Acorn Technology Systems, Inc.

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Custom Software Systems and Hardware Integration

Acorn Technology Systems is an engineering consulting company with expertise in the design and implementation of control software for complex hardware systems. Experienced in real-time and PC operating systems, Acorn can provide vertical software solutions that extend from the user interface through the Windows driver level to embedded firmware on custom hardware.

Acorn's clients receive a robust product developed quickly and with fewer defects because of an intensive system design review process. Our emphasis on incremental implementation insures that projects achieve basic functionality as soon as possible, allowing the feedback that is so important in modern development environments. Our small company size facilitates the quick response often demanded by today's rapidly changing market requirements.

Acorn has much experience in coordinating its engineering activities with other software and hardware groups in both large and small companies. We have worked effectively in both highly structured (CMM) and less formal development environments. We offer reasonable rates, for both long and short term work, while providing highly experienced and reliable engineers.

Project History

Semiconductor Ion Implanter – Axcelis Technologies, Inc.

In our most recent major project, Acorn was hired by Axcelis to be part the development team for their next generation high dose serial ion implanter. Acorn's initial responsibility was to adapt to the new platform a partially completed control framework and user interface in development for other Axcelis tools. As the project progressed, major architectural changes were incorporated to take advantage of commercially available software components in order to reduce development costs and to shorten the schedule. Acorn took a leading role in designing and implementing the interfaces to these new components in order to minimize the rework needed to already completed modules.

Another significant area of Acorn's work involved the deployment and launching of the software on customer tools, in-house simulators, and developer workstations. The tool control system runs on 4 separate computers and installing new releases and switching between releases (an important customer use case) is a difficult problem. Acorn designed and developed a suite of supervisory and management programs and scripts to automate all aspects of this complex requirement.

Tools and Technologies:
C++, C#, Visual Studio 2005, FactoryLink PAK, Win32 Platform SDK, Windows DDK, ActiveX, COM, Visual Basic .Net, TCP/IP, CORBA, SEMI standards, Java Swing, Clearcase Configuration Management, FinalBuilder build engine, ExtraView Change Management.

Scanning Electron Microscope Image Capture – Acorn Technology Systems

In order to capitalize on its scanning electron microscope experience, Acorn has developed a product family designed to add digital imaging capabilities to the large installed base of analog SEMs. The first product was based around a commercially available frame grabber and is intended for SEMs with standard TV rate video available.

The second product includes custom designed hardware capable of acquiring high resolution video images at variable scanning rates. Captured video is transferred to the PC in real time via a USB interface.

Both products utilize a common user interface which provides real-time image display and image storage in standard file formats. The software also includes image annotation and feature measurement capabilities.

Tools and Technologies:
C#, Visual Studio 2005, C++, Windows DDK, 8051 Embedded C, Cypress PSoC Designer, WinCUPL.

High Accuracy Tachometer – US Navy

As a subcontractor to Barbour Stockwell, Inc., Acorn designed and developed an ultra high accuracy tachometer, a critical component in a spin resonance test system for US Navy turbine rotors. No commercial product was available to meet the Navy's requirements of 20 measurements per second with an accuracy of .001% and a resolution of .1 RPM over a speed range of 1,000 to 100,000 RPM. The deliverables for this project consisted of a functioning prototype and a complete set of hardware and software documentation including all engineering drawings and source code.

Tools and Technologies:
C, Assembly language, Cypress PSoC Designer, WinCUPL, Visual Basic, Modbus.

Semiconductor Wafer Defect Review – Acorn/KLA-Tencor, Inc.

Based on industry and client specifications, Acorn designed and co-funded the development of a defect review application for the ev300 electron beam wafer inspection platform. This multi-threaded program contained intermediate level drivers to add functionality to other system components, a job sequencer to perform automated and semi-automated inspections including automatic defect localization and both visual and x-ray classification, data interfaces for both incoming defect locations and outgoing classification results, and an I300I implementation for remote communication with the factory host computer.

The comprehensive user interface provided display of the complete status of the tool at all times, user friendly screens for recipe and job setup, control screens for automatic, semi-automatic, and manual inspection of defects, and analysis screens to review data and images from completed jobs.

Tools and Technologies:
C++, Visual Studio 6, Windows Platform SDK, MFC, Windows DDK, ActiveX, COM, ATL, Visual Basic, TCP/IP, SEMI standards for communication, material management, and job control.

ev300 Defect Review Tool – KLA-Tencor, Inc.

Working jointly with the new e-beam review division of KLA-Tencor (formerly AMRAY, Inc.), Acorn helped develop the first generation ev300 automated 300 mm. wafer defect inspection tool. Acorn took responsibility for the overall software architecture and system design of the platform

and coordinated the integration and enhancement of previously existing subsystems along with newly developed hardware and software.

Acorn's implementation responsibilities included the control of a robotic wafer transfer system, the development of a motor stage control package capable of positioning a 300 millimeter wafer with 1 micron accuracy, and the coding of algorithms for automated electron beam and video acquisition set up.

Tools and Technologies:
VME, VxWorks, Tornado, Motorola 68000 embedded, x86 assembly language.

High Speed Turbine Controller – Barbour Stockwell, Inc.

Barbour Stockwell is a manufacturer of air and steam powered turbines for testing laboratories and industry. Under contract, Acorn developed, prototyped, and designed for manufacture a microprocessor-based turbine controller. The unit employed an adaptive, closed-loop servo algorithm capable of controlling turbines of any size from 500 to 200,000 RPM with .05% accuracy. It could be operated manually from the front panel or by a remote computer over an RS-232 serial interface.

After the development phase, Acorn supplied manufactured units to BSI for the lifetime of the product. We delivered fully-assembled and tested controllers for sale to their end-users., and provided warranty service and special software options when needed.

Tools and Technologies:
Z80 Assembly language, RS-232 interface, Visual Basic.

Linewidth Measurement System – National Bureau of Standards

Acorn designed and constructed to NBS specifications an integrated linewidth measurement system that will be used to calibrate measurement standards for the semi-conductor industry. The system consists of an electron microscope interface, an automatic mechanical and piezo-electric stage positioner with laser interferometer, and a control computer console for operator interface and data storage.

Tools and Technologies:
C and Assembly language, interferometer and SEM interfaces.

Gyroscope Test System – GE Aircraft Instruments Division

From GE specifications, Acorn designed and implemented the software to control a microcomputer based test station for semi-automatic MIL-SPEC certification of in-flight gyroscopes. The C program contained drivers for hardware interfaces to instrumentation sensors and controls, performed both static and dynamic tests with data acquisition and reduction, and provided a menu-driven user-interface with printed reports and graphs.

Tools and Technologies:
C and Assembly language, SDLC communication.

SEM Control System – AMRAY, Inc.

AMRAY, our first major client, hired Acorn to introduce microprocessor technology into their scanning electron microscope control system. The overall goal was to add capability and increase the performance, reliability, and usability of the instrument. Early projects included micrograph image annotation and high-voltage, magnification, lens, and motor stage control.

After much of the control system had been digitized, Acorn integrated a third-party frame buffer into the video system, allowing AMRAY to become the first manufacturer in the world to offer digital imaging capability on an SEM.

In later work, Acorn helped AMRAY adapt their product line for use by the semiconductor industry by developing a high throughput loadlock and cassette to cassette wafer transfer system.

Acorn's relationship with AMRAY spanned over 20 years, survived their acquisition by KLA-Tencor, and ended only when KLA decided to close the Bedford facility and move the division to California.

Tools and Technologies:
Starting with 8-bit microprocessor assembly language, and too much more to list.

Company Background

Acorn Technology Systems was established in 1980 to provide engineering services in the 'new' field of microprocessor based electronic systems. In that pursuit, Acorn has developed an expertise in the design and implementation of hardware and software control systems used to effect image capture, electron beam scanning, precision motor stage control, system communications, and turbine control.

Acorn's expertise in software system design grew as requirements for automated system control and operator ease-of-use increased. Using C, Visual Basic, C++, MFC, COM, ActiveX, and now the managed code .Net framework, Acorn has designed and delivered a wide range of projects to large and small companies.

In 2001, we moved to our present location in Devens, Massachusetts. Devens is the site of the old Fort Devens army base, which is now a planned business and residential community. Devens is about an hour's drive west of Boston on route 2.

Personnel

Our team of software and design engineers has been together for over 20 years. We are all partners in the company – the newest having joined in 1986 – and enjoy a close working relationship. The organization is an informal, agile, and highly productive enterprise that allows us to provide a very high level of direct support to our clients. In addition, we enjoy the work opportunities that are presented in the areas of science and technology.

William Lemiszki, BSEE, MIT, 1972
Bill is the Director of Engineering and a founder of the company. His principle duties include software architecture and design as well as serving as the lead programmer of our most complex projects.

Bill's specialties include object oriented system analysis, user interface design for machine control applications, and technical documentation.

Previously he was the Director of Engineering at Lebow Labs, a company specializing in the design and installation of commercial audio and video systems.

John Richardson, Ph.D. Physics, MIT, 1976
John is a senior software engineer who is responsible for most of our math and science oriented algorithms. He also specializes in the implementation of custom Windows device drivers.

Dr. Richardson studied physics at M.I.T., where he pursued experimental research, including the development of a soft x-ray detector for an x-ray astronomy satellite. John's interest in computers began with the analysis of data from this instrument.

Previously he was Staff Scientist at M.I.T. Lincoln Laboratories and Post-doctoral Fellow at M.I.T. Center for Space Research.

Dwight Calhoun, BSEE, Tufts University, 1976
Dwight is our main project manager and front line system integrator and tester. As a systems engineer, he's experienced at the matching of software to the operation of hardware. He designs and writes test, diagnostic, verification and deployment software and performs the SQA role in our projects.

Dwight's engineering interests are in test instrumentation, real-time simulation, testability of PC designs, and issues of customer usability with software applications.

Previously he was Director of Engineering at Metro Computer, Customer Support Engineer at BTX, Assistant Professor at Franklin Institute, Chief Engineer at Lebow Labs, and worked on defensive missile maintenance for the Air Force.