SSY 190
Embedded systems
Possibilities and threats with intelligent machines

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Abstract

Technology is one of the entities which truly makes us human. Technology is a result of human struggle to overcome needs, challenges and obstacles in life. So, one can simply state that the goal of technological advancement is to make human life simpler, better and more secure. It can also be said that technological advancements provide us with tools leading to a better understanding of the world around us which fulfills our unending thirst for knowledge. Hence, combining these two, we can state that the main purpose of technology is to provide a comfortable, healthy and safe life as well as deeper knowledge. This literature tries to address where current technological advancement stands in fulfilling the above objectives. We also try to explain how today's technological growth is actually leading humanity into serious problems like excessive capitalization, unemployment and singularity. By keeping these objectives of technology, we will try to find solutions and approaches to avoid these future problems.

One Man's Death is Another Man's Bread

For something to have possibilities and threats it needs to have a goal or something to strive for which the threats and possibilities impact on. A possibility for one person can be a threat for another one or even another species. Which takes us to the next issue, we can have goals on different levels.

Persons, groups, species and even evolution can have goals which collide with each other. For example: evolution can have the goal to spread life and create more intelligent beings but the human race can see that as a threat if a stronger being would evolve. Or even simpler: automating a task that was previously operated by labour can be a significant possibility for mankind but a threat for a specific person who may lose his or her job.

Today the human race is the biggest threat for evolution on Earth. Not that we slaughter other beings, that's part of the evolution, but that we have stopped evolving ourselves [1] (since most of us survive and propagate) and are afraid of creating a better human.[2]

Threats To the Environment

While improving our life standards, technology has also caused an enormous damage to nature. We must realise that we are the only intelligent species in our visible universe as far as we know. Hence, it is needless to say that we must preserve ourselves along with the nature we live in. Global warming and resulting climate change is a result of the continuous pollution and our profit oriented policies. Furthermore, we are still contributing enormously to pollution.[3]

This kind of attitude has led us towards the edge and now is the time when we really need to make serious efforts in order to gain control over the situation.

Forests, sea, ice, shallows and deserts have their own importance in keeping the balance of life on this planet. Our life is also dependent on these landscapes in some way. Continuously melting polar ice due to global warming is one of such situations where we are causing threat to ourselves along with e.g. the polar bear.

The coral reefs is another example of ecosystems which have been severely damaged as a result of industry, causing a serious threat to sea life. The Coral reefs are some of the most diverse ecosystems which are the homes of about 25 percent of marine life. As engineers, we must understand that all kinds of systems that are involved directly or indirectly in the destruction of nature are built and implemented by engineers. For a long time, these systems were designed and implemented aiming at best performance in terms of human comfort, productivity, profit and cost.

Now, we need to rethink the design specifications and should prioritise environmental health while designing any system. This comes under the higher level approach where the policy makers have to create stricter norms while putting the environment at equal priority with the profit.

The Singularity

Technological singularity is the moment in the technological journey where machines will become intelligent enough to improve themselves and decide their own goals based on some arbitrary cause. This will probably happen when computers will become more powerful, efficient and artificial intelligence will reach its zenith. AI will be able to create and invent stuff that we as humans do not understand.[4]

One criteria for the possibility of singularity is that we actually can create an intelligence which can evolve itself to be even better. In some way this has already happened via evolution but can we speed up the process? At the current state of knowledge we are a lot closer to creating a super human than we are to create a super AI machine. It is easy to imagine singularity as an explosion in intelligence, like the resource of information has done in the last 50 years [5], but singularity might not happen this way. If we take the transgenic way, that is if we create a more intelligent humanity which can in there turn create a smarter one, this will be a much slower process and it might be so that we must take this way to overcome the singularity threshold if we as normal humans are unable to create this super AI machine.

Consciousness

Is a super AI machine so bad anyway? If machines take over the world, have we extinguished all life? This is a really tricky question. Mostly because we do not have a definition of life nor do we have any scientific method to measure consciousness. Is it part of the body, monism, or is it beyond matter, dualism?[6][7] We still do not know how consciousness is being created or if it even exist - is it just an illusion?[8][9] More and more points to the latter, at least when it comes to free will. The French mathematician Laplace made an interesting point called Laplace's demon. In short: If an intelligence of unlimited power could observe the complete universe, all states of every particle, it could calculate what will happen next. Therefore it can also predict the future.[10] This concept states that it even can predict your future, your choices, how can you then have a free will? It's all chemicals and electricity. So the question is, are we actually so different to an AI machine?

Automatisation

We are trying hard to make cost and time optimal systems. However, there are some serious implications of these *honest efforts* that most of us are not even aware of. As we introduce better and more advanced systems, it not only outperforms the older system in terms of productivity, efficiency and safety but also in terms of number of human supervisors working on that system. Structure and look of modern jobs is also changing as time goes ahead. Since the technology is cheaper and better, the company wouldn't mind implementing it when it requires fewer jobs and thus less salary paid. Now, this is continuously

happening and people with all the required skills have fewer job opportunities than previously [11]. This means some sort of compensation is required so that the economy and society in general can keep on going. This compensation can be political, as in alterations to the tax system which take some of this new profit companies gain via automation to be able to create new job opportunities instead. Even if people losing jobs due to automation is bad it does not mean that the technological advancements are bad. Instead, the workers are free to do something else. One step in this direction which has already been taken in many countries is the funding of innovation, start-ups etc. This type of funding creates new job opportunities and pays off by a large margin on average via taxes, even if not all these companies succeed.

Poverty and social gap

Poverty and social gap are one of the biggest challenges that we are currently facing and as a matter of fact, these issues don't seem to be decreasing as a result of crony capitalism. The current system is failing to provide enough access of resources and opportunities to poorer sections of society. For an engineer as an individual, it is hard to influence these issues and hence we will address it at a high level approach. The benefits of a secure life, health, employment and education should be accessible to everyone which can only be provided by policy makers like governments and intergovernmental organizations. There are multiple levels where such social gaps exist. For example, the largest challenge to overcome for small innovative companies is that many times they lack the required resources or funding to carry on with their ideas. As a result, these companies are then taken over by giant companies in early starting stages. These kinds of scenarios also add to social gap in the society of companies where big ones get bigger and weak one gets weaker. To avoid such situations, small start ups, co-operative businesses and entrepreneurs should be encouraged and supported. Also, increased taxes for higher end businesses will be helpful for decreasing the social gap. Collaboration should also be encouraged as it gives a chance to everybody to contribute and gain at the same time. Instead of focusing solely on luxury oriented gadgets and appliances, the engineering community can work more toward systems and applications which are useful and affordable to the common man including the poorer section of the society. These small efforts can also contribute to a great extent in uplifting the backward section of society.

What we can do

In today's technology world, the seemingly unending and infinite human journey and its future depend pretty much on the approach we engineers pursue today. As technology has become more handy over the period, we have got more and more free time and today we are at a stage where we get to think rather than doing physical work. *Engineers are the people that make things work* was the vague definition of engineers for a long time. Now we should say *Engineers are*

the people that make things work and can distinguish between things that lead to a brighter future and things that do not.

A number of current and future issues that we have discussed have to be addressed at two levels. First at a higher level where the policy makers from government and companies have to make serious efforts in order to ensure that problems like the social gap, global warming and unemployment do not further increase. Concepts like singularity should be understood by the technical community and especially by the policy makers sitting in government and companies. This will reflect in their decisions and policies which directly will decide the direction of our growth.

Education is the medium where the new generation can be made aware of current issues, future challenges and importance of sustainable growth. Having discussions, debates and lectures for engineering students on such critical issues. These kinds of higher level efforts have greater impact in less time and these are the efforts which actually bring the big changes in system and society.

A second kind of approach is on an individual level, where each one of us should take a moral responsibility and make honest efforts in order to tackle these problems. We should keep ourselves and people around us aware of such issues. As the world is changing at a higher rate than ever, it is very important for us to make wise decisions at every step as far as the issues discussed above are concerned. This leads to the fact that we need to be aware of the current state of the world and be updated with its changing trends. This level of approach is important for long term changes in the attitude of society. If we want to make a society which considers the environmental health as a top priority then we will be relieved at least with the climate issues. Something that a higher level approach can not do is a change in attitude of an individual. Individual efforts from our side are small but they help towards building a more mature and responsible society.

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