

**Robert F. Allen**  
**Senior Associate**

**Professional Profile**

Mr. Robert F. Allen is a Senior Associate in Exponent's Technology Development practice. Mr. Allen has over 28 years experience in modular and embedded systems electronics, software, mechanical and optical components, and system design down to the component level. He has over 6 years of direct military experience and continuous experience, in excess of 30 years as a systems designer and architect for automation and test systems and embedded solutions. His major fields include Aerospace, Defense, Automated Manufacturing, Semiconductor, Medical, Optical Special Effects and Industrial Cameras, Agriculture, Robotics, Machine Vision, and Basic Research. Mr. Allen has been awarded 16 patents in Semiconductor, CMP equipment design and vehicle tracking.

**Academic Credentials and Professional Honors**

B.S., Electrical Engineering, Arizona State University, 1980

Phi Theta Kappa National Honor Fraternity, Omega Upsilon Chapter

**Licenses and Certifications**

Open Water Diver PADI #0102C65211  
Advanced Open Water Diver SDI #48005

**Patents**

U.S. Patent 6,892,131: Vehicle tracking, communication and fleet management system, issued May 10, 2005 (J. Coffee, R. Allen, et al.).

U.S. Patent 6,611,755: Vehicle tracking, communication and fleet management system, issued August 26, 2003 (J. Coffee, R. Allen, et al.).

U.S. Patent 6,364,745: Mapping system for semiconductor wafer cassettes, issued April 2, 2002 (J.R. Gonzalez-Martin, C. Karlsrud, R. Allen, T. Jordan, C. Howard, A. Hamer, J Cunnane, P. Gopalan, B. Thornton, J. Macernie, F. Calderon).

U.S. Patent 6,356,091: Automatic wafer mapping in a wet environment on a wafer cleaner, issued March 12, 2002 (J. Nimtz, T. Jordan, R. Allen).

U.S. Patent 6,350,177: Combined CMP and Wafer Cleaning Apparatus and Associated Methods, issued February 26, 2002 (J. Gonzalez, C. Karlsrud, R. Allen, T. Jordan, C. Howard, A. Hamer, J. Cunnane, P. Gopalan, B. Thornton, J. Macernie, F. Calderon).

U.S. Patent 6,296,546: Index Table and Drive Mechanism for a Chemical Mechanical Planarization Machine, October 2, 2001 (R. Allen, T. Jordan).

U.S. Patent 6,292,708: Distributed Control System for a Wafer Processing Machine (Auriga), issued September 18, 2001 (R. Allen, T. Jordan).

U.S. Patent 6,213,853: Integral Machine for Polishing, Cleaning, Rinsing and Drying Workpieces, issued April 10, 2001 (J.R Gonzalez-Martin, C. Karlsrud, R. Allen, T. Jordan, C. Howard, A. Hamer, J. Cunnane, P. Gopalan, B. Thornton, J. Macernie, F. Calderon).

U.S. Patent 6,190,118: Tilt Mechanism for Wafer Cassette, issued February 20, 2001 (R. Allen, R.T. Jordan).

U.S. Patent 6,033,521: Tilt Mechanism for Wafer Cassette, issued March 7, 2000 (R. Allen, R.T. Jordan).

U.S. Patent 5,975,986: Index Table and Drive Mechanism for a CMP Machine, issued November 2, 1999 (R. Allen, T. Jordan).

U.S. Patent 5,961,369: M & A for the In Process Detection of Workpieces with Monochromatic Light Source, issued October 5, 1999 (A. Bartels, R. Allen, P. Holzapfel, W. Lin).

U.S. Patent 5,933,289: M & A For the in Process Detection of Workpieces in a CMP Environment, issued November 30, 1999 (R. Allen, P. Holzaphel, A. Bartels, W. Lin).

U.S. Patent 5,834,645: M & A for In-Process Detection of Workpieces with a Contact Probe, issued November 10, 1998 (A. Bartels, R. Allen, C. Karlsrud, J. Mosca).

U.S. Patent 5,823,853: M & A for the In Process Detection of Workpieces with Monochromatic Light Source, issued October 20, 1998 (A. Bartels, R. Allen, C. Karlsrud, J Mosca).

U.S. Patent 5,733,171: M & A for the in Process Detection of Workpieces in a CMP Environment, issued March 31, 1998 (B. Allen, P. Holzapfel, A. Bartels, w. Lin).

## **Presentations**

Allen RF. Hydraulic control system migration to a redundant 414H/C230/WinCC platform. Presentation, Siemens Automation Summit 2007, Orlando, FL, June 12–15, 2007.

Allen RF. Upgrade of legacy process control system. Presentation, Siemens Automation Summit, Las Vegas, NV, June 6–8, 2006.

Allen RF. Using LOGO and MicroPLC's in Halloween haunted houses. Presentation, Siemens Automation Summit, Las Vegas, NV, June 6–8, 2006.

## **Prior Experience**

CTO/VP, ROI Automation Inc., 2003–2008

Senior Engineer, Systems and Controls Development, Ktech Corp, 2001–2002

R&D Manager, Advanced Packaging Systems, Motorola Manufacturing Solutions, 2000–2001

SpeedFam Corporation, Senior Staff Engineer, Manufacturing Engineering, Senior Staff Engineer,

Strategic Product Development, Development Engineering Manager, Research and Development, 1991–2000

## **Project Experience**

### *Entertainment*

Major Las Vegas Casino/Resort theatrical show—Hydraulic control and motion control and SCADA for main stage hydraulic controls and monitoring. System is redundant high availability PLC and hydraulic servo. I/O is triple and quintuple redundant with 2oo3 and 4oo5 voting for continued operation during single point failure at any hardware point or process.

### *Medical*

Uroflow meter; bladder stone disintegrator, blood bowl solvent bonder; birth-control pill carrier assembly tool; Artificial lens insertion tool force tester; Silicon transfer print fixtures, misc. fixtures and tools.

### *Defense*

- Major National Laboratories – PVDF Tactile sensor development test system and data acquisition system, Optical target point light source control system.
- Major Defense Systems Division AP/AT mine power supply pin insertion machine, AP/AT mine fuse circuit board pin insertion and swaging machine.

### *Aerospace*

- Automated robotic system for application of anti-oxidizing coatings for aircraft brake media
- Ultrasonic Wave Velocity test system for aircraft carbon brake preforms
- Aircraft Turbine Engines Materials High Temperature Corrosion Test System
- Spectroscopic Oil Analysis Program Robotic particulate recovery cell
- Fluidized bed for rapid temperature cycle of turbine wheels, ADATS auto test stand
- High Pressure High temperature Burner Rig for Ceramics testing
- Ring laser gyro dither motor assembly machine

- Wire-wrap back plane assembly and test; multilayer PCB test, wire harness assembly and test, power thyristor test system, circuit test probe design and assembly
- F-16 fighter canopy optical deviation measurement system
- Very large aircraft flap extension transmission test system
- Explosive actuator computer controlled load press
- Flow meter calibration bench, Flow control PROM burner system
- Manufacturing cell monitoring and scheduling system

### *Automotive*

- Automotive junction center press line controls, Junction center female-female terminal insertion machine
- Automotive airbag inflator assembly cell monitoring and control system with factory host interface system
- Automotive steering rate sensor environmental test chamber; Steering sensor load/dump and decay test system

### *Semiconductor and Computer*

- Wafer Level Solder Sphere Attach (WLBGA)
- High density singulation of device substrates
- Device visual and electrical test
- Wafer level packaging for transport
- Substrate Solder Sphere attach (BGA)
- Large computer MOS memory board level test system, SCR  $d_v/d_t$  tester,  $T_{rr}/t_q$  tester, wired harness manufacturing boards, cable test systems, laser substrate trimmer, wire-wrap backplane pinner machine, miscellaneous custom assembly machines and testers
- RF discreet device eutectic die bonder, Automated High Speed IC chip handler
- Wafer planarization system, Advanced wafer planarization system, Advanced wafer planarization system with integrated wafer clean and dry system (150mm and 200mm), Standalone test fixtures for test, calibration and source inspection of major CMP equipment modules
- Semiconductor chip carrier singulation tool Automation PLC software debug

### *General Industry*

- School bus Stop Arm violation monitoring system with real-time student monitoring
- Real-time motion diction of vehicle velocity and position relative to school busses when they are stopped to load/unload students
- Real-time GPS and vehicle sensor logging for conviction data logging are tagged to violation imagery
- Automated wireless connection and download of imagery and data for violation determination and student monitoring
- Complete database processing of violations with database mining of vehicle registration databases for driver identification and notification

- Handheld GPS embedded applications in cell phones
- GPS monitoring and tracking of Construction assets, web application, embedded cell phone
- Chemical manufacturing palletizer control system
- Computer controlled automated extrusion cutoff saw
- Automated standalone aluminum can recycling machine remote telephone control and monitoring system

#### *Petroleum Industry*

- Major railroad refueling center control system
- Major airport fuel tank farm control, monitoring and inventory system

#### *Photographic and Special Effects Cameras*

- Developed and programmed the control system for a Computerized Multi-Format Camera System, the first totally computer controlled 11 axis industrial Rostrum Camera System with digital autofocus
- Added four new computerized camera products that boosted the manufacturer into the world leadership in industrial camera systems

#### *Agriculture*

- Surveillance and security for dairy farms
- Developed remote sensing ground truth radiometer data acquisition system to relate ground truth data to LandSat data; developed automated volumetric open channel irrigation monitoring and control; developed thermoelectric sensors and sources for energy monitoring and generation in greenhouse CO2 applications; assisted scientists and engineers in collecting and analyzing data for agricultural response models