# DARPA's Strategic Computing Program (research review)

As part of Artificial Intelligence nanodegree program, we chose to review research done in DARPA's Strategic Computing Program. As well as many other key developments in computer science, also this research program was intended to be used in military applications. It consisted of three major projects, each focusing on AI planning in different domains of military operations.

## The Pilot's Associate

"The Pilot's Associate (PA) program, begun in February 1986, had as its goal the development of an interactive computer system that would aid a combat aircraft commander."[1] It provided users with multiple interfaces including speech synthesis.

This system was the most advenced planning system of its time and consisted of "10,000-rule, real-time expert systems, animated displays with 108 polygons per second, 200-word, speaker-independent speech recognition in high-noise environments, and a speech output system capable of a 1,000-word vocabulary".[2]

Although the program was very successful in terms of research advancements, was very promising in domain of air traffic managment and also recieved from AIAA, it was never put into operation.

## Battle Management Systems

In 1984 DARPA began funding the Fleet Command Center Battle Management Program [1] which consisted of two expert systems communicating with each other over local area network.

The goal of this project was to "assist the commander-in-chief of the U.S. Pacic Fleet in planning and monitoring the operation of nearly 300 ships in the Pacic and Indian ocean regions."[3]

As we said, the system consisted of two expert systems:

- Force Requirements Expert System (or FRESH) used for tracking positions and operational status of ships and planning future actions
- Capabilities Assessment Expert System (or CASES) used to simulate outcomes of hypothetical engagements

Both expert systems understand natural language and were hosted on Symbolics Lisp machines and written using commercial expert-system shells.

Although prototypes were build, they were never put to service.

## Autonomous Vehicles

"The goals of the project were in line with the Army's long-range strategic vision of using autonomous vehicles in logistics and supply operations, in search and rescue, and even in combat."[1]

Along with rigid hardware able to whitstand difficult conditions, these vehicles to cameras for computer vision.

"Video and range data processing modules produced road-edge information that was used to generate a model of the scene ahead. Higher level reasoning was performed by goalseeker and navigator modules, which then passed the desired path to the pilot module that actually steered the vehicle." [4]

Although this program was cancelled too, it may be considered as the starter of autonomous vehicles era.

## Conclusion

These three projects made multiple advancements in the field of AI planning, mainly speaking of:

- Computer Vision (used for planning actions)
- Expert Systems (used for plannig actions)
- Speech Recognition and Natural Language Processing (used as an interface between human and computer)

Even though the program itself disappeared, its accomplishments, along with those of the other new-generation projects, were many. Progress made during the 1980s established articial intelligence as a technology that was capable of taking on a wide variety of real-world applications.[1]

## Bibliography

[1] Nilsson, N. J.: The Quest for Artificial Intelligence: A History of Ideas and Achievements, October, 2009

[2] Strategic Computing: New-Generation Computing Technology: A Strategic Plan for Its Development and Applications to Critical Problems in Defense, Chart I.2 of appendix I, Defense Advanced Research Projects Agency, Arlington, Virginia, October 28, 1983.

[3] Saunders R.: The Fleet Command Center Battle Management Project: Lessons Learned, Proceedings of the IEEE Conference on Managing Expert System Programs and Projects, pp. 51-60, September 1990.

[4] Douglas W. Gage, UGV HISTORY 101: A Brief History of Unmanned Ground Vehicle (UGV) Development Efforts, Unmanned Systems Magazine, Special Issue on Unmanned Ground Vehicles, Vol. 13, No. 3, Summer 1995.