Memories From IBM 370 to ARM

Pete Harrod, *Arm, CB1 9NJ, Cambridge, U.K.*

My entire career has been closely tied up with the microprocessor, and this 50th anniversary has given me cause to think back and celebrate how far it has come. My first exposure to a computer was in 1973 in my first year at the University of the Witwatersrand, writing Fortran programs on punched cards and running them on an IBM 370 mainframe. But by the time I got to my final year in 1976, the Electrical Engineering Department had purchased an Intel 8080 development board (see Figure 1) and we designed and built a digital three-term motor controller based upon that board (see Figure 2), demonstrating the advantage of being able to easily change the controller's behaviour through changes to the software. The experimental setup is shown in Figure 3—note the Teletype that was our primary terminal (we used paper tape to save and load programs). Floppy discs and visual display units (VDUs) were still on the horizon, at least on a student budget. That project was the start of a fascinating journey!

MY FIRST EXPOSURE TO A COMPUTER WAS IN 1973 IN MY FIRST YEAR AT THE UNIVERSITY OF THE WITWATERSRAND, WRITING FORTRAN PROGRAMS ON PUNCHED CARDS AND RUNNING THEM ON AN IBM 370 MAINFRAME.

By the time that I got to my Ph.D. project at the University of Manchester Institute of Science and Technology (UMIST) in the United Kingdom, the 4-MHz Z80 was state of the art, and I used a number of them to build an array processor that modeled the thermal performance of buildings. I remember that the Z80 fully supported DRAM refresh, which allowed us to build a single board computer with only a few integrated circuits (ICs). I got to live and breathe Z80 machine code!

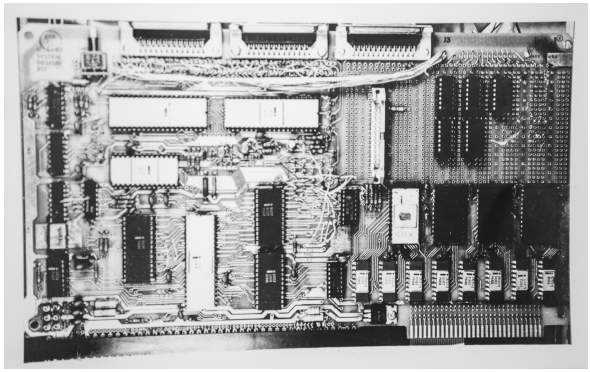

FIGURE 1. Intel MCS-80 system development kit.

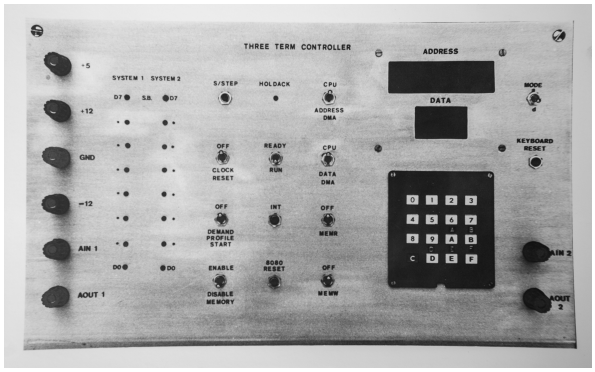

FIGURE 2. Digital three term controller front panel.

I FEEL PRIVILEGED TO HAVE PLAYED A SMALL PART IN THE MICROPROCESSOR STORY. IT IS A TECHNOLOGY THAT HAS TRULY CHANGED THE WORLD.

0272-1732 © 2021 IEEE
Digital Object Identifier 10.1109/MM.2021.3115615
Date of current version 19 November 2021.

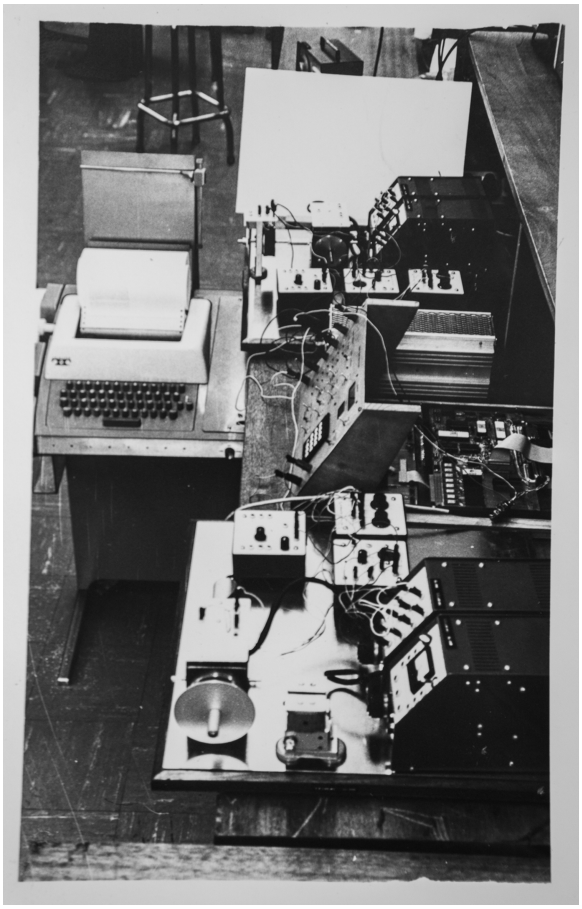

FIGURE 3. Motor control experimental setup.

Then, after working on early very large scale integration (VLSI) ICs at GEC in the United Kingdom and on the MC68030 and MC68040 with Motorola in the United States, I joined Acorn Computers in Cambridge who by then had already developed the ARM RISC processor. I then became one of the founding team of Arm when it was spun-off to develop the ARM610 processor that powered the Apple Newton. The ARM processor was small and low power, and this made it ideal for embedded applications – including in the mobile phone, which everyone in the world eventually wanted! And in the over 30 years of my career at Arm, I have contributed to developing power-efficient products for many different markets and witnessed the microprocessor become ubiquitous. For example, more than 200 billion Arm-based chips have now been shipped by Arm's partners.

I feel privileged to have played a small part in the microprocessor story. It is a technology that has truly changed the world.

PETE HARROD was one of the founders of Arm when it was spun-off from Acorn Computers in 1990—and he is still with the company, currently as a Director of Functional Safety in Arm's CPU Group, developing IP that is suitable for functional safety applications like ADAS and autonomous vehicles. Harrod received a Ph.D. degree from the University of Manchester, Manchester, U.K. He is a Life Senior Member of IEEE. Contact him at Pete.Harrod@arm.com.