The "Sac State 8008": The First Microcomputer?

Contributed by Bruce Damer

Figure 1: The complete "Sac State 8008" artifacts as donated by Bill Pentz

In April of this year, I presented a talk and exhibit of some pretty unique computing artifacts to the attendees at the 35th annual Asilomar Microcomputer Workshop. This is the story of the artifacts and the resulting ongoing intense dialogue in the microcomputer history community.

The DigiBarn Computer Museum, located in the redwood-forested Santa Cruz Mountains next to Silicon Valley in Northern California, is specialized in the medium of personal, interactive computing featuring artifacts as diverse as early 20th century manual Comptometers, to the LINC of the 1960s, Xerox workstations such as the Alto, the homebrew computing revolution of the 1970s, and the commercialization of personal computing and networks from the 1980s to the present. The artifacts in the physical collection are supplemented by a large scale cyber-artifact and oral history project on the project web site at: http://www.digibarn.com .

One of the most exciting new dontations arrived in the Summer of 2008 when a gentleman by the name of Bill Pentz paid a visit. Bill has had a long career in computing, and during one phase in the early 1970s he claimed to have lead a project to create what he thought might have been the first completely built-out computer based on a microprocessor, a kind of "ur-microcomputer". I had been impressed with his story, and when Bill later returned with the actual artifacts (discovered after decades in friend's basement) the story got even more interesting.

What was donated to our collections were the boards for a complete system but with no peripherals (see figure 1), including: front panel, processor board with Intel 8008, a board for 8K of RAM and 1702 PROMS which Bill described as containing an IBM Basic Assembly Language (BAL) emulation and a primitive Disk Operating System (DOS) supporting drivers for a 3MB removable hard drive, serial communications interface, tape interface, TTY interface and most importantly, the then new Tektronix 4023 color raster graphics terminal housing the boards in an L-shaped extender. As this project was carried out at California State University Sacramento I took to calling this the "Sac State 8008".

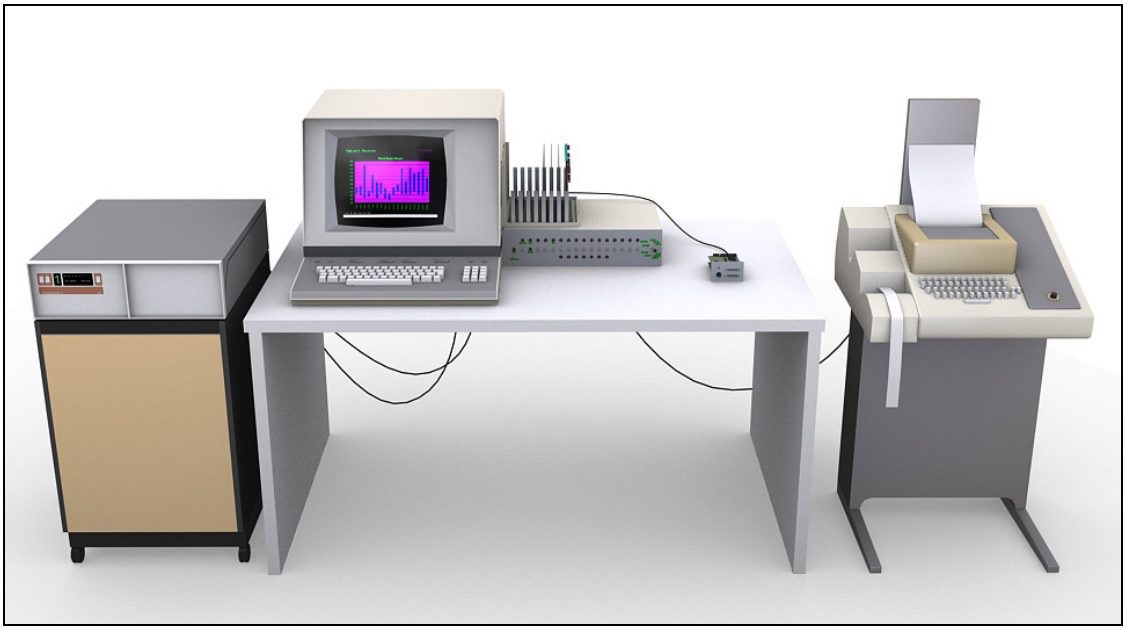

Figure 2: The 3D reconstruction of the “Sac State 8008” microcomputer circa 1972-73 (credit: Ryan Norkus)

In order to visualize how this system might have looked in action, a colleague generated a 3D reconstruction, seen in figure 2. While Bill stated that this looked “way too clean, it was much messier” we had the basic components right, with: (left to right), the Memorex 630 hard drive; the Tektronix 4023 with card extender and front switch panel to control the microcomputer; the serial interface; and ASR-33 with paper tape reader/punch and printer.

Bill stated that the artifacts represented the fifth version of what began as wire wraps in the Spring of 1972 to try to get the 8 bit Intel 8008 processor donated to the university to actually do something. Working with something so fast and so new (with unpredictable timing) proved difficult until Tektronix, one of the best electronics firms in the world, stepped in and helped the Sac State team by engineering many of the boards and providing many more off the shelf parts including the 4023 terminal. No firm or hobbyist then experimenting with the 8008 (or 4004) had this level of support.

The goal of the project was to support the the COMERs (COmputerized MEdical REcords System) system commissioned by Garry Gordon, MD who was president of the American Medical Preventics Society. With the heroic efforts of many at the Sac State Computer Science/School of Engineering, Tektronix and Intel what emerged by the Spring or Summer of 1973 was a complete system able to support the management of tens of thousands of patient records on the hard disk, serial I/O to and from a mainframe, and display of color statistical outputs on the 4023 terminal. Indeed this system, fully two years before the arrival of the MITS Altair 8800 and the beginning of the Homebrew Computer Club, was a more complete microcomputer than would exist until the late 1970s.

Figure 3: Bill Pentz (left) in the DigiBarn explaining the 8008 project to Stan Mazor

I set about trying to test the veracity of Bill's "first PC" claim by presenting the system and in some cases, Bill himself, to historical players and experts in the community. A meeting at the Computer History Museum in Mountain View garnered some interest from the curators there. An open house at the Digibarn afforded Bill (figure 3, left) to meet Stan Mazor (figure 3, right) who was a co-designer of the Intel 4004 and a contributor to the 8008. Stan was also impressed but didn't shed much light on Bill's specific application of the 8008.


Figure 4: Lee Felsenstein, commenting on the Sac State 8008 system at the Asilomar Microcomputer Workshop

Finally, let us now return to where we started out with the well-informed and opinionated attendees at Asilomar. Following my talk on the Sac State 8008 several people came into the demo room to inspect the actual 8008 artifacts. Among them were John Wharton (expert on Gary Kildall and early microcomputers), Bob Frankston (co-creator of Visicalc) and Lee Felsenstein. Lee had the best knowledge of the early microcomputer movement having chaired the Homebrew Computer Club starting in 1975. He was familiar with earlier systems such as Gordon French's attempts to build an 8008-based system. He was impressed by the artifacts stating "this device was… obviously the first full computer built from a microprocessor, the 8008". Lee went on to expound how the existence of this machine might or might not have changed microcomputer history. Bill Pentz viewed a video we posted on Lee and Bob's commentary and followed up with commentary of his own on how innovations from the Sac

State project did propagate into the community, influencing Gary Kildall's CP/M, Bill Gates and Paul Allen's BASIC and much more. The discussion continues today on our web site, which includes full descriptions and interviews with Bill Pentz and others, photographs of the artifacts, specs and related history, at:
http://digibarn.com/stories/bill-pentz-story/index.html

I would like to invite anyone who has personal experience, artifacts or other knowledge of this phase of very early microcomputers to get in touch with me directly at bdamer@digitalspace.com.