Artificial intelligence makes debut on Pegasus

Tektronix entered a new market this week when its first product for development and delivery of artificial intelligence programs was introduced at the American Association for Artificial Intelligence Conference at the University of Texas, Austin.

The 4404 Artificial Intelligence System, though priced at $14,950, offers performance competitive with existing AI machines costing $30,000 to $120,000.

Mike Taylor (4404 Marketing manager) noted that even though artificial intelligence development tools are a new market for Tek, many of the 4404 customers will be the same universities, businesses and government agencies Tek already does business with.

The 4404, often called "Pegasus" in-house because of its project name, will be available in January.

The 4404 is a complete AI programming system that includes a powerful micro-processor, mass storage, a sophisticated user interface employing a mouse and bit-mapped graphics, and optional networking capability. The system comes with the Smalltalk-80 programming language (a version of Smalltalk), with LISP and Prolog languages available as options. It is designed to increase productivity in many areas of AI research and development, including expert systems, natural languages, intelligent robotics, vision systems and automatic programming.

Tek's proprietary method of implementing the Smalltalk-80 language, combined with the 4404's powerful hardware architecture, achieves Smalltalk execution speeds that are exceeded only by systems costing over $100,000. Responsive enough to perform on-screen animation, the 4404 makes the sophisticated Smalltalk graphics interface available as an affordable new tool for AI researchers.

One of the optional languages, Franz LISP, is a widely-used member of the LISP family, which has been the primary AI programming language for over two decades. Another option, Prolog, is popular with European AI researchers and has been selected as the language of the Japanese Fifth Generation Project.

"We are especially excited about having such a high-performance implementation of the Smalltalk-80 language on such a low-cost system," said Allen Wirfs-Brock (Senior Engineer), who heads the team that optimized Smalltalk-80 for the 4404. "The AI group at Tektronix has been using Smalltalk extensively, and has found it an excellent AI programming language. And the 4404 supports simultaneous program design and implementation. Users can develop applications with the Smalltalk-80, Prolog and LISP environments, all on the same system."

Xerox Corporation developed the Smalltalk-80 language at its Palo Alto Research Center as an exploratory programming language for quick prototyping of complex systems. Tektronix was one of four major companies Xerox selected in 1980 to help evaluate it.

The Smalltalk-80 language offers the advantages of a highly integrated exploratory and development environment with an excellent user interface. The object-oriented language simplifies the task of creating large complex systems by allowing the programmer to defer many constraints and commitments until an overall framework has been defined, working instead with symbolic descriptions of objects.

The concepts of classes, objects, and messages are supported directly, and an inheritance mechanism speeds programming and reduces errors. Routines can be executed immediately upon definition, encouraging "learning by trial" approaches to problem solving. The language is highly extensible and makes its internal definitions available to the user through its powerful windowing mechanism.

The standard 4404 is a desktop system featuring the Smalltalk-80 programming environment running on the Motorola 68010 processor at 10 Mhz with no wait states. A hardware accelerator supports floating point operations.

THE STANDARD TEKTRONIX 4404 ARTIFICIAL INTELLIGENCE SYSTEM, listed at $14,950 (U.S.) features a monochrome bit-mapped display; keyboard; mouse; 32-bit micro-processor with virtual memory management; hardware floating point; 1 MByte RAM; and a 20-MByte hard disk with a single 5¼" floppy disk.

MARY WELLS (Product Support manager) explained Pegasus (4404 Artificial Intelligence System) at a recent Tek Service meeting in Portland.

User memory is 1 Mbyte of RAM, expandable to 2-Mbytes. Page-on-demand memory management provides a large, 8-Mbyte virtual memory address space which permits development of complex programs without segmentation or overlays.

The mass storage system consists of a 20-Mbyte hard disk, plus a single 5¼" floppy disk. A 40-Mbyte hard disk with a streaming tape drive is optional.

The 4404's 13" monochrome bit-mapped graphic display operates at 60 Hz, non-interlaced. The 640 X 480 pixel display acts as a window into the 1024 X 1024 display address space, with smooth panning over the entire display space. A mouse pointing device is part of the 4404's highly interactive user interface.

The system comes with a Centronics-style parallel interface, RS-232, and a Small Computer Standard Interface (SCSI) for connection to host computers, hard copy devices, and other peripherals. An ANSI X3.64 compatible terminal emulator allows immediate access to existing computers. Networking capability will be available through an optional Ethernet interface in Spring, 1985.

What is artificial intelligence?

While some persons argue philosophically that computers will never be able to think like humans, that is the ultimate objective of artificial intelligence (AI) researchers.

But the answer to whether we ever duplicate human brain function will come only after that function is precisely defined. In the meantime, the AI people are delighted when they can come up with human-like results, even though the "thought" process of the computer may not be the same as the human mind.

One area that seems to be only a short Pegasus flight away is what are known in AI circles as "expert systems."

Suppose, explains Mike Taylor (4404 Marketing manager), we get the world's top experts on blood diseases to tell us everything known about blood diseases and their treatment. The hardest part would be explaining decisions that seem to be based as much on intuition from years of experience as on fact. Mike says, however, that if you can capture the expert's knowledge, and put it into a format useable by a computer, the results can be a very powerful medical adviser which may be able to out-perform the human experts.

Enter the 4404 Artificial Intelligence System. It's not only a useful tool for developing expert systems, but it can be an application delivery system as well. Someday, for example, patients with suspected blood problems may have doctors who discuss diagnosis and treatment with their 4404's.

Mike said that in addition to heavy use in medicine and science, expert systems may also be used in business for advising on a variety of management decisions. And they are likely to be extremely helpful, he added, in service areas as electronics products become more complicated and more varied.

Other AI areas getting a lot of study are natural languages, intelligent robotics, vision systems, automatic programming, and theorem proving.

Applied Research, IDG wizards transform 'Unicorn' into 'Pegasus'

By DON LEIGHTON

A little over a year ago, Tek's artificial intelligence team in Computer Research Lab proposed a magical idea that has since turned a unicorn into a flying horse.

Since most of us didn't even know Tek had an artificial intelligence team until the introduction this week of the 4404 Artificial Intelligence System, some background is in order:

A general assumption in the electronics industry is that most instruments will someday include some form of artificial intelligence(AI). So Tek and many other companies have project teams getting ready for application of AI to products. Tek has been doing AI-related research since 1980 and has had an official AI team about two years.

In pursuit of better AI development tools, Tek's team came up with a new AI development system they thought would not only benefit their own efforts but would also be useful in some other areas of the company – if they could get it neatly packaged and produced in sufficient numbers.

So they approached Information Display Group with the idea of putting their AI development system into the cabinet of a 4107, one of the Unicorn Series of computer graphics terminals (4105, 4106, 4107, 4109).

Last fall, after seeing how good their first prototype was, they thought the intelligent thing to do was share it with outsiders, rather than keeping it just for Tek use. With a system of its power and relatively low cost, they surmised, existing AI projects could more easily expand their efforts and smaller companies and universities could afford to enter the field.

Then, product proposals were made and given management review. When it was agreed that the product would fly, so to speak, the Pegasus project officially took off. And that was barely six months ago.

Mike Taylor (4404 Marketing manager) points out that the cabinet is all that's the same between the Unicorn and the 4404 (the product of the Pegasus project). But the insides are designed for manufacturability within the Unicorn line. That has not only speeded up the project, he said, but has meant initial savings of several million dollars from reduced tooling needs and not having to set up a new manufacturing area. Those savings, plus the manufacturing efficiencies of the Unicorn area are playing a big part in making the 4404's price so attractive. The Artificial Intelligence Project is a joint effort of Applied Research Labs and Information Display Group. Dave Squire, former Unicorn Engineering manager and now Pegasus program manager, heads up a joint engineering team composed of people from Applied Research and IDG.
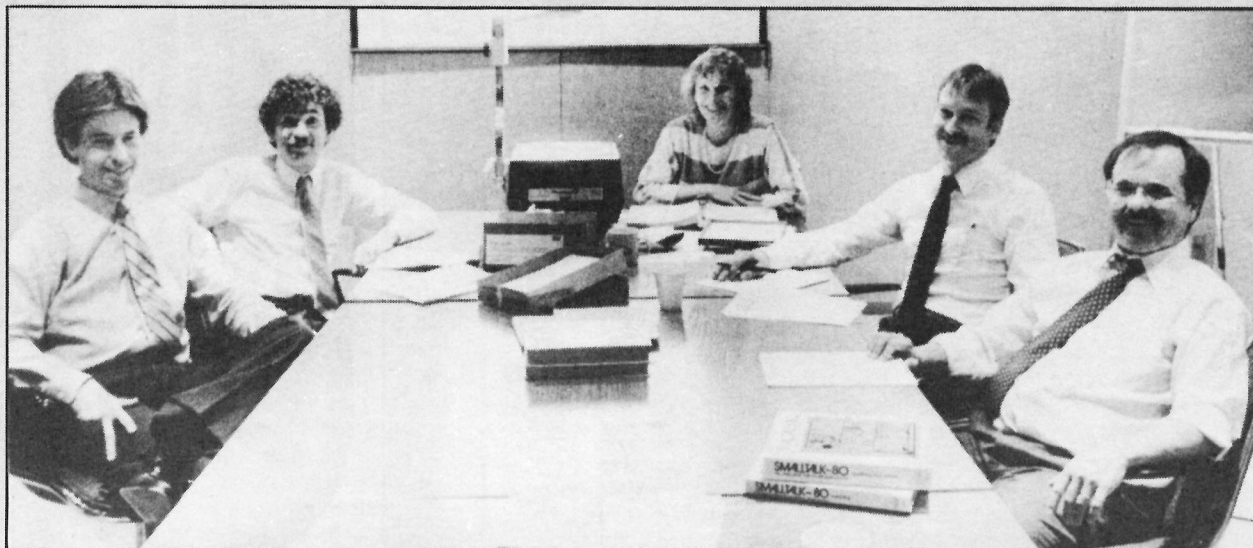
SOME SPECIALISTS got together in Wilsonville last week in preparation for introduction of the 4404 Artificial Intelligence System. From left, Reed Phillips (Regional AI Sales Specialist, Raleigh), Steve Levine (Technical Support Specialist, Santa Clara), Mary Wells (Product Support Manager), Chuck Smith (Market Planning and Research Manager), and Jeff McKenna (Regional AI Sales Specialist, Santa Clara).