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Project Portfolio

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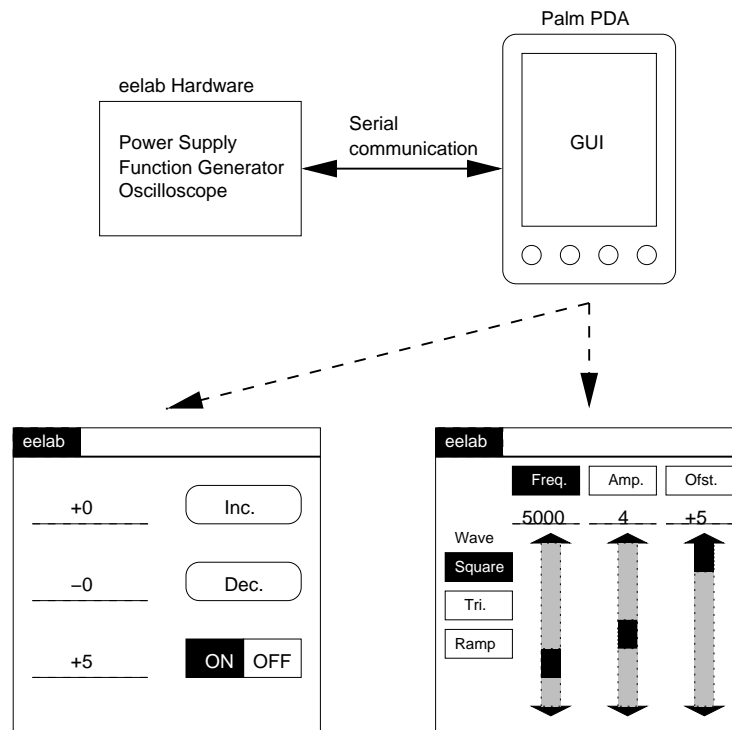
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Instrumentation GUI

Challenge:

PDA control for instrumentation hardware.



Solution:

Palm OSTM GUI written in C using GNU PRC-Tools.

Communicate with hardware via serial interface, mimic original PC GUI.

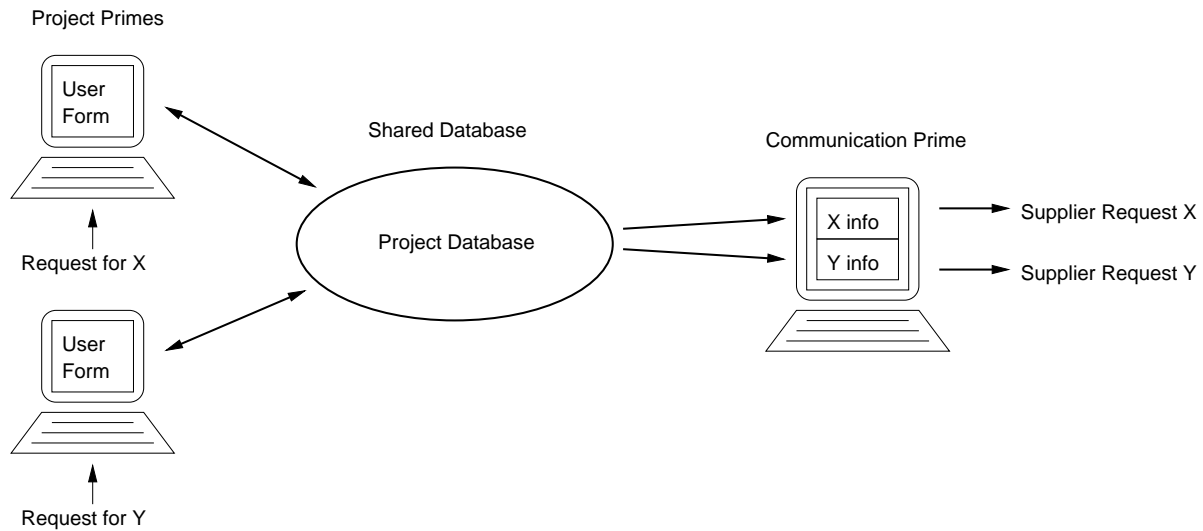
Result:

Successful control of *eelab* Power Supply and Function Generator modules; reduced footprint and cost of overall project (PDA replaces PC as controller).

Project Sharing Database

Challenge:

Formalize supplier documentation requests for a Supply Management team.



Solution:

Developed MS Access database with specific interfaces for various team members. Project Primes request documentation through user form; queue created for Communication Prime to seek documents and deliver to requestor.

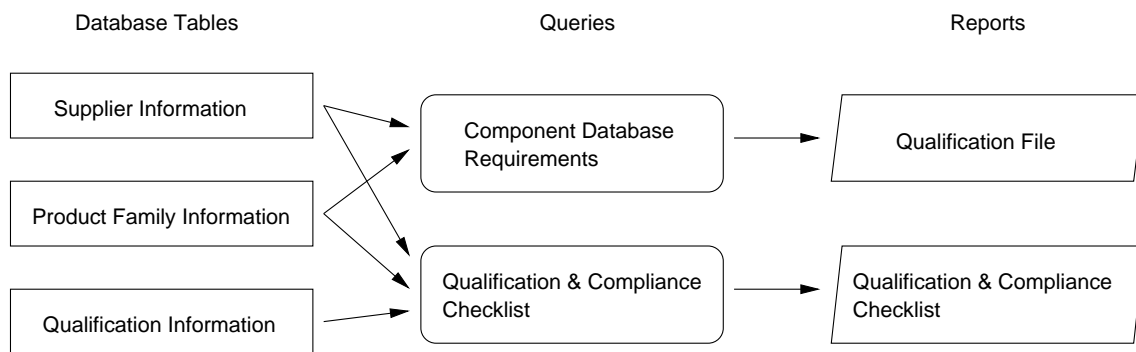
Result:

Project info and updates immediately available to all team members. Single point of contact benefits suppliers.

Product Family Qualification Database

Challenge:

Develop a formal process for qualifying a family of products for a Supply Management team.



Solution:

Developed MS Access database to automatically combine product and qualification/compliance information. Query database for required compliance and qualification references for individual parts, and generate hard copy reports for data entry and filing.

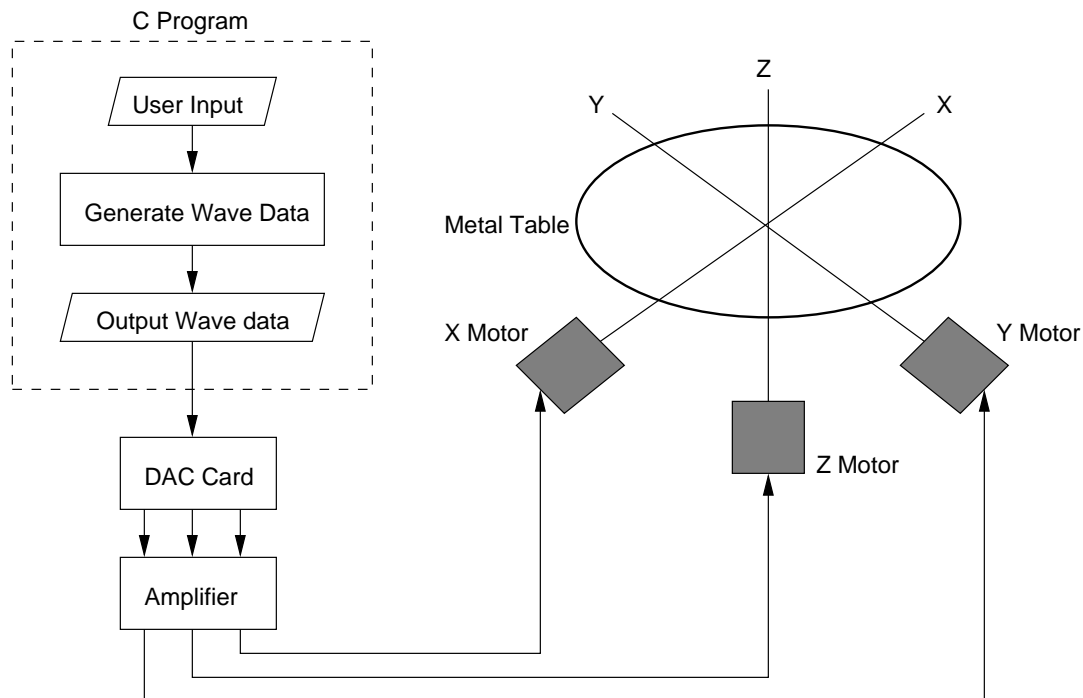
Result:

All required information cross-referenced in database for easy review; automatic report generation reduced qualification activity time by 50%.

Vibrating Table Software

Challenge:

Automate tri-axi vibration of a metal table for parts placement and sorting.



Solution:

Wrote a C program to accept trajectory information from user, generate appropriate sinusoidal wave data and send to Digital-Analog Converter card.

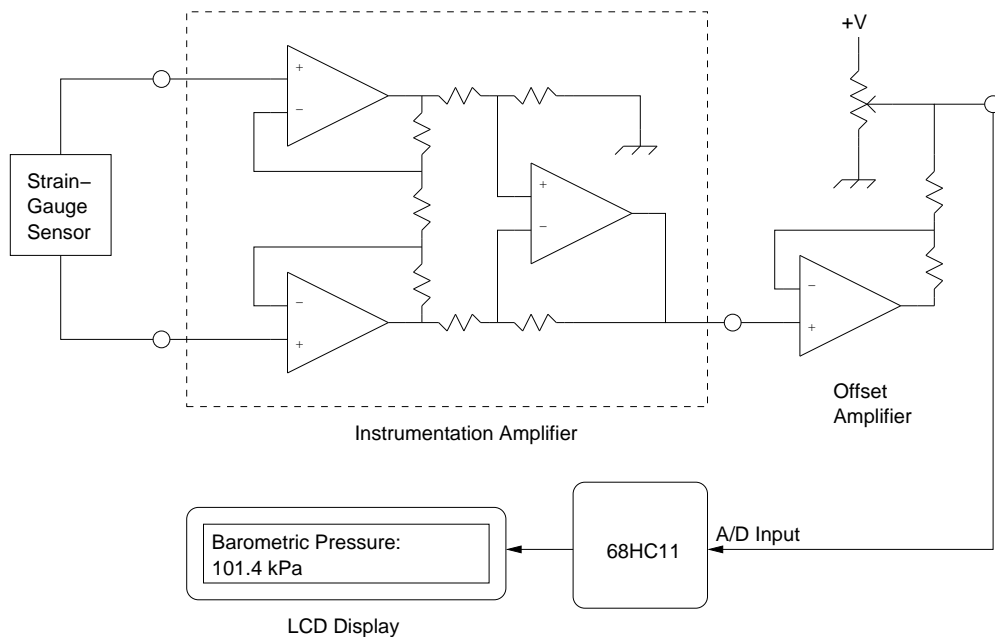
Result:

Initial requirements successfully met. Computer replaced manual trajectory adjustment, allowing for experimentation toward an expert system.

Electronic Barometric Pressure Sensor

Challenge:

Utilize a microprocessor to determine the ambient air pressure.



Solution:

Analog interface circuit amplifies voltage from strain-gauge pressure sensor for compatibility with microprocessor's A/D converter. Floating-point math package used in software to calculate pressure, used timers and interrupts to update reading; written in assembly.

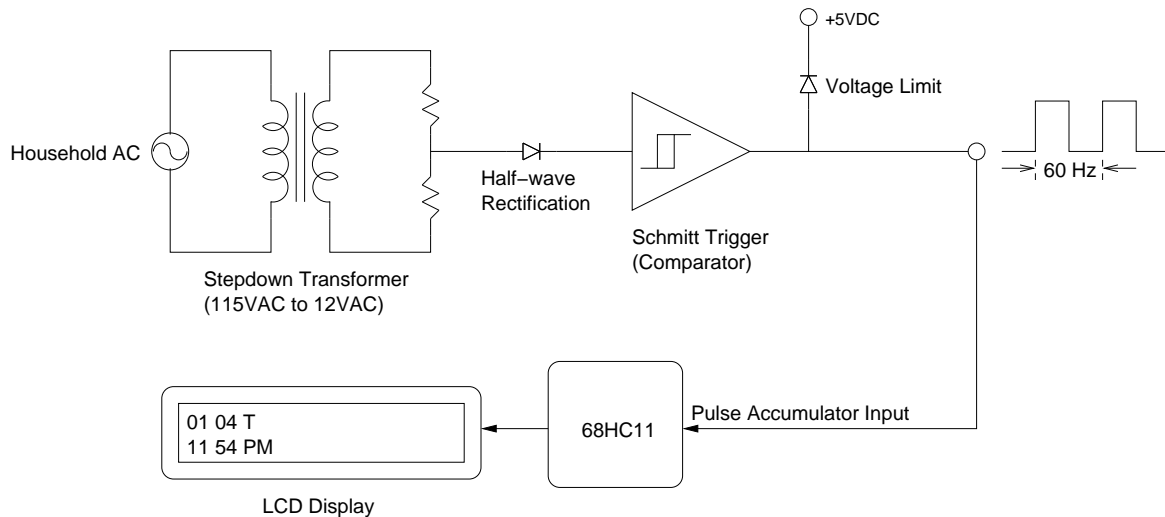
Result:

Reliable and repeatable barometric pressure readings between 87.5 and 112.5 kPa, with 0.1 kPa precision. Off-the-shelf parts keep cost low.

Real-Time Clock

Challenge:

Utilize a microprocessor for an accurate time keeping application.



Solution:

Analog interface circuit converts household AC voltage into low voltage pulse train for microprocessor input. Software keeps time via pulse accumulator and interrupts; written in assembly.

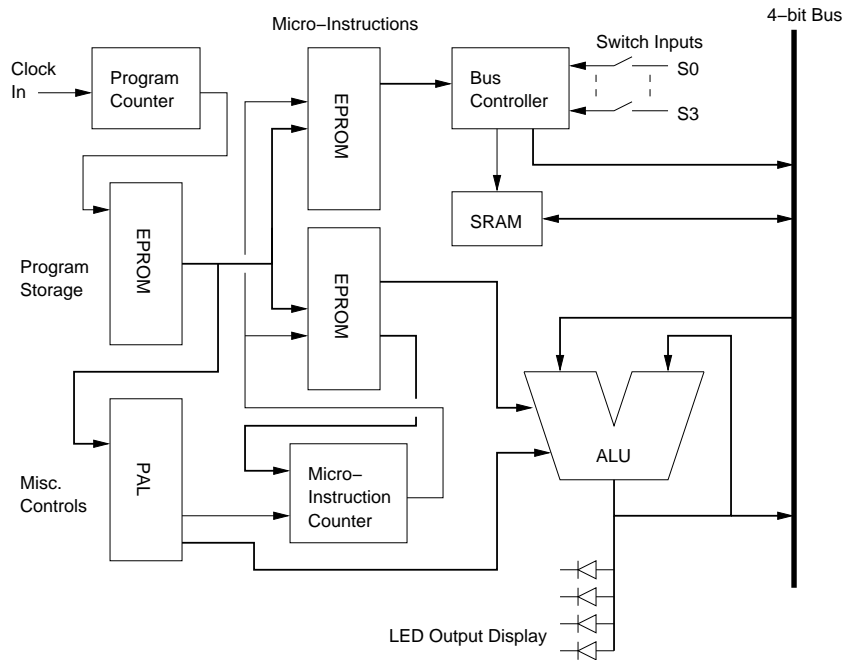
Result:

A multi-purpose digital clock accurate to $\pm 1/60s$, capable of triggering other software events and external hardware events via I/O pins. Off-the-shelf and recycled parts keep cost low.

4-Bit Microprocessor

Challenge:

Build a programmable processor module to demonstrate various micro-computer attributes.



Solution:

Programmable devices store programs and micro-instructions, interfaced with a functional data path comprised of readily available logic devices (PC, ALU, Bus Controller, etc.). Simple user interface provided via toggle switches and LEDs.

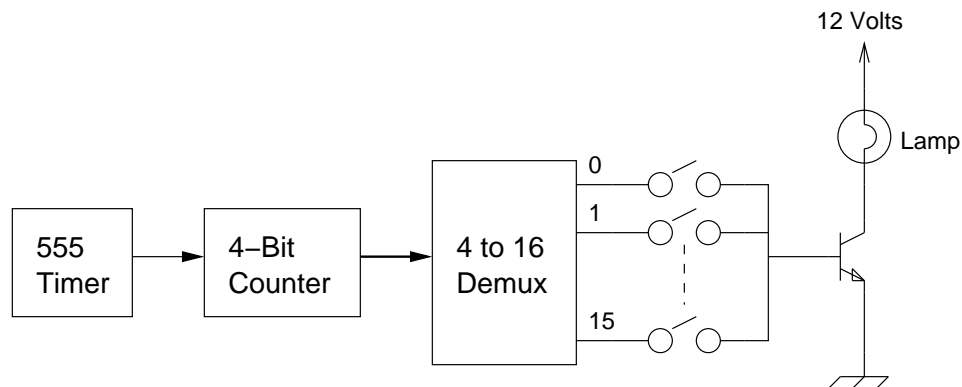
Results:

4-bit processor capable of storing and executing simple 16-step programs demonstrating data input, output, manipulation, and storage.

Theatre “Fire” Effect

Challenge:

A theatre effect for a small fire in a bucket.



Solution:

Simple digital circuit creates 16-step sequence that can be “programmed” with switches for “random” lamp flicker.

Result:

Constructed by theatre technician with easily obtained components and used successfully in student stage production.