A History Review of Drones at War

"I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones". - Albert Einstein

A DRONE BY DEFNITION

What is a drone? Is it the same as a robot, a missile, or is it completely different from both of the two? It is imperative to give a clear definition of drones before addressing the history of drones themselves. Although drones have only been around for a brief period in human history, in that time, they have been an increasingly vital component to technological communications, spying, reconnaissance, and most recently to take out enemies. The first drones were designed as spies, which are satellites that orbit specific cycles around the Earth. These satellites still play an very important role today.

Also, the usage of drones in combat to kill enemies has rapidly increased in the 21st century. As war has evolved, the need for such robotic advances has intensified.   Most commonly known, drones do the dull, dirty, and dangerous jobs that humans would otherwise have to do; and could not handle with such precision.

So, what is a drone? The drone, or type of "robot" was first introduced by Czech author Karel Capek in R.U.R.(1923). According to *Merriam-Webster's Student Dictionary*:

- The title of the play, *R.U.R.,* stood for "Rossum's Universal Robots," a fictional company that manufactured robots. These humanlike machines were supposed to perform all the hard, dull, and dangerous work for people, but they finally became resentful and rebelled, killing all humans. Capek formed the word *robot* for his machines from the Czech *robota,* meaning "forced labor." The play was very popular and its ideas made a strong impression. As a result, the word *robot* came to have several meanings, including "a human being who has become brutal and insensitive or machinelike because of overwork and mistreatment." It is used today for machines that may not look human but do perform the kind of dangerous or dull work that Rossum's Universal Robots were supposed to have done(1).

Again, the term "drone" refers to a specific type of robot which is an unmanned vehicle that is controlled by radio signals. Also, unlike a missile, which would be considered a "suicide" robot, drones are reusable. According to Merriam-Webster's Online Dictionary, its origin refers to "(1)a lazy person(1), " or, "(2)a person who does very hard or dull work(1)."[1] In order to do tedious work, that would otherwise take humans a much longer period of time , drones are capable of doing so because they lack the ability to think, feel emotion, or tire out. Drones only lose momentum when they run out of power, fuel, or if something breaks. This increases their reaction time, leaves no room for judgment calls, and reinforces tactical militaristic combat actions. Although drones are controlled by humans, the distance between the drone and their human counterparts, allows the drone to execute missions without the fear of consequence (such as injury, or death). Drones are referred to as "UVs" (Unmanned Vehicles), and are used in space, on land, in the air, and the sea.

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[1] Merriam-Webster. "drone." Merriam-Webster. http://www.merriam-webster.com/thesaurus/drone (accessed June 25, 2014).

ORIGINS OF MILITARY DRONES

The origins of remotely operated devices can be traced as far back as Nikola Tesla's demonstrations in the 1890's. Tesla's experiments, including a radio-controlled boat, were the first step towards the usage of robots and drones. His inventions were initially criticized, as most new ideas are by skeptics. People believed it was some sort of wizardry, and the United States dismissed it as an operable military device. It was not until WWI that drones became an avenue of interest in war.

One of the most significant innovations, which progressed the utilization of drones in military operations was the FL-7, a German wire-guided motorboat. Germany took Tesla's concept of the radio-controlled boat and attached explosive weapons. The FL-7 was used to attack HMS *Erebus*, a Royal Navy ship built by Harland and Wolff Heavy Industries in 1917. This drone was also the only type that was actually used during WWI. Still, it laid the ground work for the drones that followed.

In WWII, Germany developed a land vehicle, named the Goliath. As P.W. Singer explains in an article entitled *Drones Don't Die - A History of Military Robotics,* "In World War

II Germany again proved more inclined than its enemies to develop and use unmanned systems. The vehicle that saw most use was the Goliath tracked mine, which carried 100 pounds of explosives. Designed to be steered into enemy tanks and bunkers, it was about the size of a small go-cart, powered at first by electric motors and later by 12.5-hp gasoline engines."[2]

More similar to a missile, since, as noted above, the Goliath was designed to carry explosives and be detonated, thus destroying everything (including itself) in its path.

Still, the Goliath was remotely controlled, and proved somewhat successful during the war. As Lexi Krock points out on PBS.org's webpage entitled *Spies that Fly - Time Line of UAVs*, "During World War II, Nazi Germany's innovative V-1 demonstrated the formidable threat a UAV could pose in combat. America's attempts to eliminate the V-1 laid the groundwork for post-war UAV programs in the U.S(1)." During WWII, other types of remote controlled devices were used, but they were not developed to be reusable until after the war. According to Jim Garamone's article on the U.S. Department of Defense webpage, titled From *U.S. Civil War to Afghanistan: A Short History of UAVs*, "The United States also tried a type of UAV during World War II called Operation Aphrodite. "There were some rudimentary attempts to use manned aircraft in an unmanned role. The limitation there was, we didn't have the technology to launch these systems on their own and control them" Weatherington said(1)."

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[2] Singer, P.W.. "Drones Don't Die - A History of Military Robotics." History Net Where History Comes Alive World US History Online Drones Dont Die A History of Military Robotics Comments. http://www.historynet.com/drones-dont-die-a-history-of-military-robotics.htm (accessed June 25, 2014).

DRONES IN SPACE!

The very first robotic technology, or unmanned vehicle (UVs) was the satellite. The satellite is designed to follow a curved, closed path, or orbit in space. The ballistic missile, first developed in the 1930s by Nazi Germany, was the earliest type of space-bound rocket, missile or satellite that follows a specific flight path.   This type of technology is considered to be "sub-orbital" because, although they spend much of the time in space, they do not remain in orbit for the entirety of the mission. Ballistic missiles are launched from Earth, go outside of the atmosphere into a limited period of time, and usually return to Earth after completing the agenda they were set out to accomplish. Ballistic missiles have been commonly used by nation-states for an array of missions.

Ballistic Missile Shell (Exploded View)
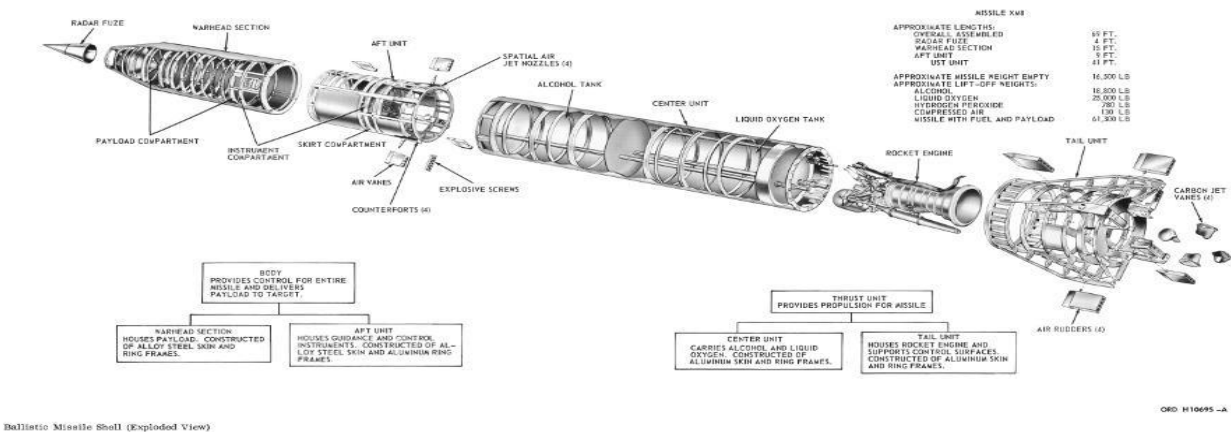
(The Redstone Field Artillery Missile System - The United States 1st Large Ballistic Missile,

**http://heroicrelics.org/info/redstone/redstone-overview.html***)*

The success of ballistic missiles is extraordinary, but there have been occurrences in which the use of ballistic missiles have caused accidental casualties of war, confusion among

international actors, and at one time, ballistic missile technology nearly began, as Singer suggests

"WWIII":

- The Ballistic Missile Early Warning System was a detection system based in Greenland that was to warn if the Soviets launched their nuclear missiles. On October 5, 1960, the system "detected" a launch "with a certainty of 99.9%," NATO went on alert and prepared its retaliation. But with just a few minutes to spare, the military figured out that the Soviets had not attacked; instead of flames from intercontinental ballistic missiles flying at the United States, the computer had detected the rising moon. It is fortunate for all humankind that this incident happened in October 1960, not two years later, which would have placed the computer's mistake right in the middle of the Cuban Missile Crisis, when fingers were on more of a hair trigger(Wired for War,197).

Examples such as the one mentioned above demonstrate how "tech is a tool", and why these

various technological devices created by humankind are "dumber and vulnerable", as Howard

Kleinberg notes in his CMR 555 *Robots at War* lectures.[3]
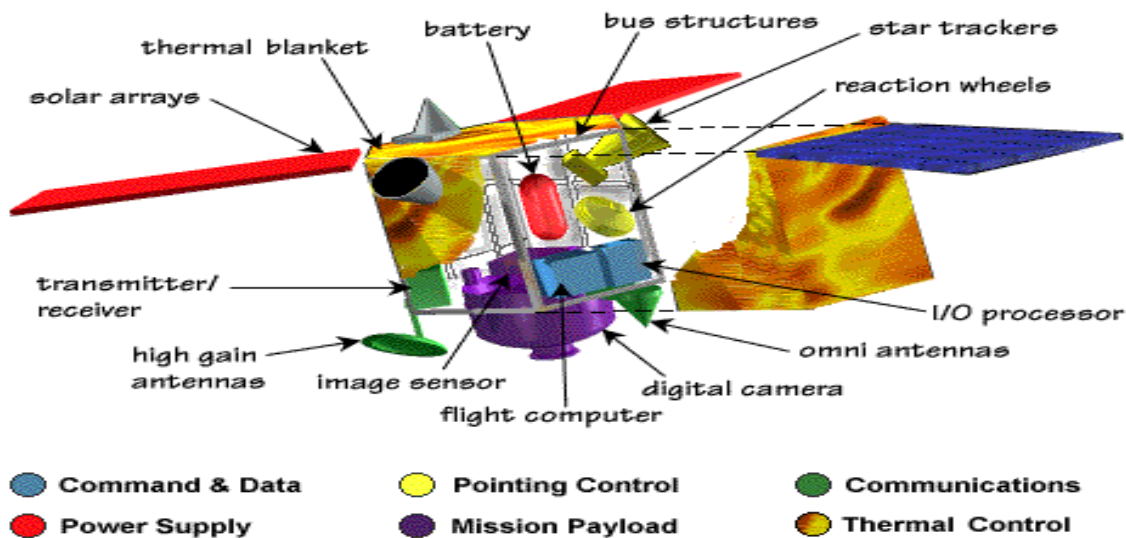
(A simplified illustration of a remote-sensing satellite, The Tech Museum of Innovation: http://ffden-

2.phys.uaf.edu/102spring2002_web_projects/D.Valdez/www/dexes/body2.htm)

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[3] Kleinberg, Howard. "CRN 61960." Lecture, CMR-555 Robots at War from Conflict Management & Resolution Graduate Certificate 2014, UNCW, May 31, 2014.
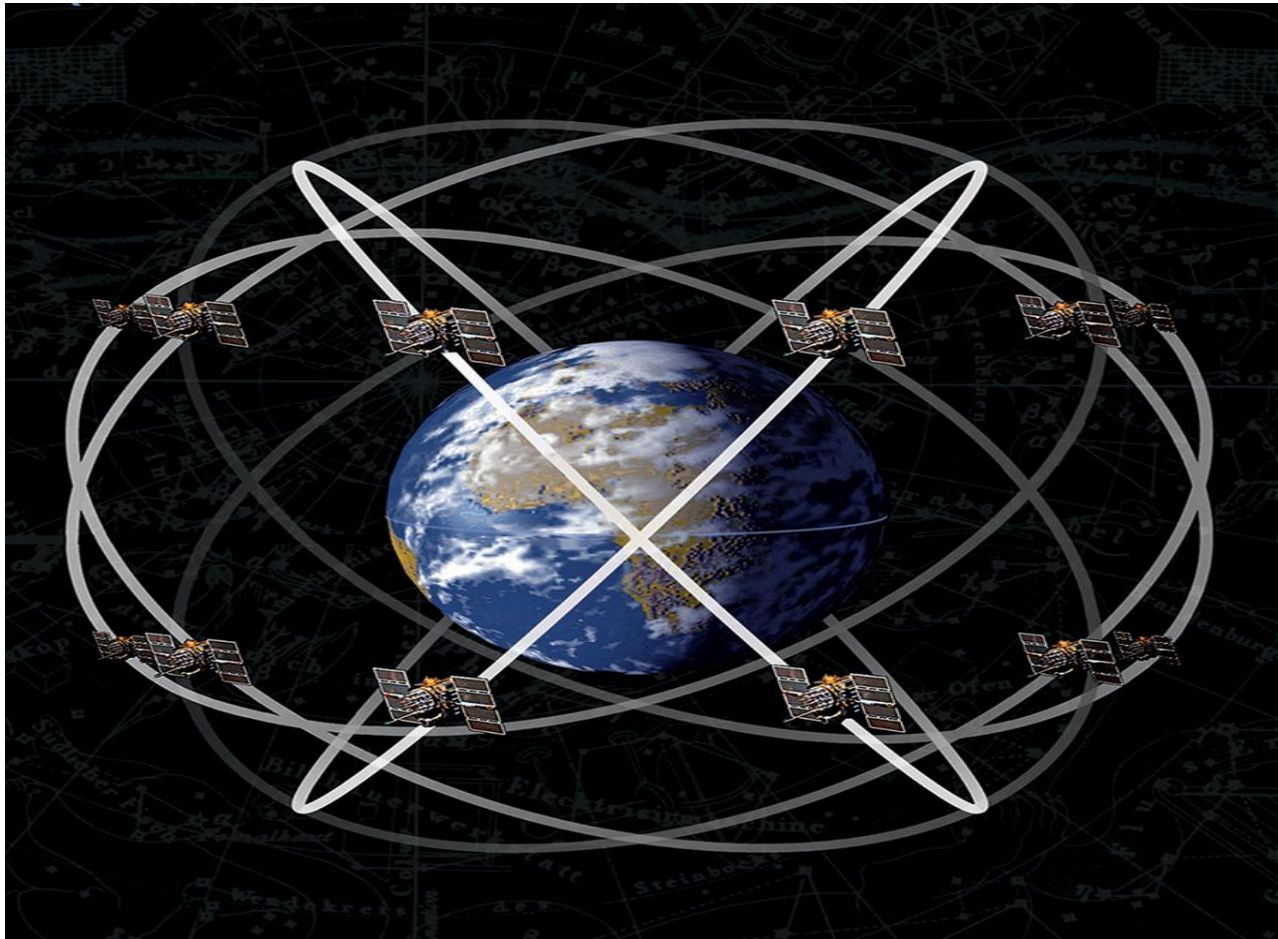
In addition, satellites that orbit closer to the Earth are for spying, and can be used against enemies. The ballistic missile, first developed in the 1930s by Nazi Germany, was the earliest type of space bound rocket, missile or satellite that follows a specific flight path.   In the 1950s, the *Discoverer* was used by the U.S. Air Force in reconnaissance operations. It evolved into the Corona project shortly after a U.S. military U-2 spy plane was shot down over the Soviet Union in 1960.[4]

Most significantly, the ability of "space drones" (aka spy satellites) to orbit the Earth, and transmit a limitless amount of communication in less than a second, is astonishing. According to the Smithsonian's webpage regarding Time and Navigation, and more specifically "GPS Constellation":

- Rockwell International (now a division of Boeing) was contracted to build GPS satellites beginning in 1974. By 1986, 18 had been launched into orbit, making the system usable for many applications. The full suite of 24 satellites needed for global coverage was in orbit by early 1995. Beginning in the 1990s, Lockheed Martin built new generations of GPS satellites. More than 30 GPS satellites were operational after 2010(1).

Ultimately, as David Fadok, John Boyd and John Warden state in their article, *Airpower's Quest for Strategic Paralysis, "*this combination of space-based systems (ISR, navigation, weather) also inspired and, critically, enabled the modern generation of UVs to operate, but first, and especially, UAVs like the Predator(21)." Facilitating modern man's need for intelligence, surveillance, reconnaissance, as well as navigation and weather; space drones opened up a entirely new way to fight wars.

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[4] Baumann, Professor Paul. "Geo/SAT 2 "HISTORY OF REMOTE SENSING, SATELLITE IMAGERY, PART II"." . http://www.oneonta.edu/faculty/baumanpr/geosat2/RS%20History%20II/RS-History-Part-2.html (accessed June 25, 2014).

FIREBEE & FRIENDS

"No nation welcomes other countries' spy drones in its territory, and no one sends back the spying equipment and its information back to the country of origin." - General Hossein Salami (Deputy Commander of Iran's Military)

In 1948, the United States Air Force began the development of a jet-powered aerial target that could fly at subsonic speeds. According to Andrea Parsch's webpage on *The Directory of U.S. Military Rockets and Missiles*:

- The Q-2A *Firebee* was a target drone powered by a Continental J69-T-19 turbojet. The Ryan Aeronautical Company developed the Firebee in 1948.After the prototypes were designed in 1951, they were specifically modified as bombers, that could fly at supersonic speeds. These drones had the capacity to carry out missions that greatly assisted operations during the war. The Firebee could also air-launched, or ground-launched with a rocket-assisted take-off (RATO) booster. This was one of the major successes for the U.S. in their development of air drones, or UAVs(1).

The concept of this particular "jet-powered aerial target with a high subsonic speed, for use in ground-to-air and air-to-gunnery(Parsch,1)", evolved in a variety of ways up until the 1990s. They proved successful in many campaigns throughout the scope of some forty years. During the U.S. military's operation of the *Firebee*, it was modified to fly at supersonic speeds, contain a GPS device, as well as other equipment such as tracking beacons, transponders, chaff/flare dispensers, and radar augmenters, to name a few alterations.[5]

In essence, the development of the *Firebee* was one of the most successful experiments with drones in the U.S. that led to the advances in modern day warfare. Throughout the history of the *Firebee*, it has been given many different names, based on the modifications. It is important to note that as all these devices are evolved, the platforms (i.e. B-52, M-1, KC-135, B2) are not changing, but the internal technology itself. In other words, it is the chips, computers, communications, and the data that is put into the UVs and UAVs that is constantly changing.

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[5] Garamone, Jim. "From U.S. Civil War to Afghanistan: A Short History of UAVs." Defense.gov News Article: From U.S. Civil War to Afghanistan: A Short History of UAVs. http://www.defense.gov/news/newsarticle.aspx?id=44164 (accessed June 25, 2014).

(Teledyne Ryan BQM-34 E/F/T Firebee II Drone (1968): http://www.fantastic-plastic.com/FirebeeII.htm)

The *Firebee II* was first used in 1971, which was distinguished by its supersonic speed,

and slender shape, but in many ways it was very similar to its predecessor. As Parsch's webpage

continues:

- The BQM-34E/F/T *Firebee II* could employ essentially the same payloads as the subsonic BQM-34A/S counterparts. To improve endurance, an external conformal fuel tank could be fitted. This limited the speed to high subsonic, and lead to a performance generally similar to that of the *Firebee I*. When production ended in 1980, almost 300 *Firebee II*s of all versions had been built. In the early 1990s, the usual attrition of target drones had reduced the number of *Firebee II*s to less than 50, and it is apparently no longer used nowadays(1).

Shortly after, the U.S. military began testing drones for reconnaissance missions. As tensions

escalated between the U.S., and most of Europe, the need for surveillance drove states to develop

unmanned reconnaissance aircrafts. The *Lightning Bug*, developed by the Ryan Aeronautical

Company, was used in five flights over Communist China. The use of the *Lightning Bug* assisted in locating specific enemy targets in both southern China and North Vietnam.[6]
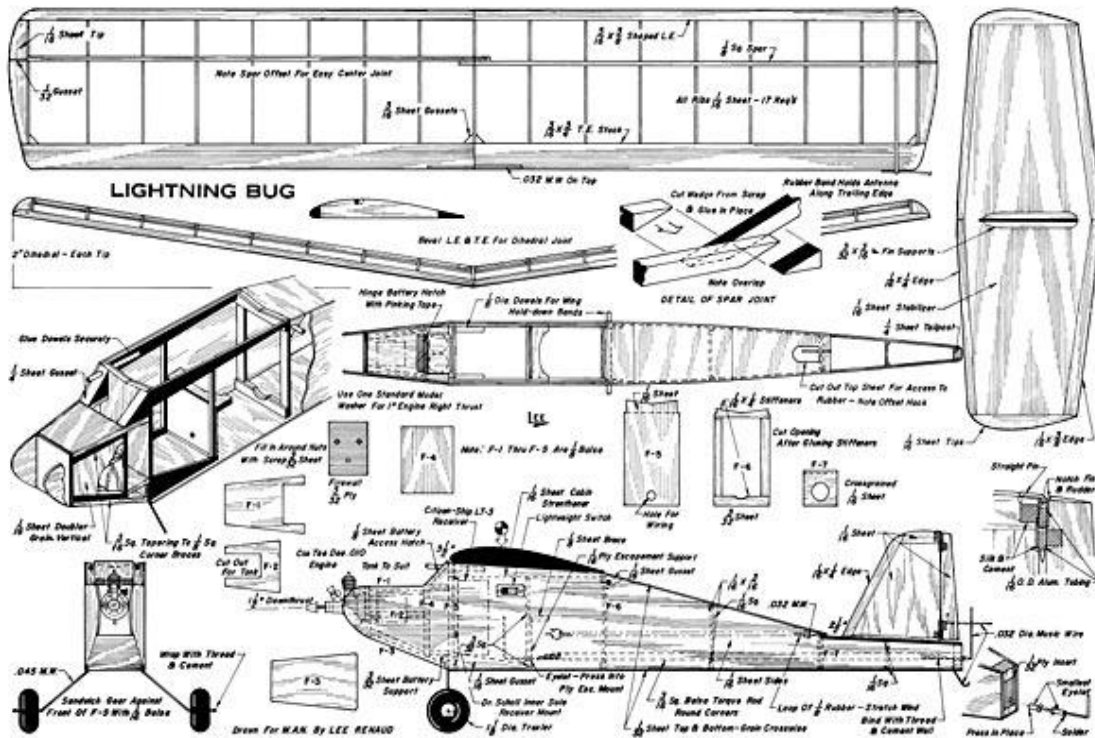
Drones were also used in battle during the Vietnam War. As Lexi Krock notes, "From their early use as target drones and remotely piloted combat vehicles, UAVs took on a new role during the Vietnam War: stealth surveillance(1)." Since the success of the Lightning Bug, the

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[6] Chong, Tony. "The Mysterious Ryan Model 147S-2 ." : The Mysterious Ryan Model 147S-2. http://ghostmodeler.blogspot.com/2013/04/the-mysterious-ryan-model-147s-2.html (accessed June 25, 2014).

usage of drones in combat became attractive. This was especially recognized because of the lack

of human casualties.

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As P.W. Singer explains on his

website, *"Scooby Doo(img.1), one of*

the very first robots "killed in action"

in Iraq, (was) blown up by an

insurgent's roadside bomb. It now

rests in the offices of its manufacturer,

iRobot. One commander put a positive

spin on such losses, "When a robot

dies, you don't have to write a letter to

its mother(1)."

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(img.1, Scooby Doo - P.W. Singer)

UNLEASH THE BEAST

"No bastard ever won a war by dying for his country. He won it by making the other poor dumb bastard

die for his country." ~ George S. Patton

In the 1980's, the United States was stagnant in their research and development of drones

because of the lack of investment, and absence in demand by politicians and military leaders

alike for such technological devices. It was the success of other countries during this time that

pushed the U.S. to further their work with drones. During the first Gulf War, UAVs provided

dramatic success for Israel. Israel's *Pioneer* UAV was used in air strikes against Syria. It was

the creation of the *Pioneer* that took technological warfare to the next level. As Singer

illustrates:

- In 1982, the Israelis carried out strikes on Syrian-occupied areas in the Bekaa Valley that decimated the Syrian air defenses (which were using the latest-model Soviet technology), with no Israeli losses. The secret to their success was a stratagem of first using UAVs to gather the electronic frequencies of the Syrian radars. Then a swarm of UAVs flew over the area, sending out fake signals. The Syrians, thinking it was a real attack, fired off their missiles. While they reloaded. a second wave of Israeli jets flew in and took out the entire defense system, using missiles that homed in on the radars that the drones had unmasked(Wired For War,56).

Such instances as mentioned above influenced the U.S. military to further their development of

drones in the 1980s. One of the first major accomplishments of the U.S.'s usage of UAVs was a

Pioneer bought from the Israeli military. The U.S. flew the *Pioneer* UAV from Navy battleships

that had been used in WWII. The new and improved *Pioneer* was also the first UAV that troops

surrendered to when Iraqis signaled white sheets overhead before being annihilated by the

massive explosion that was about to be unleashed from above.[7]

In addition, the War on Terror following the 9/11 attacks significantly increased the

demand for UAVs and UVs. Established in 1956, Foster-Miller, Inc., one of the leading

manufacturers of U.S. military robotic technology, furthered progress with UV machinery. Their

development of the TALON, a robot designed for anything from reconnaissance to combat

missions, can travel across a variety of terrains and can be operated for up to seven days before

needing to be recharged. The TALON was used, and proved very successful in missions such as

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[7] Singer, P. W.. *Wired for war: the robotics revolution and conflict in the twenty-first century*. New York: Penguin Books, 2010.

in the disaster left in the wake of the 9/11 attacks, to decontaminate the area. The TALON also

has been developed to attack enemies by omitting hazard materials. Foster-Miller also created

the Special Weapons Observation Reconnaissance Detection System, or SWORDS.[8]
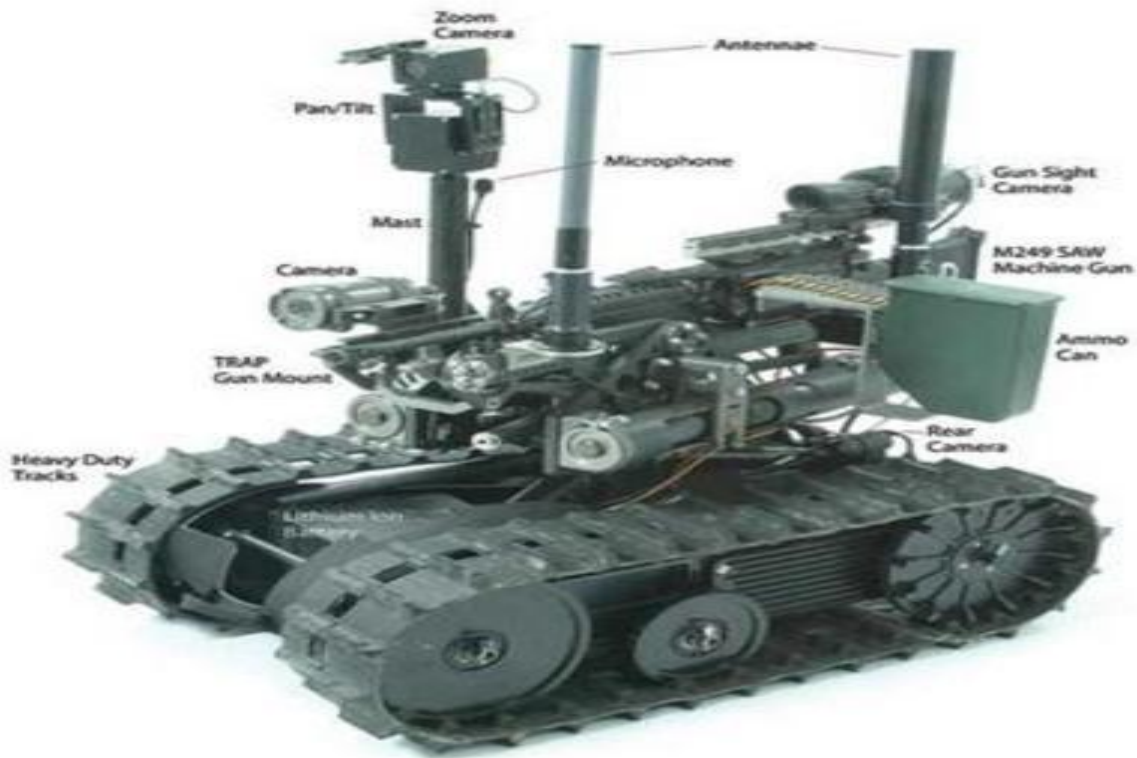
(SWORDS armed robot from Popular Mechanics, 2008)

Accordingly, Singer describes on his website, "SWORDS, made by Foster-Miller, is a

robot armed with the user's choice of weapons, ranging from machine guns to rockets. It gives

new meaning to the term "killer app."(1)" A few of the weapons that can be attached to

SWORDS include grenade launchers, M16 rifles, and quad 66mm M202A1 FLASH (Flame

Assault Shoulder Weapon) incendiary weapons. SWORDS was used in Iraq to protect important

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[8] Popular Mechanics. "The Inside Story of the SWORDS Armed Robot "Pullout" in Iraq: Update." Popular Mechanics. http://www.popularmechanics.com/technology/gadgets/4258963 (accessed June 25, 2014).

sites for the U.S. Army. They were stationed behind sandbags, and assisted in defense against

enemy combatants. SWORDS' successor, the Modular Advanced Armed Robotic System

(MAARS) is the most recent of this specific technology. The development was undertaken by

Qinetiq, located in the United Kingdom. Similar to SWORDS upgrade from the original

TALON model, MAARS is a "bigger and badder" version of SWORDS.[9]

Lastly, there have also been many recent efforts in international peacekeeping.

According to the American Society of International Law's website, a recent article entitled, "The

Use of Unmanned Aerial Vehicles (Drones) in United Nations Peacekeeping: The Case of the

Democratic Republic of Congo (DRC)":

- Inspired by the successes of unmanned drone (unmanned aerial vehicles or UAVs)
  surveillance of western countries, the United Nations Department of Peacekeeping
  Operations towards the end of 2012 announced that it intended to actually begin using
  such technology in peacekeeping operations. Subsequently, in January 2013, the UN
  announced that it would deploy UAVs for surveillance in the Kivu provinces (North and
  South) of eastern Democratic Republic of Congo (DRC) "to improve awareness and
  promote deterrence to those who move around with bad intentions in that area." The UN
  did not reveal the actual deployment date of the UAVs. Because of the sensitivities
  generated by the continued use of armed UAVs in Afghanistan, Pakistan and Somalia,
  the UN observed that drones used by UN peacekeepers would essentially be "flying
  cameras to improve situational awareness." The UN's announcement came at the heels of
  continued instability in the Great Lakes Region, especially in eastern DRC. When the
  deployment was first announced, some countries in the region, such as Rwanda, opposed
  it, arguing that, "Africa should not become a laboratory for intelligence devices from
  overseas." China, Guatemala, Pakistan and Russia also raised concerns regarding the
  deployment of UAVs. Later, however, President Paul Kagame indicated that "if the UN
  thinks the drones will help achieve peace, then let them [deploy them](1)."

As illustrated, drones have played an extremely vital role in the 20th & 21st centuries.

Mankind's use of these types of machinery, and the evolution of technology itself, has

astonishingly increased throughout a short time in history. Aside from stating that the drone has

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[9] "QinetiQ North America." QinetiQ North America. https://www.qinetiq-na.com/ (accessed June 25, 2014).

taken on a life itself, humanity's desire for drones, in and out of combat, is overwhelmingly clear. One question remains: without the sense of empathy (due to the distance between man and machine), and possible abatement of casualties .. will the use of drones in future wars decrease, or increase havoc?

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