Idaho National Laboratory
INL Robot Intelligence Kernel
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Humans have proven they can invent what the mind can conjure. From flying machines to the human-like robots depicted in the recent movie I Robot, inventors find a way to make reality from imagination.

Inventors at Idaho National Laboratory have produced a breakthrough that offers a giant step toward the far more capable, intelligent robots as depicted throughout film and literature.

"The INL Robot Intelligence Kernel enables robots to act on their own, when needed, and fundamentally changes how humans and robots work together. We have created a new and collaborative relationship between man and machine by employing our proprietary software on a simple embedded processor similar to those found in handheld computing devices."

"Independent of a specific suite of sensors, our invention can adapt to use a wide variety of sensors in a variety of combinations. The system recognizes the payloads available and adapts the robot's behavior accordingly.

Sensor data are manipulated by algorithms to combine sensor inputs into meaningful, actionable perceptions to avoid obstacles, use visual tracking and much more.

"Also, INL's generic, object-oriented software architecture serves as a sort of MS DOS for robots. It is easy to introduce new robots to the architecture and once a robot has been defined the whole suit of behaviors unfolds with no further source code changes. The INL Intelligence Kernel is currently operating on a variety of robotic systems all with different low-level proprietary controllers. This means it can be used with many commercially available robots today."

INL's invention is designed to use low-bandwidth, long-distance communication devices like cell phone modems to allow for operations in shielded and difficult environments at greater distances than conventional wireless networks. The data transmitted from the robot creates a virtual representation of the robot's surroundings on a unique Operator Control Unit.

It uses a computer-game-style interface to digitally create the robot's environment, permitting a 3D map on-the-fly capability and avoiding previous operational limitations and failures.

"In addition to vastly improved communications and autonomous navigation, INL's Intelligence Kernel enables novice operators to learn robot management in minutes, operate multiple robots simultaneously, and increase their abilities to respond to other important tasks – all of which exceeds the known competition.

All of this has been successfully demonstrated to the U.S. Departments of Defense, Energy, Health and Human Services, and Homeland Security, along with the Federal Emergency Management Administration, NASA and many others.

In fact, we are proud to note that INL's Robot Intelligence Kernel has been the brains behind winning several robotic contests, including the American Association for Artificial Intelligence Robot Rescue Competition in 2003 and the International Urban Search and Rescue.

"These performances tell us that INL's Robot Intelligence Kernel is poised to make important contributions to search and rescue operations, removal of land mines around the globe, completing routine and emergent tasks in radioactive and hazardous environments, and many other significant applications."

"We are excited about INL's major advance in robotics and how it will make both routine and emergent operations much safer, faster and better for all of us."