

## **JOHN W. RAYNES, P.E.**

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### **Raynes Engineering, Inc. (1996 - Present)**

#### **President and Senior Design Engineer – Consulting Engineering**

Founded, and continue to manage, an engineering business specializing in industrial automation, instrumentation, and control systems and electronic design. Projects undertaken have included:

Development of measurement and control systems for manufacturing:

- Complete overhaul/upgrade of the controls on a 100,000 sq.ft. existing warehouse automated conveyor and sorting system, using an array of distributed networked PLCs, device interfaces, and supervisory HMIs. Conversions were planned and executed with no stoppage of regular production. Box throughput increased by close to an order of magnitude
- Network of supervisory Windows PCs, programmed in Visual Basic, for data-driven control and management of a fully automated stamping, milling, and engraving fabrication line
- Controls for a network of 30 workcell-based electrochemical plating stations. Design uses a direct interface from PLCs to programmable power supplies through a custom serial interface
- Network of PLCs with supervisory PCs, for controlling and managing eight warehouse material load/unload stations, coordinated with a network of two-story pallet storage cranes
- Windows PC interface for running a network of individually operated laser engraving stations, obtaining engraving data in real time from a central plant orders database
- Seven-oven temperature profiling, control and monitoring station using a single PLC
- Real time Windows PC graphical interface for monitoring motion control systems
- PC-based customized measurement data collection and translation programs, interfacing to Process Control databases and software
- Instrumentation stations, for collection of high speed profile data from PLCs and data acquisition boards, to store in Microsoft Access and SQL Server databases
- PLC-based package dimensional measuring station integrated with plant shipping software
- PLC ladder-logic programming for automated catheter manufacturing machines

Datalogger-based collection and display systems, for tracking power generation from commercial solar photovoltaic arrays (hardware/sensor assembly, datalogger programming, on-site installation)

Design of pressure transducer interface circuits and systems for numerous biomedical pressure sensor catheter products over a 25 year period. Extensive experience with sensor compensation circuit designs and full manufacturing implementation, including passive network, active circuit, and digital methods.

Design and programming of a Bluetooth Low Energy micropower sensor interface to collect pressure, ECG and temperature measurements for critical care applications

#### **Solar Design, Sales, and Installation (RE Solar)**

From 2000-2008, established and ran a secondary business (doing business as RE Solar), specializing in the design, sales and installation of solar photovoltaic, wind, and micro hydro electric power systems for residences and small businesses. This business serviced the South Central Utah area from an office in Torrey, Utah.

## **Becton Dickinson, Sandy, Utah (1988 - 1996)**

### **Process and Automation Engineer - Medical Products**

Developed process measurement and feedback control for high volume catheter manufacturing  
Programmed Allen Bradley PLC-based automated catheter manufacturing machines  
Developed applications for acquiring critical experimental and production data, to determine the effects of machine performance on product quality

### **Product Design Engineer - Transducer Systems**

Long term R&D development effort to develop a catheter tip micro pressure transducer and interface, for invasive arterial blood pressure measurement:

- Developed a micropowered transducer interface with simulated Wheatstone bridge response.
- Designed transducer test systems, including and integrated database/report generation system
- Oversight of external silicon microsensor development and fabrication

## **Catalyst Research Div. of Mine Safety Appliances, Owings Mills, MD (1983 - 1988)**

Project manager for the development of an 8086 based CO<sub>2</sub> analyzer and a pulse oximeter  
Other design projects:

- Automated battery test consoles, plant instrumentation for production and process control
- Electrochemical gas sensor cell QC test system, for testing O<sub>2</sub>, CO, EtO and H<sub>2</sub>S sensors
- Automated PC board functional test systems

## **EMC Controls, Inc., Hunt Valley, MD (1981 - 1983)**

Specified and configured system hardware for VAX-based distributed control systems (DCS)  
Specified site installation requirements for DCS power and signal conditioning  
Coordinated manufacturing, hardware integration and acceptance testing

## **EIL Instruments, Incorporated, Sparks, MD (1977 - 1981)**

Design of circuit breaker and protective relay test instruments, up to 60,000 amps test capacity  
Field Application Engineer – testing of power distribution systems up to 34KV  
Customized, repaired, and calibrated analog and digital panel board meters and power meters

## **EDUCATION**

**Virginia Tech, Blacksburg, VA** - Bachelor of Science, Electrical Engineering, December, 1979

## **PROFESSIONAL CERTIFICATIONS AND AFFILIATIONS**

**Registered Professional Engineer, State of Virginia, License# 0402055870**  
**Automation Direct System Integrator**

**Institute of Electrical and Electronic Engineers (IEEE) - Present**

**Instrument Society of America (ISA) - Present**

**North American Board of Certified Energy Practitioners (NABCEP) - Past**

**Association for the Advancement of Medical Instrumentation (AAMI) - Past**

## **PATENTS/PUBLICATIONS**

U.S. Patent 5,146,788 and 5,866,821, “Apparatus and Method for a Temperature Compensation of a Catheter Tip Pressure Transducer”

U.S. Patent 5,460,183, “Switchable Filter for Rezeroing an in vivo Pressure Transducer”

U.S. Patent 5,568,815, “Self-Powered Interface Circuit for Use with a Transducer Sensor”