AI reemerges from a funding desert

By John Markoff The New York Times
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SAN FRANCISCO The five robots that successfully navigated a 132-mile course in the Nevada desert last weekend demonstrated the reemergence of artificial intelligence, a technology field that for decades has overpromised and underdelivered.

At its low point, some computer scientists and software engineers would avoid the term artificial intelligence for fear of being viewed as wild-eyed dreamers.

But the work of a small team of researchers at the Stanford Artificial Intelligence Laboratory is helping to restore credibility to the field. The team's winning robotic Volkswagen, named Stanley, covered the unpaved course in just 6 hours and 53 minutes without human intervention and guided only by global-positioning satellite waypoints to mark the route.

The feat, which won a $2 million prize from the Pentagon's Defense Advanced Research Project Agency, was compared by exuberant Darpa officials to that of the Wright Brothers at Kitty Hawk, because it was clear that it was not a fluke. Of the 23 vehicles that started this year, 22 did as well as or better than the seven miles, or 11 kilometers, completed by the best vehicle last year.

The ability of the vehicles to complete a complex everyday task - driving - underscores how artificial intelligence may at last be moving beyond the research laboratory.

While artificial intelligence technology is already in use in telephone answering systems with speech recognition and in popular household gadgets like the iRobot vacuum cleaner, none of the existing systems have been as ambitious as Darpa's "Grand Challenge" road race.

This leap was possible, in large part, because researchers are moving from an approach that relied principally on logic and rule-based systems to more probability or statistics-oriented software technologies.

"In the past AI has been dominated by symbolic systems, and now the world is gray," said Terrence Sejnowski, head of the computational neurobiology laboratory at the Salk Institute in La Jolla, California. "That's what it's like to deal with the real world."

This crucial shift, Sejnowski said, "grew out of the recognition that the human brain is very good at this, why not have machines do the same thing?"

New artificial intelligence systems, like that embodied in Stanley, are now capable of evaluating a huge amount of data from sensors and then making probabilistic decisions.

"The prior opinion of many informed observers, based on decades of disappointing experimental results, was that the problems were so hard that they would remain unsolved for many decades yet," said Hans Moravec, a robotics researcher at Carnegie Mellon University who was one of the first developers of autonomous vehicles in the 1970s. "But now everyone knows differently. The interest, effort and investment in the broader field is sure to skyrocket."

The Stanford lab has long been at the forefront of AI research. The first autonomous vehicle, based on a vehicle salvaged from the lunar landing program of the National Aeronautics and Space Administration, was created at the lab and took its first steps in 1975. By the late 1970s, it was capable of moving in one-second spurts of about two feet, pausing for half a minute to compute before attempting the next movement.

Until recently, progress in artificial intelligence lagged so far behind computing technology that some in the field talked about an "AI winter," after commercial and government funding evaporated in the mid-1980s.

Now there's talk about an AI spring among researchers like Sebastian Thrun, the director of the Stanford lab.

The enthusiasm is already spreading. Researchers point out that an obvious application for AI technology is in automobile safety systems.

"Any time you create a technology that has the potential of saving 20 to 30 thousand lives in a year, one has to sit up and take notice," said Raj Reddy, a professor of computer science and robotics at Carnegie Mellon University. "If you look at automotive accidents in the United States, the repair bill is about $55 billion each year."

The potential of the application is directly relevant to Volkswagen, the German car manufacturer that was one of the research sponsors of the Stanford team. The company has put a high priority on what it calls "driver assistance systems," now capable of providing intelligent cruise control and lane "departure" warnings, two systems that will be crucial for driver safety