The Global Positioning System Essay, Research Paper

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Introduction

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The Global Positioning System With the proliferation of satellite-based defense systems and their continuing presence in the media it makes us more aware of our national defense. The United States is large, economically strong and a sometimes tumultuous presence in the global community. Although we may feel secure because of our superior technology and defense capabilities, our size and position in world affairs can make us a target for some countries. We can no longer be concerned with just our borders and now what comes from the skies and the sea is more of a threat than ever before. The United States government had to develop a way to counter these possible attacks and the Global Positioning System (GPS) was conceived. The Global Positioning System was initiated in 1973 by the Department of Defense (DOD). It was developed by the the DOD because at a cost of over twelve billion dollars the government had the monetary resources to achieve these idealistic goals. Since that time it has grown from one satellite used strictly by the military to twenty-six satellites that can be used by civilians also. This satellite system is used to determine the speed and position of an object anywhere in the world within one hundred meters to mere millimeters depending on the size and quality of user equipment.(GPS JOINT PROGRAM OFFICE. ICD-GPS-200:GPS INTERFACE CONTROL DOCUMENT.) The original purpose of GPS was to maintain a strategic military advantage over our enemies. Toward the end of the arms race the targeting of ballistic missiles became so exact they could land directly on an enemy missile silo and destroy any missiles inside of it. The ability to take out your enemies missiles from great distances had a major effect on the balance of power. To maintain the balance of power the United States government had to develop a way to locate surfacing submarines in a matter of minutes anywhere in the world. With the use of satellites in orbit the Global Positioning System was created. GPS uses twenty-six satellites and ground tracking stations around the world to compute distances using time. This is done by finding the difference between the time a signal is sent and the time it is received. The satellites have atomic clocks so the time is extremely accurate. The receivers position is determined by using three satellites, this is called triangulation.(kAPLAN,eLLIOTT. UNDERSTANDING GPS:PRINCPLES AND APPLICATIONS) GPS is made up of three segments: space, control and user. The space segment includes the satellites and the rockets that launch them from Cape Canaveral. The satellites are powered by solar cells and continuously point their solar panels toward the sun and their antennae toward earth. The control segment includes the master control station in Colorado and monitor stations around the world. This segment makes sure orbits and clocks operate within acceptable limits. The user segment includes the equipment used by the military and civilians who receive GPS signals. ( Kaplan, Elliott. UNDERSTANDING GPS:PRINCIPLES AND APPLICATIONS) The military applications of GPS are used in fighters, bombers, helicopters, submarines and soldier s gear. Wartime defense is now more accurate and dependable than ever. While still the most important aspect of this technology, GPS is not used strictly for navigation anymore. Other uses include but are not limited to: target designation, air support, soldier rendezvous and smart weapons. Smart bombs use GPS to receive location information so they can guide themselves to a preset target. This technology is a great asset in battle as it basically casts a net over a battlefield and can locate tanks, vehicles or even soldiers who may be in immediate danger. In the everyday world, GPS has also made life easier and safer. Hikers and hunters can carry hand held receivers in case they should get lost in the wilderness. On-board navigation systems in automobiles let drivers avoid congested freeways and find better routes to destinations through voice-activated user equipment. Drivers can also make cellular calls using these GPS computers should something happen to them in transit. Other aspects of this technology are used in farming. Maps can be created of the fields during harvest and used the next season to plant and fertilize areas that need more attention. This increases crop production while reducing the use and expense of fertilizers, pesticides and fuel which also helps our environment. This process is called Precision Farming . Another very important use of GPS is the avoidance of in-flight collisions. Airlines are in the process of equipping their airplanes with GPS receivers. This will enable each aircraft to detect other planes in the vicinity and make sure they don t cross paths in the air. This is much more accurate and reliable system than is currently available and is sure to make the people flying in these planes more comfortable and secure. The Global Positioning System has grown into a resource that goes far beyond the initial design goals. These days scientists, farmers, soldiers, pilots and delivery drivers are using GPS in ways that make their jobs safer and more productive. The benefits of GPS are not limited to job related aspects alone. The future of this technology is limitless and will change and develop rapidly as new and varied applications are introduced. Bibliography 1) Kaplan, Elliott. Understanding GPS: Principles and Applications. Boston: Artech house Publishers, 1996 2) Thompson, Steven D. An Introduction to GPS, (Everyman s Guide To Satellite Navigation. ARINC Research Corporation, 1994 3) The Untold Story of CALCM: The Secret Weapon Used in the Gulf War . 4) GPS World January 1995 page 16 GPS Joint Program Office. 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