MIT's tablet tech gets a look-see from Microsoft

By Jeff Miller
STAFF WRITER

For Randall Davis, a professor of electrical engineering and computer science at MIT, one of the worst accidents ever to occur in computer engineering was the day someone hooked up a typewriter to a computer.

"It's been about 25 years since the mouse came out," Davis said. "It's time for another breakthrough."

To that end, Davis and his team of graduate students in the MIT department of electrical engineering and computer science are developing sketch interpretation software, which would allow a computer to recognize shapes drawn by a user within the context of other shapes.

(Davis was a member of the MIT artificial intelligence lab before its recent merger with the department of computer science.)

The original goal, Davis said, was to provide a means through which engineers could transparently record not only the changes made to a design, but also retain the rationale behind the changes.

The project's origins go back to when Davis, as a child, saw a Disney short film in which an animator's drawings came to life on the paper.

"I wanted smart paper," Davis said. "Paper is easy, fast and familiar, but it's appallingly dumb."

His research is already drawing interest from at least one big software company. Microsoft Corp. is considering adapting the sketching software developed by MIT Ph.D. candidate Christine Alvarado to be included as a "Power Toy" in a future version of its Tablet PC operating system to show off the capabilities of the Tablet computer, Davis said.

With a Tablet computer, users can interact with the machine not just through the mouse and keyboard, but also by writing directly on the screen.

JEFF MILLER PHOTO

Microsoft has taken an interest in sketch interpretation software being developed by a group from MIT's engineering department, including from left to right, Michael Oltmans, Prof. Randall Davis, Christine Alvarado, Metin Sezgin and Tracy Hammond.

Paul Oka, program manager for Microsoft's iCampus program at MIT, characterized the work as very early.

"At this point, there is interest," Oka said. "At this point there are issues about how to deploy it. Would it be a power toy or something else? That's unclear. It's still too early in the research project to go into any detail."

Alvarado's software allows a user to draw shapes that are basic to mechanical engineering design, and then run the diagram through an off-the-shelf simulator that follows the laws of physics.

For example, if the user draws two circles on the bottom of a rectangle, and then draws a tiny circle inside each of the two big circles, the software recognizes the big circles as wheels, the little circles as axles and the box as a structure supported by the wheels. Draw a large triangle under the cart, tap the "run" icon, and the vehicle drops to the slope and rolls off the screen.

The software supports many other sketched objects, including springs and pendulums.

But while the simulation is eye-catching, the real difficulty lies in writing a program that understands sketches without resorting to a preset method of drawing objects.

The graffiti feature found on PDAs such as the Palm, for example, requires users to draw characters in a certain fashion, which often bears only a minimal resemblance to what they represent. On the Palm, for example, the number "4" is represented by a simple right angle.

In addition, most graffiti programs simply recognize one shape after another rather than understanding them within a larger context.

In the wheel example above, the software understands that the small circle within a large circle represents an axle and not just another wheel.

Mechanical engineering isn't the only application Davis' team has found for its sketching software. Tracy Hammond, another Ph.D. candidate, has developed software that allows a programmer to sketch out a universal modeling language (UML) software architecture and then feed it into IBM's Rational Rose system, which transforms it into code.

The next goal for Davis' group is to enable users to define their own "shape vocabulary" for their own domain, so that they could "sketch" information into simulators, compilers or other applications.

And Davis would also like to expand the range of media the software understands to include voice and gesture. For instance, Davis said, it's difficult to draw three identical, equally-spaced pendulums, but it's a simple thing to say. Why not draw three rough pendulums and then say, "Make them identical and equally spaced?"

Last, Davis and his team are already working on turning a desktop computer into a true desktop: a drafting table with a rear projector throwing images onto the surface.

"We'll let you draw on your desktop," Davis said. "I'd like to see people generally scrawling on smart desktops and walls."

Travel basics: Profitable ITA expands travelers' options

By Elizabeth Dinan
STAFF WRITER

Algorithms for bargain shopping are the answer to a frugal traveler's prayers, as well as the day-to-day business at ITA Software.

ITA's system, which uses PCs instead of mainframes, searches all available airline flights for best available prices given a specified date. ITA runs airfare search programs for heavy-hitting customers including Orbitz, Continental, Air Canada and America West.

And with Forrester Research citing six out of 10 online airline ticket buyers as more interested in price than carrier, ITA's professional mission is validated as it takes its technology a step further.

"It solves the problem completely, by literally finding all of the answers, no matter how many there are and displaying the ones the customer wants to see."

Jeremy Wertheimer, CEO, ITA

Now ITA's travel technology can help users search to find the best deals that day, the day before and the day after. Would-be travelers can consider three days of travel itinerary options, expanding their choice of deals threefold.

"It's straightforward computer science," said Jeremy Wertheimer, ITA CEO and co-founder. "It solves the problem completely, by literally finding all of the answers, no matter how many there are and displaying the ones the customer wants to see."

ITA is already providing the expanded search service for America West and is poised to announce new partners any day.

Wertheimer, a MIT artificial intelligence lab graduate, said his company uses rows of Linux-based servers, something new and improved for the airline industry. The system not only produces options for users looking to get from here to there, but also suggests leaving from a smaller airport close to here or there for expanded fare options.

"What ITA is doing is teaching the airline industry how to price," said Henry Harteveldt, Forrester Research travel analyst, in a published report.

And it is now doing it internationally.

Wertheimer announced that ITA is now searching and providing price-first and the trio of days flight data for international flights on Continental. More airlines are expected to follow suit.

ITA receives data from "many different sources in the industry," Wertheimer said, including airfare information wired many times a day and seat availability updated every second. He said many millions of customers use ITA's system every month, as the company bills its customers based on different models, most frequently on a per-transaction basis.

ITA's name comes from Internet Travel Agent, while the best-price system has only an internal moniker used among company engineers. In the early days of commercial air travel, the industry didn't think it possible to have flights more than 24-hours long. When it did happen, the airline industry cooked up a fictitious connection point to link the one long flight into two on the books. That connection point was called QPX, the name adopted by ITA for its low fare search system.

"At some point we'll probably have to come up with a cool name," Wertheimer said.

Private and profitable, ITA now employs 50, doubling every year since launching in '99. The company is doing so well, it's hiring quality assurance and operations people. But be warned: The flood of résumés going into ITA means candidates are given a programming problem to solve, and they must demonstrate how they'd do it.

Perhaps they'll come up with some bargain shopping algorithms to get online customers bumped up to first class.