Cristobal Guerrero

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Simple errors are overlooked all the time though the simplest error can produce an error on a greater system. Such systems include the Pentium microprocessor that had a floating point error and the Therac-25 x-ray system. These products caused serious harm and injury to companies and people on a great scale. In this paper I will compare the ethical systems and ACM imperatives that these two systems violated. I will also discuss what artificial intelligence is and how it is both flawed and beneficial to the world.

The computing world consist of three aspects of a finite machine which are hardware, software and firmware. Hardware is the physical aspect of a finite machine such as a keyboard, wiring on a motherboard, hard drive, etc. Software is different from hardware because software cannot be physically touched. Software is an accumulation of computer programs that are related by the type of data it consist of which provides instructions for the computer. Firmware is a mixture of both hardware and software in with the aspect that the programs are built into the physical hardware with a strict instruction set. Such systems are remote controls, calculators and central processing units that have AES(Advanced encryption standard) that is built into the device. When communicating between these forms there can be errors if the form of the data is not in the correct scope. Therefore if the data cannot communicate due to being in the incorrect scope and will cause errors and depending on what the machine is being used for it can cause injuries and significant damage to what the machine is working on.

There are many different classical errors with computing which are arithmetic rounding, race conditions and memory leaks. There are many more types of errors though I shall focus on these three specific ones. Arithmetic rounding is when a number is rounded to make it easier to write. Take the example of the number 15.4768, if rounded it could be written as 15.58. Having this type of rounding makes it easier to write and to simplify in later calculations. Though, rounding makes it easier to write and understand numbers depending on the situation it can cause many flaws. Such errors are in computing and can accumulate, which then the number becomes meaningless due to being a non-promising value. The secondary error race condition is when "a flaw in an electronic system or process whereby the output or result of the process is unexpectedly and critically dependent on the sequence or timing of other events. The term originates with the idea of two signals racing each other to influence the output first".[1] Having a race condition could result in giving inaccurate results. This is error can be reflected in file systems, networking, and overall computer security.

Memory leaks are slightly different than the other two mentioned errors where rounding and race conditions cause incorrect values to be stored or shown, memory leaks cause memory to be taken up and cannot be freed for later use. Such an example is in object oriented programing and using dynamic or finite structures. Though very insignificant depending on the size of the program it may not cause a great effect to show on the overall system. An example of an implementation is when memory is allocated for an array or a type of structure. During the programs end phase when the destructor method is invoked it does not delete the structure and therefore remains in memory taking up space. If there are larger programs that do this persistently then the ram on the finite machine would be filled and therefore the only way to free up the space would be if the machine would be restarted.

Such an event where a device that had a flaw was the Intel microprocessor floating point that was called the Pentium FDIV bug. This bug caused the division operator using a floating point, a decimal in laymen terms, to produce an incorrect result. Incorrect rounding of decimal spaces can cause harmful things to happen such as creating a building. A miss calculation in the mathematics of how much pressure it can take or how much stability it can have in an earthquake would more than likely cause the building to collapse. This flaw in the Intel microprocessor was pointed out by Thomas R. Nicely that stated, “for users in mathematics, science, and engineering, we must each be our own judge as to the danger posed by the bug”. These types of calculations would not pertain to an end user who has no need to calculate figures beyond a four decimal places. Hence it was why Intel was so abrasive to replace the flawed microprocessors which they explicitly showed ethical egoism because they did not want to spend the time or the money due to being concerned for themselves.

If a building were to be built with the floating point calculations with the Pentium microprocessor that had the error it would violate the ACM code of ethics. It would violate imperative 1.2 which is “avoid harm to others”. This imperative states that one must avoid ““Harm" mean[ing] injury or negative consequences, such as undesirable loss of information, loss of property, property damage, or unwanted environmental impacts”. If the building were to collapse due to this miscalculation it would be the responsibility of Pentium as well as the engineer who constructed the building due to not reviewing their calculations. Though when legal issues come into hand the engineer and the for-profit corporation Intel would not be treated equally. This is due to both the corporation and the engineer considered as a person though a inanimate for-profit corporation cannot be prosecuted as a normal person would be. Another aspect that would be sought out would be the cost for financial loss

by all the companies that were using the machines that had the microprocessor. Depending on how long it would take to get the part replaced could cause the company using them to intentionally have a financial loss. This is due to having to wait for the parts to be replaced.

In the case where there was another malfunction due to not having a correct review was that of the Therac-25 system for x-ray machines. The system had an issue with the software where it would go above the bounds of a safety regulated amount of radiation. There were multiple incidents where "patients were given massive overdoses of radiation, approximately 100 times the intended dose". There was speculation that it was the fault of the technicians because they were in control of the overall system. Though after testing it was not the fault of the technicians but that of the software which bypassed what the technicians had been inputting for machine to run.

Having created a system out of laziness and not testing it fully was the pure result of the engineer who programmed the Therac-25 system. By taking the old system and rewriting a few components the engineer assumed that it would fully work which came up with faults. By not testing the new system fully if there was errors or not defies the imperative 1.2 of the ACM code of ethics and conduct. Having a lack of a professional review for the system defies imperative 2.5 of the ACM code as well. Due to the events of overexposure of radiation caused serious injury and death to the people who used the x-ray machine. This would cause a great financial loss to the hospital as well as the company that created the system.

There are three things that are questioned with artificial intelligence, that is what is considered artificial intelligence, how it is involved in robotics and individuals who partake in cybernetic augmentation. Artificial intelligence is very ambiguous because the definition varies from individual to

individual. According to Merriam-Webster artificial intelligence is defined as, “the capability of a machine to imitate intelligent human behavior”. The definition remains ambiguous because intelligence can be interpreted in different ways and hence it is dependent on the person. In the context of robotics artificial intelligence can be interpreted as being able to make a decision based upon certain situations. Take the example of a employee of a factory passing a line that they are not supposed to cross where the robot is assembling a product and it causes the robot to halt its operation. The decisions of a given artificial intelligence that is embedded within a robot must be predetermined. Having these predetermined decisions though cannot always account for odd situations. Take for instance the example of crossing the line, lets say the person jumped over the line and passed the line without triggering the sensor; there would be nothing to halt the machine after that.

There have been many test for and artificial being to pass off as a human being though, there have only been a few cases there they actually pass. Such a test is the Turing test. The Turing test is when a person is in a separate room than the machine or person it is communicating with. The person who is communicating with the questionable being then must interpret if he or she is communicating with a machine or a person. The first time this passed was with the artificial being ELIZA. Though ELIZA passed it was flawed because it only spoke through text as opposed to speech. This is a flaw because speech depending on the formality can differ from person to person making it difficult to determine whether or not it is a human or not.

Another ethical issue is cybernetic augmentation, is it right or not to exploit the people who partake in it. Cybernetic augmentation is where biological parts of the body are replaced with

prosthetic or even to the point where the original brain is transferred into a cybernetic body. I believe it is correct to have cybernetic augmentation when the person in question needs it for medical reasons though to exploit such things to make a "super soldier" is incorrect. Instead of creating a super soldier why not just create a robot that would do the biding of a normal soldier. Though if it comes down to creating a robot that has great enough artificial intelligence such as Mr. Data it may in fact petition to have its own rights that would reflect basic human rights. So, consequentially many issues would arise to the point of what would the new system in question want to have similar rights to a human.

People and for-profit corporations defined as people are not treated fairly in the legal system. For-profit corporations constantly exploit this by just paying fines to sway their responsibility away. Though a malfunction may be do with the software or hardware they produce they avoid responsibility as a normal person would by paying a simple fine. On a conclusive note for-profit corporations take advantage of how they are judged by as being a person.

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