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| **Essay 2 – Emerging Technology Article**  Name: Jessica Hoffman  Course: CIS150-77  Date: 2/14/2016 |

Throughout history, humans have developed new technologies at an exponential rate. The purposes of inventing new technology include lowering costs and risks, increasing benefits and revenue, and achieving a competitive advantage over rival companies vying to be the best in their field. One example of a technology that has had a major impact on the way our society functions is Global Positioning System (GPS) devices. Surprisingly, GPS technology used by common consumers has an error margin of ten meters; even the lesser-used DGPS (Differential Global Positioning System) is only accurate up to one meter. Recently, I learned about a technology that was developed by researchers at the University of California, Riverside in the past few months that enhances GPS location accuracy and reduces the margin of error to a couple centimeters. Common GPS accuracies are useful enough for everyday people driving to work or finding a restaurant, but such technology is too risky to be used for emerging technologies such as self-driving cars. Imagine a self-driving car using a GPS that has an error margin of ten meters! The UC Riverside researchers have bridged this gap with their new optimized GPS, bringing society even closer to making man-powered machinery a way of the past.

To younger generations, GPS may seem ordinary and commonplace – many of us take it for granted. The basics of GPS technology is easy enough to understand; it uses 3+ satellites to obtain a 2-D or 3-D position of the user relative to their surroundings. Latitude, longitude, and altitude are calculated using simple physics concepts such as displacement, velocity, and acceleration. UC Riverside has refined their GPS techniques not only to provide these results, but achieve them using the most efficient technique known to man. UC Riverside researchers developed a method that “combines GPS measurements with data from an inertial measurement unit (IMU) through an internal navigation system (INS).” As a result, the GPS provides data accurate to a couple centimeters, and the IMU optimizes the system to achieve continuously high bandwidth without demanding more processing power. Engineers have tried combining the GPS and IMU capabilities in the past, but none until UC Riverside have found a cost-effective way that requires “several orders of magnitude fewer computations.”

Although the researchers at UC Riverside have developed this technology, Google has been quick to show interest in their project and has recently hired one of the researchers. Google is on the verge of producing self-driving package delivery trucks that will rival Amazon’s air drones; they have patented their plans and only need to perfect the vehicles before their dreams become a reality. In addition to autonomous cars, this new GPS will boost the production of many other technologies such as precision farming and aviation. I chose to study this technology because I have become interested in technology that replaces the need for humans. Autonomous machines don’t need to be perfect - they only need to be better than the humans who previously performed the task. Self-driving cars, if improved, would eliminate the risk of sleepy or distracted drivers, DUIs, texting while driving, etc. This new GPS technology would contribute to the utilization and perfection of autonomous vehicles.

In reality, UC Riverside has yet to face the inevitable legal issues that will arise as they lead society into the next innovative era. These concerns include the testing phase before the bugs are worked out; autonomous cars may at first crash frequently until they are perfected which will cause lawsuits. Currently, no laws prohibiting autonomous vehicles exist, but if they prove to be dangerous, the government may regulate the production and usage of self-driving vehicles. This would inhibit experiments and testing done to improve the technology. Issues regarding patents and copyrights will occur as they do when multiple companies are competing to perfect a leading technology first. Google appears to be trying to side-step this issue by grasping the new GPS right from the source before another company claims rights on a similar method. Since autonomous machines using this advanced GPS would eliminate an alarming number of human jobs (truck drivers, taxis, public transportation, delivery, and piloting), and workers involved in unions for these occupations may approach the government and demand compensation. Opponents of the technology would protest that some legal action needs to be taken because they view the situation as unethical.

In the same way the GPS will cause legal issues, it will also cause ethical dilemmas. Is it unethical to devalue millions of jobs with this new, easy-to-use GPS? Once this technology hits the market and is incorporated into Google’s machinery, a multitude of other companies will follow suit. The consequence will be a better standard of living due to the increase in production and technology using more efficient methods at the cost of a high unemployment rate. From a deontological perspective, the right thing to do would be avoiding this technology until we could ensure the financial stability of the economy. Teleologically, the “end justifies the means” and the mass loss of jobs will be justified by the endless improvements to the transportation sector of the country. Autonomous vehicles may even save lives with their precision. This ethical dilemma has not yet been addressed by the researchers of this emerging GPS technology.

Looking to the future, this efficient and accurate GPS will allow for limitless improvements to machines and robots of any kind. If improved, this technology may even be applied to the medical field to develop autonomous robots that perform surgery on patients quickly and precisely using information about the patient’s dimensions, location of concern, and speed of the instruments. It is appearing more and more likely that autonomous machines will replace human beings in many professions in the future, and technology like the GPS developed by UC Riverside is a major step in that direction.

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