a highly competitive marketplace afforded ECI a technical contract vehicle that encourages meeting real customers' requirements and facilitates further development and transition of this technology. ECI has directly benefited from the SBIR program's infrastructure that guided their technology from proof-of-concept to the resulting award of two Phase III contracts (ATLAS and CURE) as well as with an emerging relationship with Lockheed Martin Missiles & Fire Control team in Dallas. The Lockheed Martin (L-M) relationship has resulted in ECI's selection as a Protégé under the Air Force Mentor-Protégé program, and a commitment by L-M to accelerate commercial adoption of EDA*STAR!*™ tools within the company's many programs.

U.S. AIR FORCE

SBIR

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