Running head: ARTIFICIAL INTELLIGENCE

Artificial Intelligence

SGM Maria A.J. Baird, MSG Wayne E. Baker

SGM Michael B. Johnson, MSG Robert S. Shawlinski

United States Army Sergeants Major Academy

Class 58

SGM Tommy Jackson

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Abstract

The United States military has been at the forefront of the development of artificial intelligence and other new technologies. Artificial intelligence is a necessity in today's military. The continuing development of artificial intelligence is a necessary evolution in today's Armed Forces as well as in the future. In this paper, we will discuss the history of artificial intelligence, the advantages and disadvantages, artificial intelligence in today's military, and the future of artificial intelligence.

Artificial Intelligence

The continuing development of artificial intelligence is a necessary evolution in today's Armed Forces as well as in the future. Living in the 21st century, it is impossible to separate yourself from all forms of artificial intelligence. From role playing video games to self autonomous robots like "The Terminator," artificial intelligence is all around us. Although self autonomous robots are still off in the distant future, if you log on to Google, you are using artificial intelligence. Artificial intelligence is key to building smaller and more lethal forces that are asked to do more. We will discuss the history of artificial intelligence in the military, the advantages and disadvantages of artificial intelligence in today's military, and the future of artificial intelligence in the military.

The development of artificial intelligence and the military have gone hand and hand since the earliest development of computers. With the current operation tempo of the military, artificial intelligence will continue to be critical to the long-term success of the military, the United States of America, and our allies. To begin with, we need to define the term artificial intelligence, the military's role in the development of artificial intelligence, and military's current commitment to developing new technologies.

Today there is much debate about what should be considered artificial intelligence. One thing that is agreed upon in the science of artificial intelligence is that self-aware robots like seen in movies and television programs are not a reality. Although the scientific and technological advances in the field of artificial intelligence have grown by leaps and bounds the idea of self aware robots is not going to happen any time soon. To start with, let us look at two ideas from experts in the artificial intelligence field as it pertains to defining what artificial intelligence is. Dimiter Dobrev explains artificial intelligence as a complicated mathematical formula (Dobrev, 2000). This formula uses a game scenario to depict if a machine is actually getting better at a task or not. The idea is to run multiple scenarios and look at how the machine adapted during each one. However, Marvin Minsky, a pioneer in the artificial intelligence field, defined artificial intelligence as the science of making machines do things that would require intelligence if done by men (Beardon, 2005). Marvin Minsky's definition while simple to grasp is too broad. By using Marvin Minsky's definition, things as simple as a calculator could be considered artificial intelligence. After studying the concepts of artificial intelligence, we will define artificial intelligence as it pertains to the military. Machines that are capable of learning from their environment can arrive at the optimal outcome without the need for continuous input from humans. One historical example of artificial intelligence is Deep Blue, a chess program that defeated world champion chess player Gary Kasparov in the spring of 1997 (Schmidt, n.d.). A historical example of the use of artificial intelligence in the military is the use of cruise missiles during the first gulf. These cruise missiles could fly on their own to a target. These sensors sent data about the terrain to the control module, which allowed the missiles to fly close to the ground automatically. This was accomplished with no other input from humans other than designating the target location.

As mentioned earlier, the military has been heavily involved in the development of artificial intelligence since the beginning. In fact, the beginning stages of computer development were almost solely limited to military uses. The first use of a computer was the gun director during World War II (Matthews, 2000). The gun director used radar data to plot the course of incoming aircraft for the anti-aircraft guns. Additionally, the creation of code breaking machines during World War II used computers to break portions of the German Enigmas code. Alan Turing, who was a pioneer in the artificial intelligence field, was heavily involved with the militaries research and development of early artificial intelligence (Hinman, 1996). Over the past 65 years, the progression of artificial intelligence from simple computer programs to more sophisticated machines is linked to the development of smaller and faster computers. The very first computer was so big it took up a whole room and had less computing power than a modern day calculator has. Many of the benefits of military programs dealing with artificial intelligence have been transferred over to civilian uses. The modern day internet is one example of a military program that is now widely used by everyone. A more current development is the car that is capable of driving in traffic and traversing across vast areas by itself. These kinds of advances are possible because of the money invested by the military for autonomous robots for the battlefield.

As in the past, the military of today places great importance on the development of new technologies. One of the United States' military advantages over our enemies is our use of technology. President George W. Bush, then Governor Bush, in a speech at The Citadel in September 1999 said, "The real goal is to move beyond marginal improvements to replace existing programs with new technologies and strategies. To use this window of opportunity to skip a generation of technology. This will require spending more, and spending more wisely" (Office of Management and Budget, 2007). This statement serves as a driving force behind the research and development budget that the military has for the development of such technologies. One of the major concepts in development is the future combat system. Currently the military has a projected cost of \$230 million to complete this system (Holmes, 2007). This is just a drop in the bucket in the big picture of the research and development budget. The military increased the spending for research and development from \$41.1 million in 2001 to \$64.3 billion in 2004 (Office of Management and Budget, 2007). This increase is expected to continue in the future.

This allows for the acceleration in the fielding of future generations of weapons incorporating artificial intelligence. The development and implementation of these new technologies will be crucial as the military continues to transform to smaller combat forces capable of rapid deployment around the world.

Next, we will discuss the advantages and disadvantages of artificial intelligence. There are many advantages and disadvantages to the continuing development of artificial intelligence. We will identify disadvantages such as cost, unemployment, and fear. Some of the advantages include how the Armed Forces uses artificial intelligence with prosthetics, intelligence gathering, weapons systems, and how it helps improve society in general.

The number one disadvantage to the continuing development of artificial intelligence in the Armed Forces is the cost. The Department of Defense spends \$73.4 billion, yes that is billion with a "b," on Research, Development, Testing, and Evaluation (RDT&E) (Office of Management and Budget, 2007). RDT&E includes the development of artificial intelligence in the Armed Forces. Many would argue that those appropriated funds could be used elsewhere for other government-sponsored activities or federally funded programs or an undeveloped nationstate to support those in need. Cost is easily considered the biggest disadvantage of the continued development of artificial intelligence. Another disadvantage is replacing human jobs with artificial intelligence. With each new technological development comes the fear of replacing human jobs with machinery and equipment armed with artificial intelligence. Fear of unemployment and the threat to one's livelihood are a factor on how some feel whether there are advantages or disadvantages to the development of artificial intelligence. Everyday consequences in everyday life affect how one feels about artificial intelligence. A big fear for some is that artificial intelligence apparatuses will acquire minds of their own – manufactured minds. If you saw the movies "A.I.," or "2001: A Space Odyssey," or "Wargames," you saw the intelligent machines think for themselves and cause havoc for the people in the movies. The functionality of these robots are not in our future, immediate or distant (Suramya, 2007). There are many disadvantages to the continued development of artificial intelligence such as cost, unemployment, and fear. But all of the advantages far outweigh the disadvantages.

In today's Army, we use artificial intelligence in our daily life in various forms. The field of artificial intelligence that is currently generating a buzz is prosthetics for amputees. As you know, we are saving more lives on the battlefield than ever before. This means that for a percentage of Soldiers surviving roadside improvised explosive devices (IEDs), or tragic accidents, the advantage for some normalcy in their lives is available. We may spend billions of dollars on the development of artificial intelligence but the cost of saving Soldiers lives is priceless. Even a democratic Congress would have to agree with that. Artificial intelligence development has progressed to the field of bionics. This newest development can be called artificial super intelligence. With the advancement of artificial intelligence, amputees around the world would not have the advantage of their limbs replaced with this amazing technology and it is worth how we spend every defense dollar.

Another way the Armed Forces uses artificial intelligence is with intelligence gathering software. The U.S. Army's Every Soldier a Sensor (ES2) simulation uses computer game technology to teach Soldiers how to perform as if they were sensors in an intelligence network. In effect, it works as if it were an artificial intelligence teaching tool (Ackerman, 2005). Again, the benefits of a trained Soldier protecting our country and its assets far outweigh the cost spent on developing the artificial intelligence.

One more advantage to the way the Armed Forces' continues the development of artificial intelligence is with weapons systems. Cruise missiles, unmanned aerial vehicles (UAVs), autonomous submersibles, and future combat systems are perfect examples that use artificial intelligence (Rhea, 2007). Putting manmade materials and technology in harms way in place of Soldiers is an advantage to all warfighters. There truly are many advantages of the development of artificial intelligence in weapons systems. These weapons systems save the lives of Soldiers and civilians alike because we no longer perform missions like carpet-bombing, which destroy or kill everyone in its path including children and the innocent. The advantage is saving lives because we are using weapons systems with artificial intelligence and that outweighs the cost.

In our society, the advantages to the continuing development of artificial intelligence are wide and varied. For example, the development of Hypertext Markup Language (HTML) is the Rosetta Stone® of the Internet. HTML interprets most computer languages so computers can talk to each other. There are many advantages in society in that it helps improve business efficiency and convenience and creates employment for highly skilled people. In addition, artificial intelligence helps build better products by having machinery programmed with artificial intelligence for repetitive and tedious work on assembly lines. This allows humans to seek employment that is not repetitive in nature and to better use their talents. More advantages of the continuing development of artificial intelligence are finding out how gene's work, oil exploration, chemical analysis, and medical diagnosis. The advantages of artificial intelligence make a difference in people's lives.

The disadvantages of the continuing development of artificial intelligence are cost, unemployment, and fear. The advantages are how the Armed Forces use artificial intelligence with prosthetics, intelligence gathering, and weapons systems. Additional advantages include the benefits of the development of artificial intelligence in society. As you can see, the development of artificial intelligence is an important element to the military's success and society as a whole.

In today's military, Soldiers have to process large amounts of information, and make life or death decisions, sometimes within seconds. Artificial intelligence can deliver invaluable assistance. This assistance includes developing unmanned aerial vehicles to implementing intricate flight plans and prosthetics, artificial intelligence is a perfect partner for today's military (Association for the Advancement of Artificial Intelligence. 2007).

Soldiers on the battlefield today are using unmanned aerial vehicles (UAV), which are being used in a variety of ways. One mission the unmanned aerial vehicles are being used is for surveillance. Soldiers can use the UAV day or night and be flown at altitudes up to 25,000 to 50,000 feet in the air. Some of the UAVs can be flown from 14 hours to more than 24 hours without having to come back down. These UAVs are giving Soldiers a firsthand look at an objective they are about to strike, or if anything is on the other side of the mountain they are about to go over. Not all of these UAVs are being used for just surveillance. The MQ-1 Predator unmanned aerial vehicle is one aircraft used. The Predator is not just an aircraft, it is a system. This system is made up of four vehicles (with sensors), a primary satellite link communication suite, a ground control station, and a 55-person team to run and control the entire system. It can carry two AGM-114 Hellfire missiles and can serve in a reconnaissance role (Wikipedia. 2007).

Another UAV is the MQ-9 Reaper used by the Air Force. This system uses a larger aircraft with a 950 horsepower turboprop engine that allows the Reaper to carry 15 times more ordinances and three times more speed (Wikipedia. 2007).

The advantage we have with (UAVs) on the battlefield helps keeps our Soldiers from being injured or even being killed. If for some reason the controller should lose power to the (UAV), it has built in sensors to automatically fly back to where it took off. On December 23, 2002 in Iraq, a Predator fired a heat-seeking missile at an Iraqi plane. This is the first time in history when an unmanned aerial vehicle and a plane went into combat against each other. The United States military have been using unmanned aerial vehicles not only for reconnaissance missions but to also to "lure" Iraqi airplanes into no fly zones to be shot down.

Another vehicle with artificial intelligence is the Stryker. According to Army-Technology.com, (2007) the Stryker is an eight-wheeled vehicle with a basic hard-steeled armor. It travels 62 MPH and as far as 312 miles. The Stryker first entered operational service in November 2003 with the first Stryker SBCT, 3rd Brigade, 2nd Infantry Division, following its deployment to Iraq. It contains the Force XXI Battle Command Brigade and below (FBCB2) digital communications system and the Enhanced Position Location Reporting System (EPLRS). This system is a joint network that allows commanders to provide graphic overlays and send OPORDs. It also can tell how fast a vehicle is moving, which vehicle it is, and where they are located. It also allows commanders to track the position of each vehicle on the battlefield and send emails or updated information, such as enemy positions, IED's and road hazards. This piece of equipment is the artificial intelligence inside the Stryker vehicle that is key to helping Soldiers win the battle. Soldiers have described this system as the best thing since sliced bread.

Not only are the Soldiers on the battlefield using artificial intelligence (AI) technology, but also are our aircraft in the skies. From running the intricate flight plans in seconds to control of our attack missiles, the military can fire our missiles up to hundreds of miles away and with the built in sensors and guidance systems, it allows them to take out targets with great precision. According to the Global Security Website, the F-15E Eagle is a two-man aircraft with two F100—purpose PW-229 turbofans. The Eagle consists of four multi-purpose terminals in the rear of the aircraft that control radar, weapons selection, and monitoring of the enemy tracking systems. It also consists of the APG-70 aperture radar and the AAQ-13 navigation/AAQ-14 targeting pods of the LANTIRN navigation and attack system. This aircraft is armed with a cannon, bombs, and missiles. Some of the missiles are also AI missiles, to include the AGM-65 Maverick and the AGM-88 Harm anti-radar missiles. Some of the bombs carried on the Eagle include the Mk82, MK83, and the GBU-10 precision guided munitions.

The Lockheed Martin F-35 Joint Strike Fighters is currently in production, but has completed numerous test flights and will see its first operational flight in 2010. The F-35 consists of state of the art Missile & Fire Control and Electronic Sensors and Systems that will be responsible for the JSF electro-optical system. The Electro-Optical Targeting System (EOTS) provides long range detection and precise targeting, along with a thermal imaging system (Global Security. 2007).

Robotics is also in use throughout the modern day battlefield. PackBot is a series of robots being used throughout the United States Military. The robots include the PackBot Explosive Ordnance Disposal (EOD) unit that is a radio or wired control unit used to handle potential explosives. The PackBot Scout is the basic configuration. The PackBot explorer is equipped with multiple cameras and several audio and other sensors. These PackBots contain a GPS receiver, electronic compass, and orientation and temperature sensors and is controlled by a computer. It also offers standard communications and networking. The control station uses laptop PC or eyepiece displays and hand-held controller. The use of the PackBot EOD has reduced the risk of physical injury to Soldiers. The PackBot first saw action in Afghanistan in 2002. It played a crucial role in clearing caves and bunkers as well as cross bomb-ridden battlefields. The PackBot was deployed in Iraq in 2003 providing support in the urban warfare setting. There are currently 500 PackBots deployed in Afghanistan and Iraq (Defense Update. 2007).

According to Wikipedia (2007), the Foster-Miller Talon is another AI robot used for reconnaissance or combat. The Talon is a small, tracked robot that can travel through sand, snow, and underwater. There are four types of Talons in use: regular (IED/EOD), Reconnaissance, SWORDS (used for small arms and guard roles), and HAZMAT. The Talon is controlled by two-way radio or fiber optic lines from a portable Operator Unit. Depending on the unit, the Talon is configured with sensors, robotic manipulator, day and night cameras, listening devices, chemical, gas, temperature, and radiation sensors. The Talon was first deployed in 2000 in Bosnia for use with explosive ordnance disposal and moving munitions. It was also used at Ground Zero after September 11th with search and recovery. The Talon has also been used in Afghanistan for covert and EOD missions. The TALON SWORDS can be equipped for reconnaissance missions with M240 or M249 machine guns or Barrett .50 caliber rifles. The 5th Special Forces in Iraq and 3rd Infantry Division has completed evaluation of the Talon Sword and will deploy to Iraq in 2007.

Artificial intelligence also plays an important role in the deployment of weapons systems, namely munitions. The Tomahawk Cruise Missile made its first appearance during Operation Desert Storm in 1991. It is a long-range missile used for land attack. The Tomahawk consists of a Global Positioning System (GPS) receiver, the optical Digital Scene Matching Area Correlation (DSMAC) system, and Time of Arrival (TOA) control. The Tomahawk has made further advancements with the improved capabilities to assess battle damage, in-flight retargeting, and mission planning with the fire control systems.

Another AI weapons system is the Global Positioning System Aided Munitions that includes the GBU-36B and the BGU-37/B. In 1992, the Air Force decided to equip their B-2 with precision bombs. Northrop Grumman developed a system that included the GATS or the GPS-aided targeting system and the GAM, which is a GPS-guided munitions. The GAM included GPS-aided Inertial Navigation System for the tail and used the B-2's Synthetic Aperture Radar along with the GPS receiver to enable imaging capabilities. These munitions allowed for more accurate targeting and the ability to update changes in the procuring of targets (Global Security. 2007).

AI continues to play a large part in improving warfighting conditions for military members, but AI has expanded to improve health conditions of military members also. The creation of artificial intelligence prosthetics has come about and service members are benefiting from them. According to the Iceland-based Ossur Company (2007), the POWER KNEE is the first powered bionic prosthesis for above-knee amputees. Created by the Ossur Company, the knee bends and straightens by replacing the actions of true muscles. The POWER KNEE uses sensors on both the artificial knee, the insole of the user's other leg, and that sends information to the POWER KNEE. Gyroscopes in the artificial knee and ankle send information about the tilt of the limbs. Both sets of information are then sent to the artificial knee where it then processes the information and responds by directing power to recreate realistic quadriceps and hamstring action. Currently, only 25 people have the POWER KNEE. The first veteran was fitted with the prosthetic at Walter Reed Army Medical Center in Washington, DC last year. Another type of prosthetic being used is the bionic leg created by Hugh Herr. The bionic lower leg uses both subtle mechanics and robotics to recreate muscles and bones. These AI legs are able to adapt to different and irregular terrain and to move faster.

Medically, artificial intelligence is making the work of assessing, analyzing, and treating patients on the battlefield easier. After the Gulf War, the U.S. Army Medical Research and Materiel Command's Telemedicine and Advanced Technology Research Center developed several systems to help in maintaining medical records on the battlefield, as well as allowing field medics to access medical records or record a patient's condition in the field. According to the Department of Defense Military Health System website, the AHLTA Mobile-also known as the Battlefield Medical Information System Tactical-Joint (BMIST-J), is a software application installed on a hand-held computer. It is used by field medics to input patient information. The information is then transmitted to AHLTA Theater, which transmits them to a system in Virginia. The system then transmits the information to the Joint Medical Workstation (JMeWS) and the Theater Medical Data Store (TMDS). These systems then help in providing tracking of medical issues, diseases or conditions in the theater of operations. Today, JMeWS is supporting Operation Iraqi Freedom by medics availability to medical threat and surveillance data, as well as access to critical logistics data such as, the availability of blood supply, equipment and hospital occupancy. It also provides the ability to receive, process, display, and analyze situational information (DOD Military Health System).

The final contribution artificial intelligence has made to the modern-day military is through the development of support systems. The Dynamic Analysis and Replanning Tool (DART) is an AI-based decision-support system that was used at the U.S. Transportation Command and U.S. European Command. Within three months of its conception, it was used throughout the Persian Gulf War. This system provides the capability to rapidly enter, manipulate, and analyze force and movement requirements.

Another artificial intelligence support system was developed after the Persian Gulf War. The U.S. Air Force's Air Campaign Planning Advisor was developed to help aid in learning through firsthand human experience. The Campaign Planning Advisor is a web-based system. It is directly linked to a performance support system.

Artificial intelligence advances in today's Army have changed the face of the battlefield. AI is now allowing Servicemen the ability to train smarter, fight safer, and target more accurately. Artificial intelligence is also giving injured Soldiers a chance at a more normal life despite severe battle injuries.

Finally, we will discuss the future of artificial intelligence in the military. A proposed theory of future military artificial intelligence would have society to ask this question, "What will Artificial Intelligence systems be like in the near and long term future?" Basically, we will get the AI that people are willing to pay for, particularly when it concerns defense spending. There have been multiple millions of dollars invested in future weapons. Although the public has not paid close enough attention to see that advancements in military artificial intelligence have advanced considerably and are actually upon us now. The AI demonstrations and applications we are going to see in the near future will trend strongly toward "cognitive prostheses" - systems that do well in the things that humans do poorly in or don't like to do or not willing to do. Both near-term and far-future systems will need to interact smoothly with humans, which will put special constraints on them. In particular, to build systems that we will trust and want to use, we will need to carefully consider and craft their implicit and explicit values.

Just like several other fields of technological and scientific study, the armed forces have gone full speed ahead with the study of future Artificial Intelligence. The potential of future armed forces applications with Artificial Intelligence are unlimited, thrilling and approachable. Although today's Armed Forces robots are mostly used to unearth improvised explosive devises on roadsides and search caves, they really can be used for more than just unarmed Soldiers; they contain the impending ability to do a lot more.

Many current Soldiers and civilians are unaware of the fact that not the entire armed forces use Artificial Intelligence is not only relegated to the battlefield, Artificial Intelligence is being targeted for other inert reasons as well. For instance, the armed forces have industrialized a computer game that uses Artificial Intelligence to train new recruits and Soldiers who will operate in a region that speaks Arabic how to converse in Arabic. The course requires soldiers to take on and accomplish simulated missions that require them to successfully comprehend and verbalize the tongue. This arrangement gives the Soldiers a more practical, uncomplicated, and efficient way to be taught the new language.

In addition the armed forces is the process of trying to construct robotic vehicles, that will be able to drive themselves into hostile environments with whatever payload is needed for that particular mission. Theoretically machinery currently has the capacity to interpret maps and all its complexities as well see the world around them to sufficiently be able to move from one location to the next with no human support. Sources within the Pentagon have stated that Soldier robots power-driven by synthetic intellect will be a key combating power in the armed forces, in the near future. The initial android Soldiers will in fact be remote-controlled vehicles. The armed forces have devoted billions of dollars into the development of Artificial Intelligence already. Congress and the American public strongly want to ensure that this project does come to fruition, Congress has prearranged that more than a third of every deep-strike aircraft and military vehicles be automated by the year twenty -ten.

As it stands today engineers and scientist have discovered through trial and error that as technology grows and machinery begin to sense, perceive, and act in response like humans, their echelon of self-sufficiency and our height of belief in them will mature to uncharted boundaries. Through technological forecasting it has been predicted that a self sufficient "factual warrior"-simulating android more than likely will not actually be at our disposal for another thirty years. Success will be considered when these robots are able to tell foe from friend and bystander from enemy, the biggest challenge is teaching them this difficult task. Engineers are aware that this will clearly take an incredible quantity of study and effort. The administration has indicated that computerized Soldiers absolutely can not be placed into the dangers of combat action to perform any actions pending the one hundred percent assurance that they are geared up so as to cause as little loss as possible.

There will be significant benefits when machines are finally able to achieve the goals that the military is expecting of it. The urgent and mainly unmistakable boom of such know-how is that machines will eliminate the majority of the human risk when it comes to high risk tasks. The ultimate goal is to ensure that equipment, not humans, be lost in combat. Additionally, Robots that will be intended for combat in the future to carry out specialized and specific tasks will benefit the military in ways that humans would not possibly be able to. Simply by ensuring that this occurs will greatly increase the military's overall effectiveness. The most promising and important thing concerning robots is that they will be capable of accomplishing task they were programmed and anticipated to do. Robots also can be cast-off when they are outdated or severely damaged. An individual Soldier expenditure can exceed an four million dollars over a life span to include retirement care, and the U.S. will struggle to sustain financial care to active duty and retired Soldiers because the life expectancy of an American citizen has increased nineteen percent over the past fifty-years. When in full production a robot price tag will be a tenth of that total and possible less.

While the eventual objective of the robot Soldier is to entirely eradicate human risk, scientist and engineers say that warfare will forever be a human undertaking linking human loss of life, to the reality of combat; no matter how much the Artificially Intelligent warrior is developed. Fresh moral questions will come up once we have the capability to enter by force into other countries with no risk of mayhem on the part of the aggressor.

The military has some absolutely amazing projects in the works to combat Soldier lose and advancement in scientific military improvement. With the introduction of several future robots in development, the U.S. is leading the way in this area of technology. The most advanced four legged robot on earth is Big Dog. Boston Dynamic has engineered the alpha male of all quadruped robots. Big Dog climbs rough terrain, walks through water, snow and mud, climb hills and carries heavy loads up to one-hundred fifty pounds. Big Dog has a computer programmed inside of him that controls all his motions and locomotion, the computer also has a extensive array of sensors that manage the complex leg action of the robot. Big Dog is being developed by the fast growing corporation Boston Dynamics with the help of Harvard University Concord Field Station, Foster Miller, and the Jet Propulsion Laboratory.

The WarriorX700 – imagine never having to tell a Soldier that he/she has to go into an urban area to chase out the bad guys, now imagine the most agile athletic robot you can imagine, one that is actually fast and nimble enough to avoid RPGs and other small arm weapons. IRobot has unveiled a 250-pound, weapons-firing, stair-climbing, ammo-carrying military robot that will

one day run a four-minute mile, IRobot developers said. Early versions of the multimission IRobot Warrior X700, the latest offering from the Burlington, Mass.-based robot makers, are slated to be ready by the second half of next year (2008). "We really think of it as a multimission platform. It can be deploying weapons systems. It can be doing re-supply operations, taking ammo or water to troops who are pinned down, perimeter security and building clearing." "Right now, it can go 10 miles per hour. When we finish the development, it will be able to do a fourminute mile. "You are starting to see the first robot that can really haul your pack and be not only a partner but be a stronger and faster partner." In addition to being ruggedized for carrying supplies, the Warrior and PackBot are being engineered with advanced software, giving them the ability to perform some battlefield functions autonomously. One Warrior variant is outfitted with an electronic firing system with four small barrels able to shoot as far as 800 meters, Development of the Warrior X700 is funded in part by the Technical Support Working Group, a U.S. government research and development effort to combat terrorism.

Robot Pairs: (the "Meteor"-the transporter, and the "PackBot" the robot)-"What a robot can do is dependent on its size. Large robots can go much faster and further and have better processing power and better communications. But they have problems getting to precise locations off the road. Smaller robots can go into tighter places, but they have limited processing power, which also limits their capabilities." While robots have been paired up before, this may be the first time the combined strengths of a large-small robot pair have been applied to a practical military application. A dynamic robotic duo works like this: A bomb disposal team uses a remote control system to drive the Meteor to a spot near the IED, carrying the PackBot in its rear. When the truck is close to the IED, a ramp extends to the ground, allowing the smaller unit to roll off. Using the Meteor's communications relay ability and rooftop camera, the disposal team—safely located at some distance away in the command post—maneuvers the PackBot to the IED for disposal. After successful completion, the PackBot reboards the Meteor, which transports it back to its starting point or to the next objective.

While an increased surge into the information age has made the old way of doing business obsolete, the better more sophisticated ones have taken over with more success. There are those in society that feel as if the advancement in military Artificial Intelligence is to soon and to fast, but the technology is monitored intensely and has yet to be identified as out of control. Experimenting with forefront technologies the military and civilian community will reap benefits that far out way the loss of staying stagnant and allowing foreign countries to become a more advanced and superior military force. With aggressive practices, and dogged determination there will be no doubt about the necessity of the importance of Artificial Intelligence as it relates to the Military and beyond. Continued research and advancement in computers, robotics and other forms of nanotechnology will set our Nation apart from the rest of the world. To ensure our Nations continued supremacy and the success of our armed forces we should welcome all positive changes towards Artificial Intelligence.

Conclusion

Artificial intelligence is a reality in today's modern military. Machines can accomplish things today that were once thought impossible. From self guided missiles to the computers that enable the stealth bomber to fly, artificial intelligence is all around us. The continued commitment in the research and development of new technologies is the key factor that will allow the United States military to remain the premier fighting force on the planet. The protection of our troops, the safety of our country, and the destruction of our enemies are the ultimate advantages to the continuing development of artificial intelligence.

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