NAVAIR Aircraft Platform Interface Laboratory

Artificial Intelligence and Robotics

The Artificial Intelligence and Robotics Laboratory can help automate dangerous and physically difficult tasks. Available technologies include artificial neural networks, intelligent data agents, and expert systems.

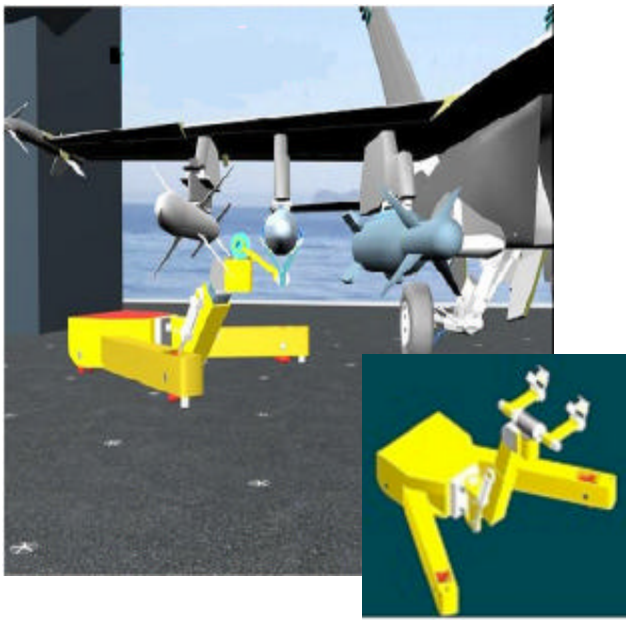
The ability to replace humans with machinery is difficult, especially when the tasks to be performed are highly complex and mission sensitive, and accountability is critical. The Artificial Intelligence and Robotics Laboratory uses its expertise and assets to validate concepts that eliminate labor intensive or dangerous tasks. In addition to the expertise and assets within the laboratory, customers also have access to the Modeling and Simulation, Environmental Test, and Product Development Laboratories, which are all collocated in the API Laboratory.

An ongoing project is the development of a shipboard weapon loader, which is an eight-degree-of-freedom manipulator mounted on a three-degree-of-freedom platform. Among other tasks, it is being developed to load weapons on aircraft. This robotic system includes a human-in-the-loop control interface, which makes it very sensitive to precise manipulation without loss of speed. This gesture control system provides the robot with the capability to respond to human gestures.

The laboratory has also been tasked to develop a mission planning intelligent network. The Naval Aircraft Weapons Management System is a modular artificial intelligence system composed of expert agents and data agents that search archived data base systems. Data mining processes extract pertinent information to provide key tailored screens and refined searches for mission planners, inventory accountants, management, and other users.

The laboratory is currently looking at using the gesture control system to autonomously direct unmanned aircraft to a spotting position using cameras, sensors, and imaging. The process should mirror the way in which a pilot is currently directed on the flight deck.

The omni-directional vehicle (bottom) replaces the towing vehicle (top)



Shipboard weapon loader

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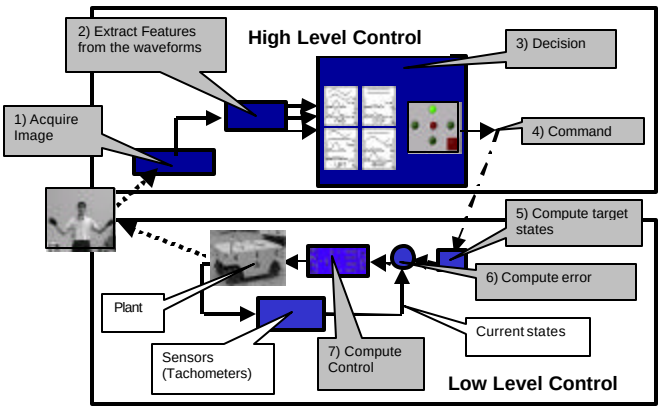
Partnering Opportunities

Several mechanisms exist for partnering with NAVAIR Lakehurst. These include cooperative research and development agreements (CRADAs), commercial services agreements (CSAs), and education partnership agreements (EPAs). Under a CRADA, Lakehurst engineers and scientists work cooperatively with their peers in industry or academia on mutually beneficial research and development. The Navy has been given statutory authorization, via CSAs, to use Navy facilities to perform specific types of work for private parties. EPAs allow collaboration between NAVAIR Lakehurst and educational institutions.



Gesture control schematic

Potential Applications

There are many industries and government agencies that are working to create machinery that will replace humans in difficult, physically dangerous situations. These include the construction industry and disaster preparedness agencies. Another area where the expertise and assets of the Artificial Intelligence and Robotics Laboratory could be applied is the development of assistive technologies, such as better wheelchairs or other devices for physically disabled individuals.

For More Information

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NAVAIR Lakehurst's Aircraft Platform Interface Facility was opened in August 2002. This 66,000-square-foot research and development facility supports the Navy's aircraft launch and recovery and support equipment missions. The technical capabilities covered by the 14 laboratories in this facility include power control systems; modeling, simulation, and data analysis/management; optical and lighting systems; integrated diagnostics; component evaluation; and applied technology. The synergism provided by collocating these teams of engineers, scientists, and technicians in one building further enhances this state-of-the-art facility.

NAVAIR Lakehurst researches, develops, tests, and procures aircraft launch and recovery systems and support equipment for Navy and Marine Corps aviation.